

NOTICE OF PUBLIC REVIEW AND NOTICE OF INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION

The California Department of Fish and Wildlife (CDFW) proposes to adopt a Mitigated Negative Declaration (MND) pursuant to the California Environmental Quality Act (CEQA) of 1970 (Section 15000 et. seq., Title 14, California Code of Regulations) for the Ostwald Waterline Replacement Project. San Jose Water Company (SJWC) is proposing to replace the existing 30-inch diameter pipeline that extends within Los Gatos Creek from the Ostwald Dam intake facility to an existing pipeline connection located 1,575 feet downstream. The project would disturb the bed and bank of Los Gatos Creek, requiring a Lake or Streambed Alteration Agreement (LSAA) under Section 1602 of the Fish and Game Code. CDFW's issuance of an LSAA requires compliance with CEQA. Because SJWC is a private water company that cannot serve as Lead Agency, CDFW has assumed Lead Agency status for the project under CEQA.

The 45-day period for public review and comment on the proposed MND begins March 9, 2018. All comments must be submitted by April 23, 2018. Written comments should be addressed to Brenda Blinn, California Department of Fish and Wildlife, Bay Delta Region, 7329 Silverado Trail, Napa, CA 94558 or emailed to: brenda.blinn@wildlife.ca.gov.

A copy of the Initial Study and proposed MND and supporting documents can be reviewed at the following locations:

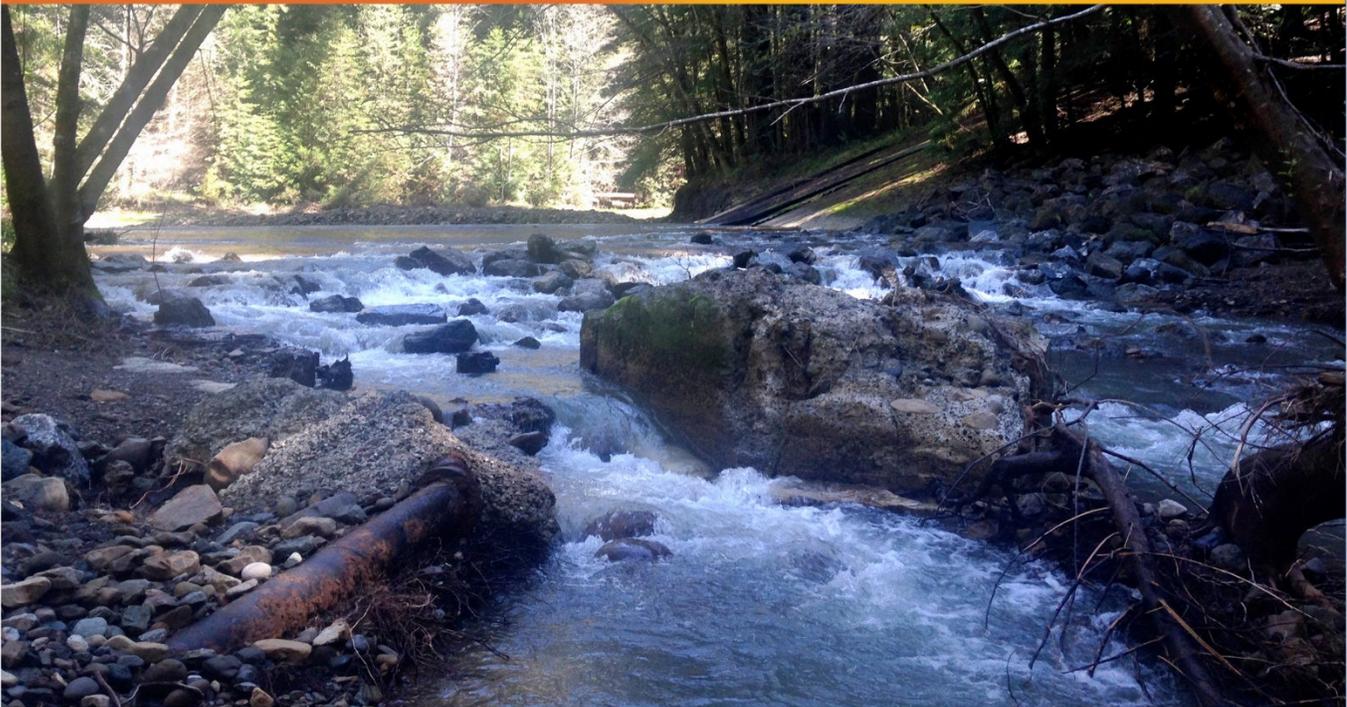
CDFW Bay Delta Region Office
7329 Silverado Trail
Napa, CA 94558

SJWC's Office
1265 South Bascom Avenue
San Jose, CA 95128
Website: <https://sjwc.co/ostwald-mnd>.

For further information please contact Brenda Blinn, Senior Environmental Scientist (Supervisory), at (707) 944-5541 or brenda.blinn@wildlife.ca.gov.

Initial Study/Proposed Mitigated Negative Declaration

Ostwald Waterline Replacement Project



March 2018



PROPOSED MITIGATED NEGATIVE DECLARATION

Project: Ostwald Waterline Replacement Project

Lead Agency: California Department of Fish and Wildlife

PROJECT DESCRIPTION

San Jose Water Company (SJWC) is proposing to replace the existing 30-inch diameter pipeline that extends within Los Gatos Creek from the Ostwald Dam intake facility to an existing pipeline connection located 1,575 feet downstream. The project would disturb the bed and bank of Los Gatos Creek, requiring a Lake or Streambed Alteration Agreement (LSAA) under Section 1602 of the Fish and Game Code. CDFW's issuance of a LSAA requires compliance with CEQA. Because SJWC is a private water company that cannot serve as Lead Agency, CDFW has assumed Lead Agency status for the project under CEQA.

FINDINGS

An Initial Study has been prepared to assess the project's potential effects on the environment and the significance of those effects. Based on the Initial Study, it has been determined that the project would not have any significant effects on the environment once mitigation measures are implemented. As a result, a Mitigated Negative Declaration (MND) is being considered for adoption by CDFW for the proposed project. This conclusion is supported by the following findings:

1. The project would have no impact related to agriculture and forest resources, land use and planning, mineral resources, population and housing, recreation, and tribal cultural resources.
2. The project would have a less-than-significant impact on aesthetics, air quality, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, noise, public services, transportation and traffic, and utilities and service systems.
3. Mitigation measures incorporated into the project will clearly reduce potentially significant impacts to less-than-significant levels related to biological resources and cultural resources.

Following are the mitigation measures that have been committed to and shall be implemented by SJWC to avoid or minimize environmental impacts. Implementation of these mitigation measures will reduce the potentially significant environmental impacts of the project to a less-than-significant level. Implementation of these mitigation measures shall be subject to monitoring in accordance with a Mitigation Monitoring and Reporting Program adopted along with this Proposed MND. The MMRP is an Attachment to the Initial Study.

Biological Resources

Mitigation Measure 3.4-1a

To avoid or reduce impacts to special-status plants, SJWC shall retain a qualified botanist to conduct protocol special-status plant surveys for potentially occurring species during the appropriate survey periods (January – March for western leatherwood, April – June for marsh microseris, and April – May for Santa Cruz microseris), based on the blooming or identification period, preceding the start of construction. All plant species encountered in the project area shall be identified to the taxonomic level necessary to determine species status. The surveys shall be conducted no later than the

blooming period immediately preceding project-related vegetation removal or ground disturbing activities, including grubbing or clearing. If no special-status plant species are found, then a mitigation and monitoring plan and compensation for the loss of special-status plant species are not required.

If special-status plant species are identified within the area of potential impact, they shall be avoided and protected during construction activities to the fullest extent possible. If avoidance is not feasible, SJWC shall prepare a mitigation and monitoring plan to protect special-status plant populations or compensate for the loss of special-status plant species found during preconstruction surveys. SJWC shall consult with CDFW on development of appropriate mitigation measures for impacts to any special-status plant populations and shall submit the mitigation and monitoring plan to CDFW for review and approval. Mitigation measures may include preserving and enhancing existing on-site populations, restoration and replanting on-site populations following project completion, creation of off-site populations on project mitigation sites through seed collection or transplantation, and/or preserving occupied habitat off-site in sufficient quantities to offset loss of occupied habitat or individuals. All measures approved by CDFW in the mitigation and monitoring plan shall be implemented by SJWC, and CDFW may, at its discretion, require additional measures to protect special-status plants.

If transplantation, including replanting affected populations following project completion, is part of the mitigation plan, the plan shall include a description and map of mitigation sites, details on the methods to be used, including collection, storage, propagation, receptor site preparation, installation, long-term protection and management, monitoring and reporting requirements, remedial action responsibilities should the initial effort fail to meet long-term monitoring requirements, and sources of funding to purchase, manage, and preserve the sites. The following performance standards shall be applied:

- ▲ The extent of occupied area and the flower density in compensatory reestablished populations shall be equal to or greater than the affected occupied habitat and shall be self-producing.
- ▲ Reestablished populations shall be considered self-producing when:
 - plants re-establish annually for a minimum of 5 years with no human intervention, such as supplemental seeding; and
 - re-established habitats contain an occupied area and flower density comparable to existing occupied habitat areas in similar habitat types.

Mitigation Measure 3.4-1b

Prior to construction activities, a qualified biologist shall conduct a Workers Environmental Awareness Program (WEAP) training for the construction crew. The biologist shall meet with the construction crew at the project area at the onset of construction to educate the construction crew on the following: 1) a review of the project boundaries; 2) all special-status species that may be present, their habitat, and identification; 3) the specific mitigation measures that will be incorporated into the construction effort, 4) the general provisions and protections afforded by USFWS and CDFW; and 5); and the proper procedures if a special-status species is encountered within the project area. An instructional pamphlet shall be included with the WEAP and additional copies shall be left for construction personnel that join the project construction effort after the WEAP has been conducted. At the completion of the WEAP, the qualified biologist shall identify someone on-site (generally the project foreman) who will ensure that new construction members receive and review the pamphlet

information. The on-site monitor shall also be the primary point of contact if special-status species are found on-site and the presence of the qualified biologist is required.

Mitigation Measure 3.4-2

The following measures shall be implemented to avoid, minimize, or compensate for impacts to California red-legged frog:

- ▲ No more than 24 hours prior to initial ground disturbance, a preconstruction survey for the California red-legged frog shall be conducted in the project area by the USFWS/CDFW-approved biologist. The survey shall consist of walking the project area to ascertain the possible presence of the species. The USFWS/CDFW-approved biologist shall investigate all potential areas that could be used by the California red-legged frog for feeding, breeding, sheltering, movement, and other essential behaviors. This includes an adequate examination of mammal burrows, such as California ground squirrels or gophers. If any adults, subadults, juveniles, tadpoles, or eggs are found, the USFWS/CDFW-approved biologist shall contact the USFWS and CDFW to determine if moving any of the individuals is appropriate. In making this determination, USFWS and CDFW shall consider if an appropriate relocation site exists. If USFWS and CDFW approve moving the animals, SJWC shall ensure the approved biologist is given sufficient time to move the animals from the work site before ground disturbance is initiated. Only USFWS/CDFW-approved biologists shall capture, handle, and monitor the California red-legged frog.
- ▲ The USFWS/CDFW-approved biologist shall conduct employee education training for employees working on earthmoving and/or construction activities. Personnel shall be required to attend the presentation, which shall describe the California red-legged frog avoidance, minimization, and conservation measures, legal protection of the animals, and other related issues. All attendees shall sign an attendance sheet along with their printed name, company or agency, email address, and telephone number. The original sign-in sheet shall be sent to the USFWS and CDFW within seven calendar days of the completion of the training.
- ▲ SJWC shall minimize adverse effects to the California red-legged frog by limiting, to the maximum extent possible, the number of access routes, construction areas, equipment staging, storage, parking, and stockpile areas. Prior to the date of initial ground disturbance in the project area, equipment staging areas, site access routes, construction equipment and personnel parking areas, debris storage areas, and any other areas that may be disturbed shall be identified, surveyed by the USFWS/CDFW-approved biologist, and clearly identified with 5-foot tall bright orange plastic fencing. The fencing shall be inspected by the USFWS/CDFW-approved biologist and maintained daily by SJWC or its contractor until the last day that construction equipment is at the project.
- ▲ To the extent practicable, initial ground-disturbing activities shall be avoided between November 1 and March 31 because that is the time period when the California red-legged frog is most likely to be moving through upland areas. If ground-disturbing activities must take place between November 1 and March 31, SJWC shall ensure that daily monitoring by the USFWS/CDFW-approved biologist is completed for the California red-legged frog.
- ▲ To minimize harassment, injury, death, and harm in the form of temporary habitat disturbances, all project-related vehicle traffic shall be restricted to established roads, construction areas, equipment staging, storage, parking, and stockpile areas. These areas shall be included in preconstruction surveys and, to the maximum extent possible, established in locations disturbed by previous activities to prevent further adverse effects. Project-related vehicles shall observe a 20-mile per hour speed limit within construction areas, except on county roads, and state and

federal highways. Off-road traffic outside of designated and fenced project work areas shall be prohibited.

- ▲ If a work site is to be temporarily dewatered by pumping, intakes shall be completely screened with wire mesh not larger than 5 millimeters to prevent California red-legged frogs from entering the pump system. Water shall be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow shall be removed in a manner that would allow flow to resume with the least disturbance to the substrate.
- ▲ Each encounter with the California red-legged frog shall be treated on a case-by-case basis in coordination with the USFWS and CDFW, but the general procedure is as follows: (1) the animal shall not be disturbed if it is not in danger; or (2) the animal shall be moved to a secure location if it is in any danger.
- ▲ Restoration and revegetation work for temporary effects shall be implemented using native California plant species collected onsite or from local sources (i.e., local ecotype). Native or nonnative plant species and material from non-local sources shall be utilized only with prior written authorization from USFWS and CDFW. All topsoil from natural lands shall be removed, cached, and returned to the site according to USFWS/CDFW-approved restoration protocols.
- ▲ For onsite storage of pipes, conduits and other materials that could provide shelter for the California red-legged frog, an open-top trailer shall be used to elevate the materials above ground. This is intended to reduce the potential for animals to climb into the conduits and other materials.
- ▲ To the maximum extent practicable, no construction activities shall occur during rain events or within 24 hours following a rain event. Prior to construction activities resuming, a USFWS/CDFW-approved biologist shall inspect the action area and all equipment/materials for the presence of California red-legged frogs. The animals shall be allowed to move away from the project area of their own volition or moved by the USFWS-approved biologist.
- ▲ To the maximum extent practicable, night-time construction shall be minimized or avoided by the applicant. Because dusk and dawn are often the times when the California red-legged frog is most actively moving and foraging, to the maximum extent practicable, earthmoving and construction activities shall cease no less than 30 minutes before sunset and shall not begin again until 30 minutes after sunrise. Except when necessary for driver or pedestrian safety, to the maximum extent practicable, artificial lighting at a project area shall be prohibited during the hours of darkness.
- ▲ Trenches or pits 1 foot or deeper that are going to be left unfilled for more than 48 hours shall be securely covered with boards or other material to prevent the California red-legged frog from falling into them. If this is not possible, SJWC shall ensure wooden ramps or other structures of suitable surface that provide adequate footing for the California red-legged frog are placed in the trench or pit to allow for their unaided escape. Auger holes or fence post holes that are greater than 1.0 inch in diameter shall be immediately filled or securely covered so they do not become pitfall traps for the California red-legged frog. The USFWS/CDFW-approved biologist shall inspect the trenches, pits, or holes prior to their being filled to ensure there are no California red-legged frogs in them. The trench, pit, or hole also shall be examined by the USFWS/CDFW-approved biologist each workday morning at least one hour prior to initiation of work and in the late afternoon no more than one hour after work has ceased to ascertain whether any individuals have become trapped. If the escape ramps fail to allow the animal to escape, the USFWS/CDFW-

approved biologist shall remove and transport it to a safe location, or contact the USFWS and CDFW for guidance.

- ▲ SJWC shall compensate at a 1:1 ratio for the temporary effects and a 3:1 ratio for permanent effects to California red-legged frog by purchasing 1.8 acres of California red-legged frog credits at a USFWS and CDFW-approved conservation bank or by permanently protecting 1.8 acres of California red-legged frog habitat. SJWC shall provide the funding for the California red-legged frog credits or mitigation lands prior to the initiation of construction of the proposed project.

Mitigation Measure 3.4-3

To avoid or reduce potential impacts to western pond turtle, Santa Cruz black salamander, and California giant salamander, the following pre-construction actions shall be taken: a qualified biologist shall conduct preconstruction surveys for western pond turtle, Santa Cruz black salamander, and California giant salamander and their nests 48 hours prior to the commencement of construction activities. The qualified biologist shall survey all areas within the riparian zone where construction activities will occur. If an adult pond turtle is found in any areas prior to or during project-related construction activities, a qualified biologist shall relocate the individual from the site and to a suitable location outside of potential project impacts. Because the terrestrial stage of these salamander species are known to occur under rocks, logs, and leaf litter, the biologist shall inspect all such habitats and ensure that all potential habitats have been cleared. If a buried nest of pond turtle eggs, or eggs or larvae of the salamanders are encountered during the preconstruction survey effort or project-related construction activities within the construction area, construction shall stop and CDFW shall be notified. CDFW does not recommend moving the eggs because of specific conditions required for development and hatching. Construction can be reinitiated only with CDFW approval.

Mitigation Measure 3.4-4

To avoid or reduce impacts to special-status bat species, SJWC shall retain a qualified bat specialist or wildlife biologist to conduct a pre-construction survey for suitable roosting habitat no more than 15 days prior to the start of construction. Surveys shall consist of a daytime pedestrian survey looking for evidence of bat use (e.g., guano), and/or an evening emergence survey to note the presence or absence of bats. The type of survey shall be determined by the biologist in consultation with CDFW. Cavities, crevices, exfoliating bark, and bark fissures that could provide suitable potential nest or roost habitat for bats shall be checked using roof-prism binoculars supplemented as needed with a flashlight or spotlight. If evidence of bat use is observed, the number and species of bats using the roost shall be determined and recorded. Bat detectors may be used to supplement survey efforts, but are not required. If no bat roosts are found, then no further mitigation is required.

Tree limbs and screening vegetation may be pruned or removed from roost trees, provided the biologist first confirms that only single bats and/or adult bats are utilizing the roost tree and after the bats have been safely excluded from the roost. Exclusion measures shall allow for the gradual nighttime dispersal of bats, to minimize stress and maximize bats' ability to find new roosts. While the exclusion process would displace bats from daytime resting habitat, it would minimize disorientation, stress, and mortality associated with exposure to disturbances from daytime vegetation management activities. Exclusion techniques shall be determined by the biologist and would depend on the roost type. If features of the tree would be modified by pruning such that the tree will no longer function as a roost, a detailed mitigation plan addressing compensation, exclusion methods, and roost removal procedures shall be developed, in consultation with CDFW, before implementation. Exclusion methods may include use of one-way doors at roost entrances (bats may leave but not reenter), or sealing roost entrances when the site can be confirmed to contain no bats.

Exclusion efforts will be avoided during certain periods of sensitive activity (e.g., during hibernation or while females in maternity colonies are nursing young).

If an active maternity roost is detected, avoidance is preferred. Work in the vicinity of the roost (buffer to be determined by biologist) shall be postponed until the biologist monitoring the roost determines that the young have fledged and are no longer dependent on the roost. The monitor shall ensure that all bats have left the area of disturbance prior to initiation of construction activities that would disturb the roost. A plan addressing compensation, exclusion methods, and roost removal procedures will be developed and implemented and shall require approval by CDFW prior to initiation of project construction. The plan may include construction and installation of bat boxes suitable to the bat species and colony size excluded from the original roosting site. The plan shall specify that roost replacement will be implemented before bats are excluded from the original roost site. Once compensation is implemented and it is confirmed that bats are not present in the roost site, the roost structure may be removed.

Mitigation Measure 3.4-5

To avoid or reduce impacts to San Francisco dusky-footed woodrat, a qualified wildlife biologist previously approved by CDFW shall conduct a preconstruction survey to identify woodrat middens within the disturbance area and within 25 feet of the disturbance area within 5 days of initiation of ground disturbing activities. If no middens are found, no further mitigation is required.

If active middens are found, a 25-foot no construction buffer shall be delineated with fencing or flagging in consultation with CDFW and maintained during construction activities. If avoidance is not feasible and the midden is found within an area of proposed construction, a relocation plan shall be prepared and submitted to CDFW for approval. Once the relocation plan has been approved, the midden shall be dismantled prior to land clearing or construction activities, to allow animals to escape harm and to reestablish territories for the next breeding season. Middens shall only be dismantled during the non-breeding season, between October 1 and December 31, or after a qualified biologist determines through monitoring (i.e., trail camera placement or daily human monitoring) of the midden that it is not being used. Live traps shall be installed and checked for three consecutive nights to capture and relocate individuals. Traps shall be closed during daylight hours and opened and baited each evening only within 1 hour before sunset. Traps shall be checked the following morning and any captured San Francisco dusky-footed woodrat will be released directly into temporary shelter houses in immediately adjacent riparian habitat. The live-trap with the captured San Francisco dusky-footed woodrat will then be placed at the entrance and carefully opened such that the individual enters on its own. Dismantling of middens shall be done by hand. If a litter of young is found or suspected while dismantling, midden material shall be replaced, and the midden be left alone for 2 to 3 days before a recheck to determine whether the animals have left the midden. All woodrat middens dismantled and relocated, and any middens protected shall be mapped and documented and reported to CDFW.

Mitigation Measure 3.4-6

The following measures shall be implemented to avoid, reduce or compensate for the loss or degradation of riparian habitat, and achieve consistency with Fish and Game Code Section 1602:

- ▲ SJWC shall notify CDFW before commencing any activity within the bed, bank, or riparian corridor of Los Gatos Creek. The project proponent shall conduct construction activities in accordance with the LSAA, including implementing measures necessary to protect fish and wildlife resources.
- ▲ SJWC shall compensate for all impacts to riparian habitat to ensure no net loss of riparian habitat by restoring and revegetating areas of temporary disturbance within the project area. SJWC shall develop and implement a riparian mitigation plan that will include creation, restoration and/or

enhancement of habitat within the project area or surrounding area, and removal of non-native species, where appropriate. Compensatory mitigation shall be conducted in consultation with CDFW in accordance with the terms of the LSAA.

- ▲ The riparian mitigation plan shall include the following:
 - identification of appropriate revegetation sites;
 - in-kind reference habitats for comparison with compensatory riparian habitats (using performance and success criteria) to document success;
 - monitoring protocol, including schedule and annual report requirements. Compensatory habitat shall be monitored for a minimum of 5 years from completion of mitigation, or human intervention (including recontouring and grading), or until the success criteria identified in the approved mitigation plan have been met, whichever is longer;
 - ecological performance standards, based on the best available science and including specifications for native riparian plant densities, species composition, amount of dead woody vegetation gaps and bare ground, and survivorship; at a minimum, compensatory mitigation planting sites must achieve 80 percent survival of planted riparian trees and shrubs by the end of the 5-year maintenance and monitoring period or dead and dying trees shall be replaced and monitoring continued until 80 percent survivorship is achieved;
 - corrective measures if performance standards are not met;
 - responsible parties for monitoring and preparing reports; and
 - responsible parties for receiving and reviewing reports and for verifying success or prescribing implementation or corrective actions.

Mitigation Measure 3.4-7a

The following measures shall be implemented to avoid or compensate for impacts to waters of the United States, and achieve consistency with the project's NWP:

- ▲ Obtain and implement all measures set forth in the USACE NWP.
- ▲ A post-construction report shall be submitted 45 days after completion of construction documenting construction activities and containing as-built drawings (if different from drawings submitted with the Section 404 permit application) and before and after photographs.
- ▲ Prior to construction, the project area shall be surveyed, and following construction, all disturbed areas within the bed and bank of the creek shall be regraded and restored to pre-project survey conditions. All temporary impacts shall be restored at least to preconstruction condition and only native wetland species shall be used in replanting. Reseeding and replanting will be implemented between November 1 and December 1 immediately following construction, and the site will be restored to pre-construction conditions within 1 year of the end of construction. Plant stock will be collected on-site, if feasible. If no plant stock is available on-site, it will be acquired from local sources for use in restoration. Data shall be collected and reported in accordance with the USACE NWP. These data will be used to evaluate project conditions related to success criteria set forth in the NWP. All invasive weed species shall be removed from all restoration areas annually for 3 years.

Mitigation Measure 3.4-7b

The Los Gatos Creek corridor shall be photographed to document pre-project conditions prior to the initiation of construction activities. Photographs will be georeferenced on the existing topographic survey for the project area. Following the completion of all construction activities, the pre-construction documentation shall be used to return the project area to existing conditions, including reestablishment of native emergent, aquatic, and riparian vegetation, and restoring preconstruction contours.

Mitigation Measure 3.4-7c

The SJWC shall obtain a permit under Section 401 of the CWA from the RWQCB prior to project implementation, and will implement all requirements of the permit in the timeframes required therein, including any avoidance and minimization measures included in the permit.

Mitigation Measure 3.4-8

To avoid or reduce impacts to nesting birds, the following actions shall be taken:

- ▲ Construction activities in upland habitat shall be initiated before the start of the nesting season (i.e., before February 15), if possible.
- ▲ Although no trees are proposed to be removed, there would be some minor pruning of some lower hanging limbs extending into the project area. For project activities, including vegetation pruning, that begin between February 15 and September 15, a qualified biologist shall conduct preconstruction surveys for nesting birds and to identify active nests on and within 500 feet of the project area with direct line of sight to the proposed work areas. The surveys shall be conducted no more than 14 days prior to the beginning of any construction activities between February 15 and September 15. A second survey will be conducted no more than 48 hours prior to the beginning of any construction activities between February 15 and September 15. If no active nests are found during surveys, no additional mitigation is required. However, if a historic raptor nest (used within the last 5 years) is documented during surveys and impacts to the suitable nest habitat cannot be avoided, CDFW shall be consulted for appropriate mitigation for loss of historic raptor nesting habitat.
- ▲ If active nests are found, appropriate buffers shall be established around active nest sites. No project activity shall commence within the buffer areas until a qualified biologist has determined the young have fledged, the nest is no longer active, or reducing the buffer, in coordination with CDFW, would not likely result in nest abandonment. The appropriate no-disturbance buffer shall be determined by a qualified biologist based on site-specific conditions, the species of nesting bird, nature of the project activity, visibility of the disturbance from the nest site, and other relevant circumstances. Monitoring of the nest by a qualified biologist during construction activities shall be required if the activity has potential to adversely affect the nest. If construction activities cause the nesting bird to vocalize, make defensive flights at intruders, get up from a brooding position, or fly off the nest, then the no-disturbance buffer shall be increased until the agitated behavior ceases. The exclusionary buffer will remain in place until the chicks have fledged or as otherwise determined by a qualified biologist.

Mitigation Measure 3.4-9

To avoid or reduce impacts to nesting birds, the following additional actions shall be taken:

- ▲ If vegetation pruning or other disturbance related to construction is required during the nesting season (typically February 15 – September 15), focused surveys for active bird nests shall be conducted before and within 5 days of initiating construction by a qualified biologist. A second survey will be conducted no more than 48 hours prior to the beginning of any construction activities between February 15 and September 15. The appropriate area to be surveyed and timing of the survey may vary depending on the activity and species that could be affected. If no active nests are found during focused surveys, no further mitigation is required.
- ▲ If an active nest is located during the preconstruction surveys, an appropriate no-disturbance buffer shall be determined by a qualified biologist in consultation with CDFW based on site-specific conditions, the species of nesting bird, nature of the project activity, visibility of the disturbance from the nest site, and other relevant circumstances. Monitoring of the nest by a qualified biologist during construction activities shall be required if the activity has potential to adversely affect the nest. If construction activities cause the nesting bird to vocalize, make defensive flights at intruders, get up from a brooding position, or fly off the nest, then the no-disturbance buffer shall be increased until the agitated behavior ceases. The exclusionary buffer will remain in place until the chicks have fledged or as otherwise determined by a qualified biologist.
- ▲ If construction stops for more than 5 days during the nesting season, a follow up survey shall be conducted to make sure that no nesting birds moved into the area.

Cultural Resources

Mitigation Measure 3.5-1

If any prehistoric or historic-era subsurface archaeological features or deposits, including locally darkened soil (potentially a “midden”), that could conceal cultural deposits, are discovered during construction, all ground-disturbing activity within 100 feet of the resources shall be halted and a qualified professional archaeologist shall be retained to assess the significance of the find. If the find is determined to be significant by the qualified archaeologist (i.e., because it is determined to constitute either an historical resource or a unique archaeological resource), the archaeologist shall develop appropriate procedures to protect the integrity of the resource and ensure that no additional resources are affected. Procedures could include but would not necessarily be limited to preservation in place, archival research, subsurface testing, or contiguous block unit excavation and data recovery.

Mitigation Measure 3.5-2

If human remains are discovered during any construction activities, potentially damaging ground-disturbing activities in the area of the remains will be halted immediately, and SJWC will notify the County coroner and the NAHC immediately, according to Section 5097.98 of the Public Resources Code and Section 7050.5 of California’s Health and Safety Code. If the remains are determined by the NAHC to be Native American, the guidelines of the NAHC will be adhered to in the treatment and disposition of the remains. SJWC will also retain a professional archaeologist with Native American burial experience to conduct a field investigation of the specific site and consult with the Most Likely Descendant (MLD), if any, identified by the NAHC. Following the coroner’s and NAHC’s findings, the archaeologist, and the NAHC-designated MLD will determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed. The responsibilities for acting upon notification of a discovery of Native American human remains are identified in California Public Resources Code Section 5097.94.

Pursuant to Section 21082.1 of the California Environmental Quality Act, CDFW has independently reviewed and analyzed the Initial Study and Mitigated Negative Declaration for the project and finds that the Initial Study and Mitigated Negative Declaration reflects the independent judgment of CDFW. The Lead Agency further finds that the project mitigation measures shall be implemented as stated in the Mitigated Negative Declaration.

I hereby approve this project:

Name/ Title

California Department of Fish and Wildlife

(to be signed upon approval of the project after the public review period is complete)

**Initial Study/Proposed Mitigated Negative Declaration
for the
Ostwald Waterline Replacement Project**

PREPARED FOR

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Mitigation Monitoring and Reporting Program

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LIST OF ABBREVIATIONS

AB	Assembly Bill
BAAQMD	Bay Area Air Quality Management District
CAAQS	California Ambient Air Quality Standard
CalEPA	California Environmental Protection Agency
CARB	California Air Resources Board
CBC	California Building Code
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CGP	Construction General Permit
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO ₂	carbon dioxide
CRHR	California Register of Historical Resources
CRPR	California Rare Plant Rank
cy	cubic yards
dB	decibels
DD&A	Denise Duffy and Associates
DOC	California Department of Conservation
DTSC	California Department of Toxic Substances Control
EIR	environmental impact report
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency's
FMMP	Farmland Mapping and Monitoring Program
GHGs	greenhouse gases
GIS	Geographic Information System
gpm	gallons per minute
IP	Individual Permit
IPaC	Information, Planning, and Conservation System
IPCC	Intergovernmental Panel on Climate Change
IS/MND	Initial Study and Mitigated Negative Declaration
lb/day	pounds per day
L _{eq}	equivalent continuous sound level
L _{max}	maximum sound level
LSAA	Lake or Streambed Alteration Agreement
LUPs	Linear Underground/Overhead Projects
MBTA	Migratory Bird Treaty Act

mgd	million gallons per day
MLD	Most Likely Descendant
MRP	Municipal Regional Stormwater NPDES Permit
MTCO _{2e} /year	metric tons of carbon dioxide equivalent per year
NAAQS	National Ambient Air Quality Standard
NOI	Notice of Intent
NOP	Notice of Preparation
NO _x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NWIC	Northwest Information Center
NWP	Nationwide Permit
O ₃	ozone
OHP	Office of Historic Preservation
PM ₁₀	respirable particulate matter
PM _{2.5}	fine particulate matter
proposed project	Ostwald Waterline Replacement Project
ROG	reactive organic gases
RWQCB	Regional Water Quality Control Board
RWQCBs	Regional Water Quality Control Boards
SB	Senate Bill
SCCFD	Santa Clara County Fire Department
SFBAAB	San Francisco Bay Area Air Basin
SJWC	San Jose Water Company
SMAQMD	Sacramento Metropolitan Air Quality Management District
SO ₂	sulfur dioxide
SR	State Route
SWPPP	Storm Water Pollution Prevention Plan
TACs	toxic air contaminants
TCRs	tribal cultural resources”
TIA	Transportation Impact Analysis
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
VMT	vehicle miles traveled
VTA	Santa Clara Valley Transportation Authority
WEAP	Workers Environmental Awareness Program
WPT	western pond turtle

1 INTRODUCTION

This Initial Study and Mitigated Negative Declaration (IS/MND) evaluates the environmental effects of the Ostwald Waterline Replacement Project (proposed project). San Jose Water Company (SJWC) is proposing to replace the existing 30-inch diameter pipeline that extends within Los Gatos Creek from the Ostwald Dam intake facility to an existing downstream pipeline. The project would disturb the bed and bank of Los Gatos Creek, requiring a Lake or Streambed Alteration Agreement (LSAA) under Section 1602 of the Fish and Game Code. California Department of Fish and Wildlife's (CDFW's) issuance of a LSAA requires compliance with the California Environmental Quality Act (CEQA). Because SJWC is a private water company that cannot serve as Lead Agency, CDFW has assumed Lead Agency status for the project under CEQA.

This document has been prepared in accordance with the CEQA (Public Resources Code Section 21000 et seq.) and the CEQA Guidelines (California Code of Regulations Section 15000 et seq.). Under CEQA, an IS can be prepared by a lead agency to determine if a project may have a significant effect on the environment (CEQA Guidelines Section 15063[a]), and thus to determine the appropriate environmental document. In accordance with CEQA Guidelines Section 15070, a "public agency shall prepare...a proposed negative declaration or mitigated negative declaration...when: (a) the IS shows that there is no substantial evidence...that the project may have a significant impact on the environment, or (b) the IS identifies potentially significant effects but revisions to the project plans or proposal are agreed to by the applicant and such revisions would reduce potentially significant effects to a less-than-significant level." In this circumstance, the lead agency prepares a written statement describing its reasons for concluding that the proposed project would not have a significant effect on the environment and, therefore, does not require the preparation of an environmental impact report (EIR). This IS/MND provides the required environmental analysis, substantial evidence supporting the analysis, and determinations that no significant effect on the environment would occur with implementation of the proposed project, after consideration of mitigating revisions agreed to by the applicant.

1.1 PURPOSE OF THIS DOCUMENT

CEQA requires that all state and local government agencies consider the environmental consequences of projects over which they have discretionary authority before acting on those projects. An MND, which requires inclusion of an IS, is a public document used by the decision-making lead agency to determine whether a project may have a significant adverse impact on the environment. If the agency finds that the proposed project may have a significant adverse impact on the environment, but that the impacts will be clearly reduced to a less-than-significant level through implementation of specific mitigation measures, an MND shall be prepared.

This IS/MND is a public information document that describes the proposed project, existing environmental setting in the project area, and potential environmental impacts of construction and operation of the proposed project. It is intended to inform the public and decision-makers of the proposed project's compliance with CEQA, State CEQA Guidelines, and Fish and Game Code requirements.

1.2 REVIEW PROCESS

This IS/MND is being circulated for public and agency review as required by CEQA. Because the lead agency is a state agency, CDFW is circulating the IS/MND to the State Clearinghouse of the Governor's Office of Planning and Research for distribution and a 45-day public review period. The IS/MND is available for review at CDFW Bay Delta Region Office located at 7329 Silverado Trail, Napa and at SJWC's office located at 1265

South Bascom Avenue, San Jose. A copy of the IS/MND is also available for review on CDFW's website: <https://www.wildlife.ca.gov/Notices>, and SJWC's website: <http://sjwc.co/ostwald-mnd>.

During the review period, written comments may be submitted to:

Brenda Blinn
Senior Environmental Scientist (Supervisory)
California Department of Fish and Wildlife
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558
brenda.blinn@wildlife.ca.gov

After comments are received from the public and reviewing agencies during the public comment period, CDFW may (1) adopt the Mitigated Negative Declaration and approve the proposed project; (2) undertake additional environmental studies; or (3) disapprove the proposed project. If the project is approved, CDFW may issue a Lake or Streambed Alteration Agreement and SJWC may proceed with detailed design and construction.

1.3 AGENCY ROLES AND RESPONSIBILITIES

1.3.1 Lead Agency

CDFW is the lead agency responsible for approving and carrying out the project and for ensuring that the requirements of CEQA have been met. After the Initial Study public-review process is complete, the Regional Manager of CDFW will determine whether to adopt a Mitigated Negative Declaration (see State CEQA Guidelines Sections 15074) and approve the project.

1.3.2 Trustee and Responsible Agencies

A trustee agency is a State agency that has jurisdiction by law over natural resources that are held in trust for the people of the State of California (State CEQA Guidelines Section 15386). The only trustee agency that may have jurisdiction over resources potentially affected by the project is the CDFW (see section 3.4 of this Initial Study for evaluation of Biological Resources).

Responsible agencies are public agencies, other than the lead agency, that have discretionary-approval responsibility for reviewing, carrying out, or approving elements of a project. Responsible agencies should participate in the lead agency's CEQA process, review the lead agency's CEQA document, and use the document when making a decision on project elements. The San Francisco Bay Regional Water Quality Control Board is the only responsible agency for the project and would use this IS/MND for discretionary actions related to issuing a Section 401 Water Quality Certification and National Pollutant Discharge Elimination System (NPDES) Permit.

1.3.3 Required Permits and Approvals

The following list identifies permits and other approval actions required before implementation of individual elements of the proposed project.

- ▲ CDFW (lead agency): LSAA under Fish and Game Code Section 1602;

- ▲ San Francisco Bay Regional Water Quality Control Board (RWQCB; CEQA Responsible Agency): Section 401 certification and NPDES Permit;
- ▲ U.S. Fish and Wildlife Service (USFWS; federal agency approval) Endangered Species Act Section 7 consultation for California red-legged frog; and
- ▲ U.S. Army Corps of Engineers (USACE; federal agency approval): Clean Water Act Section 404 Nationwide Permit #12 (Utility Line Activities) or Nationwide Permit #33 (Temporary Construction, Access, and Dewatering) or Individual Permit.

1.4 REGULATORY FRAMEWORK

- ▲ **Federal Endangered Species Act** - Pursuant to the federal Endangered Species Act (ESA) (16 U.S.C. Section 1531 et seq.), USFWS regulates the taking of species listed in the ESA as threatened or endangered. In general, persons subject to ESA (including private parties) are prohibited from “taking” endangered or threatened fish and wildlife species on private property, and from “taking” endangered or threatened plants in areas under federal jurisdiction or in violation of state law. The definition of “take” is to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” USFWS has also interpreted the definition of “harm” to include significant habitat modification that could result in take. Section 7 of the ESA applies if a federal discretionary action is required (e.g., a federal agency must issue a permit), in which case the involved federal agency consults with USFWS.
- ▲ **Migratory Bird Treaty Act** - The Migratory Bird Treaty Act (MBTA), first enacted in 1918, provides for protection of international migratory birds and authorizes the Secretary of the Interior to regulate the taking of migratory birds. The MBTA provides that it will be unlawful, except as permitted by regulations, to pursue, take, or kill any migratory bird, or any part, nest, or egg of any such bird. Under the MBTA, “take” is defined as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities.” Take does not include habitat destruction or alteration, as long as there is not a direct taking of birds, nests, eggs, or parts thereof. The MBTA is administered by USFWS.
- ▲ **Clean Water Act: Section 404** - USACE regulates Section 404 of the Clean Water Act (CWA) and requires the issuance of an Individual Permit (IP) or Nationwide Permit (NWP) Authorization for activities that result in a discharge of dredged or fill material within their jurisdiction. Under Section 404 of the CWA, the USACE has jurisdiction over all waters of the United States, including wetlands and other special aquatic sites.
- ▲ **California Endangered Species Act** - Pursuant to the California Endangered Species Act (CESA), a permit from CDFW is required for projects that could result in the “take” of a plant or animal species that is listed by the state as threatened or endangered. Under CESA, “take” is defined as an activity that would directly or indirectly kill an individual of a species, but does not include “harm” or “harass,” as does the federal definition. Authorization for take of state-listed species can be obtained through a California Fish and Game Code Section 2081 incidental take permit.
- ▲ **California Fish and Game Code Sections 3503 and 3503.5—Protection of Bird Nests and Raptors** - Section 3503 of the Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 of the California Fish and Game Code states that it is unlawful to take, possess, or destroy any raptors, including their nests or eggs. The California Fish and Game Code is enforced by CDFW.

- ▲ **California Fish and Game Code Sections 1600-1607** – These sections of the Fish and Game Code and require issuance of a 1602 Lake or Streambed Alteration Agreement (LSAA) for projects that result in a modification to the bed and/or bank of a river, stream, or lake. CDFW issues LSAsAs and issuance of a LSAA for the proposed project is the subject of this IS/MND.
- ▲ **California Species of Special Concern** - CDFW maintains a list of animal “Species of Special Concern,” most of which are species whose breeding populations in California may face extirpation if current population trends continue. Although these species have not been formally listed as endangered, CDFW recommends considering these species during analysis of project impacts to protect declining populations and avoid the need to list them as endangered in the future. CDFW maintains lists of designated endangered, threatened, and rare plant and animal species. Listed species either were designated under the California Native Plant Protection Act or designated by the CDFW Commission.
- ▲ **Clean Water Act - Section 401** - The California Regional Water Quality Control Board (RWQCB) regulates Section 401 of the CWA and requires the issuance of a Water Quality Certification to uphold state water quality standards for projects that require a 404 permit from the USACE for discharge of dredged or fill material.
- ▲ **Porter-Cologne Water Quality Control Act** - The Porter-Cologne Water Quality Control Act authorizes the State Water Resources Control Board to regulate state water quality and protect beneficial uses. The Act, passed in 1975, provides for the development and periodic review of Water Quality Control Plans (Basin Plans) that designate beneficial uses of California’s major rivers and groundwater basins and establish narrative and numerical water quality objectives for those waters. Basin plans are implemented through issuance of Waste Discharge Requirements and NPDES permits regulating waste discharges so that water quality objectives are met. The RWQCB’s issue NPDES permits on behalf of the SWRCB.

1.5 DOCUMENT ORGANIZATION

This IS/MND is organized as follows:

Chapter 1: Introduction. This chapter provides an introduction to the environmental review process, describes agencies roles and responsibilities, and describes the purpose and organization of this document.

Chapter 2: Project Description and Background. This chapter describes the background of the proposed project, identifies basic project objectives, describes construction and operation of the proposed project, and discusses alternatives to the project.

Chapter 3: Environmental Checklist. This chapter presents an analysis of a range of environmental issues identified in the CEQA Environmental Checklist and determines if project actions would result in no impact, a less-than-significant impact, a less-than-significant impact with mitigation incorporated, or a potentially significant impact. If any impacts were determined to be potentially significant, an EIR would be required. For this project, however, none of the impacts were determined to be significant.

Chapter 4: References. This chapter lists the references used in preparation of this IS/MND.

Chapter 5: List of Preparers. This chapter identifies report preparers.

2 PROJECT DESCRIPTION AND BACKGROUND

2.1 INTRODUCTION

San Jose Water Company (SJWC) is proposing to replace an existing water pipeline within Los Gatos Creek (proposed project or project) from the Ostwald Dam intake facility to an existing pipeline connection located 1,575 feet downstream (to the north).

2.2 PROJECT BACKGROUND AND NEED

The purpose of the project is to replace a 55-year-old, steel raw water intake pipeline with a new ductile iron pipeline to provide reliable and consistent delivery of water from the existing Ostwald Dam intake facility to the Montevina Water Treatment Plant. Without replacement of the existing pipeline, emergency repairs to fix leaks and failed sections of pipe would be needed in the future.

2.3 PROJECT OBJECTIVES

The proposed project is intended to achieve the following basic objectives:

- ▲ provide the least environmentally damaging, most feasible, and cost-effective replacement of the 30-inch water pipeline to prevent future pipe failures and emergency repairs; and
- ▲ provide reliable delivery of water from the Ostwald Dam intake facility to the MWTP.

2.4 LOCATION

The project is located approximately 4.5 miles south of the Town of Los Gatos in Santa Clara County, California. The project area is within the main stem of Los Gatos Creek approximately 2 miles upstream from Lexington Reservoir and 2 miles downstream of Lake Elzman (Exhibit 2-1). The project area is located on Assessor Parcel Numbers 558-25-013 and 558-25-016, and is accessible from an unnamed private road maintained by SJWC to the south and Aldercroft Heights Road to the north (Exhibit 2-2).

2.5 EXISTING FACILITIES

Ostwald Dam is an approximately 100-foot wide inflatable rubber tube that impounds water from Los Gatos Creek for diversion into the intake facility on the east bank of the creek. The dam and intake facility have been in operation since 1960. SJWC raises and lowers the inflatable Ostwald Dam based on raw water quality and treatment needs for the MWTP. During storm events the dam is lowered to allow debris, sediment, and other creek materials to pass over the diversion structure. Raw water is then conveyed from the intake facility via a 30-inch steel pipeline to the MWTP for treatment and distribution. Water from other SJWC diversions in the Los Gatos Creek Watershed also feed into this pipeline, and the pipeline conveys a maximum flow rate of 18 million gallons per day (mgd).

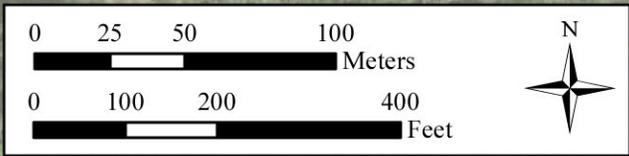


Source: Adapted by Ascent Environmental in 2017

Exhibit 2-1

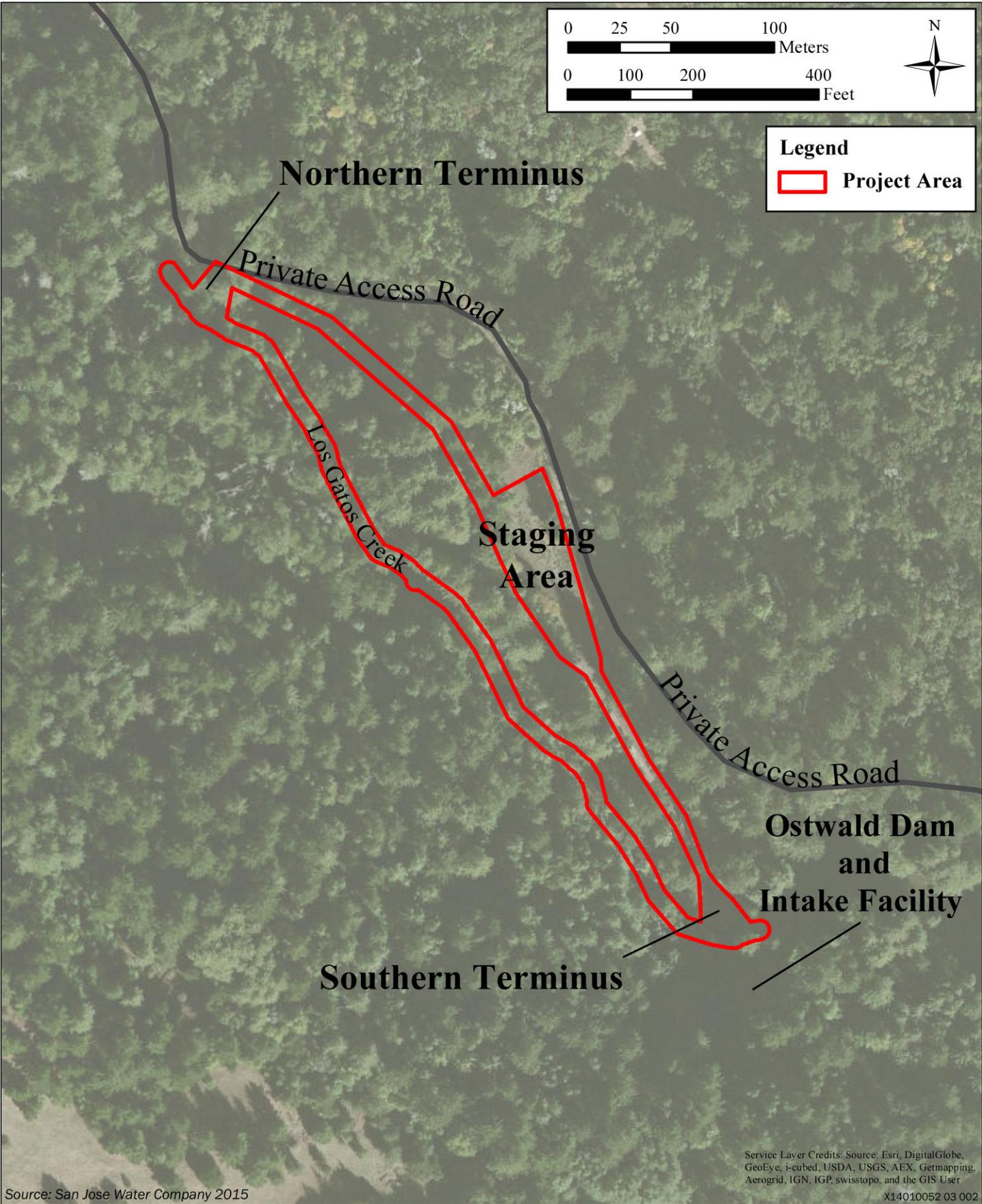
Project Vicinity





Legend

Project Area



Source: San Jose Water Company 2015

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

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2.6 DESCRIPTION OF PROPOSED PROJECT

2.6.1 Pipeline Replacement

SJWC proposes to replace approximately 1,575 linear feet of existing steel water pipeline with a new 30-inch ductile iron pipeline with polyethylene encasement (for corrosion protection). The replacement pipeline would be installed within the same alignment as the existing pipeline. Temporary equipment access to the pipeline alignment would be necessary to remove the old pipeline and construct the new pipeline.

Equipment access to the existing pipeline would be gained at the southern and northern termini of the proposed pipeline alignment (Exhibit 2-2). Low flows typically occur in the creek during the summer months when construction would occur. Therefore, equipment and workers would access the work area from the two termini and travel adjacent to or within the creek bed. Construction within the work area would occur after the creek is completely dewatered. Existing access routes would be used to the maximum extent possible.

The project work area would include the 1,575 linear feet of pipeline proposed for replacement, an associated 30-foot wide buffer (15 feet on either side) of the pipeline included for construction equipment access, the access road, the creek bed and area immediately adjacent to the creek providing access from the pipeline termini and the active work areas, and an approximately 0.85-acre staging area on the eastern side of the existing access road (Exhibit 2-2).

All of the trees within the project area would be retained. Minor pruning of some lower hanging limbs extending into the project area, particularly near the staging areas, would be necessary. Primary access to the project area for construction vehicle traffic would be via an unnamed private road between the southern end of the project area and Cothran Road to the south. Secondary access for light vehicles and auxiliary access would be via Aldercroft Heights Road between Old Santa Cruz Highway (north of the project) and the project area.

The contractor would employ an open trenching technique to extract and replace the existing pipeline. The typical trench width for the permanent replacement pipe would be approximately 52 inches. The grade of the existing pipe would determine the depth of excavation, but is anticipated to be to a depth of approximately 4 feet.

2.6.2 Control of Surface Water and Groundwater Within the Work Area

The existing Ostwald Dam would remain inflated for the duration of the project (day and night). A temporary 18-inch diameter HDPE bypass pipeline would be installed between the Ostwald Dam and a connection point to the existing 30-inch raw water pipe to maintain raw water flows to the Montevina Water Treatment Plant during project construction. Any surface water would be controlled by Ostwald Dam and up to two Aqua Dams as needed. Each Aqua Dam would be approximately 4 feet high and 40 feet long. An Aqua Dam is a temporary inflatable dam that is filled with water when inflated.

The first Aqua Dam would be inflated just below the existing Ostwald Dam to capture any surface water that seeps around the spillway and existing dam. The first Aqua Dam would be filled with water either from current bypass releases or from water behind Ostwald Dam. Any water that collects behind the first Aqua Dam would be pumped behind the existing Ostwald Dam. The first Aqua Dam would stay in place until the project is complete and then be removed.

It is anticipated that the first Aqua Dam would eliminate most of any surface water that would be encountered within the work below it. However, the second Aqua Dam would be available on-site for use at any time, where surface water or groundwater could be encountered. The second Aqua Dam, if needed, would be filled via a trailer that would transport water from the raw water hydrant on the north end of the project area. This dam would be placed approximately 300 feet downstream of the first Aqua Dam, and relocated downstream in 300-foot increments (approximately once per week). Relocation of this second Aqua Dam would be accomplished by releasing water from the dam back into the creek, rolling it up and carrying it downstream by hand or via an excavator.

Within each dewatered area, excavation and replacement of the pipeline would occur in approximately 50-foot segments each working day. Construction excavation work area would therefore be limited in stream length to approximately 50 feet and would shift downstream in 50-foot increments each day. Prior to the end of each working day, the exposed trench would be backfilled with native materials excavated on-site.

Dewatering of groundwater in excavation work areas would occur using sump pumps in conjunction with a small force main that would transport excavation water to a Baker Tank, as discussed below.

2.6.3 Maintenance of Minimum Stream Flow Downstream of the Work Area

Per water diversion license (#10933), a minimum of 2 cubic feet per second (cfs) of stream flow must be maintained in the channel downstream of Ostwald Dam. During construction, a minimum of 2 cfs of stream flow would be maintained downstream of the work area for the entire duration of the project.

A stream flow maintenance outlet (6 to 12-inch HDPE lateral) would be connected to the 18-inch temporary bypass pipe. This lateral pipeline would return water to the stream and would be relocated downstream in 300-foot intervals as described above. If the second Aqua Dam is used, any collected water behind the dam would be pumped to a Baker Tank located above the stream channel. Once the water collected in the Baker Tank settled, it would be allowed to gravity feed into the 18-inch bypass pipeline.

The native creek bed material is primarily aggregate, which has low potential for turbidity once re-watered. However, a filtration system would be used as needed to control the turbidity of the returned stream flows. In addition, a secondary filtration system (e.g., straw wattles, rock filter bags, hay bales) may be placed across the creek to further control turbidity. These measures would be monitored daily, and corrective measures would be incorporated as needed. The Aqua Dams would be removed permanently once construction is complete.

2.6.4 Fill Material

Fill material would not need to be stockpiled overnight. Cut and fill would be balanced on-site; no fill material would need to be imported to the site nor excavated material hauled away from the site. All vehicles and equipment would be moved up from the creek bed to the upland staging area at the end of each working day.

2.6.5 Removal of Existing Pipeline

During construction, the existing pipeline segment would be removed whenever possible. If it is determined that removal of the old pipeline would cause greater disruption to the stream and riparian habitat than leaving it in place, the existing pipeline would be retired in place by plugging the cut ends of pipe with native materials including cobble, pebble, gravel and sand approximately up to 6 feet in length into each end of the old pipe. A qualified biologist would consult with the construction foreman to determine the level of impact required to remove sections of the existing pipeline in the field. To determine the level of habitat disturbance, the qualified biologist and construction foreman would consider the area of excavation and

disturbance necessary to remove the existing pipeline section(s). This area would be compared to the trench created to install the new pipeline. If removing the existing pipe would result in additional impacts to the bed and bank beyond the replacement pipe work area or removal of healthy, mature riparian vegetation, the existing pipeline would be retired and abandoned in-place.

2.6.6 Construction

Construction activity in upland areas is scheduled to begin in mid-May and work in the channel would begin in mid-June of 2018 and take approximately 6 to 8 weeks to complete. Construction activities would generally take place from Monday through Friday during normal daytime working hours. Approximately eight workers would be on-site during construction, and there would be up to two deliveries for materials per day with a few additional delivery trips during construction start-up and the end of construction. Pipeline segments would be transported to the construction yard on top of Lexington Dam and transported to the project area as needed. All construction equipment and truck deliveries would occur during the daytime hours. Extraction and replacement of the existing pipeline would require heavy machinery including, but not limited to: a front loader, small crane, and an excavator. The machinery would be used to access the project area and work within the stream channel. An existing ramp provides access from the intake facility access road to the east bank of Los Gatos Creek, below the dam. Construction staging is proposed within the access road upslope (east of the pipeline). Traffic control measures would be implemented as needed for large trucks accessing the project area during construction including use of pilot vehicles, lane closure signs, and flaggers. Equipment would access the active work area each day by accessing the southern or northern pipeline termini and travelling along adjacent to the creek or within the creekbed. Cut and fill would be balanced on-site. No pile driving or blasting would occur.

SJWC proposes to implement the following best management practices as part of the project description to avoid or minimize environmental impacts:

- ▲ Staging will occur on access roads, surface streets, or other disturbed areas that are already compacted and support only ruderal vegetation, and all maintenance equipment and materials would be contained within the existing service roads, paved roads, or other pre-determined staging areas. The staging area is located approximately 75 feet upslope from the creekbed.
- ▲ Building or construction materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into the active channel.
- ▲ No runoff from staging areas will be allowed to enter the creek channel without being subjected to adequate filtration (e.g., vegetated buffer, hay bales, silt screens).
- ▲ During the dry season, no stockpiled soils will remain exposed for more than 7 days. During the wet season, no stockpiled soils will remain exposed unless surrounded by properly installed and maintained silt fencing or other means of erosion control.
- ▲ Equipment and materials for cleanup of spills will be available on the project area at all times. All spills and leaks will be cleaned up immediately and disposed of in accordance with all regulatory requirements.
- ▲ All equipment used in the creek channel will be inspected for leaks each day prior to initiation of work and action taken to repair leaks prior to use.
- ▲ No equipment will be serviced in the creek channel or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated, and containment measures would be taken to prevent release of hazardous materials.

In addition, the following “Basic Construction Mitigation Measures Recommended for All Proposed Projects” will be implemented in accordance with Bay Air Quality Management District requirements to minimize fugitive dust and other particulate emissions:

- ▲ All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- ▲ All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- ▲ All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.
- ▲ Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points.
- ▲ All construction equipment shall be maintained and properly tuned in accordance with manufacturer’s specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- ▲ A publicly visible sign shall be posted at the site with the telephone number and person to contact at the SJWC regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District’s phone number shall also be visible to ensure compliance with applicable regulations (BAAQMD 2017a:8-4).

2.6.7 Post-Construction Restoration

Prior to construction, the project area would be surveyed, and following construction, all disturbed areas within the bed and bank of the creek would be regraded and restored to pre-project survey conditions. To be considered a temporary impact, restoration success criteria need to be met within 1 year after construction. Any impacts that would not be restored within 1 year, while still short-term, would be considered permanent impacts. Grassland areas would be planted/seeded with locally occurring species. The restoration areas would require annual maintenance, including annual invasive plant removal, and reseeding as needed for up to 3 years. Riparian restoration areas will be considered self-producing when plants re-establish annually for a minimum of 5 years with no human intervention, such as supplemental seeding. All other operations and maintenance activities would remain consistent with existing SJWC operations.

2.7 ALTERNATIVES

Two alternatives to the proposed project were evaluated during preliminary engineering by SJWC and its engineering consultant, West Valley Construction Company, in 2010. A description of these alternatives is provided below as background for the proposed project; however, both of the alternatives were determined to have greater environmental effects and would be substantially more costly than the proposed project. Therefore, neither of these alternatives is evaluated further in this IS/MND.

- ▲ Access Road Alignment Alternative
- ▲ Micro-tunneling Alternative

2.7.1 Access Road Alignment Alternative

Under this alternative, two options for placing the new pipeline alignment within the existing access road were considered: a deep-trench option and shallow-trench option.

DEEP-TRENCH ROAD ALIGNMENT OPTION

The access road alignment is approximately 40 feet higher in elevation than Los Gatos Creek and the existing pipeline, so a considerably larger area of construction disturbance would be required to install a new pipeline that would operate properly. Conventional trenching to construct the new pipeline within the existing access roadway would require an approximately 5-foot wide by 40-foot deep trench for the majority of the 1,575 feet of pipeline to establish the necessary grade to maintain the required gravity-flow conditions. This option would reduce impacts to biological resources within Los Gatos Creek, including wetlands, riparian areas, and special-status species, and potential water quality impacts associated with work in the creekbed. However, this option would also result in greater impacts related to off-hauling approximately 12,500 cubic yards (cy) of excavated soil from trenching (approximately 1,250 additional truck trips), backfill of approximately 12,500 cy of material (approximately 1,250 additional truck trips), and potential trimming and/or removal of mature redwood trees to accommodate the required large-clearance excavator equipment. Compared to the proposed project, the deep-trench option would result in an increase in temporary impacts during construction and an increase in permanent impacts related to loss of habitat from the expanded project footprint, as well as greater traffic impacts and air quality and greenhouse gas emissions. Additionally, this alternative would result in greater impacts related to a longer construction period. This alternative would also be substantially more costly. For these reasons, the deep-trench option has been eliminated from further consideration.

SHALLOW-TRENCH ROAD ALIGNMENT OPTION

If a shallower pipeline were placed in the roadway alignment, it would possess insufficient gravity flow and, therefore, would require a new pump station to lift flows up slope approximately 30 – 35 feet. This option would reduce disturbance to biological resources within Los Gatos Creek, including wetlands, riparian areas, and special-status species, and potential water quality impacts associated with work in the creekbed. However, under this option, disturbance associated with construction of a pump station would be in addition to the excavation required for a new pipeline. This option would require greater overall landscape disturbance associated with trenching for 1,575 feet of pipeline, construction of a new pump station, and a new connection with the existing water intake. Disturbance for pipeline construction would include substantial grading for the segments ascending the slope from the creek to the shallow road alignment on the upstream end and descending back down the slope from the road to the creek on the downstream end. This option would also require a new power supply to the site to accommodate the large pumps/motors. The current power supply to the project area would not be adequate to operate a pump station of the required size. A pump station would also require standby engine generators for backup power, which would involve storage of fuel on site. Extensive grading/site work would be needed to create a level foundation for the pump station building. Under this alternative, the current intake configuration would need to be reconfigured to be compatible with the new pump station and pipeline alignment. Compared to the proposed project, the shallow trench option would result in an increase in temporary traffic, air quality, greenhouse gas, and biological resource impacts associated with construction of a pump station and installation of a new pipeline, and an increase in permanent impacts related to loss of habitat from the expanded project footprint, as well as, increased energy usage and air quality and greenhouse gas emissions associated with operation of a new pump station. Additionally, this alternative would result in greater impacts related to a longer construction period, and would add permanent, significant noise impacts to a predominately rural area, which would need to be mitigated. This option would require additional ongoing maintenance related to maintenance of the pipeline and the pump station, which would add to local traffic. Recognizing the larger construction project, added power supply, and ongoing operational needs, this alternative would be

substantially more costly than the proposed project. For these reasons, the shallow-trench option has been eliminated from further consideration.

2.7.2 Micro-tunneling Alternative

The micro-tunneling alternative would use micro-tunneling technology to place the new pipeline under the existing access road. This alternative would tunnel under the access road to avoid the need for a 40-foot deep trench required by the deep-trench road alignment option to achieve a gravity-flow alignment. The micro-tunneling alternative would require at least two vertical shafts to allow access to the tunnel drilling path. Each shaft would be 24 feet in diameter and 40 feet deep to accommodate the proposed drilling distances (450 feet, 500 feet, and 350 feet) that would be required for the micro-tunneling machine. Excavation of these shafts would require transporting specialized equipment to the site, and would result in removal of approximately 1,500 cy of spoil material. This methodology would also require a 60-inch diameter micro-tunneling boring machine. Micro-tunneling requires that the tunneling spoils be removed via a slurry system of flexible piping taking excavated materials to slurry processing centrifuges above ground. Operation of this slurry system would require continuous operation of engine generators during construction. Approximately 1,250 cy of wet tunnel spoils would need to be hauled off-site in addition to the 1,500 cy of spoil material from the shafts. Approximately 1,500 cy of soil material would need to be hauled to the project site to backfill the shafts following construction. Therefore, this alternative would result in 425 additional truck trips compared to the proposed project assuming 10-wheeler dump trucks (150 trips off-hauling shaft spoils, 150 trips backfilling shafts, 125 trips off-hauling wet tunnel spoils).

This alternative would require continuous dewatering of groundwater from the shafts and tunnel drilling path for the duration of construction (approximately 130 days), whereas the project would require dewatering of a 50-foot work area each day for up to 40 working days. The continuous dewatering associated with this alternative would require installation of approximately 50 dewatering wells to pump approximately 25 gallons per minute, and a bypass system to transport well water downstream. Dewatering would also require continuous operation of several engine generators for the duration of construction.

As with the construction options discussed above, the micro-tunneling alternative would reduce disturbance of biological resources within Los Gatos Creek, including wetlands, riparian areas, and special-status species, and potential water quality impacts associated with work in the creekbed. However, compared to the proposed project, the micro-tunneling alternative would result in an increase in greater temporary impacts during construction, particularly related to continuous dewatering and slurry removal, as well as greater traffic impacts and air quality and greenhouse gas emissions related to continuous operation of several generators during construction, additional construction equipment operation, and 425 additional truck trips during construction. Construction of this alternative would require much larger equipment compared to the proposed project, that would result in issues with ingress and egress on the narrow roads and clearance with overhead powerlines in the project area. Additionally, this alternative would result in greater impacts related to a longer construction period. For these reasons and the substantial additional cost, the micro-tunneling alternative has been eliminated from further consideration.

2.8 OTHER RELATED PROJECTS

2.8.1 Ostwald Dam Operation and Diversion

A separate LSAA is currently being sought for operation of Ostwald Dam and water diversion from Los Gatos Creek to develop target flows in compliance with Fish and Game Code Section 5937. This section requires bypass flows to keep fish in good condition. The operation of Ostwald Dam and diversion from Los Gatos Creek would be analyzed independently from the proposed project. The proposed project would replace the existing pipeline used for water diversion from Ostwald Dam; its replacement would be needed regardless of

whether existing flows are revised or not. The proposed pipeline replacement would not result in any changes in diversion or flows (post-construction) from Los Gatos Creek nor influence the decision about target flows. Therefore, the projects have independent utility and dam operations and diversion will be evaluated under a separate CEQA document and LSAA.

2.8.2 Los Gatos Creek Watershed Maintenance Program

A separate LSAA is also being sought for the Los Gatos Creek Watershed Maintenance Program (Watershed Maintenance Program). The Public Draft EIR for the Watershed Maintenance Program was released in March 2017. This program includes SJWC's ongoing routine maintenance activities for their facilities and lands within the Los Gatos Watershed, including Los Gatos Creek. Activities, such as, dam maintenance, vegetation removal, sediment removal, erosion repair, access road maintenance, and culvert and fence repair, are covered under this program. The proposed pipeline replacement would be needed regardless of the Watershed Maintenance Program and would not result in changes to this program. Therefore, the projects have independent utility. The Watershed Maintenance Program has been evaluated under a separate CEQA document and will be covered under a separate LSAA.

3 ENVIRONMENTAL CHECKLIST

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a “Potentially Significant Impact” as indicated by the checklist on the following pages.

- | | | |
|---|---|--|
| <input type="checkbox"/> Aesthetics | <input type="checkbox"/> Agriculture and Forest Resources | <input type="checkbox"/> Air Quality |
| <input type="checkbox"/> Biological Resources | <input type="checkbox"/> Cultural Resources | <input type="checkbox"/> Geology / Soils |
| <input type="checkbox"/> Greenhouse Gas Emissions | <input type="checkbox"/> Hazards & Hazardous Materials | <input type="checkbox"/> Hydrology / Water Quality |
| <input type="checkbox"/> Land Use / Planning | <input type="checkbox"/> Mineral Resources | <input type="checkbox"/> Noise |
| <input type="checkbox"/> Population / Housing | <input type="checkbox"/> Public Services | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Transportation / Traffic | <input type="checkbox"/> Tribal Cultural Resources | <input type="checkbox"/> Utilities / Service Systems |
| <input type="checkbox"/> Mandatory Findings of Significance | | <input checked="" type="checkbox"/> None with Mitigation |

DETERMINATION (To be completed by the Lead Agency)

On the basis of this initial evaluation:

- I find that the proposed project could not have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.
- I find that although the proposed project **COULD** have a significant effect on the environment, there **WILL NOT** be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.
- I find that the proposed project **MAY** have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.
- I find that the proposed project **MAY** have a “potentially significant impact” or “potentially significant unless mitigated” impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.
- I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier **EIR** or **NEGATIVE DECLARATION** pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier **EIR** or **NEGATIVE DECLARATION**, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature

Date

Gregg Erickson, Acting Regional Manager

California Department of Fish and Wildlife

3.1 AESTHETICS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
I. Aesthetics. Would the project:				
a) Have a substantial adverse effect on a scenic vista?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.1.1 Environmental Setting

Aesthetic resources are generally defined as both the natural and built features of the landscape that contribute to the public’s experience and appreciation of the landscape. Depending on the extent to which a project’s presence would negatively alter the perceived visual character and quality of the landscape, there may be impacts to aesthetic resources.

The project area has a high degree of visual quality that is characterized by steep, rugged topography and intact redwood forest (Exhibits 3.1-1 and 3.1-2). Los Gatos Creek that transverses the property contributes to the area’s high scenic quality. The project area is largely undeveloped, with the development being limited to Aldercroft Heights Road, Ostwald Dam, which consists of a rubber dam that extends across the width of Los Gatos Creek when inflated, and a bridge along Aldercroft Heights Road. The nearest residences are located approximately 2,000 feet northeast of the project area along Old Gold Mine Road.

The project area offers some scenic views of the stream and forest; however, it is not open to the public and access to these areas is limited by steep topography and dense vegetation. Views of the property from off-site are largely obscured by intervening vegetation and topography.

A portion of State Route (SR) 17, which is eligible for listing as a State-designated scenic highway (Caltrans 2011), is located approximately 2,000 feet northeast of the project area. In addition, Aldercroft Heights Road from Alma Bridge Road to Wrights Station Road is designated by Santa Clara County as a scenic road. However, views of the project area from the highway are completely blocked and from Aldercroft Heights Road are largely obscured by vegetation and topography.

Nighttime views in the project area are dark and generally free of light pollution. The only sources of nighttime light are surrounding residences located along Aldercroft Road. There are no sources of nighttime light or glare within the project area.



Source: Ascent Environmental 2017

Exhibit 3.1-1

Los Gatos Creek, Looking Southwest



Source: Ascent Environmental 2017

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Exhibit 3.1-2

Proposed Staging within the Project Area, Looking Northeast



3.1.2 Discussion

a) Have a substantial adverse effect on a scenic vista?

No impact. The proposed project is in a remote area surrounded by Coast redwood forest. The nearest residences are located approximately 2,000 feet northeast of the project area. The pipeline is on private property and although there may be unauthorized recreation use in the project vicinity, there are no public vistas in the area. In addition, changes in views associated with construction would be temporary, and the project area would be restored to its current condition following construction. Because the proposed project would not adversely affect a scenic vista, there would be no impact.

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

Less than significant. The project area is located near Aldercroft Heights Road, which is designated as a scenic roadway by Santa Clara County. However, views of the project area from this roadway are very limited, and the project is not located near, or visible from, any state scenic highways. In addition, changes in views during construction would be temporary and the project area would be restored to its current condition upon replacement of the pipeline, avoiding any permanent impacts to the viewshed. Therefore, this impact would be less than significant.

c) Substantially degrade the existing visual character or quality of the site and its surroundings?

Less than significant. The project area has a high degree of visual quality and construction of the project would result in changes to the visual character of the area. However, although construction equipment and disturbance of the site would be visible during construction, these changes in views would be temporary. Following construction, the project area would be restored to existing conditions, and the project would not degrade the existing visual character or quality of the project area and its surroundings. There are no residential uses within the immediate vicinity of the project and the project would not be visible from any public viewpoints. Therefore, this impact would be less than significant.

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

No impact. The project would include replacement of an existing pipeline and would not create any new sources of light or glare. Therefore, there would be no impact.

3.2 AGRICULTURE AND FOREST RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
II. Agriculture and Forest Resources.				
<p>In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997, as updated) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state’s inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.</p>				
<p>Would the project:</p>				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with existing zoning for agricultural use or a Williamson Act contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Result in the loss of forest land or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.2.1 Environmental Setting

Farmlands are mapped by the State of California Department of Conservation (DOC) under the Farmland Mapping and Monitoring Program (FMMP). The FMMP was created by the State of California to provide data on farmland quality for use by decision-makers in considering possible conversion of agricultural lands. Under the FMMP, land is delineated into the following eight categories: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban or Built-Up Land, Other Land, and Water. Mapping is conducted on a county-wide scale, with minimum mapping units of

10 acres unless otherwise specified. The project area is in a rural area within Los Gatos Creek, and is designated under the FMMP as Other Land (Exhibit 3.2-1) (DOC 2014).

3.2.2 Discussion

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No impact. The project area is not used for agricultural production and is designated as Other Land by the FMMP (DOC 2014). The project area does not contain any Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. Therefore, Important Farmland would not be converted to a non-agricultural use as a result of the project, and there would be no impact.

b) Conflict with existing zoning for agricultural use or a Williamson Act contract?

No impact. The project area is not subject to Williamson Act contract. Therefore, implementation of the project would not conflict with existing zoning for agricultural use or a Williamson Act contract. No impact would occur.

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

No impact. The project area is redwood forest. The project area is zoned as Hillside and is not zoned for Timberland Production. The project would include replacement of an existing pipeline and would not require any tree removal. No other changes to the environment would occur from implementation of the proposed project that would conflict with the existing zoning. Therefore, although the project area is forest land, the project would not conflict with existing zoning for forest land or timberland. There would be no impact.

d) Result in the loss of forest land or conversion of forest land to non-forest use?

No impact. Although surrounded by redwood forest, the proposed pipeline alignment and construction activities would be within Los Gatos Creek and would not include any tree removal or conversion of forest land to non-forest uses. Therefore, no impact would occur.

e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?

No impact. No forest or agricultural resources are located within or adjacent to the project area, and as discussed above in items a) through d), the project would not involve changes in the existing environment which, due to their location or nature, could result in conversion of forest land or agricultural land. Therefore, no impact would occur.

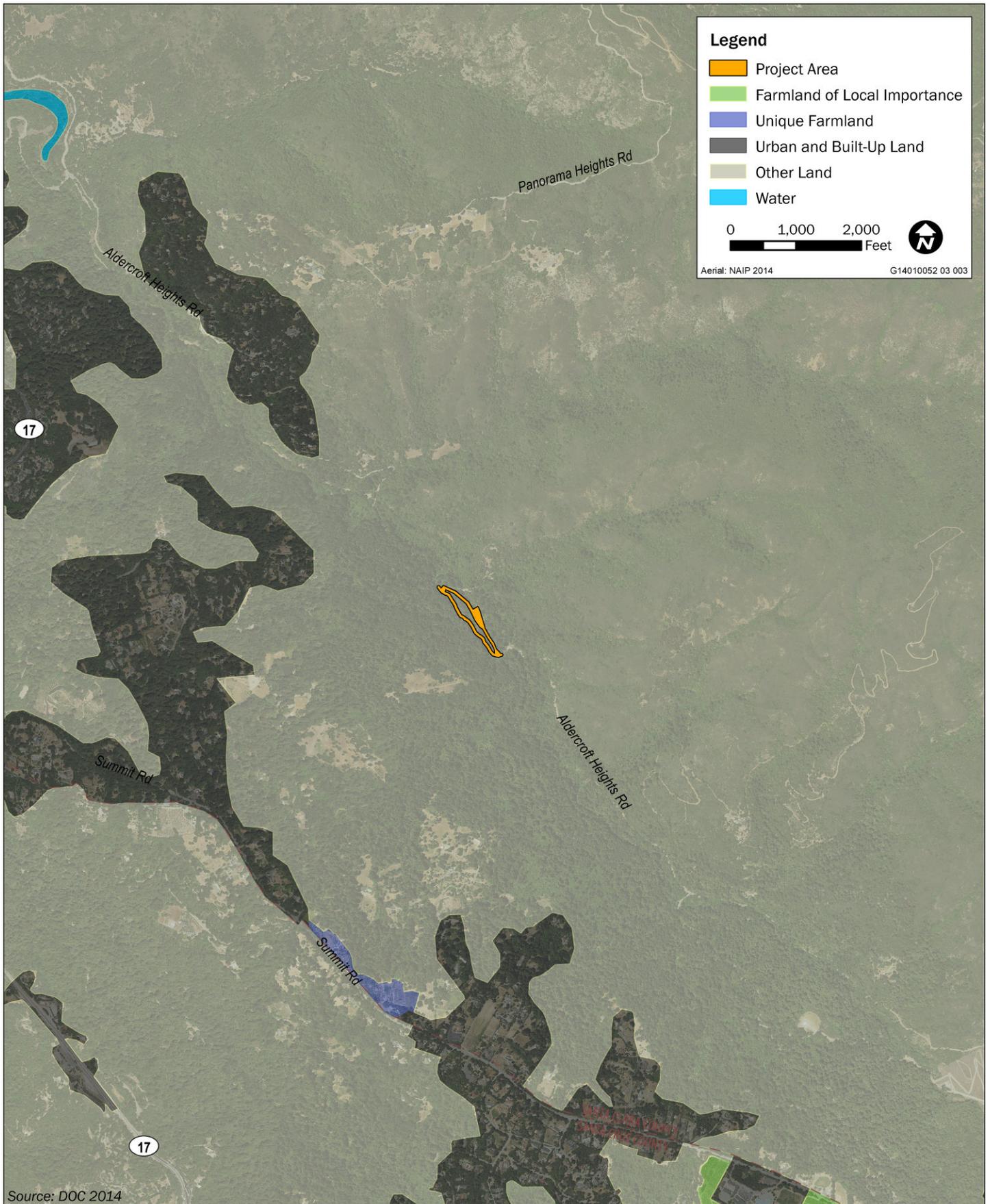


Exhibit 3.2-1

Important Farmland Classification



3.3 AIR QUALITY

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
III. Air Quality.				
Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied on to make the following determinations.				
Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Expose sensitive receptors to substantial pollutant concentrations?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e) Create objectionable odors affecting a substantial number of people?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

3.3.1 Environmental Setting

The ambient concentrations of air pollutant emissions are determined by the amount of emissions released by the sources of air pollutants and the atmosphere’s ability to transport and dilute such emissions. Natural factors that affect transport and dilution include terrain, wind, atmospheric stability, and sunlight. Therefore, existing air quality conditions in an area are determined by such natural factors as topography, meteorology, and climate, in addition to the amount of emissions released by existing air pollutant sources.

The project area is located within the San Francisco Bay Area Air Basin (SFBAAB). The SFBAAB includes all of Alameda, Contra Costa, Marin, Napa, San Francisco, Santa Clara, and San Mateo counties; the western portion of Solano County, and the southern portion of Sonoma County. The Bay Area Air Quality Management District (BAAQMD) is the local agency authorized to regulate stationary air quality sources in the SFBAAB. The federal Clean Air Act and the California Clean Air Act mandate the control and reduction of specific air pollutants. Under these Acts, the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) have established ambient air quality standards for specific "criteria" pollutants, designed to protect public health and welfare. Primary criteria air pollutants include carbon monoxide (CO), reactive organic gases (ROG), nitrogen oxides (NO_x), respirable particulate matter (PM₁₀), sulfur dioxide (SO₂), and lead. Secondary criteria pollutants include ozone (O₃) and fine particulate matter (PM_{2.5}).

The SFBAAB is designated as nonattainment with respect to the California Ambient Air Quality Standard (CAAQS) and the National Ambient Air Quality Standard (NAAQS) for ozone (CARB 2015). Ozone is not directly emitted into the air but is formed through complex chemical reactions between precursor emissions of ROG

and NO_x in the presence of sunlight. The SFBAAB is also designated as nonattainment with respect to the CAAQS for PM₁₀ and with respect to the CAAQS and NAAQS for PM_{2.5} (CARB 2015).

BAAQMD seeks to improve air quality conditions in the SFBAAB through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy of the BAAQMD includes the development of programs for the attainment of CAAQS and NAAQS, adoption and enforcement of rules and regulations, and issuance of permits for stationary sources. BAAQMD's *2017 Clean Air Plan* focuses on two goals: protecting public health and the climate. The *2017 Clean Air Plan* defines a strategy to: (1) reduce emissions of air pollutants that are most harmful to Bay Area residents; (2) reduce emissions of greenhouse gases to protect the climate; and (3) decrease emissions of carbon dioxide by reducing fossil fuel combustion (BAAQMD 2017b).

BAAQMD has developed a set of guidelines for use by lead agencies when preparing environmental documents (BAAQMD 2017a). The guidelines contain thresholds of significance for criteria air pollutants and toxic air contaminants (TACs), and make recommendations for conducting air quality analyses. BAAQMD's recommended thresholds are summarized in Table 3.3-1.

Table 3.3-1 BAAQMD Construction and Operational Phase Thresholds of Significance

Pollutant	Construction-Related	Operational-Related	
	Average Daily Emissions (lb/day)	Average Daily Emissions (lb/day)	Maximum Annual Emissions (tpy)
ROG	54	54	10
NO _x	54	54	10
PM ₁₀	82 (exhaust)	82	15
PM _{2.5}	54 (exhaust)	54	10
PM ₁₀ /PM _{2.5} (fugitive dust)	best management practices	None	
Local CO	None	9.0 ppm (8-hour average), 20.0 ppm (1-hour average)	
Risk and Hazards for New Sources and Receptors	Same as Operational Thresholds ¹	Increased cancer risk > 10 in 1 million Increased non-cancer risk > 1.0 Hazard index (Chronic or Acute)	
Odors	None	5 confirmed complaints per year averaged over three years	

Notes: BAAQMD = Bay Area Air Quality Management District; CO = carbon monoxide; lb/day = pounds per day; NO_x = oxides of nitrogen; PM₁₀ = respirable particulate matter; PM_{2.5} = fine particulate matter; ppm = parts per million; ROG = reactive organic compounds; tpy = tons per year.

¹ BAAQMD recommends that for construction projects that are less than 1-year duration should annualize impacts over the scope of actual days that peak impacts are to occur, rather than the full year.

Source: BAAQMD 2017a:2-2.

If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in a significant adverse air quality impact to the region's existing air quality conditions. Therefore, additional analysis to assess cumulative impacts is unnecessary (BAAQMD 2017a).

3.3.2 Discussion

a) Conflict with or obstruct implementation of the applicable air quality plan?

Less than significant. The emission inventories used to develop a region's air quality attainment plans are based primarily on projected population growth and vehicle miles traveled (VMT) for the region, which are based, in part, on the planned growth identified in regional and community plans. Therefore, projects that would result in increases in population or employment growth beyond that projected in regional or community plans could result in increases in VMT above that planned in the attainment plan, further resulting in mobile-source emissions that could conflict with a region's air quality planning efforts. Increases in VMT beyond that projected in area plans generally would have a significant adverse incremental effect on the region's ability to attain or maintain the CAAQS and/or NAAQS.

The project includes replacing an existing water pipeline with a new ductile iron pipeline. Thus, as a replacement project, the proposed project would not generate increased capacity to deliver water or demand for any new permanent employees or result in an increase in visitors or associated vehicle trips (e.g., employee trips, visitation trips). Operation of the project would include routine maintenance similar to what occurs under existing conditions and would not increase the VMT associated with operation of the pipeline. In addition, operation of the new pipeline would not result in an increase in population or employment growth that would increase VMT.

Thus, implementation of the proposed project would not conflict with or obstruct implementation of any air quality planning efforts. As a result, this impact would be less than significant.

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Less than significant. The project would not result in an increase in long-term operational emissions because the replacement of an existing 30-inch diameter pipeline would not introduce new emissions sources to the SFBAAB or an increased level of vehicle activity. Emissions would, however, be generated during project construction. Construction for replacement of the pipeline is scheduled to begin in mid-May 2018 and take approximately 6 to 8 weeks to complete. Construction activities would generally take place from Monday through Friday during normal daytime working hours. Approximately eight workers would be on-site during construction, and there would be up to two deliveries for materials per day. Excavation and replacement of the existing pipeline would require the operation of heavy-duty construction equipment: a front loader, a small crane, and an excavator. Cut and fill would be balanced on-site.

Emissions of ROG and NO_x would be primarily associated with exhaust generated (e.g., gas and diesel) by off-road construction equipment, truck trips used to deliver materials, and passenger vehicles used for commuting. Fugitive PM₁₀ and PM_{2.5} dust emissions would be associated primarily with ground-disturbance activities during excavation and site preparation and would vary as a function of such parameters as soil silt content, soil moisture, wind speed, size of disturbance area, and the amount of vehicle travel across paved and unpaved surfaces. Exhaust emissions from diesel equipment, haul truck trips, and worker commute trips would also contain nominal levels of PM₁₀ and PM_{2.5}.

Construction-related emissions were estimated using the Road Construction Emissions Model (Sacramento Metropolitan Air Quality Management District [SMAQMD] 2016). The Road Construction Emissions Model is recommended to assess the emissions for linear construction projects and allows for the input of project-specific information. This model was developed by SMAQMD but is approved by BAAQMD as well as other air districts in California.

Table 3.3-2 summarizes the modeled construction-related emissions of criteria air pollutants and precursors for the project. Refer to Appendix A for detailed modeling input parameters and results.

Table 3.3-2 Summary of Construction-Generated Emissions of Criteria Air Pollutants and Precursors

	Average Daily Emissions (lb/day)					
	ROG	NO _x	PM ₁₀ (exhaust)	PM ₁₀ (fugitive dust)	PM _{2.5} (exhaust)	PM _{2.5} (fugitive dust)
Total Construction Emissions	2	24	1	<1	1	<1
BAAQMD Thresholds of Significance	54	54	82	None	54	None
Significant Impact?	No	No	No	N/A	No	N/A

Notes: N/A = not applicable; NO_x = oxides of nitrogen; ROG = reactive organic gases; PM₁₀ = respirable particulate matter; PM_{2.5} = fine particulate matter; lb/day = pounds per day. Refer to Appendix A for detailed assumptions and modeling output files.

Source: Modeling conducted by Ascent Environmental in 2017.

As shown in Table 3.3-2, construction-generated emissions of ROG, NO_x, PM₁₀, and PM_{2.5} would not exceed the thresholds of significance adopted by BAAQMD. Thus, the emissions of criteria air pollutants and precursors generated by project construction would not contribute to the nonattainment status of the BAAQMD for any criteria air pollutants.

Fugitive dust emissions, however, including emissions of PM₁₀ and PM_{2.5}, would be generated by ground disturbance and earth moving activities (i.e., excavation, grading), as well as travel by haul trucks, vehicles, and equipment on dirt roadways and other unpaved surfaces. Fugitive dust emissions would vary as a function of soil silt content, soil moisture, wind speed, and the area of disturbance. As discussed in Chapter 2, "Project Description and Background," the project would implement the following "Basic Construction Mitigation Measures Recommended for All Proposed Projects" in accordance with BAAQMD requirements to minimize fugitive dust and other particulate emissions:

- ▲ All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day with water hauled to the site via water truck (rather than drawn from the creek).
- ▲ All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- ▲ All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.
- ▲ Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points.
- ▲ All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- ▲ A publicly visible sign shall be posted at the site with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations (BAAQMD 2017a:8-4).

In summary, because construction-generated emissions of ozone precursors, ROG and NO_x, would not exceed applicable mass emission thresholds established by BAAQMD, these emissions would not violate or contribute to ozone concentrations that exceed the NAAQS and CAAQS for ozone. Moreover, because BAAQMD-recommended dust control measures would be implemented during project construction, fugitive emissions of PM₁₀, and PM_{2.5} would not violate or contribute substantially to the nonattainment status with respect to the CAAQS for PM₁₀ or with respect to the CAAQS and NAAQS for PM_{2.5} in the SFBAAB. As a result, this impact would be less than significant.

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

Less than significant. As discussed under item b) above, the project would not result in an increase in long-term operational emissions because the project would not introduce new emission sources to the SFBAAB or an increased level of vehicle activity. SFBAAB is designated as nonattainment with respect to the CAAQS and the NAAQS for ozone and PM_{2.5}; nonattainment for the CAAQS for PM₁₀; and unclassified for the NAAQS for PM₁₀. Past, present, and future development projects contribute to the adverse air quality in the SFBAAB on a cumulative basis. By its very nature, air pollution throughout the BAAQMD is a cumulative impact. A project's individual emissions can contribute to existing cumulatively significant adverse air quality impacts. As explained in BAAQMD's guidance, if a project's contribution to the cumulative impact is considerable, then the project's impact on air quality would be significant. In developing thresholds of significance for air

pollutants, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable (BAAQMD 2017a:2-1). If project-related emissions do not exceed the identified significance thresholds, including BAAQMD's air quality CEQA thresholds of significance of 54 pounds per day (lb/day) for ROG or NO_x, 82 lb/day for PM₁₀ exhaust, and 54 lb/day for PM_{2.5} exhaust, its emissions would not be cumulatively considerable, and would not result in significant adverse air quality impacts. As discussed in the analysis under item b) above, with implementation of BAAQMD's "Basic Construction Mitigation Measures Recommended for All Proposed Projects" to minimize fugitive dust emissions generated during project construction, the project would not contribute to a localized exceedance of the CAAQS and NAAQS for of PM₁₀ and PM_{2.5}. As a result, project-generated emissions of criteria air pollutants and precursors would not be cumulatively considerable. This impact would be less than significant.

d) Expose sensitive receptors to substantial pollutant concentrations?

Less than significant. The closest sensitive receptor to the project area is a residence located approximately 2,000 feet to the northeast. As discussed in item b) above, the project would not result in regional (e.g., ROG, NO_x, PM₁₀, and PM_{2.5}) emissions of criteria air pollutant or precursors that would exceed applicable BAAQMD-adopted thresholds of significance. Further, the project would implement control measures in accordance with BAAQMD requirements to minimize fugitive PM₁₀ and PM_{2.5} dust. Thus, project-generated emissions of criteria air pollutant and precursors would not expose sensitive receptors to substantial pollutant concentrations.

Construction-related activities would result in temporary, short-term project-generated emissions of diesel particulate matter from the exhaust of off-road, heavy-duty diesel equipment for site preparation and excavation. Particulate exhaust from diesel-fueled engines (i.e., diesel PM) was identified as a TAC by the CARB in 1998. As a TAC, diesel PM is an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations. The potential cancer risk from the inhalation of diesel PM outweighs the potential for all other health impacts (CARB 2003). Based on the construction emission estimates presented in Table 3.3-2 above, maximum daily exhaust emissions of PM₁₀, considered a surrogate for diesel PM, would be 1 lb/day during construction. Because the project is linear in nature, the same sensitive receptors would not be exposed to construction-generated diesel PM during the entire construction period. Considering the highly dispersive properties of diesel PM, the relatively low level of diesel PM emissions that would be generated during project construction, and the relatively short duration of construction activities, construction-related TAC emissions would not expose sensitive receptors to an incremental increase in cancer risk that exceeds 10 in 1 million or a hazard index greater than 1.0. No new operational-related TAC emissions would occur and the project's operation would not expose sensitive receptors to an incremental increase in cancer risk. Thus, this impact would be less than significant.

e) Create objectionable odors affecting a substantial number of people?

Less than significant. The occurrence and severity of odor impacts depend on numerous factors, including the nature, frequency, and intensity of the source; wind speed and direction; and the presence of sensitive receptors. Although offensive odors rarely cause physical harm, they may still be very unpleasant, leading to considerable distress and often generating citizen complaints to local governments and regulatory agencies.

The project would not involve the development or relocation of any sensitive receptors in proximity to an existing odor source. Also, the project would not introduce any major odor source for which BAAQMD has established a recommended screening distance (e.g., wastewater treatment facilities, landfills, composting facilities). Replacement of an existing pipeline would not introduce new, permanent sources of objectionable odors.

During construction, the operation of diesel-powered vehicles and heavy-duty equipment may generate temporary, localized odors from equipment exhausts. However, such emissions would be short-term and would dissipate rapidly with increasing distance from the source. Furthermore, there are no sensitive receptors located within the immediate project vicinity. This impact would be less than significant.

3.4 BIOLOGICAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. Biological Resources. Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.4.1 Environmental Setting

This section describes the environmental setting for biological resources and discusses the potential effects from project implementation on those resources. The project area encompasses approximately 2.89 acres and is defined as the area where direct, project-related construction, access, and staging would occur or permanent features would be developed, as well as adjacent areas that may be indirectly affected by project activities.

The environmental setting description and analysis is based on a reconnaissance-level field survey by Ascent Environmental on March 14, 2017, a wetland delineation conducted by Denise Duffy and Associates (DD&A) biologists on February 17, 2015, the *Ostwald Pipeline Replacement Project Biological Assessment* (SJWC 2015), and a Foothill yellow-legged frog (*Rana boylei*) habitat assessment conducted by Sarah Kupferberg on September 20, 2017. Surveys by DD&A included delineation of jurisdictional wetlands and waters of the United States, identification and mapping of habitat types within the survey area, evaluation of the potential

for sensitive biotic resources, and the evaluation of project impacts. Information provided by DD&A, as a consultant to the applicant, has been subject to independent review and analysis by Ascent Environmental, under contract to CDFW. Additional information was obtained from biological resource databases, including the California Natural Diversity Database (CNDDDB); the California Native Plant Society (CNPS) Inventory; and the U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation System (IPaC).

The project is located approximately 4.5 miles south of the Town of Los Gatos within the main stem of Los Gatos Creek, approximately 2 miles upstream from Lexington Reservoir and 2 miles downstream of Lake Elsmar, in Santa Clara County, California (Exhibit 2-1). Los Gatos Creek is located in the Guadalupe River Watershed and is a tributary of the Guadalupe River.

LAND COVER TYPES

Four land cover types were identified during the reconnaissance-level survey of the project area:

- ▲ Redwood Forest - 0.87 acre,
- ▲ Open Water - 0.76 acre,
- ▲ Ruderal Grassland - 0.69 acre, and
- ▲ Developed/Disturbed - 0.56 acre.

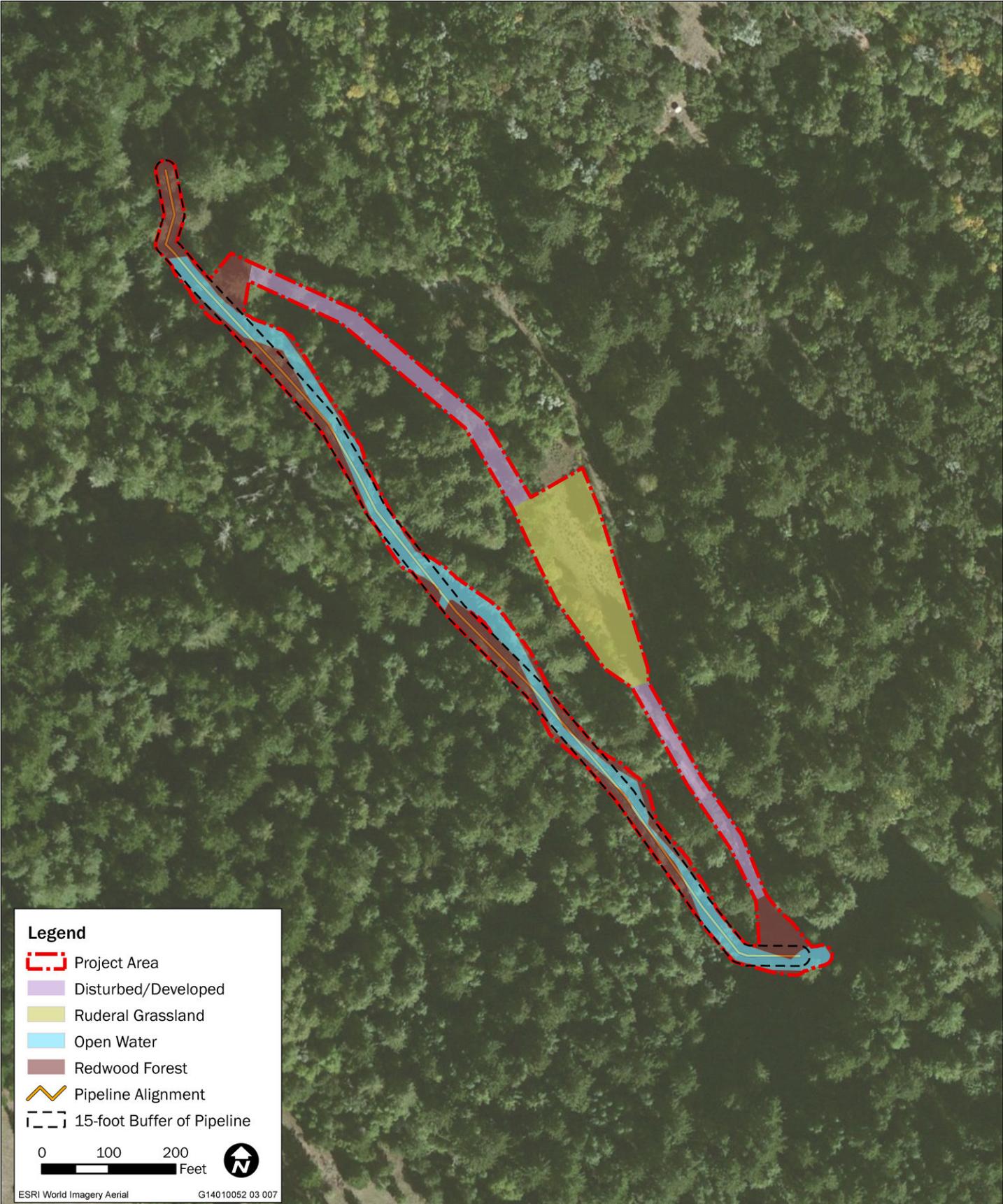
A brief description of each land cover type can be found below along with the special-status species with the potential to occur within each land cover type. Each description also notes if the land cover type is considered a sensitive natural community by CDFW. Sensitive natural communities are defined by CDFW as communities that are of limited distribution statewide or within a county or region and often vulnerable to environmental effects of projects (CDFG 2009).

Redwood Forest

Approximately 0.87-acre of redwood forest occurs within the project area (Exhibit 3.4-1). Redwood forest is classified as redwood forest alliance in the Manual of California Vegetation and is identified by CDFW as a sensitive natural community (Sawyer et al. 2009). Redwood forest is the dominant land cover type and is located throughout the project area. Dominant species in the canopy include Coast redwood (*Sequoia sempervirens*), California bay laurel (*Umbellularia californica*), tanoak (*Notholithocarpus densiflorus*), and interior live oak (*Quercus wislizeni*). Dominant species present in the understory include Bermuda buttercup (*Oxalis pes-caprae*), chain fern (*Woodwardia fimbriata*), sword fern (*Polystichum* sp.), English ivy (*Hedera helix*), California blackberry (*Rubus ursinus*), and periwinkle (*Vinca* sp.).

Common wildlife species expected to occur within the redwood forest habitat include California ground squirrel (*Otospermophilus beecheyi*), raccoon (*Procyon lotor*), California slender salamander (*Batrachoseps attenuates*), western terrestrial garter snake (*Thamnophis elegans*), and banana slug (*Ariolimax columbianus*). Suitable nesting habitat for raptors and other avian species is present within redwood forest habitat. These include Cooper's hawk (*Accipiter cooperii*) and osprey (*Pandion haliaetus*), as well as purple martin (*Progne subis*). Trees that are either hollow or contain crevices provide potential roosting habitat for common bat species including hoary bat (*Lasiurus cinereus*), Long-eared myotis (*Myotis evotis*), and Yuma myotis (*Myotis yumanensis*).

Special-status wildlife with the potential to occur within the redwood forest habitat include Santa Cruz black salamander (*Aneides flavipunctatus niger*), California giant salamander (*Dicamptodon ensatus*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), and San Francisco dusky-footed woodrat (*Neotoma fuscipes*), which are CDFW Species of Special Concern. Special-status plants with the potential to occur within the redwood forest habitat include western leatherwood (*Dirca occidentalis*), marsh microseris (*Microseris paludosa*), and Santa Cruz microseris (*Stebbinsoseris dicipiens*).



Source: DD&A 2017. Compiled by Ascent Environmental in 2017

Exhibit 3.4-1

Land Cover Types



Open Water

Approximately 0.76 acre of open water/stream channel occurs within the project area (Exhibit 3.4-1). Aquatic habitat within streams, rivers, or sloughs is referred to as open-water habitat. The amount of open water within the stream channel varies throughout the year and from one year to the next, but for purposes of this analysis, the area within the ordinary high-water mark of Los Gatos Creek is identified as open water. Open-water habitat is characterized by the water column of the active flow channel where fish and aquatic invertebrates can forage, migrate, and breed. Los Gatos Creek within the project area provides habitat for a variety of fish, including the following native species: California roach (*Hesperoleucus symmetricus*), hitch (*Lavinia exilicauda*), Pacific lamprey (*Lampetra tridentata*), and riffle sculpin (*Cottus gulosus*) (Smith 2013).

A number of non-native fish species have been detected in Los Gatos Creek including bluegill (*Lepomis macrochirus*), brown bullhead (*Ictalurus nebulosus*), carp (*Cyprinus carpio*), green sunfish (*Lepomis cyanellus*), goldfish (*Carassius auratus*), largemouth bass (*Micropterus salmoides*), mosquito fish (*Gambusia affinis*), pumpkinseed (*Lepomis gibbosus*), and red shiner (*Notropis lutrensis*) (Smith 2013).

Suitable habitat for California red-legged frog (*Rana draytonii*), a federally-listed species and CDFW Species of Special Concern, is present within the open-water habitat type. A known occurrence of California red-legged frog dating to 1989 (CNDDDB 2017) is documented within the project area. In addition, western pond turtle (*Emys marmorata*), and California giant salamander, which are CDFW Species of Special Concern, are likely to be present. This habitat is considered sensitive by resources agencies and is subject to the regulatory jurisdiction under Section 404 the Clean Water Act (CWA) and Section 1602 of the California Fish and Game Code.

Ruderal Grassland

Approximately 0.69 acre of ruderal grassland land cover type occurs within the project area (Exhibit 3.4-1). Ruderal grassland within the project area occurs in a previously disturbed area that is reverting to natural conditions. Ruderal grassland typically supports non-native weedy plant species including ripgut brome (*Bromus diandrus*), wildoats (*Avena fatua*), farmer's foxtail (*Hordeum murinum* ssp. *leporinum*), black mustard (*Brassica nigra*), stork's bill (*Erodium botrys*), wild geranium (*Geranium dissectum*), milk thistle (*Silybum marianum*), English plantain (*Plantago lanceolata*), and French broom (*Genista monspessulana*). Ruderal grassland within the project area supports a large area of French broom.

Common wildlife species expected to occur in this habitat type include gopher, vole, mourning dove (*Zenaidura macroura*), house finch (*Carpodacus mexicanus*), American kestrel (*Falco sparverius*), cottontail (*Sylvilagus audubonii*) and mule deer (*Odocoileus hemionus columbianus*).

Developed/Disturbed

Approximately 0.56 acre of developed/disturbed land cover type occurs in the project area (Exhibit 3.4-1). This land cover type is associated with the existing roads (paved and gravel) that occur in the project area. Vegetation within this land cover type is minimal and consist of ruderal vegetation along the road shoulders as well as, common plant species associated with adjacent land cover types.

Common wildlife species associated with this land cover type, include species that are habituated to urbanized and developed/disturbed habitats such as raccoon, striped skunk (*Mephitis mephitis*), coyote (*Canis latrans*), California ground squirrel, mule deer, American robin (*Turdus migratorius*), and Steller's jay (*Cyanocitta stelleri*).

SPECIAL-STATUS SPECIES

Special-status species include plants and animals in the following categories:

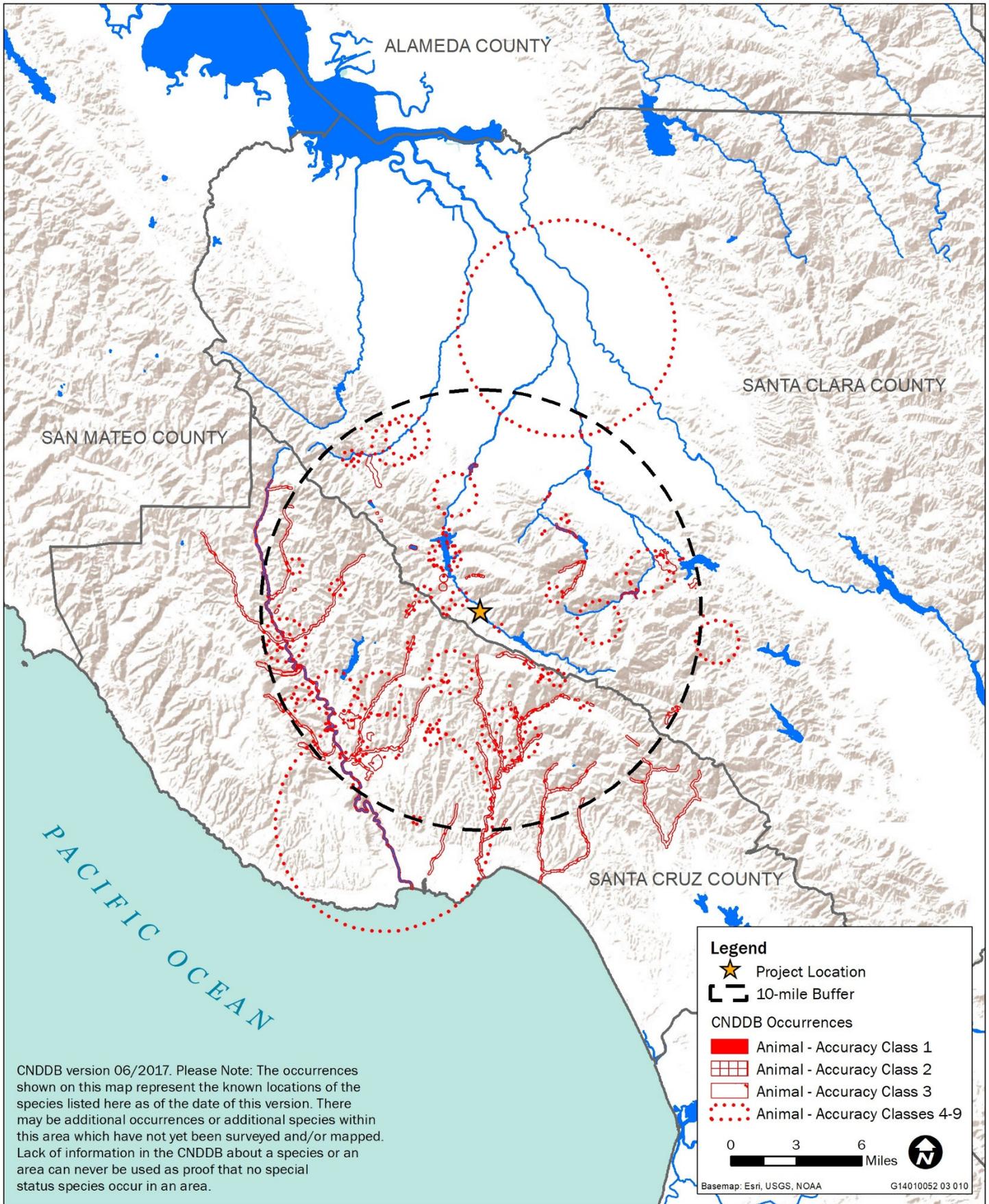
- ▲ species officially listed by the State of California or the Federal government as endangered, threatened, or rare;

- ▲ candidates for state or Federal listing as endangered or threatened;
- ▲ taxa (i.e., taxonomic categories or groups) that meet the criteria for listing, even if not currently included on any list, as described in California Code of Regulations (CCR) Section 15380 of the State CEQA Guidelines;
- ▲ species identified by CDFW as Species of Special Concern;
- ▲ species listed as Fully Protected under the California Fish and Game Code;
- ▲ species afforded protection under local or regional planning documents; and
- ▲ taxa considered by CDFW to be “rare, threatened, or endangered in California” and assigned a California Rare Plant Rank (CRPR). The CNPS system includes six rarity and endangerment ranks for categorizing plant species of concern, which are summarized as follows:
 - CRPR 1A - Plants presumed to be extinct in California;
 - CRPR 1B - Plants that are rare, threatened, or endangered in California and elsewhere;
 - CRPR 2A - Plants presumed to be extinct in California, but more common elsewhere;
 - CRPR 2B - Plants that are rare, threatened, or endangered in California, but more common elsewhere;
 - CRPR 3 - Plants about which more information is needed (a review list); and
 - CRPR 4 - Plants of limited distribution (a watch list).

All plants with a CRPR designation are considered "special plants" by CDFW. The term “special plants” is a broad term used by CDFW to refer to all of the plant taxa inventoried in the CNDDDB, regardless of their legal or protection status. Plants ranked as CRPR 1A, 1B, 2A, and 2B may qualify as endangered, rare, or threatened species within the definition of State CEQA Guidelines Section 15380. CDFW recommends that potential impacts to CRPR 1 and 2 species be evaluated in CEQA documents. In general, CRPR 3 and 4 species do not meet the definition of endangered, rare, or threatened pursuant to State CEQA Guidelines Section 15380.

The term “California Species of Special Concern” is applied by CDFW to animals not listed under the California Endangered Species Act (CESA), but that are nonetheless declining at a rate that could result in listing, or that historically occurred in low numbers and have known threats to their persistence.

Current agency status information was obtained from the USFWS (USFWS 2017) and CDFW (CNDDDB 2017) for species that are listed, proposed for listing, or are candidates for listing as threatened or endangered under the FESA or the CESA, or are CDFW Species of Special Concern.” RareFind Reports (CNPS 2017) from the CNDDDB were reviewed for special-status species occurrences in the United States Geological Survey (USGS) quadrangle containing the project area (Los Gatos quadrangle), and the eight surrounding quadrangles (Cupertino, San Jose West, San Jose East, Castle Rock Ridge, Santa Teresa Hills, Felton, Laurel, and Loma Prieta). The database query results are included in Appendix B. Based on these lists, field surveys, and review of relevant literature, a table was created detailing special-status plant and wildlife species known to occur or with the potential to occur within the project vicinity, along with their legal status, habitat requirements, and potential to be affected by the project (see Appendix B). Exhibit 3.4-2 displays CNDDDB Geographic Information System (GIS) occurrence data within and adjacent to the project area. Species documented as known or with the potential to occur in the project area, based on comparing geographic ranges and habitat requirements of the species and habitat conditions in the project area, are discussed further below. All other species are assumed absent based on the species-specific rationale provided in Appendix B.

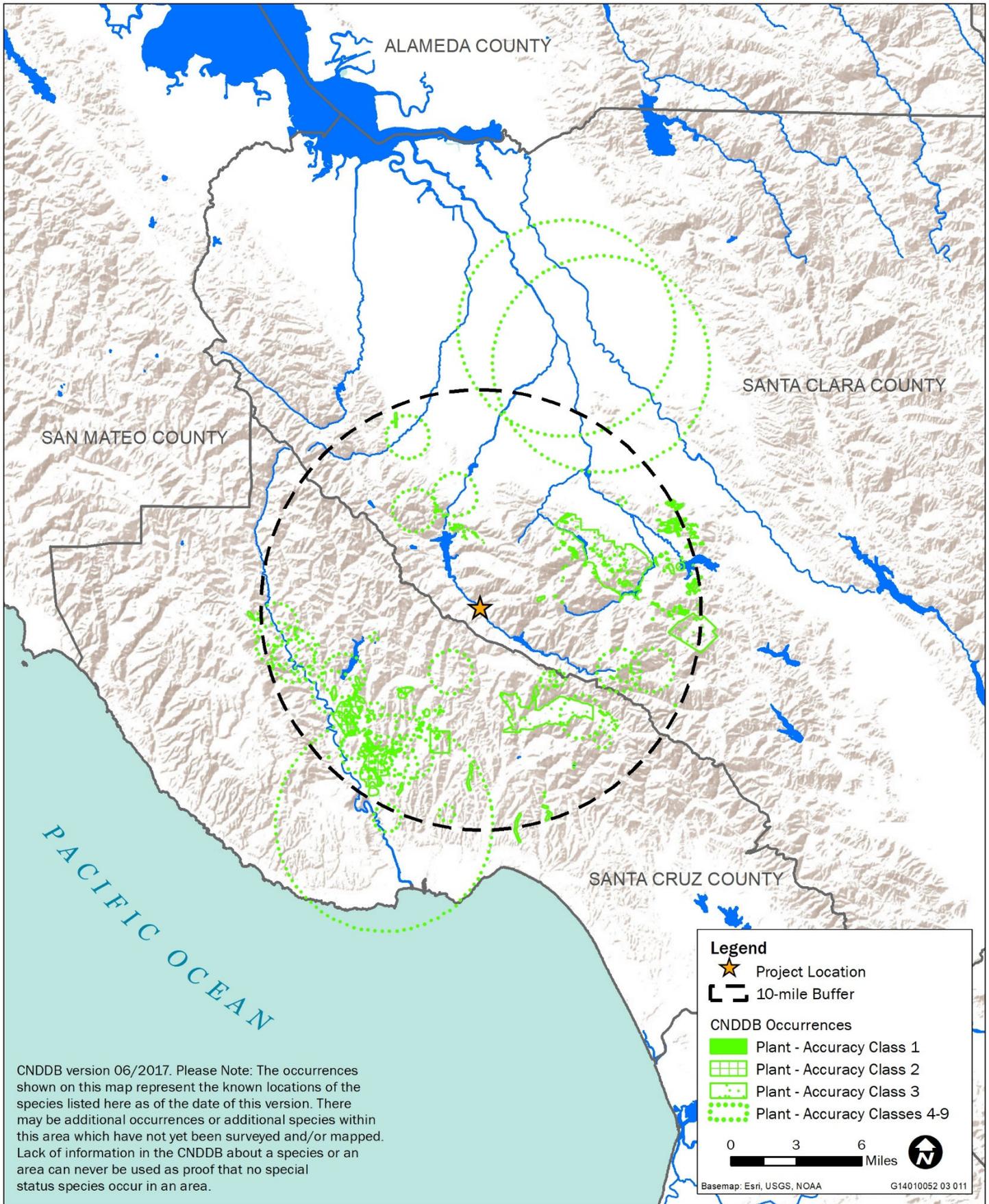


CNDDDB version 06/2017. Please Note: The occurrences shown on this map represent the known locations of the species listed here as of the date of this version. There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Lack of information in the CNDDDB about a species or an area can never be used as proof that no special status species occur in an area.

Exhibit 3.4-2

Special-status Species (Animals) within 10 Miles of the Project Area





CNDDDB version 06/2017. Please Note: The occurrences shown on this map represent the known locations of the species listed here as of the date of this version. There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Lack of information in the CNDDDB about a species or an area can never be used as proof that no special status species occur in an area.

Exhibit 3.4-3

Special-status Species (Plants) within 10 Miles of the Project Area



Special-Status Plant Species

Fifty-three special-status plant species have been documented within the USGS quadrangles evaluated. Fifty of the 53 special-status plant species are not expected to occur within the project area, because of the species-specific characteristics presented in Appendix B. Suitable habitat for western leatherwood, marsh microseris, and Santa Cruz microseris is present within the project area.

Special-Status Wildlife Species

Several special-status wildlife species that have the potential to occur within or adjacent to the project area include Santa Cruz black salamander, California giant salamander, California red-legged frog, western pond turtle, San Francisco dusky-footed woodrat, pallid bat, and Townsend's big-eared bat. Additionally, suitable nesting and foraging habitat exists within the project area for several raptors and other avian species protected under the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code, including Cooper's hawk, osprey, and great-horned owl (*Bubo virginianus*). No other special-status wildlife species, beyond those listed above, are known or expected to occur at the project area or vicinity, based on the species-specific analysis presented in Appendix B.

Foothill yellow-legged frog recently became a State candidate for listing as threatened under CESA and is a CDFW Species of Special Concern. A habitat assessment was conducted on September 21, 2017, within the project area to determine habitat suitability for foothill yellow-legged frog (Kupferber 2017). No foothill yellow-legged frogs were observed within the project area during the assessment. Because the project area lacks connectivity via stream course to the nearest known localities of foothill yellow-legged frog and there are upstream and downstream impoundments, the species is not likely to be present in or successfully colonize the project area. In addition, while the project area may provide some habitat for adult frogs of the species, the low light and low productivity of the area would make it unsuitable for tadpoles, which rely on periphytic algae as a food source. Thus, the project area does not provide suitable breeding and rearing habitat for the species, and it is unlikely that a self-sustaining population would become established in the project area (Kupferberg 2017). Because the project area provides little or no suitable habitat for the key life stages of the species, and the species is not expected to occur in the area, the project would not have a substantial adverse effect, either directly or through habitat modifications on foothill yellow-legged frog.

Sensitive Habitats

Sensitive habitats include those that are of special concern to resource agencies or are afforded specific consideration through CEQA Guidelines, Section 1602 of the California Fish and Game Code, Section 404 of the CWA, and the State's Porter-Cologne Act. Sensitive natural habitat may be of special concern to these agencies and conservation organizations for a variety of reasons, including their locally or regionally declining status, or because they provide important habitat to common and special-status species. Sensitive habitats often provide other important ecological functions, such as enhancing flood and erosion control and maintaining water quality.

CDFW maintains a list of plant communities that are native to California. Within that list, CDFW identifies special-status (or sensitive) natural communities, which are communities that are of limited distribution statewide or within a county or region and often vulnerable to environmental effects of projects (CDFG 2009). Redwood forest is a sensitive natural community as identified by CDFW.

Wetlands and Other Waters of the United States

The San Francisco Bay is a navigable water and as such, tributaries conveying waters to it have the potential to be federally jurisdictional. Los Gatos Creek has a hydrologic connection to the Guadalupe River, which then empties into San Francisco Bay through Alviso Slough. As a result, wetlands within or adjacent to the Los Gatos Creek have the potential to be federally jurisdictional. Within the survey area 0.76 acres of potential other Waters of the United States was documented along the approximately 1,600 linear feet within Los Gatos Creek (Appendix C).

3.4.2 Discussion

- a) **Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?**

Less than significant with mitigation. Special-status plant and wildlife species are known to or could occur in the project area. Western leatherwood, marsh microseris, and Santa Cruz microseris are the only special-status plant species with the potential to occur within the project area, based on their species-specific characteristics and habitat needs. The project area has suitable habitat for Townsend's big-eared bat, pallid bat, San Francisco dusky-footed woodrat, Santa Cruz black salamander, California giant salamander, western pond turtle, and California red-legged frog. Special-status plants and wildlife that are not expected to occur in the project area and/or be affected by project activities, including foothill yellow-legged frog, are described above.

Special-Status Plants

Construction activities associated with the removal of the existing pipeline and installation of the new pipeline, including minor pruning of some lower hanging limbs extending into the project area, particularly near the staging areas, and trenching within the Los Gatos Creek corridor, could result in impacts to these species, if they are present. Impacts could include trampling, crushing, burying, or removal. This impact would be potentially significant.

Mitigation Measure 3.4-1a

To avoid or reduce impacts to special-status plants, SJWC shall retain a qualified botanist to conduct protocol special-status plant surveys for potentially occurring species during the appropriate survey periods (January–March for western leatherwood, April–June for marsh microseris, and April–May for Santa Cruz microseris), based on the blooming or identification period, preceding the start of construction. All plant species encountered in the project area shall be identified to the taxonomic level necessary to determine species status. The surveys shall be conducted no later than the blooming period immediately preceding project-related vegetation removal or ground disturbing activities, including grubbing or clearing. If no special-status plant species are found, then a mitigation and monitoring plan and compensation for the loss of special-status plant species are not required.

If special-status plant species are identified within the area of potential impact, they shall be avoided and protected during construction activities to the fullest extent possible. If avoidance is not feasible, SJWC shall prepare a mitigation and monitoring plan to protect special-status plant populations or compensate for the loss of special-status plant species found during preconstruction surveys. SJWC shall consult with CDFW on development of appropriate mitigation measures for impacts to any special-status plant populations and shall submit the mitigation and monitoring plan to CDFW for review and approval. Mitigation measures may include preserving and enhancing existing on-site populations, restoration and replanting on-site populations following project completion, creation of off-site populations on project mitigation sites through seed collection or transplantation, and/or preserving occupied habitat off-site in sufficient quantities to offset loss of occupied habitat or individuals. All measures approved by CDFW in the mitigation and monitoring plan shall be implemented by SJWC, and CDFW may, at its discretion, require additional measures to protect special-status plants.

If transplantation, including replanting affected populations following project completion, is part of the mitigation plan, the plan shall include a description and map of mitigation sites, details on the methods to be used, including collection, storage, propagation, receptor site preparation, installation, long-term protection and management, monitoring and reporting requirements, remedial action responsibilities should the initial effort fail to meet long-term monitoring requirements, and sources of funding to purchase, manage, and preserve the sites. The following performance standards shall be applied:

- ▲ The extent of occupied area and the flower density in compensatory reestablished populations shall be equal to or greater than the affected occupied habitat and shall be self-producing.
- ▲ Reestablished populations shall be considered self-producing when:
 - plants re-establish annually for a minimum of 5 years with no human intervention, such as supplemental seeding; and
- ▲ re-established habitats contain an occupied area and flower density comparable to existing occupied habitat areas in similar habitat types.

Mitigation Measure 3.4-1b

Prior to construction activities, a qualified biologist shall conduct a Workers Environmental Awareness Program (WEAP) training for the construction crew. The biologist shall meet with the construction crew at the project area at the onset of construction to educate the construction crew on the following: 1) a review of the project boundaries; 2) all special-status species that may be present, their habitat, and identification; 3) the specific mitigation measures that will be incorporated into the construction effort, 4) the general provisions and protections afforded by USFWS and CDFW; and 5); and the proper procedures if a special-status species is encountered within the project area. An instructional pamphlet shall be included with the WEAP and additional copies shall be left for construction personnel that join the project construction effort after the WEAP has been conducted. At the completion of the WEAP, the qualified biologist shall identify someone on-site (generally the project foreman) who will ensure that new construction members receive and review the pamphlet information. The on-site monitor shall also be the primary point of contact if special-status species are found on-site and the presence of the qualified biologist is required.

Significance after Mitigation

With implementation of Mitigation Measures 3.4-1a and 3.4-1b, the potential loss of special-status plants would be minimized by identifying special-status plant populations and avoiding them, or compensating for the loss of special-status plants, if it is not feasible to avoid them. Mitigation Measure 3.4-1b would further reduce impacts to special-status species by requiring that all personnel involved in the project attend the WEAP training that instructs construction personnel of the environmental constraints and responsibilities of the project to protect sensitive resources within the project area. Therefore, this impact would be reduced to a **less-than-significant** level.

California Red-Legged Frog

Suitable breeding and dispersal habitat for California red-legged frog exists within the project area within Los Gatos Creek and the adjacent uplands. Removal of the existing pipeline and installation of the new pipeline in an open trench within the Los Gatos Creek corridor could impact California red-legged frog through individual mortality, noise disturbance, and habitat loss, conversion, and/or disturbance. As discussed in the November 4, 2016, USFWS Biological Opinion (08ESMF00-2016-F-1522) (Appendix D), the project would result in temporary impacts to 0.73 acre of open water and sand bar habitat and permanent impacts to 0.05 acre of redwood forest. The project would also result in permanent impacts to 0.05-acre of redwood forest habitat (north access route into Los Gatos Creek). This is considered a permanent effect because the redwood forest understory would not be restored to pre-project conditions within 1 year of the initial disturbance. For this analysis, this is the only area where there would be a permanent impact to habitat; all other habitat impacts would be restorable within one season and are, thus, considered temporary impacts.

Impacts to California red-legged frog and its habitat would be potentially significant. The following measures for avoidance and minimization of impacts to California red-legged frog during project construction from the project's USFWS Biological Opinion (USFWS 2016) will be implemented.

Mitigation Measure 3.4-2

The following measures shall be implemented to avoid, minimize, or compensate for impacts to California red-legged frog:

- ▲ No more than 24 hours prior to initial ground disturbance, a preconstruction survey for the California red-legged frog shall be conducted in the project area by the USFWS/CDFW-approved biologist. The survey shall consist of walking the project area to ascertain the possible presence of the species. The USFWS/CDFW-approved biologist shall investigate all potential areas that could be used by the California red-legged frog for feeding, breeding, sheltering, movement, and other essential behaviors. This includes an adequate examination of mammal burrows, such as California ground squirrels or gophers. If any adults, subadults, juveniles, tadpoles, or eggs are found, the USFWS/CDFW-approved biologist shall contact the USFWS and CDFW to determine if moving any of the individuals is appropriate. In making this determination, USFWS and CDFW shall consider if an appropriate relocation site exists. If USFWS and CDFW approve moving the animals, SJWC shall ensure the approved biologist is given sufficient time to move the animals from the work site before ground disturbance is initiated. Only USFWS/CDFW-approved biologists shall capture, handle, and monitor the California red-legged frog.
- ▲ The USFWS/CDFW-approved biologist shall conduct employee education training for employees working on earthmoving and/or construction activities. Personnel shall be required to attend the presentation, which shall describe the California red-legged frog avoidance, minimization, and conservation measures, legal protection of the animals, and other related issues. All attendees shall sign an attendance sheet along with their printed name, company or agency, email address, and telephone number. The original sign-in sheet shall be sent to the USFWS and CDFW within seven calendar days of the completion of the training.
- ▲ SJWC shall minimize adverse effects to the California red-legged frog by limiting, to the maximum extent possible, the number of access routes, construction areas, equipment staging, storage, parking, and stockpile areas. Prior to the date of initial ground disturbance in the project area, equipment staging areas, site access routes, construction equipment and personnel parking areas, debris storage areas, and any other areas that may be disturbed shall be identified, surveyed by the USFWS/CDFW-approved biologist, and clearly identified with 5-foot tall bright orange plastic fencing. The fencing shall be inspected by the USFWS/CDFW-approved biologist and maintained daily by SJWC or its contractor until the last day that construction equipment is at the project.
- ▲ To the extent practicable, initial ground-disturbing activities shall be avoided between November 1 and March 31 because that is the time period when the California red-legged frog is most likely to be moving through upland areas. If ground-disturbing activities must take place between November 1 and March 31, SJWC shall ensure that daily monitoring by the USFWS/CDFW-approved biologist is completed for the California red-legged frog.
- ▲ To minimize harassment, injury, death, and harm in the form of temporary habitat disturbances, all project-related vehicle traffic shall be restricted to established roads, construction areas, equipment staging, storage, parking, and stockpile areas. These areas shall be included in preconstruction surveys and, to the maximum extent possible, established in locations disturbed by previous activities to prevent further adverse effects. Project-related vehicles shall observe a 20-mile per hour speed limit within construction areas, except on county roads, and state and federal highways. Off-road traffic outside of designated and fenced project work areas shall be prohibited.
- ▲ If a work site is to be temporarily dewatered by pumping, intakes shall be completely screened with wire mesh not larger than 5 millimeters to prevent California red-legged frogs from entering the pump system. Water shall be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow shall be removed in a manner that would allow flow to resume with the least disturbance to the substrate.

- ▲ Each encounter with the California red-legged frog shall be treated on a case-by-case basis in coordination with the USFWS and CDFW, but the general procedure is as follows: (1) the animal shall not be disturbed if it is not in danger; or (2) the animal shall be moved to a secure location if it is in any danger.
- ▲ Restoration and revegetation work for temporary effects shall be implemented using native California plant species collected onsite or from local sources (i.e., local ecotype). Native or nonnative plant species and material from non-local sources shall be utilized only with prior written authorization from USFWS and CDFW. All topsoil from natural lands shall be removed, cached, and returned to the site according to USFWS/CDFW-approved restoration protocols.
- ▲ For onsite storage of pipes, conduits and other materials that could provide shelter for the California red-legged frog, an open-top trailer shall be used to elevate the materials above ground. This is intended to reduce the potential for animals to climb into the conduits and other materials.
- ▲ To the maximum extent practicable, no construction activities shall occur during rain events or within 24 hours following a rain event. Prior to construction activities resuming, a USFWS/CDFW-approved biologist shall inspect the action area and all equipment/materials for the presence of California red-legged frogs. The animals shall be allowed to move away from the project area of their own volition or moved by the USFWS-approved biologist.
- ▲ To the maximum extent practicable, night-time construction shall be minimized or avoided by the applicant. Because dusk and dawn are often the times when the California red-legged frog is most actively moving and foraging, to the maximum extent practicable, earthmoving and construction activities shall cease no less than 30 minutes before sunset and shall not begin again until 30 minutes after sunrise. Except when necessary for driver or pedestrian safety, to the maximum extent practicable, artificial lighting at a project area shall be prohibited during the hours of darkness.
- ▲ Trenches or pits 1 foot or deeper that are going to be left unfilled for more than 48 hours shall be securely covered with boards or other material to prevent the California red-legged frog from falling into them. If this is not possible, SJWC shall ensure wooden ramps or other structures of suitable surface that provide adequate footing for the California red-legged frog are placed in the trench or pit to allow for their unaided escape. Auger holes or fence post holes that are greater than 1.0 inch in diameter shall be immediately filled or securely covered so they do not become pitfall traps for the California red-legged frog. The USFWS/CDFW-approved biologist shall inspect the trenches, pits, or holes prior to their being filled to ensure there are no California red-legged frogs in them. The trench, pit, or hole also shall be examined by the USFWS/CDFW-approved biologist each workday morning at least one hour prior to initiation of work and in the late afternoon no more than one hour after work has ceased to ascertain whether any individuals have become trapped. If the escape ramps fail to allow the animal to escape, the USFWS/CDFW-approved biologist shall remove and transport it to a safe location, or contact the USFWS and CDFW for guidance.
- ▲ SJWC shall compensate at a 1:1 ratio for the temporary effects and a 3:1 ratio for permanent effects to California red-legged frog by purchasing 1.8 acres of California red-legged frog credits at a USFWS and CDFW-approved conservation bank or by permanently protecting 1.8 acres of California red-legged frog habitat. SJWC shall provide the funding for the California red-legged frog credits or mitigation lands prior to the initiation of construction of the proposed project.

In addition, implementation of Mitigation Measures 3.4-1b above would further reduce potential impacts to California red-legged frog.

Significance after Mitigation

With implementation of Mitigation Measures 3.4-1b and 3.4-2, the potential loss of individual California red-legged frogs will be avoided or minimized and temporary and permanent effects to California red-legged frog as a result of project construction will be compensated. This impact would be reduced to a **less-than-significant** level.

Other Special-Status Reptiles and Amphibians

Suitable aquatic habitat for western pond turtle, Santa Cruz black salamander, and California giant salamander occurs within Los Gatos Creek. The surrounding redwood forest provides appropriate upland habitat for the western pond turtle, Santa Cruz black salamander, and California giant salamander. Removal of the existing pipeline and installation of the new pipeline in an open trench within the Los Gatos Creek corridor could impact western pond turtle, Santa Cruz black salamander, and California giant salamander and their nests through habitat disturbance, crushing of individuals, disturbance of nests with eggs or hatchlings. This impact would be potentially significant.

Mitigation Measure 3.4-3

To avoid or reduce potential impacts to western pond turtle, Santa Cruz black salamander, and California giant salamander, the following pre-construction actions shall be taken: a qualified biologist shall conduct preconstruction surveys for western pond turtle, Santa Cruz black salamander, and California giant salamander and their nests 48 hours prior to the commencement of construction activities. The qualified biologist shall survey all areas within the riparian zone where construction activities will occur. If an adult pond turtle is found in any areas prior to or during project-related construction activities, a qualified biologist shall relocate the individual from the site and to a suitable location outside of potential project impacts. Because the terrestrial stage of these salamander species are known to occur under rocks, logs, and leaf litter, the biologist shall inspect all such habitats and ensure that all potential habitats have been cleared. If a buried nest of pond turtle eggs, or eggs or larvae of the salamanders are encountered during the preconstruction survey effort or project-related construction activities within the construction area, construction shall stop and CDFW shall be notified. CDFW does not recommend moving the eggs because of specific conditions required for development and hatching. Construction can be reinitiated only with CDFW approval.

In addition, implementation of Mitigation Measures 3.4-1b and 3.4-2 above would further reduce potential impacts to special-status reptiles and amphibians.

Significance after Mitigation

With implementation of the Mitigation Measures 3.4-1b, 3.4-2, and 3.4-3, the potential impacts to western pond turtle, Santa Cruz black salamander, and California giant salamander will be avoided or minimized. These species share similar habitat within the project area with the California red-legged frog, and mitigation for this species would also reduce potential impacts to special-status reptiles and amphibians to a **less-than-significant** level.

Special-Status Bats

Two special-status bat species have the potential to occur within the project area. Although no trees are proposed to be removed, minor pruning of some lower hanging limbs extending into the project area, particularly near the staging area, and noise disturbance may result in impacts to these species if they occur on the project area. If a day roost, hibernation roost, or maternity colony roost were present in the on-site trees, vegetation trimming could result in direct mortality of bats occupying trimming locations or abandonment of a nearby maternity, nursing, or wintering colony, because of noise and human disturbance. This impact would be potentially significant.

Mitigation Measure 3.4-4

To avoid or reduce impacts to special-status bat species, SJWC shall retain a qualified bat specialist or wildlife biologist to conduct a pre-construction survey for suitable roosting habitat no more than 15 days prior to the start of construction. Surveys shall consist of a daytime pedestrian survey looking for evidence of bat use (e.g., guano), and/or an evening emergence survey to note the presence or absence of bats. The type of survey shall be determined by the biologist in consultation with CDFW. Cavities, crevices, exfoliating bark, and bark fissures that could provide suitable potential nest or roost habitat for bats shall be checked using roof-prism binoculars supplemented as needed with a flashlight or spotlight. If evidence of bat use is observed, the number and species of bats using the roost shall be determined and recorded. Bat detectors may be used to supplement survey efforts, but are not required. If no bat roosts are found, then no further mitigation is required.

Tree limbs and screening vegetation may be pruned or removed from roost trees, provided the biologist first confirms that only single bats and/or adult bats are utilizing the roost tree and after the bats have been safely excluded from the roost. Exclusion measures shall allow for the gradual nighttime dispersal of bats, to minimize stress and maximize bats' ability to find new roosts. While the exclusion process would displace bats from daytime resting habitat, it would minimize disorientation, stress, and mortality associated with exposure to disturbances from daytime vegetation management activities. Exclusion techniques shall be determined by the biologist and would depend on the roost type. If features of the tree would be modified by pruning such that the tree will no longer function as a roost, a detailed mitigation plan addressing compensation, exclusion methods, and roost removal procedures shall be developed, in consultation with CDFW, before implementation. Exclusion methods may include use of one-way doors at roost entrances (bats may leave but not reenter) or sealing roost entrances when the site can be confirmed to contain no bats. Exclusion efforts will be avoided during certain periods of sensitive activity (e.g., during hibernation or while females in maternity colonies are nursing young).

If an active maternity roost is detected, avoidance is preferred. Work in the vicinity of the roost (buffer to be determined by biologist) shall be postponed until the biologist monitoring the roost determines that the young have fledged and are no longer dependent on the roost. The monitor shall ensure that all bats have left the area of disturbance prior to initiation of construction activities that would disturb the roost. A plan addressing compensation, exclusion methods, and roost removal procedures will be developed and implemented and shall require approval by CDFW prior to initiation of project construction. The plan may include construction and installation of bat boxes suitable to the bat species and colony size excluded from the original roosting site. The plan shall specify that roost replacement will be implemented before bats are excluded from the original roost site. Once compensation is implemented and it is confirmed that bats are not present in the roost site, the roost structure may be removed.

In addition, implementation of Mitigation Measures 3.4-1b above would further reduce potential impacts to special-status bats.

Significance after Mitigation

With implementation of Mitigation Measures 3.4-1b and 3.4-4 the potential impacts to special-status bats would be avoided or minimized by conducting preconstruction surveys, avoiding bat roosts, and implementing exclusion measures, if needed. Bat maternity roosts will be avoided, and if needed, CDFW will be consulted for guidance in the event that the bat maternity roost cannot be avoided. Compensatory bat roosts shall be provided for any bat roosts lost as a result of the project. Therefore, this impact would be reduced to a **less-than-significant** level.

San Francisco Dusky-footed Woodrat

The project area supports redwood forest, which is suitable habitat for the San Francisco dusky-footed woodrat. Although no trees are proposed to be removed, minor pruning of some lower hanging limbs extending into the project area, particularly near the staging areas, and noise disturbance may result in impacts to this species if it is present. Potential impacts include midden abandonment, midden removal, and crushing of woodrats. These would be potentially significant impacts.

Mitigation Measure 3.4-5

To avoid or reduce impacts to San Francisco dusky-footed woodrat, a qualified wildlife biologist previously approved by CDFW shall conduct a preconstruction survey to identify woodrat middens within the disturbance area and within 25 feet of the disturbance area within 5 days of initiation of ground disturbing activities. If no middens are found, no further mitigation is required.

If active middens are found, a 25-foot no construction buffer shall be delineated with fencing or flagging in consultation with CDFW and maintained during construction activities. If avoidance is not feasible and the midden is found within an area of proposed construction, a relocation plan shall be prepared and submitted to CDFW for approval. Once the relocation plan has been approved, the midden shall be dismantled prior to land clearing or construction activities, to allow animals to escape harm and to reestablish territories for the next

breeding season. Middens shall only be dismantled during the non-breeding season, between October 1 and December 31, or after a qualified biologist determines through monitoring (i.e., trail camera placement or daily human monitoring) of the midden that it is not being used. Live traps shall be installed and checked for three consecutive nights to capture and relocate individuals. Traps shall be closed during daylight hours and opened and baited each evening only within 1 hour before sunset. Traps shall be checked the following morning and any captured San Francisco dusky-footed woodrat will be released directly into temporary shelter houses in immediately adjacent riparian habitat. The live-trap with the captured San Francisco dusky-footed woodrat will then be placed at the entrance and carefully opened such that the individual enters on its own. Dismantling of middens shall be done by hand. If a litter of young is found or suspected while dismantling, midden material shall be replaced, and the midden be left alone for 2 to 3 days before a recheck to determine whether the animals have left the midden. All woodrat middens dismantled and relocated, and any middens protected shall be mapped and documented and reported to CDFW.

In addition, implementation of Mitigation Measures 3.4-1b above would further reduce potential impacts to San Francisco dusky-footed woodrat.

Significance after Mitigation

With implementation of Mitigation Measures 3.4-1b and 3.4-5, the potential impacts to San Francisco dusky-footed woodrat would be avoided or minimized. Therefore, impacts to San Francisco dusky-footed woodrat would be reduced to a **less-than-significant** level.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?

Less than significant with mitigation. Approximately 0.87-acre of redwood forest habitat occurs within the project area, and construction activities, including trenching associated with the removal of the existing pipeline and installation of the new pipeline would result in permanent impacts to 0.05-acre of redwood forest habitat. Although no trees are proposed to be removed, there would be some minor pruning of some lower hanging limbs extending into the project area, particularly near the staging areas. The project applicant will obtain a Lake or Streambed Alteration Agreement (LSAA) under Section 1602 of the Fish and Game Code from CDFW as part of the proposed project prior to project implementation. As discussed in Chapter 2, "Project Description and Background," the following BMPs would also be implemented during construction:

- ▲ To the extent feasible, staging will occur on access roads, surface streets, or other disturbed areas that are already compacted and support only ruderal vegetation, and all maintenance equipment and materials would be contained within the existing service roads, paved roads, or other pre-determined staging areas. The staging area is located approximately 75 feet upslope from the creekbed.
- ▲ Building or construction materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into the active channel.
- ▲ No runoff from staging areas will be allowed to enter the creek channel without being subjected to adequate filtration (e.g., vegetated buffer, hay bales, silt screens).
- ▲ During the dry season, no stockpiled soils will remain exposed for more than 7 days. During the wet season, no stockpiled soils will remain exposed unless surrounded by properly installed and maintained silt fencing or other means of erosion control.
- ▲ Equipment and materials for cleanup of spills will be available on the project area at all times. All spills and leaks will be cleaned up immediately and disposed of in accordance with all regulatory requirements.
- ▲ All equipment used in the creek channel will be inspected for leaks each day prior to initiation of work and action taken to repair leaks prior to use.

- ▲ No equipment will be serviced in the creek channel or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated.
- ▲ Water pollution control measures would be incorporated into the project design to avoid and/or minimize effects on water quality including, compliance with the San Francisco Bay Region Municipal Regional Stormwater NPDES Permit and Construction General Permit requirements for Linear Underground/Overhead Projects.

Following construction, there would not be increased erosion or other activities that could violate water quality standards. However, this impact would still be potentially significant.

Mitigation Measure 3.4-6

The following measures shall be implemented to avoid, reduce or compensate for the loss or degradation of riparian habitat, and achieve consistency with Fish and Game Code Section 1602:

- ▲ SJWC shall notify CDFW before commencing any activity within the bed, bank, or riparian corridor of Los Gatos Creek. The project proponent shall conduct construction activities in accordance with the LSAA, including implementing measures necessary to protect fish and wildlife resources.
- ▲ SJWC shall compensate for permanent impacts to riparian habitat to ensure no net loss of riparian habitat by revegetating areas within the project area. SJWC shall develop and implement a riparian mitigation plan that will include creation, restoration and/or enhancement of habitat within the project area or surrounding area, and removal of non-native species, where appropriate. Compensatory mitigation shall be conducted in consultation with CDFW in accordance with the terms of the LSAA.
- ▲ The riparian mitigation plan shall include the following:
 - identification of appropriate revegetation sites;
 - in-kind reference habitats for comparison with compensatory riparian habitats (using performance and success criteria) to document success;
 - monitoring protocol, including schedule and annual report requirements. Compensatory habitat shall be monitored for 3 years for wetland species and a minimum of 5 years for trees and shrubs (if impacts to trees or shrubs cannot be avoided), from completion of mitigation, or human intervention (including recontouring and grading), or until the success criteria identified in the approved mitigation plan have been met, whichever is longer;
 - ecological performance standards, based on the best available science and including specifications for native riparian plant densities, species composition, amount of dead woody vegetation gaps and bare ground, and survivorship; at a minimum, compensatory mitigation planting sites must achieve 80 percent survival of planted riparian trees and shrubs by the end of the 5-year maintenance and monitoring period or dead and dying trees shall be replaced and monitoring continued until 80 percent survivorship is achieved;
 - corrective measures if performance standards are not met;
 - responsible parties for monitoring and preparing reports; and
 - responsible parties for receiving and reviewing reports and for verifying success or prescribing implementation or corrective actions.

Significance after Mitigation

With implementation of Mitigation Measure 3.4-6, the potential impacts to redwood forest habitat would be avoided, minimized and mitigated by restoring and revegetating the project area to pre-project conditions. Therefore, this impact would be reduced to a **less-than-significant** level.

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Less than significant with mitigation. Approximately 0.76 acre of potentially jurisdictional wetlands and other waters of the United States exist within the project area, and construction activities, including trenching and dewatering, would result in temporary removal, filling, and hydrological interruption of 0.76 acre of wetlands and open water. As discussed above and in Chapter 2, BMPs would be implemented during construction to minimize impacts to sensitive habitats including jurisdictional waters.

The project also has a preliminary authorization under the Nationwide Permit (NWP) Program through the use of NWP #12 (Utility Line Activities) (USACE 2017). However, if implementation of the project exceeds the thresholds of the NWP Program, USACE may require issuance of an Individual Permit.

All impacts are considered temporary, because the Los Gatos Creek corridor would be restored to its existing condition within 1 year following construction. However, this impact would still be significant.

Mitigation Measure 3.4-7a

The following measures will be implemented to avoid or compensate for impacts to waters of the United States, and achieve consistency with the project's NWP:

- ▲ Obtain and implement all measures set forth in the USACE NWP.
- ▲ A post-construction report shall be submitted 45 days after completion of construction documenting construction activities and containing as-built drawings (if different from drawings submitted with the Section 404 permit application) and before and after photographs.
- ▲ Following construction, all disturbed areas within the bed and bank of the creek shall be regraded and restored to pre-project survey conditions. All temporary impacts shall be restored at least to preconstruction condition and only native wetland species shall be used in replanting. Reseeding and replanting will be implemented between November 1 and December 1 immediately following construction, and the site will be restored to pre-construction conditions within 1 year of the end of construction. Plant stock will be collected on-site, if feasible. If no plant stock is available on-site, it will be acquired from local sources for use in restoration. Data shall be collected and reported in accordance with the USACE NWP. These data will be used to evaluate project conditions related to success criteria set forth in the NWP. All invasive weed species shall be removed from all restoration areas annually for 3 years.

Mitigation Measure 3.4-7b

The Los Gatos Creek corridor will be photographed to document pre-project conditions prior to the initiation of construction activities. Photographs will be georeferenced on the existing topographic survey for the project area. Following the completion of all construction activities, the pre-construction documentation shall be used to return the project area to existing conditions, including reestablishment of native emergent, aquatic, and riparian vegetation, and restoring preconstruction contours.

Mitigation Measure 3.4-7c

The SJWC will obtain a permit under Section 401 of the CWA from the RWQCB prior to project implementation, and will implement all requirements of the permit in the timeframes required therein, including any avoidance and minimization measures included in the permit.

Significance after Mitigation

With implementation of Mitigation Measures 3.4-7a-c, the potential adverse effect on waters of the United States and waters of the State would be avoided. Because the project area will be restored to pre-project conditions within 1 year of the impact, long-term impacts to wetlands and waters of the United States from implementation of the project would not occur. Therefore, this impact would be reduced to a **less-than-significant** level.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less than significant with mitigation. Within the project area, Los Gatos Creek may function as a pathway for aquatic and terrestrial wildlife movement that allows animals to move between Lake Elsmar and Lexington Reservoir. Movement of native fish species, such as California roach, hitch, Pacific lamprey, and riffle sculpin could be disturbed by work within Los Gatos Creek and dewatering during construction. Noise and disturbance associated with construction activities could also cause species that commonly use habitats in the project area for dispersal (e.g., Los Gatos Creek corridor) to temporarily avoid dispersal through the project area. However, these effects would be temporary, and once construction is complete, wildlife movement through the area would be similar to existing conditions. Thus, impacts on the movement of resident or migratory species would be less than significant.

The redwood forest habitat within the project area and adjacent lands provide suitable nesting habitat for common raptors, songbirds, and bats. Construction activities, if they were to start within the nesting or nursery period could result in potential impacts to these species.

Nesting Raptors

Nesting raptors are protected under the MBTA and Fish and Game Code. Although no nesting raptors were observed during surveys conducted in the project area a large stick nest attributable to a raptor was observed by during the March 13, 2017, site visit near the project area, and the redwood forest provides suitable nesting habitat for Cooper's hawks, osprey, great-horned owl, flammulated owl, western screech owl, peregrine falcon (*Falco peregrinus*), American kestrel, red-tailed hawk, and red-shouldered hawk. If construction occurs during the nesting season (February 15 to September 15), there is the potential to impact nesting raptors. Construction disturbance during the nesting season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "take" by the CDFW. This would be a potentially significant impact.

Mitigation Measure 3.4-8

To avoid or reduce impacts to nesting birds, the following actions shall be taken:

- ▲ Construction activities in upland habitat shall be initiated before the start of the nesting season (i.e., before February 15), if possible.
- ▲ Although no trees are proposed to be removed, there would be some minor pruning of some lower hanging limbs extending into the project area. For project activities, including vegetation pruning, that begin between February 15 and September 15, a qualified biologist shall conduct preconstruction surveys for nesting birds and to identify active nests on and within 500 feet of the project area with direct line of sight to the proposed work areas. The surveys shall be conducted no more than 14 days prior to the beginning of any construction activities between February 15 and September 15. A second survey will be conducted no more than 48 hours prior to the beginning of any construction activities between February 15 and September 15. If no active nests are found during surveys, no additional mitigation is required. However, if a historic raptor nest (used within the last 5 years) is documented during surveys and impacts to the suitable nest habitat cannot be avoided, CDFW shall be consulted for appropriate mitigation for loss of historic raptor nesting habitat.

- ▲ If active nests are found, appropriate buffers shall be established around active nest sites. No project activity shall commence within the buffer areas until a qualified biologist has determined the young have fledged, the nest is no longer active, or reducing the buffer, in coordination with CDFW, would not likely result in nest abandonment. The appropriate no-disturbance buffer shall be determined by a qualified biologist based on site-specific conditions, the species of nesting bird, nature of the project activity, visibility of the disturbance from the nest site, and other relevant circumstances. Monitoring of the nest by a qualified biologist during construction activities shall be required if the activity has potential to adversely affect the nest. If construction activities cause the nesting bird to vocalize, make defensive flights at intruders, get up from a brooding position, or fly off the nest, then the no-disturbance buffer shall be increased until the agitated behavior ceases. The exclusionary buffer will remain in place until the chicks have fledged or as otherwise determined by a qualified biologist.

Significance after Mitigation

With implementation of Mitigation Measures 3.4-8, the potential impacts to nesting raptors as a result of project construction would be avoided by pruning vegetation outside of the nesting season whenever possible, conducting pre-construction surveys if construction activities are to occur during the nesting season, and establishing no disturbance buffers to protect active raptor nests if present. Therefore, this impact would be reduced to a **less-than-significant** level.

Other Nesting Birds

Bird species with a likelihood of nesting in the project area include: Allen's hummingbird (*Selasphorus sasin*), Costa's hummingbird (*Calypte costae*), fox sparrow (*Passerella iliaca*), Lawrence's goldfinch (*Carduelis lawrencei*), Lewis' woodpecker (*Melanerpes lewis*), Nuttall's woodpecker (*Picoides nuttallii*), oak titmouse (*Baeolophus inornatus*), olive-sided flycatcher (*Contopus cooperi*), Rufous hummingbird (*Aimophila ruficeps*), yellow warbler (*Dendroica petechia*), yellow-billed magpie (*Pica nuttalli*), and purple martin (*Progne subis*). USFWS maintains a list of Birds of Conservation Concern (BCC) that, without additional conservation management actions, are likely to become candidates for listing under the ESA. The BCC list includes seasons as to when these birds receive additional management actions and those include Year Around (YR), Breeding (B), and Wintering (W).

Wintering species (i.e., Lewis' woodpecker, fox sparrow) that may use the project area during migration are not expected to use the site during the proposed window of construction. If project activities were initiated in areas being used by these migrating species, these species would move offsite unharmed. Although loss of foraging and resting habitat for these species would occur, suitable and more contiguous habitat is available adjacent to the project elements that would not be disturbed by project activities. Therefore, the loss of winter habitat within the project area would not adversely affect the local wintering population or viability of these species.

If construction occurs during the nesting season (February 15 to September 15), there is the potential to impact nesting birds. Construction disturbance during the nesting season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment and mortality of chicks and eggs. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "take" by the CDFW. Construction activities such as vegetation pruning or site grading/trenching may result in nest abandonment and chick mortality in nests immediately adjacent to or within the project area and would be a violation of the MBTA and Section 3503 of the California Fish and Game Code. This would be a significant impact.

Mitigation Measure 3.4-9

To avoid or reduce impacts to nesting birds, the following additional actions shall be taken:

- ▲ If vegetation pruning or other disturbance related to construction is required during the nesting season (typically February 15 – September 15), focused surveys for active bird nests shall be conducted before and within 5 days of initiating construction by a qualified biologist. A second survey will be conducted no more than 48 hours prior to the beginning of any construction activities between February 15 and September 15. The appropriate area to be surveyed and timing of the survey may vary depending on the

activity and species that could be affected. If no active nests are found during focused surveys, no further mitigation is required.

- ▲ If an active nest is located during the preconstruction surveys, an appropriate no-disturbance buffer shall be determined by a qualified biologist in consultation with CDFW based on site-specific conditions, the species of nesting bird, nature of the project activity, visibility of the disturbance from the nest site, and other relevant circumstances. Monitoring of the nest by a qualified biologist during construction activities shall be required if the activity has potential to adversely affect the nest. If construction activities cause the nesting bird to vocalize, make defensive flights at intruders, get up from a brooding position, or fly off the nest, then the no-disturbance buffer shall be increased until the agitated behavior ceases. The exclusionary buffer will remain in place until the chicks have fledged or as otherwise determined by a qualified biologist.
- ▲ If construction stops for more than 5 days during the nesting season, a follow up survey shall be conducted to make sure that no nesting birds moved into the area.

Significance after Mitigation

With implementation of Mitigation Measure 3.4-9, the potential impacts to nesting birds as a result of project construction would be avoided. Therefore, this impact would be reduced to a **less-than-significant** level.

Common Bats

Redwood or other hollow trees within Redwood Forest habitat could provide maternity colony roosts for several bat species. Common bats with potential to occur on the project area include Yuma myotis (*Myotis yumanensis*), Long-eared myotis (*Myotis evotis*), and hoary bat (*Lasiurus cinereus*). Maternity colony roosts can be active from early April until mid-October. Although no tree removal is proposed as part of the project, vegetation pruning, operation of construction equipment, water pumps, and generators would cause noise, vibration and other disturbance to a roosting colony. Should any of the trees within or adjacent to the project area support an active roost of bats, tree limb/vegetation removal, and noise and vibration from construction activities could result in the abandonment, injury or mortality to bats. This would be a significant impact.

Implementation of Mitigation Measure 3.4-4 above will reduce impacts related to active bat maternity roosts.

Significance after Mitigation

With implementation of Mitigation Measure 3.4-4, the potential impacts to bats would be avoided by conducting preconstruction surveys, implementing a no disturbance buffer, and implementing exclusion measures if necessary. Bat maternity roosts will be avoided to the fullest extent possible, and if needed, CDFW will be consulted for guidance in the event that the bat maternity roost cannot be avoided, and compensatory bat roosts shall be provided for any bat roosts lost as a result of the project. Therefore, this impact would be reduced to a **less-than-significant** level.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

No impact. Division C16 of the Santa Clara County Ordinance Code requires a Tree Removal Permit for the removal of any protected tree on any private or public property in designated areas of the County. The water pipeline replacement project would not require removal of any protected trees.

Additionally, the *Santa Clara County General Plan (1994)* contains several goals and policies for the preservation of wetlands and protection of the local watershed above Lexington Reservoir. Impacts of the project on wetlands and other creek resources would only occur during construction. Mitigation is identified above to reduce these impacts to a less-than-significant level. Following project completion, all impacts to wetlands and waters of the United States would be restored to preconstruction conditions within 1 year of the impacts, thereby avoiding permanent impacts to wetland resources. The project would not conflict with any Santa Clara County ordinances protecting biological resources. Therefore, there would be no impact.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

No impact. The project area is located outside the boundaries of the *Santa Clara Valley Habitat Conservation Plan* boundary. There are no other Habitat Conservation Plans, Natural Community Conservation Plans, or other approved local, regional, or state habitat conservation plans that cover the project area or that would be affected by project activities. Therefore, there would be no impact.

3.5 CULTURAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
V. Cultural Resources. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Disturb any human remains, including those interred outside of dedicated cemeteries?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.5.1 Environmental Setting

A cultural resources evaluation was performed for the project area in 2015 (Holman & Associates Archaeological Consultants 2015), and the findings of the evaluation are summarized below.

Previous studies in the project vicinity included an archival study and field inspection conducted in 2005 by Matt Dias for lands considered by SJWC for a timber harvest plan. The timber harvest plan extended from the vicinity of Chemeket Park south to the Austrian Dam, covering portions of the hillside southwest of Los Gatos Creek and extending across the creek a short distance covering the current project area. The survey resulted in the recording of elements of the Southern Pacific Railroad Grade, located on the slopes south of the creek. It is assumed that the existing paved road leading to the SJWC access gates at the northern end of the existing project area was part of the original railroad grade (Holman & Associates Archaeological Consultants 2015).

In April 2015, Holman & Associates Archaeological Consultants conducted an archaeological literature review for the project at the Northwest Information Center (NWIC). The NWIC serves as the regional archive for the State Office of Historic Preservation (OHP) where archaeological records are kept and curated. There are no recorded historic and/or prehistoric sites located in the project vicinity. One previous archaeological survey was conducted for the project area with negative findings (i.e., no resources were identified) (Holman & Associates Archaeological Consultants 2015).

A visual inspection of the project area was also conducted by Holman & Associates Archaeological Consultants in April 2015. A general visual inspection of the creek embankment adjacent to the roadway extending from the inflatable Ostwald Dam to the SJWC entrance gate was conducted. The survey was limited to a visual inspection of the steep slopes to confirm that there were no historic deposits associated with the early logging activity within the project area. The steepness of the slopes in the project area are thought to have precluded Native American or historical habitation of the area. Historic uses in the project vicinity are limited to logging of mature forest within the late 19th or early 20th century (Holman & Associates Archaeological Consultants 2015). The Ostwald Dam has been in operation since 1960.

Based on the results of the field survey, no evidence of historic and/or prehistoric use in the vicinity of the pipeline was observed. The nearest historic resource is the ruins of a former residence located uphill and

outside the project area. This consists of the remains of a swimming pool and house retaining walls covered by dense vegetation just inside SJWC property. The residence is thought to have been the summer home of a doctor from San Jose, that was abandoned and cleared away some time in the 1930's (Holman & Associates Archaeological Consultants 2015).

PALEONTOLOGICAL RESOURCES

Significant nonrenewable vertebrate and invertebrate fossils and unique geologic units have been documented throughout California. The fossil-yielding potential of an area is highly dependent on the geologic age and origin of the underlying rocks. Paleontological potential refers to the likelihood that a rock unit will yield a unique or significant paleontological resource. All sedimentary rocks, some volcanic rocks, and some low-grade metamorphic rocks have potential to yield paleontological resources. Depending on location, the paleontological potential of subsurface materials generally increases with depth beneath the surface, as well as with proximity to known fossiliferous deposits.

Pleistocene or older (older than 11,000 years) continental sedimentary deposits have a high paleontological potential while Holocene-age deposits (less than 10,000 years old) have a low paleontological potential, because they are geologically immature and are unlikely to have fossilized the remains of organisms. Metamorphic and igneous rocks have a low paleontological potential, either because they formed beneath the surface of the earth (such as granite), or because they have been altered under high heat and pressures, chaotically mixed or severely fractured. Generally, the processes that form igneous and metamorphic rocks are too destructive to preserve identifiable fossil remains.

Santa Clara County, located at the southern end of San Francisco Bay, is flanked on the west by the Santa Cruz Mountains. The Santa Cruz Mountains are composed primarily of Franciscan Assemblage sandstone, shale, chert and serpentine with lesser amounts of Santa Clara, Purisima, San Lorenzo, Monterey, and Vaqueros formations of Tertiary age also occur. The Franciscan Assemblage was deposited originally in a deep marine trench off the California Coast. As a result of convergence of the Pacific and North American plates, those sediments were folded, faulted, and accreted onto the continental margin, forming the Coast Ranges. During the Tertiary period, marine and non-marine sediments were deposited in portions of the Coast Ranges, creating the Tertiary formations mentioned above (Santa Clara County 1994).

A search of the University of California Museum of Paleontology's (UCMP) database was conducted on May 25, 2017. Records of paleontological finds maintained by the University of California Berkeley Museum of Paleontology (2017) state that there are 190 localities at which fossil remains have been found in Santa Clara County (UCMP 2017).

3.5.2 Discussion

a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?

Less than significant. Historical resources include standing buildings (e.g., houses, barns, outbuildings, cabins) and intact structures (e.g., dams, bridges). A significant historical resource is defined as "a resource listed or eligible for listing on the California Register of Historical Resources (CRHR)" (Public Resources Code [PRC] Section 5024.1). A historical resource may be eligible for listing on the CRHR if it:

1. is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; or
2. is associated with the lives of persons important in our past; or

3. embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possess high artistic values; or
4. has yielded, or may be likely to yield, information important in prehistory or history.

Eligibility for listing on the CRHR rests on dual factors of significance and integrity. A property must have both significance and integrity to be eligible. Loss of integrity, if sufficiently great, will overwhelm historical significance a property may possess and render it ineligible. Likewise, a property can have complete integrity, but if it lacks significance, it must also be ineligible.

There are no buildings (houses, barns, outbuildings, or cabins) located within the project area, and the only structures within the project area are the inflatable Ostwald Dam and the private SJWC access road that is part of the original Southern Pacific Railroad grade. The Ostwald Dam is not eligible for listing in the CRHR and is not historically significant; also, the proposed project would not affect the dam. While the SJWC private access road may be used for access to the project area during construction, the roadway is currently used for maintenance access and the project would not change the use of the roadway. The nearest historic resource, the ruins of a former residence, is located uphill from the project area and would not be affected by the project. Therefore, no historic resources would be affected by the project and, this impact would be less than significant.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?

Less than significant with mitigation. As described above in Section 3.5.1, neither the literature review nor field survey resulted in the identification of significant cultural resources within the project area. However, the potential exists that unidentified archaeological resources could be discovered during construction. This is unlikely due to the steepness of the project area, but damage to an unknown archaeological resource would be a potentially significant impact.

Mitigation Measure 3.5-1

If any prehistoric or historic-era subsurface archaeological features or deposits, including locally darkened soil (potentially a “midden”), that could conceal cultural deposits, are discovered during construction, all ground-disturbing activity within 100 feet of the resources shall be halted and a qualified professional archaeologist shall be retained to assess the significance of the find. If the find is determined to be significant by the qualified archaeologist (i.e., because it is determined to constitute either an historical resource or a unique archaeological resource), the archaeologist shall develop appropriate procedures to protect the integrity of the resource and ensure that no additional resources are affected. Procedures could include but would not necessarily be limited to preservation in place, archival research, subsurface testing, or contiguous block unit excavation and data recovery.

Significance after Mitigation

Implementation of Mitigation Measure 3.5-1 would reduce impacts associated with archaeological resources to a **less-than-significant** level because it would require the performance of professionally accepted and legally compliant procedures for the discovery of previously undocumented significant archaeological resources.

c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less than significant. Although paleontological resources have been found within the county, the project would be replacing an existing pipeline, which would include shallow excavation (approximately 4 feet) of a previously disturbed area. Therefore, the likelihood of encountering paleontological resources during project construction is extremely low. This impact would be less than significant.

d) Disturb any human remains, including those interred outside of formal cemeteries?

Less than significant with mitigation. Based on the documentary research described above, no evidence suggests that any prehistoric or historic-era marked or un-marked human interments are present within or in the immediate vicinity of the project area. However, there is a possibility that unmarked, previously unknown Native American or other graves could be present and could be uncovered during construction activities. California law recognizes the need to protect historic-era and Native American human burials, skeletal remains, and grave-associated items from vandalism and inadvertent destruction and any substantial change to or destruction of these resources would be a potentially significant impact.

Mitigation Measure 3.5-2

If human remains are discovered during any construction activities, potentially damaging ground-disturbing activities in the area of the remains will be halted immediately, and SJWC will notify the County coroner and the NAHC immediately, according to Section 5097.98 of the Public Resources Code and Section 7050.5 of California's Health and Safety Code. If the remains are determined by the NAHC to be Native American, the guidelines of the NAHC will be adhered to in the treatment and disposition of the remains. SJWC will also retain a professional archaeologist with Native American burial experience to conduct a field investigation of the specific site and consult with the Most Likely Descendant (MLD), if any, identified by the NAHC. Following the coroner's and NAHC's findings, the archaeologist, and the NAHC-designated MLD will determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed. The responsibilities for acting upon notification of a discovery of Native American human remains are identified in California Public Resources Code Section 5097.94.

Significance after Mitigation

Implementation of Mitigation Measure 3.5-2 would reduce potentially significant impacts to human remains because actions would be implemented to avoid, move, record, or otherwise treat the remains appropriately, in accordance with pertinent laws and regulations. By providing an opportunity to avoid or minimize the disturbance of human remains, and to appropriately treat any remains that are discovered, this impact would be reduced to a **less-than-significant** level.

3.6 GEOLOGY AND SOILS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. Geology and Soils. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to California Geological Survey Special Publication 42.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
iv) Landslides?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial risks to life or property?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.6.1 Environmental Setting

The project area is within the Los Gatos Creek corridor, which is a meandering perennial creek. In some locations, the creek is lined with steep embankments. The project alignment lies at an elevation of approximately 795 feet above sea level.

The project area is underlain by alluvial terrace deposits, consisting of boulders, gravel, sand, and silt. The soils in the project area are from the Ben Lomond-Casrock complex, 30 to 50 percent slopes (Exhibit 3.6-1) (NRCS 2016). The Ben Lomond series generally consist of deep, well-drained soils that formed in material weathered from sandstone or granitic rocks. This soil type has severe erosion potential, and moderate shrink-swell potential (NRCS 2009).

The project area is located within the seismically-active San Francisco Bay Area; however, the project area is not located within a State of California Earthquake Fault Hazard Zone (1991) for active faults, and no known faults cross the pipeline alignment. Nearby active faults include the San Andreas Fault, Monte Vista-Shannon Fault, and the Zayante-Vergeles Fault. The San Andreas fault zone is located approximately 820 feet southwest of and generally parallel to the pipeline alignment.

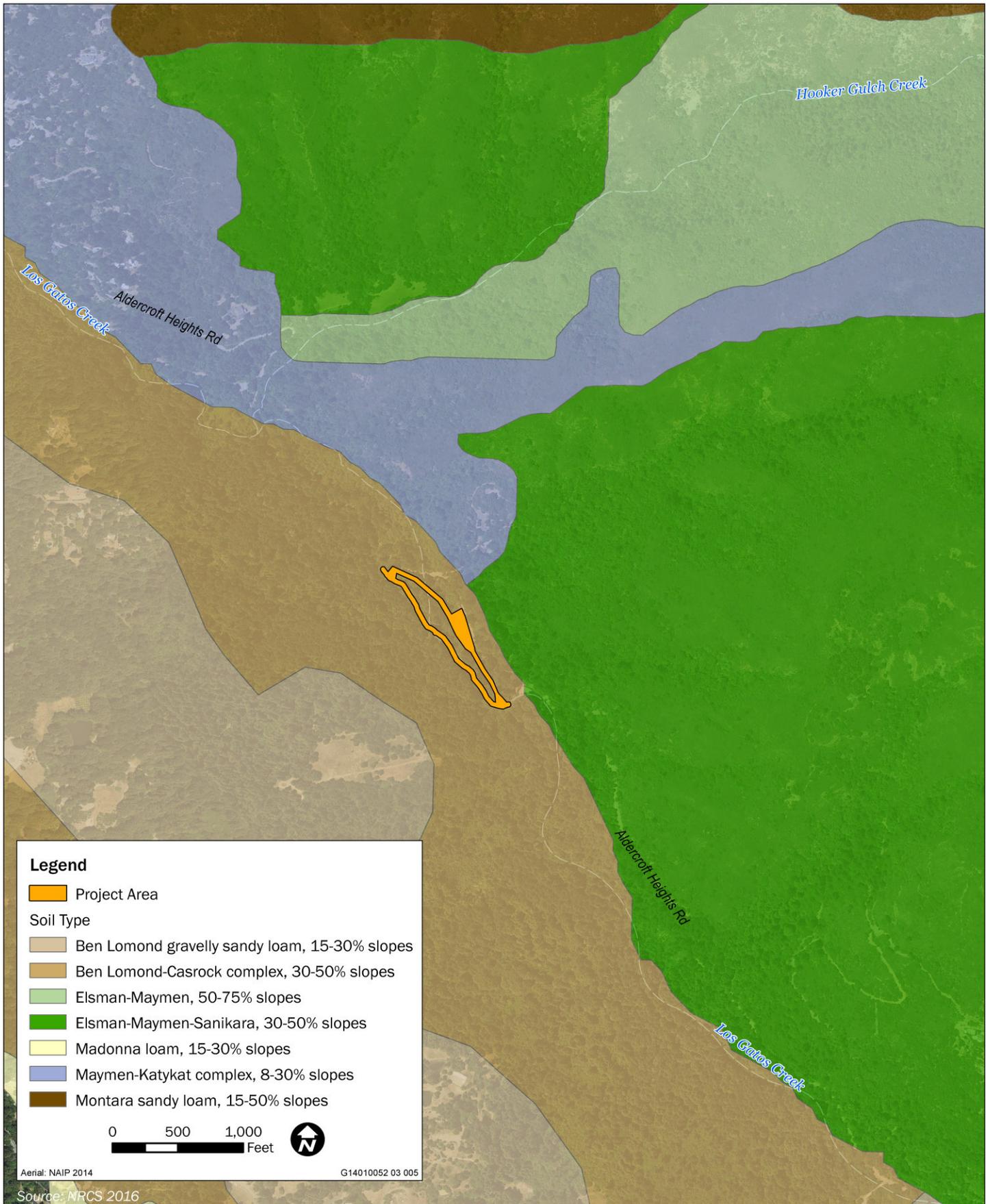


Exhibit 3.6-1

Soils Map



3.6.2 Discussion

a) **Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:**

i) **Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to California Geological Survey Special Publication 42.)**

No impact. The Alquist-Priolo Act (Public Resources Code Sections 2621–2630) was passed in 1972 to mitigate the hazard of surface faulting to structures designed for human occupancy. The purpose of the Act is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The project area is located within a seismically-active area, and is less than 1 mile from the San Andreas Fault Zone. However, the proposed project would replace an existing pipeline within the project area, and no additional structures would be developed as part of the proposed project. In addition, the project is on private land and the project would not increase public access to the project area. Therefore, no impact would occur.

ii) **Strong seismic ground shaking?**

Less than significant. The San Andreas Fault is located approximately 820 feet southwest of the project. Because the project area is in a seismically-active region, the proposed pipeline would likely be subject to strong seismic ground shaking during its design life. However, the California Building Code (CBC) includes design standards that are intended to protect structures from the maximum credible earthquake that could occur on the site. The potential for seismic impacts would be minimized by applying all standard engineering and construction techniques in compliance with the requirements of the CBC for Seismic Zone 4. Because the project would be designed in accordance with the most recent provisions of the CBC, the project's seismic hazard impacts would be less than significant.

iii) **Seismic-related ground failure, including liquefaction?**

Less than significant. Although the proposed project is in a seismically-active location, liquefaction and other seismic-related ground failure primarily affect structures. Because the project would replace an existing pipeline and there are currently no structures on-site, impacts related to liquefaction would be less than significant.

iv) **Landslides?**

Less than significant. The project proposes to replace an existing water line in its current location within Los Gatos Creek. The project area is located west of a mapped area of landslide deposits consisting of unconsolidated and intact blocks of rock and soil debris that have moved downslope. Although there is the potential that landslides could affect the project area, the proposed project would not include construction of any new structures on-site or increase visitation to the area. Therefore, because the proposed project would not increase the exposure of people or structures to landslides, this impact would be less than significant.

b) **Result in substantial soil erosion or the loss of topsoil?**

Less than significant. Development of the project would require open trenching approximately 52 inches wide and 4 feet deep for approximately 1,575 linear feet. Site preparation, trenching, grading, and other construction activities would disturb soil, increase erosion, and potentially cause siltation of Los Gatos Creek. The project would be required as a standard condition to obtain a grading permit and comply with the provisions of Santa Clara County Code of Ordinances Section C12. In addition, as discussed in Chapter 2, "Project Description and Background," the following BMPs would be implemented during construction:

- ▲ To the extent feasible, staging will occur on access roads, surface streets, or other disturbed areas that are already compacted and support only ruderal vegetation, and all maintenance equipment and

materials would be contained within the existing service roads, paved roads, or other pre-determined staging areas. The staging area is located approximately 75 feet upslope from the creekbed.

- ▲ Building or construction materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into the active channel.
- ▲ No runoff from staging areas will be allowed to enter the creek channel without being subjected to adequate filtration (e.g., vegetated buffer, hay bales, silt screens).
- ▲ During the dry season, no stockpiled soils will remain exposed for more than 7 days. During the wet season, no stockpiled soils will remain exposed unless surrounded by properly installed and maintained silt fencing or other means of erosion control.
- ▲ Equipment and materials for cleanup of spills will be available on the project area at all times. All spills and leaks will be cleaned up immediately and disposed of in accordance with all regulatory requirements.
- ▲ All equipment used in the creek channel will be inspected for leaks each day prior to initiation of work and action taken to repair leaks prior to use.
- ▲ No equipment will be serviced in the creek channel or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated.
- ▲ Compliance with County requirements for controlling construction-related pollution and preparation and implementation of the BMPs listed above would ensure that project-related erosion impacts would be less than significant.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Less than significant. Generally, impacts associated with unstable soils relate to potential damage to structures. The proposed project would replace an existing pipeline and would not develop any new structures, and excavation associated with the project would occur within the flat area in the creekbed. In addition, only 50 feet of trench would be excavated each day and the open area of trench would be backfilled at the end of each work day. Therefore, the project would not destabilize soils in the project area and excavation would occur in flat areas with low probability of landslides. Thus, no structures would be affected by unstable soils, and the project would not destabilize soils in the project area. Project-related impacts related to unstable soils would be less than significant.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial risks to life or property?

Less than significant. The project would be located on moderately expansive soils, which could damage the proposed pipeline. However, as discussed above under item c), substantial risk to life or property would generally occur to habitable buildings, which could experience compromised structural integrity due to expansive soils. The proposed project would include replacement of an existing pipeline and would not include construction of any new structures. Therefore, this impact would be less than significant.

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No impact. The project is replacement of a water line and does not involve septic tanks or alternative wastewater disposal systems. Therefore, there would be no impact.

3.7 GREENHOUSE GAS EMISSIONS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. Greenhouse Gas Emissions. Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

3.7.1 Environmental Setting

Certain gases in the earth’s atmosphere, classified as greenhouse gases (GHGs), play a critical role in determining the earth’s surface temperature. GHGs are responsible for “trapping” solar radiation in the earth’s atmosphere, a phenomenon known as the greenhouse effect. Prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO₂), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

Emissions of GHGs have the potential to adversely affect the environment because such emissions contribute, on a cumulative basis, to global climate change. Although the emissions of one single project, would not cause global climate change, GHG emissions from multiple projects throughout the world could result in a cumulative impact with respect to global climate change.

Human-caused emissions of these GHGs in excess of natural ambient concentrations are responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth’s climate, known as global climate change or global warming. It is “extremely likely” that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic factors together (Intergovernmental Panel on Climate Change [IPCC] 2014:3, 5). By adoption of Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006, and Senate Bill (SB) 97, the State of California has acknowledged that the effects of GHG emissions cause adverse environmental impacts. AB 32 mandates that emissions of GHGs must be capped at 1990 levels by the year 2020 (CARB 2007). In August 2016, Governor Brown signed SB 32 and AB 197, which serve to extend California’s GHG reduction programs beyond 2020 to achieve a Statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030. Executive Order S-3-05, signed by Governor Arnold Schwarzenegger in 2005, established total GHG emission targets for the state. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

On January 20, 2017, CARB released its proposed *2017 Climate Change Scoping Plan Update* (2017 Scoping Plan Update), which lays out the framework for achieving the 2030 reductions as established in more recent legislation. On December 14, 2017, CARB approved the 2017 Scoping Plan. The 2017 Scoping Plan Update identifies the GHG reductions needed by each emissions sector to achieve a statewide emissions level that is 40 percent below 1990 levels before 2030. The update also identifies how GHGs associated with proposed projects could be evaluated under CEQA. Specifically, it states that achieving “no net increase” in GHG emissions is the correct overall objective of projects evaluated under CEQA if conformity with an applicable local GHG reduction plan cannot be demonstrated. CARB recognizes that it may not be appropriate or feasible for every development project to mitigate its GHG emissions to no net increase and that this may

not necessarily imply a substantial contribution to the cumulatively significant environmental impact of climate change.

The threshold of significance is available in the BAAQMD *California Environmental Quality Act Air Quality Guidelines* (BAAQMD 2017a). BAAQMD considers the GHG emissions associated with project operation to be less than significant if the emissions generated by the project would be less than 1,100 metric tons of carbon dioxide equivalent per year (MTCO_{2e}/year).

BAAQMD has not developed a threshold of significance for evaluating construction-related GHG emissions from a project. However, BAAQMD recommends that lead agencies quantify and disclose construction-related GHG emissions and make a significance determination of these emissions (BAAQMD 2017a). With respect to operational emissions, BAAQMD recommends a significance threshold of 1,100 MTCO_{2e}/year. BAAQMD developed its recommended threshold of 1,100 MTCO_{2e}/year based on the statewide reduction goal for 2020 (BAAQMD 2017a:D-10 through D-29).

SB 32, signed in September 2016, set a new state target for the year 2030 at 40 percent below 2020 levels which will make it possible to reach the ultimate goal of reducing emissions 80 percent below 1990 levels by 2050 set by Executive Orders S-3-05 and B-30-15. Thus, for projects that would generate emissions beyond 2020, thresholds established for compliance with 2020 targets may be reduced by 40 percent and 80 percent so as to not conflict with or prevent the state from meeting 2030 and 2050 GHG targets.

3.7.2 Discussion

a) **Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?**

Less than significant. Operation of the project would include routine maintenance similar to what occurs under existing conditions and would not increase the vehicle trips associated with operation and maintenance. Operation of the new water pipeline would not result in increased GHG emissions, because the project would not involve any new direct or indirect emission sources or increased activity by existing emissions sources (such as new motor vehicle trips or increased consumption of electricity).

Construction activities would result in temporary GHG emissions related to worker commute trips, delivery of materials, and off-road construction equipment (e.g., a front loader, a crane, and an excavator). Project construction is anticipated to start in mid-May 2018 and take approximately 6 to 8 weeks to complete. Approximately eight workers would be on-site during construction and up to two truck deliveries of materials per day. Cut and fill would be balanced on-site. Construction-related emissions were estimated using the Road Construction Emissions Model, Version 8.1.0 (SMAQMD 2016). The Road Construction Emissions Model is recommended to assess emissions for linear construction projects and allows for input of project-specific information. This model was developed by SMAQMD but is approved by BAAQMD as well as other air districts in California.

Project implementation would result in a net increase of 35 MTCO_{2e} over the 8 weeks of construction. This one-time mass of GHG emissions would be less than the mass emission threshold of 1,100 MTCO_{2e}/year, which is the BAAQMD-recommended threshold based on the statewide reduction goal for 2020. No mass emission thresholds specifically tied to the statewide reduction goals of 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050 have been developed by BAAQMD or other air district in California. At the time of writing this environmental document, potential mass emission thresholds notable of consideration are 660 MTCO_{2e}/year, which is 40 percent below 1,100 MTCO_{2e}/year, and 220 MTCO_{2e}/year, which is 80 percent below 1,100 MTCO_{2e}/year. Given that the one-time increase in GHG emissions associated with the proposed project would not exceed either of these more stringent threshold levels, the project's GHG emissions would be minimal and not cumulatively considerable. This impact would be less than significant.

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less than significant. As discussed in item a) above, continued operation of the water pipeline would not result in increased GHG emissions because the project would not result in any new direct or indirect emission sources or increased activity by existing emissions sources. As also explained in item a) above, the project's one-time emissions of 35 MT CO₂e would be nominal. Therefore, the project would not conflict with or obstruct implementation of CARB's 2017 Scoping Plan Update (CARB 2017) for achieving GHG reductions consistent with AB 32 and Executive Orders S-3-05 and B-30-15. This impact would be less than significant.

3.8 HAZARDS AND HAZARDOUS MATERIALS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. Hazards and Hazardous Materials. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

3.8.1 Environmental Setting

A data search of various agency lists was conducted for the project area and surrounding areas to identify potential hazardous contamination sites. Two sites approximately 0.5-mile west of the project area are listed as small quantity generators that report to the EPA according to the Envirofacts Web database (EPA 2017). There are no sites included in the California Department of Toxic Substances Control (DTSC) EnviroStor Database (DTSC 2017). One leaking underground storage tank site associated with the Lupin Lodge (Geotracker ID T0608501962) and one PG&E clean-up site (Geotracker ID T10000008580) were identified

on the Cortese List approximately 1.4 miles north of the project area. However, both sites are listed as cases that have been resolved (California Environmental Protection Agency [CalEPA] 2017).

The project area is in a relatively remote location in the Santa Cruz Mountains, and does not contain any known hazardous materials contamination. The project area is within the designated Wildfire and Urban Interface Fire Area with a fire hazard zone classification of very high. There are no schools within 0.25-mile of the project area and no airports or private airstrips within 2 miles.

3.8.2 Discussion

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Less than significant. Construction of the project would involve the routine transport and handling of hazardous substances such as diesel fuels, lubricants, solvents, and epoxies. Handling and transport of these materials could result in the exposure of workers to hazardous materials. Once construction is complete, no new hazardous substances would be used in for operation of the pipeline. Construction workers would be required to use, store, and transport hazardous materials in accordance with local, state, and federal regulations, including Cal/OSHA and DTSC requirements and manufacturer's instructions, during project construction. Because the project would be required to implement and comply with existing hazardous material regulations, impacts related to the creation of significant hazards to the public or environment through the routine transport, use, and disposal of hazardous materials would be unlikely. Therefore, this impact would be less than significant.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment?

Less than significant. The project is in a rural area with no reported or anticipated sources of hazardous material contamination. Operation of the existing pipeline would not introduce hazardous materials into the area. However, it is possible that hazardous materials such as fuels, oils, grease, and lubricants from equipment could be accidentally released during construction. As described in Chapter 2, "Project Description and Background," the project includes BMPs that require that hazardous materials are properly managed during construction. These include the following:

- ▲ Building or construction materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into the active channel.
- ▲ No runoff from staging areas will be allowed to enter the creek channel without being subjected to adequate filtration (e.g., vegetated buffer, hay bales, silt screens).
- ▲ Equipment and materials for cleanup of spills will be available on the project area at all times. All spills and leaks will be cleaned up immediately and disposed of in accordance with all regulatory requirements.
- ▲ All equipment used in the creek channel will be inspected for leaks each day prior to initiation of work and action taken to repair leaks prior to use.
- ▲ No equipment will be serviced in the creek channel or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated.
- ▲ Implementation of the BMPs listed above would minimize the potential for release of hazardous materials such that the project would not cause a significant hazard to the environment or the public. This impact would be less than significant.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

No impact. The project area is not located within 0.25-mile of an existing or proposed school. The nearest school is Los Gatos Preschool, approximately 0.6-mile southwest of the project area. Therefore, there would be no impact.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code §65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No impact. The Hazardous Waste and Substances Sites (Cortese) List is a planning document used by the State, local agencies, and developers to comply with the CEQA requirements in providing information about the location of hazardous materials release sites. Government Code section 65962.5 requires CalEPA to develop at least annually an updated Cortese List. DTSC is responsible for a portion of the information contained in the Cortese List. Other State and local government agencies are required to provide additional hazardous material release information for the Cortese List. DTSC's EnviroStor database provides DTSC's component of Cortese List data.

As discussed above, review of regulatory agency databases indicated that no records of any hazardous materials were identified for the project area. The project area is not identified on the Cortese list or other State or county hazardous materials lists; therefore, there would be no impact.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

No impact. The project area is not located within 2 miles of any airports or private airstrips and is not located within an airport land use plan area. The nearest airport is more than 14 miles from the project area. Therefore, there would be no impact.

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

No impact. See item e) above.

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No impact. The project area is on private land, and there are no adopted emergency response plans or emergency evacuation plans affecting the area. Implementation of the proposed project would not interfere with any evacuation plans. The proposed project would provide appropriate emergency vehicle access during construction. Therefore, implementation of the proposed project would not interfere with an adopted emergency response plan or emergency evacuation plan. Therefore, there would be no impact.

h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

Less than significant. The project area is located within the Wildfire and Urban Interface Fire Area with a fire hazard zone classification of very high area as defined by Santa Clara County. However, the project would be required to comply with Chapter 7A of the County Building Code and Chapter 49 of the County Fire Code, which include specific guidelines for construction located within this zone. Operation of the pipeline would not increase the potential for wildland fires. Therefore, this impact would be less than significant.

3.9 HYDROLOGY AND WATER QUALITY

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. Hydrology and Water Quality. Would the project:				
a) Violate any water quality standards or waste discharge requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial on- or offsite erosion or siltation?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in on- or offsite flooding?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
f) Otherwise substantially degrade water quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
i) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
j) Result in inundation by seiche, tsunamis, or mudflow?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

3.9.1 Environmental Setting

HYDROLOGY

The project area is within Los Gatos Creek adjacent to and north of the existing Ostwald Dam. Los Gatos Creek is a tributary to Guadalupe River and is within the Guadalupe River Watershed. The Guadalupe Watershed drains approximately 170 square miles of western Santa Clara County. The Guadalupe River flows south from the confluence of Alamos and Guadalupe Creeks to the north, discharging into San Francisco Bay through Alviso Slough (SWRCB 2005).

The headwaters for Los Gatos Creek are located in the Santa Cruz Mountains near Loma Prieta Road. Los Gatos Creek flows through one impoundment, Lake Elsmar, before reaching the project area. Los Gatos Creek then flows into Lexington Reservoir approximately 2 miles to the north. Hydrologic input for upper Los Gatos Creek is dominated by releases from the upstream reservoirs and surface runoff. Three unnamed tributaries were identified contributing hydrologic input to Los Gatos Creek within the project area.

REGULATORY FLOODPLAIN

The project area is within Zone D in the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map, which is defined as areas of possible but undetermined flood hazards.

WATER QUALITY

Los Gatos Creek has been classified as an impaired water body for diazinon from urban/stormwater runoff by the San Francisco RWQCB's 303(d) List of Impaired Water Bodies in the San Francisco Bay Region (SWRCB 2017).

Construction in Santa Clara County is subject to the conditions of the National Pollutant Discharge Elimination System (NPDES) Permit. The objective of the NPDES program is to control and reduce pollutants entering water bodies from non-point discharges. The program is administered by Regional Water Quality Control Boards (RWQCBs) throughout California. The San Francisco Bay Area RWQCB issues NPDES point source permits for discharges from major industries and non-point source permits for discharges to water bodies in the Bay Area for municipalities and other local government entities. The project area is currently covered by the California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (MRP).

The project would be required to comply with the Construction General Permit (CGP) requirements for Linear Underground/Overhead Projects (LUPs). The following would need to be provided in compliance with the CGP 1) Notice of Intent (NOI), 2) site maps and drawings, 3) a Storm Water Pollution Prevention Plan (SWPPP), and 5) contact person. A LUP is complete when 1) there is no potential for construction-related storm water pollution; 2) all elements of the SWPPP have been completed; 3) construction materials and waste have been disposed of properly; 4) the site is in compliance with all local storm water management requirements; and 5) the LRP submits an NOI and has received approval for termination from the appropriate Regional Water Board office.

3.9.2 Discussion

a) Violate any water quality standards or waste discharge requirements?

Less than significant. Site preparation and construction activities would disturb soil and could increase siltation of Los Gatos Creek. However, the project would be required as a standard condition to obtain a grading permit and comply with the provisions of Santa Clara County Code of Ordinances Section C12, which requires review by the County geologist; preparation of a hydrology report, soil engineering investigation, and

geologic report, as needed; and protection of environmentally sensitive areas on or near the site, such as creeks, streams, wetlands, lakes, springs, trees, and riparian habitat as conditions of approval. As discussed in Chapter 2, "Project Description and Background," the following BMPs would also be implemented during construction:

- ▲ To the extent feasible, staging will occur on access roads, surface streets, or other disturbed areas that are already compacted and support only ruderal vegetation, and all maintenance equipment and materials would be contained within the existing service roads, paved roads, or other pre-determined staging areas. The staging area is located approximately 75 feet upslope from the creekbed.
- ▲ Building or construction materials, including chemicals and sediment, will not be stockpiled or stored where they could spill into the active channel.
- ▲ No runoff from staging areas will be allowed to enter the creek channel without being subjected to adequate filtration (e.g., vegetated buffer, hay bales, silt screens).
- ▲ During the dry season, no stockpiled soils will remain exposed for more than 7 days. During the wet season, no stockpiled soils will remain exposed unless surrounded by properly installed and maintained silt fencing or other means of erosion control.
- ▲ Equipment and materials for cleanup of spills will be available on the project area at all times. All spills and leaks will be cleaned up immediately and disposed of in accordance with all regulatory requirements.
- ▲ All equipment used in the creek channel will be inspected for leaks each day prior to initiation of work and action taken to repair leaks prior to use.
- ▲ No equipment will be serviced in the creek channel or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated.

In addition, water pollution control measures would be incorporated into the project design to avoid and/or minimize effects on water quality including, compliance with the MRP and CGP requirements for LUPs.

Operation of the project would not result in increased erosion or other activities that could violate water quality standards.

With implementation of the measures above and compliance with applicable permits, construction and operation of the proposed project would not violate any water quality standards or waste discharge requirements set forth by the San Francisco RWQCB. This impact would be less than significant.

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?

No impact. The project would not divert water from groundwater sources or increase impervious surfaces that would prevent ground water recharge. Therefore, the proposed project would not deplete or otherwise affect groundwater supplies or recharge. Therefore, there would be no impact on groundwater.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial on- or offsite erosion or siltation?

Less than significant. The project would require temporary dewatering of a small construction zone (50 feet of the existing stream course each day, shifting progressively through the construction area) by diversion of the streamflow in a pipe around the daily construction zone. Otherwise, the course of the stream would not be altered, and downstream surface water flow would not be interrupted or altered. As discussed in Section 3.6, "Geology and Soils," above, grading for the proposed project has the potential to result in a temporary increase in erosion during construction. After construction, the project area would be restored to its original condition based upon the requirements of the CGP, and the existing soil would be used to backfill the open trench. Replacement of the native substrate would prevent future downcutting in the channel. Compliance with County requirements for controlling construction-related pollution and preparation and implementation of the BMPs listed above would reduce project-related erosion impacts to a less-than-significant level.

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in on- or offsite flooding?

Less than significant. The project would temporarily divert water around a small construction zone within Los Gatos Creek during project construction, as described in item c) above. However, the project would replace an existing facility within the same general alignment, which would not alter drainage patterns in the long-term. In addition, hydraulic calculations were prepared for the project to ensure the project would not increase the flood water surface elevation (Appendix E). Therefore, the project would not substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site. This impact would be less than significant.

e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Less than significant. See item d) above. Implementation of the proposed project would not create or contribute runoff that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff. This impact would be less than significant.

f) Otherwise substantially degrade water quality?

Less than significant. The project would not substantially degrade water quality, as described in item c) above. This impact would be less than significant.

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

No impact. The project area is within Zone D (defined as areas of possible but undetermined flood hazards) as defined by FEMA; however, construction activities would primarily occur within Los Gatos Creek, which is subject to flooding. Although project activities would be within an area subject to flooding, the project would replace an existing pipeline within approximately the same footprint. The project does not propose the development of any housing or other habitable structures in a floodplain. Therefore, there would be no impact to related to placing housing within a floodplain.

h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?

Less than significant. The project would replace the existing pipeline located in Los Gatos Creek. The pipeline would be the same size as the existing pipeline, would generally be within the same alignment, and would be placed under the creek bed. Therefore, once construction is complete, the project is not expected to impede or redirect flood flows within Los Gatos Creek. In addition, hydraulic calculations were performed

for the project that determined that the project would not increase the flood water surface elevation (Appendix E). This impact would be less than significant.

i) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?

No impact. The project area is adjacent to Ostwald Dam, which is an inflatable impoundment. However, proposed replacement of the existing water line within the creek would not expose people or structures to a significant risk of loss, injury or death involving flooding as a result of the failure of a levee or dam. There would be no impact.

j) Result in inundation by seiche, tsunami, or mudflow?

Less than significant. The project area is not located in an area subject to significant seiche or tsunami risk; however, the project is in an area with steep slopes that is subject to mudflows. The project would be constructed during the dry season to minimize the potential for mudflow risks to construction workers. Operation of the new pipeline would not increase the risks related to seiche, tsunami, or mudflow. This impact would be less than significant.

3.10 LAND USE AND PLANNING

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
X. Land Use and Planning. Would the project:				
a) Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.10.1 Environmental Setting

Adjacent land uses in the Los Gatos Creek watershed consist predominantly of rural residential, recreational, and open-space uses. Lands surrounding the project area include lands designated as Hillside (HS) and Other Public Open Lands. SR 17 is located approximately 0.5-mile to the west and Aldercroft Heights Road is located northeast of the project area. There are also several rural residences located northeast of the project area along Aldercroft Heights Road.

The nearest residential community to the Ostwald pipeline is Aldercroft Heights. This community is located downstream of the project area, with the distance to the closest home being approximately 2,000 feet. The project alignment lies on two private parcels that are designated in the County General Plan as HS and zoned HS and HS-sr (Exhibit 3.10-1). The purpose of the Scenic Roads (-sr) combining district is to protect the visual character of scenic roads in Santa Clara County through special development and sign regulations. The HS General Plan designation allows for institutional land uses where they require remote rural settings.

3.10.2 Discussion

a) Physically divide an established community?

No impact. The project area is on private land and is not located within a community. The proposed replacement of the existing water pipeline would not physically divide an established community. Therefore, there would be no impact.

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

No impact. The proposed project would be consistent with the County’s General Plan policies to provide and improve water services to the residents of Santa Clara County. In addition, the project would be consistent with the HS General Plan designation, which allows for institutional land uses where they require remote rural settings.

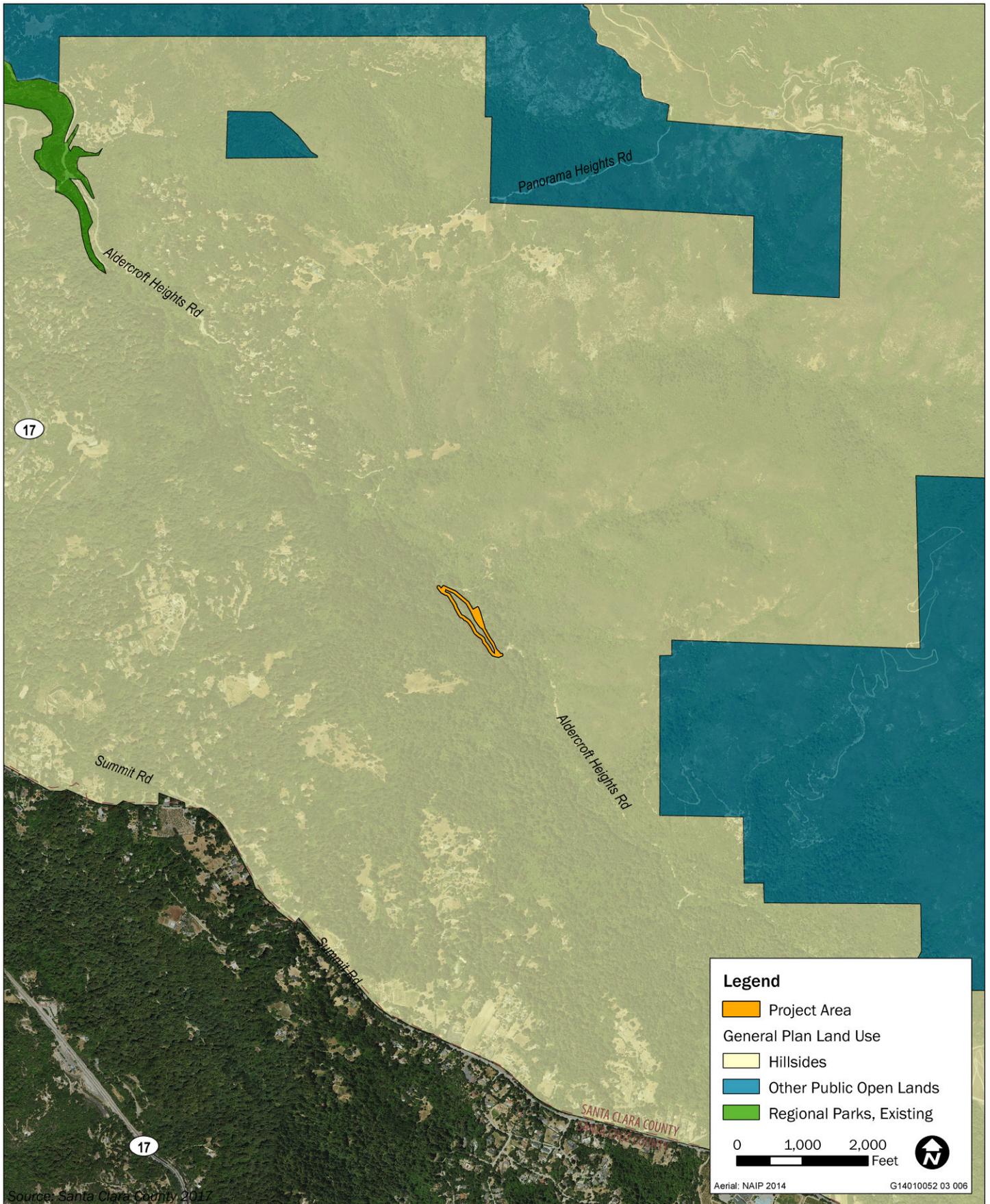


Exhibit 3.10-1

General Plan Land Use Designations



Following construction, the project would not result in any changes in views from Aldercroft Heights Road. Therefore, the project would be consistent with the General Plan and zoning designations. No changes in the land use designation, zoning, or any planning documents would be required. The project would not conflict with any applicable land use plan, policy, or regulation. Therefore, there would be no impact.

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

No impact. Santa Clara County has an adopted HCP/NCCP as described above under Section 3.4, “Biological Resources”; however, the project area is located outside the boundaries of the SCVHCP. Therefore, there are no HCP/NCCPs that are applicable to the project area. There would be no impact.

3.11 MINERAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XI. Mineral Resources. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.11.1 Environmental Setting

According to the Santa Clara County General Plan EIR, there are a number of mineral resource deposits in Santa Clara County that are of regional or state-wide significance, and eight of those deposits are currently being quarried (Santa Clara County 1994). However, none of these sites are located within the project area.

3.11.2 Discussion

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

No impact. The project area is not located within an area of known mineral resources, and the project would replace an existing pipeline. Therefore, construction of the project would have no effect on the availability of known mineral resources that would be of value to the region and the residents of the state, and no impact would occur.

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

No impact. There are no locally important mineral resource recovery sites delineated on a local general plan, specific plan, or other land use plan that include the project area. Therefore, development of the project would have no effect on the availability of known mineral resources, and no impact would occur.

3.12 NOISE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XII. Noise. Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or in other applicable local, state, or federal standards?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.12.1 Environmental Setting

Existing noise conditions are governed by the presence of noise-sensitive receptors, the location and type of noise sources, and overall ambient noise levels. Noise-sensitive land uses generally consist of those land uses where noise exposure could result in health-related risks to individuals, as well as places where a quiet setting is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Noise-sensitive land uses are also vibration-sensitive.

The project is located approximately 4.5 miles south of the Town of Los Gatos within the main stem of Los Gatos Creek, approximately 2 miles upstream from Lexington Reservoir and 2 miles downstream of Lake Elzman in Santa Clara County. There are no sensitive receptors located within the project area. The project area is surrounded by trees, and bounded by Mount Thayer to the east and the Skyland Ridge to the west. The nearest off-site noise-sensitive receptor is a residence located approximately 2,000 feet to the northeast.

Santa Clara County has established noise standards to protect citizens from potential hearing damage and other adverse physiological and social effects from noise exposure. Applicable policies and regulations are contained in the Santa Clara County Zoning Regulations, which are described below.

COUNTY OF SANTA CLARA ZONING REGULATIONS

The Santa Clara County Noise Ordinance (Chapter VIII: Control of Noise and Vibration) contains the following applicable provisions:

- ▲ Construction noise is exempt from [the County’s] Exterior Noise standards, except for work between weekday and Saturday hours of 7:00 p.m. and 7:00 a.m., or any time on Sundays or holidays, such that the sound creates a noise disturbance across a residential or commercial property line (Sections B11-156 and B11-154).
- ▲ The County Noise Ordinance (Section B11 154(b)) states that, where technically and economically feasible, construction activities shall be conducted in such a manner that the maximum noise levels at affected properties will not exceed those listed in the following tables:

(i) Mobile equipment. Maximum noise levels for nonscheduled, intermittent, short-term operation (less than 10 days) of mobile equipment:

Table 3.12-1 Maximum Noise Levels for Mobile Construction Equipment

	Single- and Two-Family Dwelling Residential Area	Residential Area Multifamily Dwelling
Daily (7:00 a.m.–7:00 p.m.), except Sundays and legal holidays	75 dB	80 dB
Daily (7:00 p.m. to 7:00 a.m.) and all day Sunday and legal holidays	50 dB	55 dB
Notes: dB = decibels (instantaneous)		
Source: Santa Clara County 2017.		

(ii) Stationary equipment. Maximum noise levels for repetitively scheduled and relatively long-term operation (periods of 10 days or more) of stationary equipment:

Table 3.12-2 Maximum Noise Levels for Stationary Construction Equipment

	Single- and Two-Family Dwelling Residential Area	Residential Area Multifamily Dwelling
Daily (7:00 a.m.–7:00 p.m.), except Sundays and legal holidays	60 dB	65 dB
Daily (7:00 p.m. to 7:00 a.m.) and all day Sunday and legal holidays	50 dB	55 dB
Notes: dB = decibels (instantaneous)		
Source: Santa Clara County 2017.		

3.12.2 Discussion

- a) **Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or in other applicable local, state, or federal standards?**
Less than significant. The project would not result in any new stationary noise sources and would not result in additional vehicular trips on local roadways after construction is complete. The project also would not result in the development of any new noise-sensitive receptors. Therefore, the project would not result in any long-term operational noise impacts.

However, construction activities would result in short-term noise. Construction activities would consist of site preparation, excavation, replacement of approximately 1,575 linear feet of existing water pipeline, and hauling materials to/from the project area. Pipeline segments would be transported to the construction yard on top of Lexington Dam and transported to the project area as needed. Construction of the replacement pipeline would begin in mid-May 2018 and take approximately 6 to 8 weeks to complete. All construction would be limited to the hours of 7:00 a.m. through 7:00 p.m., Monday through Friday, and no pile driving or blasting would take place.

Construction-generated noise levels would fluctuate depending on the type, number, and duration of equipment used. The effects of construction noise largely depend on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise-sensitive receptors, and the existing ambient noise environment at nearby receptors.

Table 3.12-3 lists the noise levels generated by the types of equipment that would be used during project construction. Based on the reference noise levels listed in Table 3.12-3 and accounting for typical usage factors for each piece of equipment, on-site construction activities could generate a combined average noise level of approximately 85 decibels (dB) maximum sound level (L_{max}) and 83 dB equivalent continuous sound level (L_{eq}) at 50 feet from the project boundary. Calculations of these combined noise levels are provided in Appendix F.

The daytime noise exposure level was estimated for the closest noise-sensitive receptor that could be adversely affected by construction noise. The attenuated noise levels at the nearest noise-sensitive receptor, the residence located approximately 2,000 feet from the project area, would be 43 dB L_{max} and 42 dB L_{eq} . These estimates are conservative because they do not account for any shielding provided by dense trees and topography between the construction area and the residence, and the modeling assumes that the noise-generating equipment could operate simultaneously in proximity to each other near the boundaries of the project area. Detailed inputs and parameters for the estimated construction noise exposure levels are also provided in Appendix F.

Table 3.12-3 Noise Levels Generated by Typical Construction Equipment

Equipment Type	Maximum Noise Level (dB L_{max}) at 50 feet ¹	Typical Noise Level (dB L_{eq}) at 50 feet ^{1,2}
Crane	85	76
Excavator	85	77
Front End Loader	80	81
Combined Noise Level at 50 feet	85	83
Attenuated Noise Level at 2,000 feet	43	42

Notes: dB= decibels; L_{max} = maximum sound level (highest instantaneous sound level measured during a specified period); L_{eq} = equivalent continuous sound level

¹ Assumes all equipment is fitted with a properly maintained and operational noise control device, per manufacturer specifications. Noise levels listed are manufacturer-specified noise levels for each piece of heavy construction equipment.

² Assumes typical usage factors.

Source: Federal Transit Administration (FTA) 2006; data modeled by Ascent Environmental 2017.

As established in Santa Clara County Code of Ordinances Section B11-156(d), construction noise is exempt from the County's Exterior Noise Standards. The County Code of Ordinances Section B11-154 sets limits for daytime and nighttime construction noise. As indicated in Section B11-154(b)(i), the daytime limit for construction noise is 75 dB for single-family residences and the nighttime limit is 50 dB. As described above, the project's construction-generated noise (i.e., approximately 43 dB L_{max} and 42 dB L_{eq} at the nearest sensitive receptor) would not exceed the County's daytime construction noise standards. No nighttime construction would occur for this project. Therefore, this impact would be less than significant.

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Less than significant. The types of construction activities necessary to implement the proposed project include minimal site disturbance and would not result in excessive ground vibration. No pile driving or rock blasting would occur. Based on the types of construction activities that would take place (e.g., site preparation and excavation), maximum groundborne vibration and noise levels would be generated by trucks operating in the project area and hauling materials to and from the construction staging area.

Considering the type and number of construction equipment and the distance to the nearest sensitive receptor (2,000 feet from the construction area), the proposed project would not expose people to excessive ground vibration. The impact would be less than significant.

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

No impact. As discussed under item a) above, the project would not result in any new stationary noise sources and would not result in additional vehicular trips on local roadways after construction is complete. There would be no impact.

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Less than significant. As discussed under item a) above, the proposed project would involve the use of noise-generating construction equipment during daytime hours over a 6- to 8-week period. These types of noise-generating equipment would not operate for extended periods of time and would not exceed any applicable Santa Clara County noise standard during the daytime at the nearest noise-sensitive receptor. Therefore, the construction-generated noise levels would not result in temporary or permanent increases in ambient noise levels at the nearest noise-sensitive receptor. This impact would be less than significant.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No impact. Airports within Santa Clara County include: Moffett Field Airfield (military airport), Palo Alto, Reid-Hillview, and South County, and San Jose International Airport. Each of these airports have adopted Comprehensive Land Use Plans intended to protect the general welfare of the inhabitants within the vicinity of these airports. However, all of these airports are more than 14 miles from the project area. Because the project would not result in the development of any new noise-sensitive receptors, and because the project is not in proximity to an airport or landing strip, the project would not result in the exposure of people to excessive noise levels from aircraft operations. There would be no impact related to noise exposure from aircraft activity.

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

No impact. See item e) above.

3.13 POPULATION AND HOUSING

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. Population and Housing. Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Displace substantial numbers of existing homes, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.13.1 Environmental Setting

Located in the unincorporated area of Santa Clara County, the project vicinity is sparsely populated, with housing consisting mostly of rural residences along Aldercroft Heights Road. According to the US Census Bureau, in 2016 Santa Clara County’s population totaled 1,919,402 with 665,061 total housing units and an occupation rate of 2.95 persons per household (U.S. Census Bureau 2016). The nearest town is Los Gatos, which had a population of 30,545 in 2016. The total housing units for Los Gatos was not reported for 2016, but totaled 13,050 in 2010 (U.S. Census Bureau 2016). There is no housing within the project area.

3.13.2 Discussion

- a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?**

No impact. The project proposes to replace an existing water pipeline with a pipeline of the same diameter and capacity. The project would not expand the amount of water delivered or the service area for water delivery that would directly or indirectly facilitate growth. Therefore, there would be no impact.

- b) Displace substantial numbers of existing homes, necessitating the construction of replacement housing elsewhere?**

No impact. There is no housing within the project area, and the proposed project would not displace any existing housing, necessitating the construction of replacement housing. Therefore, there would be no impact.

- c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?**

No impact. As discussed above, there is no housing within the project area, and replacement of an existing pipeline would not displace any housing or people. Therefore, there would be no impact.

3.14 PUBLIC SERVICES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV. Public Services. Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
Fire protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Police protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Schools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Parks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other public facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.14.1 Environmental Setting

Fire protection within Santa Clara County is currently provided by 10 municipal fire districts, six county fire districts, two local fire districts, and CAL FIRE. The unincorporated areas of the county, including the project area, are served by the Santa Clara County Central Fire Protection District and CAL FIRE (Santa Clara County 1994). CAL FIRE and Santa Clara County Fire Department (SCCFD) provide fire suppression, basic and advanced rescue, advanced life support first response medical services, hazardous materials and technical rescue response, fire inspection, fire investigation, disaster preparedness, and public education. There are 297 full time firefighters and 15 volunteer firefighters within the county that are based at 17 fire stations (SCCFD 2014). As discussed above in Section 3.8, “Hazards and Hazardous Materials,” the project area is within the designated Wildfire and Urban Interface Fire Area with a fire hazard zone classification of very high.

The Santa Clara County Sheriff’s Office is the primary jurisdictional law enforcement agency that provides law enforcement service to unincorporated areas of Santa Clara County.

The project area is located within the Los Gatos Union School District. The nearest school is Los Gatos Preschool, approximately 0.6-mile southwest of the project area. Several large open space preserves are located in the vicinity of the project area including the Sierra Azul Open Space Preserve to the east and northeast; Bear Creek Redwoods Open Space Preserve to the northwest; and Lexington Reservoir County Park to the north.

3.14.2 Discussion

- a) **Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:**

Fire protection?

Less than significant. The project area is in an area designated as very high fire risk, and construction equipment has the potential to accidentally ignite a fire that could increase the demand for fire protection during the construction period. The project would be required to comply with Chapter 7A of the County Building Code and Chapter 49 of the County Fire Code, which include specific guidelines for construction in fire hazard zones with a very high hazard classification. In addition, construction would be temporary and would take place within Los Gatos Creek, which would substantially reduce the potential for ignition of a fire, because of high vegetation moisture content. Operation of the pipeline would not increase the potential for wildland fires or increase the population in the project vicinity, such that additional fire protection services would be needed. Therefore, the project would have a less-than-significant impact on fire protection.

Police protection?

No impact. The project area would continue to be served by the County Sheriff. The project would replace an existing pipeline and would not increase the population in the project vicinity, such that additional police services would be needed. Therefore, no impact to police protection would occur.

Schools?

No impact. The nearest school is approximately 0.6-mile from the project area. Therefore, the project would not have a direct effect on schools. In addition, the project would not increase the population in the project vicinity, such that there would be additional demand for schools. Therefore, the project would have no impact on schools.

Parks?

No impact. The project area is located adjacent to open space; however, the project area is located on private property and the proposed project would have no direct effect on parks or the adjacent open space areas. The project would also not result in an increase in population. Therefore, the project would not require the construction of new parks or alterations to existing facilities to maintain performance objectives. Therefore, no impact on parks would occur.

Other public facilities?

No impact. The project would include replacement of an existing pipeline, and would not result in an increase in population in the project vicinity that would increase the demand for other public facilities, such as libraries and community centers. Therefore, the project would have no impact on public facilities.

3.15 RECREATION

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XV. Recreation. Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.15.1 Environmental Setting

As discussed in Section 3.14, “Public Services,” above, several large open space preserves are near the project area including the Sierra Azul Open Space Preserve to the east and northeast; Bear Creek Redwoods Open Space Preserve to the northwest; and Lexington Reservoir County Park to the north. Sierra Azul Open Space Preserve provides for hiking, biking, and equestrian use, and Bear Creek Redwoods Open Space Preserve allows hiking and equestrian use. Lexington Reservoir County Park provides hiking, biking, fishing, picnicking, and non-power boating. The project area is located on private land without public access and is not located within any recreational areas. Los Gatos Creek may attract unauthorized use of the project area for fishing or other informal recreation, which would require trespassing.

3.15.2 Discussion

a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

No impact. The project may temporarily disturb informal stream-related recreation (e.g., fishing) during construction; however, this is an unauthorized use that requires trespassing. The construction would not affect any recreation areas or facilities. In addition, the project would not increase the population or housing in the project vicinity. Therefore, use of existing neighborhood and regional parks or other recreational facilities would not change as a result of the project. Because the project would not result in the physical deterioration of public recreational facilities, no impact would occur.

b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?

No impact. The project would not increase the population in the project vicinity. Therefore, the project would not require construction of new homes or infrastructure, including parks and recreational facilities. No impact would occur.

3.16 TRANSPORTATION/TRAFFIC

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI. Transportation/Traffic. Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e) Result in inadequate emergency access?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.16.1 Environmental Setting

The project area is within the main stem of Los Gatos Creek approximately 2 miles upstream from Lexington Reservoir and 2 miles downstream of Lake Elzman (see Exhibit 2-1). The project area is located on Assessor Parcel Numbers 558-25-013 and 558-25-016, and is accessible from an unnamed private access road to the south and Aldercroft Heights Road to the north (see Exhibit 2-2).

Primary access to the project area for construction vehicle traffic would be via the unnamed private access road, maintained by SJWC, between the southern end of the project area and Cothran Road to the south. There is no public access on the private SJWC road; a locked gate secures the entrance to the road. Secondary access for light vehicles and auxiliary access would be via Aldercroft Heights Road between Old Santa Cruz Highway (to the north) and the project area.

Detailed descriptions of these roadway facilities as well as transit, bicycle, and pedestrian facilities that provide access to the project area are provided below.

TRANSPORTATION SYSTEM

The existing transportation system serving the project area includes the following roadways:

- ▲ *California State Route 17 (SR 17)* is a north-south running state freeway and county expressway that runs between the cities of San Jose and Santa Cruz. In the vicinity of the project, SR 17 provides two travel lanes in each direction. Caltrans reports that the average daily traffic volume on SR 17 is approximately 57,000 vehicles between Redwood Drive and SR 35/Summit Road in Santa Clara County (California Department of Transportation 2015).
- ▲ *Summit Road* is identified as a “mountain road” in the Santa Clara County Official Country Road Book (Santa Clara County 2017). This two-lane road runs northwest from Soquel San Jose Road to Bear Creek Road. West of SR 17, Summit Road becomes SR 35. Currently, there are no bike lanes or transit facilities along this roadway.
- ▲ *Aldercroft Heights Road* is identified as a “mountain road” in the Santa Clara County Official Country Road Book (Santa Clara County 2017). It is a two-lane rural road that runs southeast from Old Santa Cruz Highway and dead-ends in the vicinity of the project area. Currently, there are no sidewalks, bike lanes, or transit facilities on this street in the vicinity of the project.

There are no bike lanes or sidewalks within the project vicinity. Additionally, the project area is not served by transit.

3.16.2 Methods and Assumptions

The project has the potential to affect transportation facilities and increase traffic during construction and during operation and maintenance. The project area would continue to be accessed via existing public roadways.

Assumptions used to evaluate traffic impacts are based on detail provided in Chapter 2, “Project Description.” As described in Chapter 2, it is assumed that construction would take approximately 6 to 8 weeks, and construction would require up to eight workers daily, depending on the intensity of the work activities. Delivery trips were based on materials needed for construction and averaged over the construction period.

The restoration component of the project would occur following completion of the pipeline replacement and is estimated to require up to eight workers over a span of approximately 5 days. Additionally, maintenance activities associated with the restoration areas would require a total of approximately two trips in the first month, and one additional trip annually for up to 3 years. All other operations and maintenance activities would remain consistent with existing SJWC operations.

3.16.3 Discussion

- a) **Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?**

Less than significant. There would be a temporary increase in construction-related traffic from materials deliveries and construction workers traveling to and from the project area and temporary construction staging areas. The number of workers would vary during the construction period; however, there could be a

peak of eight workers commuting daily to the project area during the 6- to 8-week construction period. Materials delivery trips offsite would be limited to initial construction staging, daily equipment and material delivery, and demobilization at the end of construction. It is estimated that a maximum of two truck trips per day would be needed for delivery of materials. Thus, at the peak of construction commuting by construction workers and delivery trips it is estimated that approximately 20 peak daily trips (10 roundtrips x 2) would be added to area roadways. All construction activities would generally take place from Monday through Friday during normal daytime working hours (7:00 a.m. to 7:00 p.m.).

The primary roadway that would be used to access the project area and temporary construction staging areas would be via the private access road between the southern end of the project area and Cothran Road to the south. Secondary access for light vehicles and auxiliary access would be via Aldercroft Heights Road between Old Santa Cruz Highway (north of the project) and the project area.

Local roadways in the project area have relatively low traffic volumes. No traffic counts are available for the primary roadway that would be affected by construction traffic (unnamed private access road), because it is not a public roadway and only provides access for SJWC maintenance vehicles. The secondary access route (Aldercroft Heights Road) carries 68 vehicles per day along the segments nearest to the project area (Santa Clara County 2017). The temporary addition of up to 20 daily vehicle trips to either of these roads during construction would not cause LOS to degrade to unacceptable levels. Thus, LOS thresholds would not be exceeded nor would the project result in a substantial increase in overall traffic volumes that would require additional analysis. Additionally, the increase in traffic volumes caused by construction activity would be temporary. For these reasons, construction-traffic would have a less-than-significant impact on traffic operating on roads around the project area.

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

Less than significant. Operations and maintenance activities associated with the restoration areas would require up to two trips in the first month of operation and one additional annual trip for up to 3 years. The Santa Clara Valley Transportation Authority (VTA) 2013 Congestion Management Program requires the preparation of a Transportation Impact Analysis (TIA) for projects that generate 100 or more peak hour trips (VTA 2013: 12). Thus, the project would not result in a substantial increase in overall traffic volumes that would require additional analysis. Additionally, the operational traffic associated with the project would occur over a limited period of time (3 years) and is considerably lower than proposed construction activities. Therefore, the project would not conflict with the VTA Congestion Management Program. Thus, the project would result in a less-than-significant impact.

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

No impact. The nearest publicly-owned airport is the San Jose International Airport, approximately 14 miles north of the project area. Bonny Doon Village Airport is the closest private airstrip located approximately 10 miles southwest of the project area. The project would have no effect on air traffic patterns because no above-ground structures would be constructed. Additionally, continued operation of the new pipeline would not have any impact on air traffic levels. There would be no impact.

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Less than significant. The proposed project would result in large trucks occasionally delivering supplies to the project area during construction, and the access roads to the project area are mountain roads that are narrow and winding. The use of these narrow roads by large trucks could create a temporary hazard. However, as discussed in Chapter 2, "Project Description and Background," traffic control measures would be implemented as needed to avoid hazards during construction including use of pilot vehicles, lane closure signs, and flaggers. In addition, the project would not result in the reconfiguration of existing roads or the

construction of new roads. Additionally, the primary access road for construction equipment is a private road. Thus, this impact would be less than significant.

e) Result in inadequate emergency access?

Less than significant. The project would not result in the reconfiguration of existing roads or the construction of new roads. All existing emergency access ingress and egress points would remain unchanged and adequate emergency access would be maintained subsequent to the completion of project construction.

Construction and operational traffic generated by the project would primarily be on the unnamed access road, which is a private roadway, and the project would not add significant congestion to local roads. The project would be constructed in accordance with all vehicular rules and regulations, including not obstructing the roadway right-of-way and making way for emergency vehicles. Thus, emergency response times during construction and operation would not increase. This impact would be less than significant.

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

No impact. There are no sidewalks, bike lanes, or transit service in the project area along the primary access road (unnamed private access road) or the secondary access road (Aldercroft Heights Road). Additionally, the project would not result in the reconfiguration of existing roads or the construction of new roads, and there are no bicycle or transit facilities within the project area. Therefore, the project would not conflict with any adopted policies or programs for transit, bicycle, or pedestrian facilities. There would be no impact.

3.17 TRIBAL CULTURAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. Tribal Cultural Resources. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

3.17.1 Environmental Setting

AB 52, signed by Governor Edmund G. Brown, Jr., in September 2014, established a new class of resources under CEQA: “tribal cultural resources” (TCRs). AB 52, as provided in PRC Sections 21080.3.1, 21080.3.2, and 21082.3, requires that lead agencies undertaking CEQA review must, upon written request of a California Native American Tribe, begin consultation once the lead agency determines that the application for the project is complete, prior to the issuance of a Notice of Preparation (NOP) of an environmental impact report (EIR) or notice of intent to adopt a negative declaration or mitigated negative declaration.

AB 52 applies to those projects for which a lead agency had issued a NOP of an EIR or notice of intent to adopt a negative declaration or mitigated negative declaration on or after July 1, 2015. Therefore, the requirements of AB 52 apply to the proposed project, and CDFW has initiated consultation with Tribes that have requested consultation. On February 2, 2017, CDFW sent letters to the Muwekma Ohlone Indian Tribe of the San Francisco Bay Area, Ohlone Indian Tribe, Amah Mutsun Tribal Band, North Valley Yokuts Tribe, Indian Canyon Mutsun Band Costanoan, and Amah Mutsun Tribal Band of Mission San Juan Bautista. No requests for consultation regarding the potential of the project to affect tribal cultural resources were received.

3.17.2 Discussion

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?

No impact. As discussed above, in compliance with AB 52, CDFW sent letters to the Muwekma Ohlone Indian Tribe of the San Francisco Bay Area, Ohlone Indian Tribe, Amah Mutsun Tribal Band, North Valley Yokuts Tribe, Indian Canyon Mutsun Band Costanoan, and Amah Mutsun Tribal Band of Mission San Juan Bautista. No responses were received. Compliance with AB 52 is complete. As defined in PRC Section 21074, to be a TCR, a resource must have cultural value to a California Native American tribe and be either:

1. listed or determined to be eligible for listing, on the national, state, or local register of historic resources, or
2. a resource that the lead agency determines, in its discretion and supported by substantial evidence, to treat as a tribal cultural resource pursuant to the criteria in PRC Section 50241(c). PRC Section 5024.1(c) provides that a resource meets criteria for listing as an historic resource in the California Register if any of the following apply:
 1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
 2. Is associated with the lives of persons important in our past.
 3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
 4. Has yielded, or may be likely to yield, information important in prehistory or history.

The project area is located within the lands historically occupied by the Ohlone Indians; however, the area is not known to have any traditional Native American uses and the steep slopes in the project area would reasonably preclude Native American and historical habitation of the project area. For these reasons, no resources within the project area are known or expected to meet any of the PRC 5024.1(c) criteria listed above as TCRs. Therefore, the project would have no impact on TCRs, as defined in PRC Section 21074.

b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

No impact. See item a) above.

3.18 UTILITIES AND SERVICE SYSTEMS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII. Utilities and Service Systems. Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project’s projected demand, in addition to the provider’s existing commitments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Be served by a landfill with sufficient permitted capacity to accommodate the project’s solid waste disposal needs?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
g) Comply with federal, state, and local statutes and regulations related to solid waste?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

3.18.1 Environmental Setting

WATER

The proposed replacement water pipeline would continue to be operated and maintained by SJWC, as it is currently. SJWC is an investor-owned public utility that is under the jurisdiction of the SWRCB and the California Public Utilities Commission. It supplies water to the cities of San Jose, Cupertino, Campbell, Monte Sereno, Saratoga, Los Gatos, and unincorporated portions of Santa Clara County. Approximately 90 percent of the water SJWC distributes to customers is provided by the Santa Clara Valley Water District and the remaining 10 percent is produced by the SJWC-owned Montevina and Saratoga water treatment plants. SJWC serves water to a combined number of 215,115 service connections with a combined population of approximately 1 million.

WASTEWATER AND STORMWATER

No existing wastewater or stormwater drainage facilities serve the project area. Rural residences in the vicinity are served by septic systems.

SOLID WASTE

Solid waste within unincorporated Santa Clara County is collected by the Green Team and transported to the Guadalupe Landfill in San Jose. Guadalupe Landfill provides waste management services for nonhazardous solid wastes, including construction/demolition, mixed municipal, industrial, and green material waste. Guadalupe Landfill has a maximum permitted throughput of 1,300 tons per day of solid waste, and has a remaining capacity of approximately 11 million cubic yards (as of 2011). The estimated closure date for the landfill is 2048 (CalRecycle 2017).

3.18.2 Discussion

a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

No impact. As discussed in Section 3.18.1, above, there is no wastewater service to the project area. In addition, no restrooms would be constructed as part of the proposed project, and no wastewater would be generated. The proposed project would result in no impact related to wastewater treatment requirements.

b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Less than significant. The project would consist of replacing an existing water line, which is the subject of this Initial Study. However, the project would not construct a new water line or expand the existing water facilities. The project would not include new or expanded wastewater facilities. Therefore, this impact would be less than significant.

c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

No impact. Drainage of stormwater runoff occurs naturally within the project area. The project proposes replacement of a water pipeline and does not propose any new stormwater drainage facilities or expansion of existing facilities. In addition, the project would not increase stormwater runoff. There would be no impact.

d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

No impact. Construction of the proposed project may require a minor amount of water for dust suppression, which would not affect existing water entitlements or resources. In addition, the project would replace an existing water pipeline without changing the capacity of the pipeline or demand for water in the service area. Therefore, the project would not require any new or expanded water entitlements. There would be no impact on available water supplies.

e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?

No impact. No wastewater service is currently provided for the project area, and no wastewater service would be required for the project. Therefore, the proposed project would have no impact on wastewater treatment providers and related wastewater systems.

f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

Less than significant. The proposed project would not generate substantial solid waste that would adversely affect any landfills. The old steel pipeline materials that would be removed by the project would be recycled

to the extent feasible so there would be a very minimal amount of solid waste hauled off-site during construction. Cut and fill would be balanced on-site. Operation of the new pipeline would not generate solid waste. This impact would be less than significant.

g) Comply with federal, state, and local statutes and regulations related to solid waste?

Less than significant. The proposed project would generate very little solid waste during construction and would not generate any solid waste during operation that would be disposed of at a landfill. In addition, no hazardous wastes would be generated. The project would continue to comply with federal, state, and local statutes and regulations related to solid waste. Therefore, this impact would be less than significant.

3.19 MANDATORY FINDINGS OF SIGNIFICANCE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII. Mandatory Findings of Significance.				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Authority: Public Resources Code Sections 21083, 21083.5.

Reference: Government Code Sections 65088.4.

Public Resources Code Sections 21080, 21083.5, 21095; *Eureka Citizens for Responsible Govt. v. City of Eureka* (2007) 147 Cal.App.4th 357; *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th at 1109; *San Franciscans Upholding the Downtown Plan v. City and County of San Francisco* (2002) 102 Cal.App.4th 656.

3.19.1 Discussion

- a) **Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory?**

Less than significant with mitigation. As described in the biological resources analysis of this IS (Section 3.4), implementation of the proposed project, including mitigation measures included in this IS/Proposed MND, would result in less-than-significant impacts related to biological resources. The proposed project does not have the potential to substantially degrade fish or wildlife habitat, adversely affect wildlife populations, or restrict the range of special-status species. Also, as indicated in the cultural resources analysis of this IS/Proposed MND (Section 3.5), implementation of the proposed project would not adversely affect existing historic structures and mitigation measures would prevent substantial adverse effects to unknown archaeological resources or human remains. These impacts would be less than significant with mitigation.

- b) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)**

Less than significant with mitigation. Cumulative environmental effects are multiple individual effects that, when considered together, would be considerable or compound or increase other environmental impacts. As discussed in Sections 3.1 through 3.18 above, all potential impacts of the proposed project would be less-than-significant or reduced to a less-than-significant level with incorporation of mitigation measures. In addition to project-specific impacts, this evaluation considered the potential for incremental effects that are cumulatively considerable. The proposed project would have localized impacts, so the geographic area for cumulative impacts would be limited to Los Gatos Creek in the vicinity of the proposed project, and would generally be limited to the construction period for the proposed project because there would not be any long-term impacts related to the project that could combine with other impacts. As discussed in Chapter 2, “Project Description and Background,” the primary projects that could occur in the project vicinity are the Ostwald Dam Operation and Diversion LSAA and the Los Gatos Creek Watershed Maintenance Program. The EIR prepared for the Los Gatos Creek Watershed Maintenance Program concluded that a cumulative impact on special-status plants could occur. However, implementation of applicable BMPs and mitigation measures would ensure that the program’s contribution to cumulative impacts on special-status animal species would not be considerable. In addition, the proposed project’s impacts related to special-status animal species have been mitigated to a less-than-significant level. Any impacts related to changes to flows or diversions associated with the Ostwald Dam Operation and Diversion LSAA would not occur within the same time frame as the proposed project and would, therefore, not combine with the construction-related impacts associated with the proposed project. Therefore, the project would not make a considerable contribution to a cumulative impact and cumulative impacts would be less than significant with mitigation.

- c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?**

Less than significant with mitigation. As identified in this Initial Study, all impacts associated with the proposed project would be temporary and would be reduced to a less-than-significant level with mitigation. Therefore, implementation of the proposed water pipeline replacement would not result in substantial adverse effects on human beings, either directly or indirectly. This impact would be less than significant with mitigation.

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Attachment

Mitigation Monitoring and Reporting Program

MITIGATION MONITORING AND REPORTING PROGRAM

INTRODUCTION

In accordance with the California Environmental Quality Act (CEQA), Public Resources Code Section 21000 et seq.), the California Department of Fish and Wildlife (CDFW) prepared an Initial Study/Mitigated Negative Declaration (IS/MND) that identified adverse environmental impacts related to issuance of a Lake or Streambed Alteration Agreement (LSAA) for replacement of 1,575 feet of existing water pipeline within Los Gatos Creek, as proposed by San Jose Water Company (SJWC). The IS/MND also identifies mitigation measures that would clearly reduce the identified impacts to a less-than-significant level, or that would eliminate these impacts all together.

CEQA Guidelines require public agencies “to adopt a reporting and monitoring program for changes to the project which it has adopted or made a condition of project approval to mitigate or avoid significant effects on the environment.” A Mitigation Monitoring and Reporting Program (MMRP) is required for the proposed project because the IS/MND identifies potential significant adverse impacts related to the project implementation, and mitigation measure have been identified to reduce those impacts. Adoption of the MMRP would occur along with approval of the proposed project.

PURPOSE OF MITIGATION MONITORING AND REPORTING PROGRAM

This MMRP has been prepared as a mechanism for CDFW to monitor that all required mitigation measures are implemented and completed in a satisfactory manner before and during project construction and operation. The MMRP may be modified by CDFW during project implementation, as necessary, in response to changing conditions or other refinements. The attached table has been prepared to assist the responsible parties in implementing the mitigation measures. The table identifies individual mitigation measures, monitoring/mitigation timing, person/agency responsible for implementing each measure, monitoring and reporting procedures, and provides space to confirm implementation of the mitigation measures. The numbering of mitigation measures follows the numbering sequence found in the IS/MND.

ROLES AND RESPONSIBILITIES

Unless otherwise specified herein, CDFW is responsible for taking all actions necessary to implement the mitigation measures under its jurisdiction according to the specifications provided for each measure and for demonstrating that the action has been successfully completed. CDFW, at its discretion, may delegate implementation responsibility or portions thereof to a licensed contractor or other designated agent.

CDFW would be responsible for overall administration of the MMRP and for verifying that SJWC and/or the construction contractor has completed the necessary actions for each measure. CDFW would designate a project manager to oversee implementation of the MMRP. Duties of the project manager include the following:

- ▲ Verify routine inspections of the construction site are conducted by appropriate CDFW staff; check plans, reports, and other documents required by the MMRP; and conduct report activities.
- ▲ Serve as a liaison between CDFW and SJWC or the contractor regarding mitigation monitoring issues.
- ▲ Complete forms and maintain reports and other records and documents generated for the MMRP.

- ▲ Coordinate and ensure that corrective actions or enforcement measures are taken, if necessary.

The responsible party for implementation of each item would identify the staff members responsible for coordinating with CDFW on the MMRP.

REPORTING

CDFW's project manager will prepare a monitoring report upon completion of the project describing compliance with the required mitigation measures. Information regarding inspections and other requirements will be compiled and explained in the report. The report will be designed to simply and clearly identify whether mitigation measures have been adequately implemented. At a minimum, each report will identify the mitigation measures or conditions to be monitored for implementation, whether compliance with the mitigation measures or conditions has occurred, the procedures used to assess compliance, and whether further action is required. The report will be presented retained in the CDFW project files.

MITIGATION MONITORING AND REPORTING PLAN TABLE

The categories identified in the attached MMRP table are described below.

- ▲ Mitigation Measure – This column provides the text of the mitigation measures identified in the IS/MND.
- ▲ Timing – this column identifies the time frame in which the mitigation will be implemented.
- ▲ Enforcement – this column identifies the party responsible for enforcing compliance with the requirements of the mitigation measure.
- ▲ Dated Signature for Verification of Compliance – this column is to be dated and signed by the person (either project manager or his/her designee) responsible for verifying compliance with the requirements of the mitigation measure.

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
3.4 Biological Resources				
<p>Mitigation Measure 3.4-1a: To avoid or reduce impacts to special-status plants, SJWC shall retain a qualified botanist to conduct protocol special-status plant surveys for potentially occurring species during the appropriate survey periods (January – March for western leatherwood, April – June for marsh microseris, and April – May for Santa Cruz microseris), based on the blooming or identification period, preceding the start of construction. All plant species encountered in the project area shall be identified to the taxonomic level necessary to determine species status. The surveys shall be conducted no later than the blooming period immediately preceding project-related vegetation removal or ground disturbing activities, including grubbing or clearing. If no special-status plant species are found, then a mitigation and monitoring plan and compensation for the loss of special-status plant species are not required.</p> <p>If special-status plant species are identified within the area of potential impact, they shall be avoided and protected during construction activities to the fullest extent possible. If avoidance is not feasible, SJWC shall prepare a mitigation and monitoring plan to protect special-status plant populations or compensate for the loss of special-status plant species found during preconstruction surveys. SJWC shall consult with CDFW on development of appropriate mitigation measures for impacts to any special-status plant populations and shall submit the mitigation and monitoring plan to CDFW for review and approval. Mitigation measures may include preserving and enhancing existing on-site populations, restoration and replanting on-site populations following project completion, creation of off-site populations on project mitigation sites through seed collection or transplantation, and/or preserving occupied habitat off-site in sufficient quantities to offset loss of occupied habitat or individuals. All measures approved by CDFW in the mitigation and monitoring plan shall be implemented by SJWC, and CDFW may, at its discretion, require additional measures to protect special-status plants.</p> <p>If transplantation, including replanting affected populations following project completion, is part of the mitigation plan, the plan shall include a description and map of mitigation sites, details on the methods to be used, including collection, storage, propagation, receptor site preparation, installation, long-term protection and management, monitoring and reporting requirements, remedial action responsibilities should the initial effort fail to meet long-term monitoring</p>	<p>Before any construction activities, during project construction as applicable, and following construction.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife</p>	

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
<p>requirements, and sources of funding to purchase, manage, and preserve the sites. The following performance standards shall be applied:</p> <ul style="list-style-type: none"> ▲ The extent of occupied area and the flower density in compensatory reestablished populations shall be equal to or greater than the affected occupied habitat and shall be self-producing. ▲ Reestablished populations shall be considered self-producing when: <ul style="list-style-type: none"> ▸ plants re-establish annually for a minimum of 5 years with no human intervention, such as supplemental seeding; and ▲ re-established habitats contain an occupied area and flower density comparable to existing occupied habitat areas in similar habitat types. 				
<p>Mitigation Measure 3.4-1b: Prior to construction activities, a qualified biologist shall conduct a Workers Environmental Awareness Program (WEAP) training for the construction crew. The biologist shall meet with the construction crew at the project area at the onset of construction to educate the construction crew on the following: 1) a review of the project boundaries; 2) all special-status species that may be present, their habitat, and identification; 3) the specific mitigation measures that will be incorporated into the construction effort, 4) the general provisions and protections afforded by USFWS and CDFW; and 5); and the proper procedures if a special-status species is encountered within the project area. An instructional pamphlet shall be included with the WEAP and additional copies shall be left for construction personnel that join the project construction effort after the WEAP has been conducted. At the completion of the WEAP, the qualified biologist shall identify someone on-site (generally the project foreman) who will ensure that new construction members receive and review the pamphlet information. The on-site monitor shall also be the primary point of contact if special-status species are found on-site and the presence of the qualified biologist is required.</p>	<p>Before any construction activities and during project construction as applicable.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife U.S. Fish and Wildlife Service</p>	
<p>Mitigation Measure 3.4-2: The following measures shall be implemented to avoid, minimize, or compensate for impacts to California red-legged frog:</p> <ul style="list-style-type: none"> ▲ No more than 24 hours prior to initial ground disturbance, a preconstruction survey for the California red-legged frog shall be conducted in the project area by the USFWS/CDFW-approved biologist. The survey shall consist of walking the project area to ascertain the possible presence of the species. The USFWS/CDFW-approved biologist shall investigate all potential areas that could be used by the California red-legged frog for feeding, breeding, sheltering, movement, and other essential behaviors. This includes an 	<p>Before any construction activities, during project construction as applicable, and following construction.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife U.S. Fish and Wildlife Service</p>	

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
<p>adequate examination of mammal burrows, such as California ground squirrels or gophers. If any adults, subadults, juveniles, tadpoles, or eggs are found, the USFWS/CDFW-approved biologist shall contact the USFWS and CDFW to determine if moving any of the individuals is appropriate. In making this determination, USFWS and CDFW shall consider if an appropriate relocation site exists. If USFWS and CDFW approve moving the animals, SJWC shall ensure the approved biologist is given sufficient time to move the animals from the work site before ground disturbance is initiated. Only USFWS/CDFW-approved biologists shall capture, handle, and monitor the California red-legged frog.</p> <ul style="list-style-type: none"> ▲ The USFWS/CDFW-approved biologist shall conduct employee education training for employees working on earthmoving and/or construction activities. Personnel shall be required to attend the presentation, which shall describe the California red-legged frog avoidance, minimization, and conservation measures, legal protection of the animals, and other related issues. All attendees shall sign an attendance sheet along with their printed name, company or agency, email address, and telephone number. The original sign-in sheet shall be sent to the USFWS and CDFW within seven calendar days of the completion of the training. ▲ SJWC shall minimize adverse effects to the California red-legged frog by limiting, to the maximum extent possible, the number of access routes, construction areas, equipment staging, storage, parking, and stockpile areas. Prior to the date of initial ground disturbance in the project area, equipment staging areas, site access routes, construction equipment and personnel parking areas, debris storage areas, and any other areas that may be disturbed shall be identified, surveyed by the USFWS/CDFW-approved biologist, and clearly identified with 5-foot tall bright orange plastic fencing. The fencing shall be inspected by the USFWS/CDFW-approved biologist and maintained daily by SJWC or its contractor until the last day that construction equipment is at the project. ▲ To the extent practicable, initial ground-disturbing activities shall be avoided between November 1 and March 31 because that is the time period when the California red-legged frog is most likely to be moving through upland areas. If ground-disturbing activities must take place between November 1 and March 31, SJWC shall ensure that daily monitoring by the USFWS/CDFW-approved biologist is completed for the California red-legged frog. 				

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
<ul style="list-style-type: none"> ▲ To minimize harassment, injury, death, and harm in the form of temporary habitat disturbances, all project-related vehicle traffic shall be restricted to established roads, construction areas, equipment staging, storage, parking, and stockpile areas. These areas shall be included in preconstruction surveys and, to the maximum extent possible, established in locations disturbed by previous activities to prevent further adverse effects. Project-related vehicles shall observe a 20-mile per hour speed limit within construction areas, except on county roads, and state and federal highways. Off-road traffic outside of designated and fenced project work areas shall be prohibited. ▲ If a work site is to be temporarily dewatered by pumping, intakes shall be completely screened with wire mesh not larger than 5 millimeters to prevent California red-legged frogs from entering the pump system. Water shall be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow shall be removed in a manner that would allow flow to resume with the least disturbance to the substrate. ▲ Each encounter with the California red-legged frog shall be treated on a case-by-case basis in coordination with the USFWS and CDFW, but the general procedure is as follows: (1) the animal shall not be disturbed if it is not in danger; or (2) the animal shall be moved to a secure location if it is in any danger. ▲ Restoration and revegetation work for temporary effects shall be implemented using native California plant species collected onsite or from local sources (i.e., local ecotype). Native or nonnative plant species and material from non-local sources shall be utilized only with prior written authorization from USFWS and CDFW. All topsoil from natural lands shall be removed, cached, and returned to the site according to USFWS/CDFW-approved restoration protocols. ▲ For onsite storage of pipes, conduits and other materials that could provide shelter for the California red-legged frog, an open-top trailer shall be used to elevate the materials above ground. This is intended to reduce the potential for animals to climb into the conduits and other materials. ▲ To the maximum extent practicable, no construction activities shall occur during rain events or within 24 hours following a rain event. Prior to construction activities resuming, a USFWS/CDFW-approved biologist shall inspect the action area and all equipment/materials for the presence of California red-legged frogs. The animals shall be allowed to move away from 				

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
<p>the project area of their own volition or moved by the USFWS-approved biologist.</p> <ul style="list-style-type: none"> ▲ To the maximum extent practicable, night-time construction shall be minimized or avoided by the applicant. Because dusk and dawn are often the times when the California red-legged frog is most actively moving and foraging, to the maximum extent practicable, earthmoving and construction activities shall cease no less than 30 minutes before sunset and shall not begin again until 30 minutes after sunrise. Except when necessary for driver or pedestrian safety, to the maximum extent practicable, artificial lighting at a project area shall be prohibited during the hours of darkness. ▲ Trenches or pits 1 foot or deeper that are going to be left unfilled for more than 48 hours shall be securely covered with boards or other material to prevent the California red-legged frog from falling into them. If this is not possible, SJWC shall ensure wooden ramps or other structures of suitable surface that provide adequate footing for the California red-legged frog are placed in the trench or pit to allow for their unaided escape. Auger holes or fence post holes that are greater than 1.0 inch in diameter shall be immediately filled or securely covered so they do not become pitfall traps for the California red-legged frog. The USFWS/CDFW-approved biologist shall inspect the trenches, pits, or holes prior to their being filled to ensure there are no California red-legged frogs in them. The trench, pit, or hole also shall be examined by the USFWS/CDFW-approved biologist each workday morning at least one hour prior to initiation of work and in the late afternoon no more than one hour after work has ceased to ascertain whether any individuals have become trapped. If the escape ramps fail to allow the animal to escape, the USFWS/CDFW-approved biologist shall remove and transport it to a safe location, or contact the USFWS and CDFW for guidance. ▲ SJWC shall compensate at a 1:1 ratio for the temporary effects and a 3:1 ratio for permanent effects to California red-legged frog by purchasing 1.8 acres of California red-legged frog credits at a USFWS and CDFW-approved conservation bank or by permanently protecting 1.8 acres of California red-legged frog habitat. SJWC shall provide the funding for the California red-legged frog credits or mitigation lands prior to the initiation of construction of the proposed project. 				
<p>Mitigation Measure 3.4-3: To avoid or reduce potential impacts to western pond turtle, Santa Cruz black salamander, and California giant salamander, the following pre-construction actions shall be taken: a qualified biologist shall conduct</p>	<p>Before any construction activities.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife</p>	

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
<p>preconstruction surveys for western pond turtle, Santa Cruz black salamander, and California giant salamander and their nests 48 hours prior to the commencement of construction activities. The qualified biologist shall survey all areas within the riparian zone where construction activities will occur. If an adult pond turtle is found in any areas prior to or during project-related construction activities, a qualified biologist shall relocate the individual from the site and to a suitable location outside of potential project impacts. Because the terrestrial stage of these salamander species are known to occur under rocks, logs, and leaf litter, the biologist shall inspect all such habitats and ensure that all potential habitats have been cleared. If a buried nest of pond turtle eggs, or eggs or larvae of the salamanders are encountered during the preconstruction survey effort or project-related construction activities within the construction area, construction shall stop and CDFW shall be notified. CDFW does not recommend moving the eggs because of specific conditions required for development and hatching. Construction can be reinitiated only with CDFW approval.</p>				
<p>Mitigation Measure 3.4-4: To avoid or reduce impacts to special-status bat species, SJWC shall retain a qualified bat specialist or wildlife biologist to conduct a pre-construction survey for suitable roosting habitat no more than 15 days prior to the start of construction. Surveys shall consist of a daytime pedestrian survey looking for evidence of bat use (e.g., guano), and/or an evening emergence survey to note the presence or absence of bats. The type of survey shall be determined by the biologist in consultation with CDFW. Cavities, crevices, exfoliating bark, and bark fissures that could provide suitable potential nest or roost habitat for bats shall be checked using roof-prism binoculars supplemented as needed with a flashlight or spotlight. If evidence of bat use is observed, the number and species of bats using the roost shall be determined and recorded. Bat detectors may be used to supplement survey efforts, but are not required. If no bat roosts are found, then no further mitigation is required.</p> <p>Tree limbs and screening vegetation may be pruned or removed from roost trees, provided the biologist first confirms that only single bats and/or adult bats are utilizing the roost tree and after the bats have been safely excluded from the roost. Exclusion measures shall allow for the gradual nighttime dispersal of bats, to minimize stress and maximize bats' ability to find new roosts. While the exclusion process would displace bats from daytime resting habitat, it would minimize disorientation, stress, and mortality associated with exposure to disturbances from</p>	<p>Before any construction activities and during project construction as applicable.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife</p>	

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
<p>daytime vegetation management activities. Exclusion techniques shall be determined by the biologist and would depend on the roost type. If features of the tree would be modified by pruning such that the tree will no longer function as a roost, a detailed mitigation plan addressing compensation, exclusion methods, and roost removal procedures shall be developed, in consultation with CDFW, before implementation. Exclusion methods may include use of one-way doors at roost entrances (bats may leave but not reenter), or sealing roost entrances when the site can be confirmed to contain no bats. Exclusion efforts will be avoided during certain periods of sensitive activity (e.g., during hibernation or while females in maternity colonies are nursing young).</p> <p>If an active maternity roost is detected, avoidance is preferred. Work in the vicinity of the roost (buffer to be determined by biologist) shall be postponed until the biologist monitoring the roost determines that the young have fledged and are no longer dependent on the roost. The monitor shall ensure that all bats have left the area of disturbance prior to initiation of construction activities that would disturb the roost. A plan addressing compensation, exclusion methods, and roost removal procedures will be developed and implemented and shall require approval by CDFW prior to initiation of project construction. The plan may include construction and installation of bat boxes suitable to the bat species and colony size excluded from the original roosting site. The plan shall specify that roost replacement will be implemented before bats are excluded from the original roost site. Once compensation is implemented and it is confirmed that bats are not present in the roost site, the roost structure may be removed.</p>				
<p>Mitigation Measure 3.4-5: To avoid or reduce impacts to San Francisco dusky-footed woodrat, a qualified wildlife biologist previously approved by CDFW shall conduct a preconstruction survey to identify woodrat middens within the disturbance area and within 25 feet of the disturbance area within 5 days of initiation of ground disturbing activities. If no middens are found, no further mitigation is required.</p> <p>If active middens are found, a 25-foot no construction buffer shall be delineated with fencing or flagging in consultation with CDFW and maintained during construction activities. If avoidance is not feasible and the midden is found within an area of proposed construction, a relocation plan shall be prepared and submitted to CDFW for approval. Once the relocation plan has been approved, the midden shall be dismantled prior to land clearing or construction activities,</p>	<p>Before any construction activities and during project construction as applicable.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife</p>	

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
<p>to allow animals to escape harm and to reestablish territories for the next breeding season. Middens shall only be dismantled during the non-breeding season, between October 1 and December 31, or after a qualified biologist determines through monitoring (i.e., trail camera placement or daily human monitoring) of the midden that it is not being used. Live traps shall be installed and checked for three consecutive nights to capture and relocate individuals. Traps shall be closed during daylight hours and opened and baited each evening only within 1 hour before sunset. Traps shall be checked the following morning and any captured San Francisco dusky-footed woodrat will be released directly into temporary shelter houses in immediately adjacent riparian habitat. The live-trap with the captured San Francisco dusky-footed woodrat will then be placed at the entrance and carefully opened such that the individual enters on its own. Dismantling of middens shall be done by hand. If a litter of young is found or suspected while dismantling, midden material shall be replaced, and the midden be left alone for 2 to 3 days before a recheck to determine whether the animals have left the midden. All woodrat middens dismantled and relocated, and any middens protected shall be mapped and documented and reported to CDFW.</p>				
<p>Mitigation Measure 3.4-6: The following measures shall be implemented to avoid, reduce or compensate for the loss or degradation of riparian habitat, and achieve consistency with Fish and Game Code Section 1602:</p> <ul style="list-style-type: none"> ▲ SJWC shall notify CDFW before commencing any activity within the bed, bank, or riparian corridor of Los Gatos Creek. The project proponent shall conduct construction activities in accordance with the LSAA, including implementing measures necessary to protect fish and wildlife resources. ▲ SJWC shall compensate for all impacts to riparian habitat to ensure no net loss of riparian habitat by restoring and revegetating areas of temporary disturbance within the project area. SJWC shall develop and implement a riparian mitigation plan that will include creation, restoration and/or enhancement of habitat within the project area or surrounding area, and removal of non-native species, where appropriate. Compensatory mitigation shall be conducted in consultation with CDFW in accordance with the terms of the LSAA. ▲ The riparian mitigation plan shall include the following: <ul style="list-style-type: none"> ▸ identification of appropriate revegetation sites; 	<p>Before any construction activities, during project construction as applicable, and following construction.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife</p>	

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
<ul style="list-style-type: none"> ➤ in-kind reference habitats for comparison with compensatory riparian habitats (using performance and success criteria) to document success; ➤ monitoring protocol, including schedule and annual report requirements. Compensatory habitat shall be monitored for a minimum of 5 years from completion of mitigation, or human intervention (including recontouring and grading), or until the success criteria identified in the approved mitigation plan have been met, whichever is longer; ➤ ecological performance standards, based on the best available science and including specifications for native riparian plant densities, species composition, amount of dead woody vegetation gaps and bare ground, and survivorship; at a minimum, compensatory mitigation planting sites must achieve 80 percent survival of planted riparian trees and shrubs by the end of the 5-year maintenance and monitoring period or dead and dying trees shall be replaced and monitoring continued until 80 percent survivorship is achieved; ➤ corrective measures if performance standards are not met; ➤ responsible parties for monitoring and preparing reports; and ➤ responsible parties for receiving and reviewing reports and for verifying success or prescribing implementation or corrective actions. 				
<p>Mitigation Measure 3.4-7a: The following measures shall be implemented to avoid or compensate for impacts to waters of the United States, and achieve consistency with the project’s NWP:</p> <ul style="list-style-type: none"> ▲ Obtain and implement all measures set forth in the USACE NWP. ▲ A post-construction report shall be submitted 45 days after completion of construction documenting construction activities and containing as-built drawings (if different from drawings submitted with the Section 404 permit application) and before and after photographs. ▲ Prior to construction, the project area shall be surveyed, and following construction, all disturbed areas within the bed and bank of the creek shall be regraded and restored to pre-project survey conditions. All temporary impacts shall be restored at least to preconstruction condition and only native wetland species shall be used in replanting. Reseeding and replanting will be implemented between November 1 and December 1 immediately following construction, and the site will be restored to pre-construction conditions within 1 year of the end of construction. Plant stock will be collected on-site, if feasible. If no plant stock is available on-site, it will be 	<p>Before any construction activities, during project construction as applicable, and following construction.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife U.S. Army Corps of Engineers</p>	

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
<p>acquired from local sources for use in restoration. Data shall be collected and reported in accordance with the USACE NWP. These data will be used to evaluate project conditions related to success criteria set forth in the NWP. All invasive weed species shall be removed from all restoration areas annually for 3 years.</p>				
<p>Mitigation Measure 3.4-7b: The Los Gatos Creek corridor shall be photographed to document pre-project conditions prior to the initiation of construction activities. Photographs will be georeferenced on the existing topographic survey for the project area. Following the completion of all construction activities, the pre-construction documentation shall be used to return the project area to existing conditions, including reestablishment of native emergent, aquatic, and riparian vegetation, and restoring preconstruction contours.</p>	<p>Before any construction activities and following construction.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife</p>	
<p>Mitigation Measure 3.4-7c: The SJWC shall obtain a permit under Section 401 of the CWA from the RWQCB prior to project implementation, and will implement all requirements of the permit in the timeframes required therein, including any avoidance and minimization measures included in the permit.</p>	<p>Before any construction activities, during project construction as applicable, and following construction.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife San Francisco Regional Water Quality Control Board</p>	
<p>Mitigation Measure 3.4-8: To avoid or reduce impacts to nesting birds, the following actions shall be taken:</p> <ul style="list-style-type: none"> ▲ Construction activities in upland habitat shall be initiated before the start of the nesting season (i.e., before February 15), if possible. ▲ Although no trees are proposed to be removed, there would be some minor pruning of some lower hanging limbs extending into the project area. For project activities, including vegetation pruning, that begin between February 15 and September 15, a qualified biologist shall conduct preconstruction surveys for nesting birds and to identify active nests on and within 500 feet of the project area with direct line of sight to the proposed work areas. The surveys shall be conducted no more than 14 days prior to the beginning of any construction activities between February 15 and September 15. A second survey will be conducted no more than 48 hours prior to the beginning of any construction activities between February 15 and September 15. If no active nests are found during surveys, no additional mitigation is required. However, if a historic raptor nest (used within the last 5 years) is documented during surveys and impacts to the suitable nest habitat cannot be avoided, CDFW shall be consulted for appropriate mitigation for loss of historic raptor nesting habitat. 	<p>Before any construction activities, during project construction as applicable, and following construction.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife</p>	

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
<p>If active nests are found, appropriate buffers shall be established around active nest sites. No project activity shall commence within the buffer areas until a qualified biologist has determined the young have fledged, the nest is no longer active, or reducing the buffer, in coordination with CDFW, would not likely result in nest abandonment. The appropriate no-disturbance buffer shall be determined by a qualified biologist based on site-specific conditions, the species of nesting bird, nature of the project activity, visibility of the disturbance from the nest site, and other relevant circumstances. Monitoring of the nest by a qualified biologist during construction activities shall be required if the activity has potential to adversely affect the nest. If construction activities cause the nesting bird to vocalize, make defensive flights at intruders, get up from a brooding position, or fly off the nest, then the no-disturbance buffer shall be increased until the agitated behavior ceases. The exclusionary buffer will remain in place until the chicks have fledged or as otherwise determined by a qualified biologist.</p>				
<p>Mitigation Measure 3.4-9: To avoid or reduce impacts to nesting birds, the following additional actions shall be taken:</p> <ul style="list-style-type: none"> ▲ If vegetation pruning or other disturbance related to construction is required during the nesting season (typically February 15 – September 15), focused surveys for active bird nests shall be conducted before and within 5 days of initiating construction by a qualified biologist. A second survey will be conducted no more than 48 hours prior to the beginning of any construction activities between February 15 and September 15. The appropriate area to be surveyed and timing of the survey may vary depending on the activity and species that could be affected. If no active nests are found during focused surveys, no further mitigation is required. ▲ If an active nest is located during the preconstruction surveys, an appropriate no-disturbance buffer shall be determined by a qualified biologist in consultation with CDFW based on site-specific conditions, the species of nesting bird, nature of the project activity, visibility of the disturbance from the nest site, and other relevant circumstances. Monitoring of the nest by a qualified biologist during construction activities shall be required if the activity has potential to adversely affect the nest. If construction activities cause the nesting bird to vocalize, make defensive flights at intruders, get up from a brooding position, or fly off the nest, then the no-disturbance buffer shall be increased until the agitated behavior ceases. The exclusionary buffer will remain in place until the chicks have fledged or as otherwise determined by a qualified biologist. 	<p>Before any construction activities, during project construction as applicable, and following construction.</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife</p>	

Ostwald Waterline Replacement Project Mitigation Monitoring and Reporting Program Table

Mitigation Measure	Timing	Implementation	Enforcement	Dated Signature for Verification of Compliance
<p>▲ If construction stops for more than 5 days during the nesting season, a follow up survey shall be conducted to make sure that no nesting birds moved into the area.</p>				
<p>3.5 Cultural Resources</p>				
<p>Mitigation Measure 3.5-1: If any prehistoric or historic-era subsurface archaeological features or deposits, including locally darkened soil (potentially a “midden”), that could conceal cultural deposits, are discovered during construction, all ground-disturbing activity within 100 feet of the resources shall be halted and a qualified professional archaeologist shall be retained to assess the significance of the find. If the find is determined to be significant by the qualified archaeologist (i.e., because it is determined to constitute either an historical resource or a unique archaeological resource), the archaeologist shall develop appropriate procedures to protect the integrity of the resource and ensure that no additional resources are affected. Procedures could include but would not necessarily be limited to preservation in place, archival research, subsurface testing, or contiguous block unit excavation and data recovery.</p>	<p>Throughout project construction</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife</p>	
<p>Mitigation Measure 3.5-2: If human remains are discovered during any construction activities, potentially damaging ground-disturbing activities in the area of the remains will be halted immediately, and SJWC will notify the County coroner and the NAHC immediately, according to Section 5097.98 of the Public Resources Code and Section 7050.5 of California’s Health and Safety Code. If the remains are determined by the NAHC to be Native American, the guidelines of the NAHC will be adhered to in the treatment and disposition of the remains. SJWC will also retain a professional archaeologist with Native American burial experience to conduct a field investigation of the specific site and consult with the Most Likely Descendant (MLD), if any, identified by the NAHC. Following the coroner’s and NAHC’s findings, the archaeologist, and the NAHC-designated MLD will determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed. The responsibilities for acting upon notification of a discovery of Native American human remains are identified in California Public Resources Code Section 5097.94.</p>	<p>Throughout project construction</p>	<p>SJWC/construction contractor</p>	<p>California Department of Fish and Wildlife</p>	

Appendix A

Air Quality, Greenhouse Gas Modeling

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 8.1.0

Daily Emission Estimates for -> Ostwald Pipeline Replacement - Construction														
Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	0.75	5.40	8.94	0.55	0.35	0.20	0.36	0.32	0.04	0.01	1,372.55	0.36	0.02	1,386.45
Grading/Excavation	0.74	5.35	8.47	0.54	0.34	0.20	0.35	0.31	0.04	0.01	1,225.83	0.36	0.01	1,238.23
Drainage/Utilities/Sub-Grade	1.31	7.85	15.50	0.84	0.64	0.20	0.62	0.58	0.04	0.02	1,903.90	0.54	0.02	1,923.32
Paving	1.31	7.85	15.50	0.64	0.64	0.00	0.58	0.58	0.00	0.02	1,903.90	0.54	0.02	1,923.32
Maximum (pounds/day)	2.04	13.21	23.97	1.38	0.98	0.40	0.97	0.89	0.08	0.03	3,129.74	0.90	0.03	3,161.55
Total (tons/construction project)	0.02	0.15	0.26	0.01	0.01	0.00	0.01	0.01	0.00	0.00	34.75	0.01	0.00	35.10
Notes: Project Start Year -> 2018														
Project Length (months) -> 2														
Total Project Area (acres) -> 0														
Maximum Area Disturbed/Day (acres) -> 0														
Water Truck Used? -> Yes														
		Total Material Imported/Exported Volume (yd ³ /day)		Daily VMT (miles/day)										
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck								
Grubbing/Land Clearing	0	0	0	0	80	40								
Grading/Excavation	0	0	0	0	80	0								
Drainage/Utilities/Sub-Grade	0	0	0	30	80	0								
Paving	0	0	0	30	80	0								
PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.														
Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.														
CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.														

Total Emission Estimates by Phase for -> Ostwald Pipeline Replacement - Construction																		
Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	Total			Exhaust			Fugitive Dust			Total			Exhaust			Fugitive Dust		
	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	PM10 (tons/phase)	PM10 (tons/phase)	PM10 (tons/phase)	PM2.5 (tons/phase)	PM2.5 (tons/phase)	PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)				
Grubbing/Land Clearing	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.02	0.00	0.00	2.77				
Grading/Excavation	0.01	0.05	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.79	0.00	0.00	9.89				
Drainage/Utilities/Sub-Grade	0.01	0.06	0.12	0.01	0.00	0.00	0.00	0.00	0.00	0.00	14.66	0.00	0.00	13.44				
Paving	0.00	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.28	0.00	0.00	5.76				
Maximum (tons/phase)	0.01	0.06	0.12	0.01	0.00	0.00	0.00	0.00	0.00	0.00	14.66	0.00	0.00	13.44				
Total (tons/construction project)	0.02	0.15	0.26	0.01	0.01	0.00	0.01	0.01	0.00	0.00	34.75	0.01	0.00	31.85				

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

Road Construction Emissions Model Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells D10 through D24, E28 through G35, and D38 through D41 for all project types.
Please use "Clear Data Input & User Overrides" button first before changing the Project Type or begin a new project.

Version 8.1.0



To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

Input Type

Project Name	Ostwald Pipeline Replacement - Construction	
Construction Start Year	2018	Enter a Year between 2014 and 2025 (inclusive)
Project Type	4	1) New Road Construction : Project to build a roadway from bare ground, which generally requires more site preparation than widening an existing roadway 2) Road Widening : Project to add a new lane to an existing roadway 3) Bridge/Overpass Construction : Project to build an elevated roadway, which generally requires some different equipment than a new roadway, such as a crane 4) Other Linear Project Type: Non-roadway project such as a pipeline, transmission line, or levee construction
Project Construction Time	2.00	months
Working Days per Month	22.00	days (assume 22 if unknown)
Predominant Soil/Site Type: Enter 1, 2, or 3 <small>(for project within "Sacramento County", follow soil type selection instructions in cells E18 to E20 otherwise see instructions provided in cells J18 to J22)</small>	1	1) Sand Gravel : Use for quaternary deposits (Delta/West County) 2) Weathered Rock-Earth : Use for Laguna formation (Jackson Highway area) or the lone formation (Scott Road, Rancho Murieta) 3) Blasted Rock : Use for Salt Springs Slate or Copper Hill Volcanics (Folsom South of Highway 50, Rancho Murieta)
Project Length	0.30	miles
Total Project Area	0.20	acres
Maximum Area Disturbed/Day	0.02	acres
Water Trucks Used?	1	1. Yes 2. No

Material Hauling Quantity Input

Material Type	Phase	Haul Truck Capacity (yd ³) (assume 20 if unknown)	Import Volume (yd ³ /day)	Export Volume (yd ³ /day)
Soil	Grubbing/Land Clearing	0.00	0.00	0.00
	Grading/Excavation	0.00	0.00	0.00
	Drainage/Utilities/Sub-Grade	0.00	0.00	0.00
	Paving	0.00	0.00	0.00
Asphalt	Grubbing/Land Clearing	0.00	0.00	0.00
	Grading/Excavation	0.00	0.00	0.00
	Drainage/Utilities/Sub-Grade	0.00	0.00	0.00
	Paving	0.00	0.00	0.00

Mitigation Options

On-road Fleet Emissions Mitigation	No Mitigation	Select "2010 and Newer On-road Vehicles Fleet" option when the on-road heavy-duty truck fleet for the project will be limited to vehicles of model year 2010 or newer
Off-road Equipment Emissions Mitigation	No Mitigation	Select "20% NOx and 45% Exhaust PM reduction" option if the project will be required to use a lower emitting off-road construction fleet. The SMAQMD Construction Mitigation Calculator can be used to confirm compliance with this mitigation measure (http://www.airquality.org/ceqa/mitigation.shtml). Select "Tier 4 Equipment" option if some or all off-road equipment used for the project meets CARB Tier 4 Standard

Please note that the soil type instructions provided in cells E18 to E20 are specific to Sacramento County. Maps available from the California Geologic Survey (see weblink below) can be used to determine soil type outside Sacramento County.

http://www.conservation.ca.gov/cgs/information/geologic_mapping/Pages/googlemaps.aspx#regionalseries

Note: The program's estimates of construction period phase length can be overridden in cells D50 through D53, and F50 through F53.

Construction Periods	User Override of Construction Months	Program Calculated Months	User Override of Phase Starting Date	Program Default Phase Starting Date
Grubbing/Land Clearing		0.20	4/1/2018	1/1/2018
Grading/Excavation		0.80	4/8/2018	1/8/2018
Drainage/Utilities/Sub-Grade		0.70	5/2/2018	2/2/2018
Paving		0.30	5/24/2018	2/24/2018
Totals (Months)	2			

Note: Soil Hauling emission default values can be overridden in cells D61 through D64, and F61 through F64.

Soil Hauling Emissions	User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT					
User Input										
Miles/round trip: Grubbing/Land Clearing				0	0.00					
Miles/round trip: Grading/Excavation				0	0.00					
Miles/round trip: Drainage/Utilities/Sub-Grade				0	0.00					
Miles/round trip: Paving				0	0.00					
Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Grading/Excavation (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Draining/Utilities/Sub-Grade (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Paving (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Hauling Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Asphalt Hauling emission default values can be overridden in cells D87 through D90, and F87 through F90.

Asphalt Hauling Emissions	User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT					
User Input										
Miles/round trip: Grubbing/Land Clearing				0	0.00					
Miles/round trip: Grading/Excavation				0	0.00					
Miles/round trip: Drainage/Utilities/Sub-Grade	30.00		1	0	30.00					
Miles/round trip: Paving	30.00		1	0	30.00					
Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Grading/Excavation (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Draining/Utilities/Sub-Grade (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Paving (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Drainage/Utilities/Sub-Grade	0.01	0.04	0.36	0.01	0.00	0.00	110.04	0.00	0.00	111.16
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.86
Pounds per day - Paving	0.01	0.04	0.36	0.01	0.00	0.00	110.04	0.00	0.00	111.16
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.37
Total tons per construction project	0.00	0.00	0.00	0.00	0.00	0.00	1.21	0.00	0.00	1.22

Note: Worker commute default values can be overridden in cells D113 through D118.

Worker Commute Emissions										
User Input	User Override of Worker Commute Default Values		Default Values		Calculated					
					Daily Trips	Daily VMT				
Miles/ one-way trip	20									
One-way trips/day	2									
No. of employees: Grubbing/Land Clearing	2				4	80.00				
No. of employees: Grading/Excavation	2				4	80.00				
No. of employees: Drainage/Utilities/Sub-Grade	2				4	80.00				
No. of employees: Paving	2				4	80.00				
Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.03	1.33	0.15	0.05	0.02	0.00	393.83	0.01	0.01	395.91
Grading/Excavation (grams/mile)	0.03	1.33	0.15	0.05	0.02	0.00	393.83	0.01	0.01	395.91
Draining/Utilities/Sub-Grade (grams/mile)	0.03	1.33	0.15	0.05	0.02	0.00	393.83	0.01	0.01	395.91
Paving (grams/mile)	0.03	1.33	0.15	0.05	0.02	0.00	393.83	0.01	0.01	395.91
Grubbing/Land Clearing (grams/trip)	1.17	3.21	0.26	0.00	0.00	0.00	87.83	0.02	0.01	91.49
Grading/Excavation (grams/trip)	1.17	3.21	0.26	0.00	0.00	0.00	87.83	0.02	0.01	91.49
Draining/Utilities/Sub-Grade (grams/trip)	1.17	3.21	0.26	0.00	0.00	0.00	87.83	0.02	0.01	91.49
Paving (grams/trip)	1.17	3.21	0.26	0.00	0.00	0.00	87.83	0.02	0.01	91.49
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.02	0.26	0.03	0.01	0.00	0.00	70.23	0.00	0.00	70.63
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.16
Pounds per day - Grading/Excavation	0.02	0.26	0.03	0.01	0.00	0.00	70.23	0.00	0.00	70.63
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.00	0.00	0.62
Pounds per day - Drainage/Utilities/Sub-Grade	0.02	0.26	0.03	0.01	0.00	0.00	70.23	0.00	0.00	70.63
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.54
Pounds per day - Paving	0.02	0.26	0.03	0.01	0.00	0.00	70.23	0.00	0.00	70.63
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.23
Total tons per construction project	0.00	0.01	0.00	0.00	0.00	0.00	1.55	0.00	0.00	1.55

Note: Water Truck default values can be overridden in cells D145 through D148, and F145 through F148.

Water Truck Emissions										
User Input	User Override of		Program Estimate of		User Override of Truck		Default Values		Calculated	
	Default # Water Trucks	Number of Water Trucks	Miles Traveled/Vehicle/Day	Miles Traveled/Vehicle/Day	Miles Traveled/Vehicle/Day	Miles Traveled/Vehicle/Day	Daily VMT			
Grubbing/Land Clearing - Exhaust	1		40.00				40.00			
Grading/Excavation - Exhaust							0.00			
Drainage/Utilities/Subgrade							0.00			
Paving							0.00			
Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Grading/Excavation (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Draining/Utilities/Sub-Grade (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Paving (grams/mile)	0.14	0.54	5.40	0.14	0.07	0.02	1,663.79	0.01	0.06	1,680.70
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.01	0.05	0.48	0.01	0.01	0.00	146.72	0.00	0.00	148.21
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.33
Pounds per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.33

Note: Fugitive dust default values can be overridden in cells D171 through D173.

Fugitive Dust	User Override of Max		Default		PM10	PM10	PM2.5	PM2.5
	Acreage Disturbed/Day	Maximum Acreage/Day	Maximum Acreage/Day	Maximum Acreage/Day	pounds/day	tons/per period	pounds/day	tons/per period
Fugitive Dust - Grubbing/Land Clearing					0.20	0.00	0.04	0.00
Fugitive Dust - Grading/Excavation					0.20	0.00	0.04	0.00
Fugitive Dust - Drainage/Utilities/Subgrade					0.20	0.00	0.04	0.00

Values in cells D183 through D216, D234 through D267, D285 through D318, and D336 through D369 are required when 'Other Project Type' is selected.

Off-Road Equipment Emissions															
Grubbing/Land Clearing		Default Number of Vehicles	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	Program-estimate					pounds/day									
				Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00				Model Default Tier	Excavators	0.30	3.38	3.19	0.15	0.14	0.01	536.03	0.17	0.00	541.59
				Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00				Model Default Tier	Rubber Tired Loaders	0.42	1.71	5.25	0.18	0.16	0.01	619.57	0.19	0.01	626.01
				Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
User-Defined Off-road Equipment															
If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab															
Number of Vehicles		Equipment Tier	Type	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e		
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Grubbing/Land Clearing		pounds per day	0.72	5.09	8.44	0.33	0.31	0.01	1,155.60	0.36	0.01	1,167.60		
	Grubbing/Land Clearing		tons per phase	0.00	0.01	0.02	0.00	0.00	0.00	2.54	0.00	0.00	2.57		

Grading/Excavation		Default Number of Vehicles	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
Override of Default Number of Vehicles	Program-estimate														
				Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00				Model Default Tier	Excavators	0.30	3.38	3.19	0.15	0.14	0.01	536.03	0.17	0.00	541.59
				Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00				Model Default Tier	Rubber Tired Loaders	0.42	1.71	5.25	0.18	0.16	0.01	619.57	0.19	0.01	626.01
				Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
User-Defined Off-road Equipment		<i>If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab</i>				ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Number of Vehicles		Equipment Tier		Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Grading/Excavation		pounds per day	0.72	5.09	8.44	0.33	0.31	0.01	1,155.60	0.36	0.01	1,167.60	
		Grading/Excavation		tons per phase	0.01	0.04	0.07	0.00	0.00	0.00	10.17	0.00	0.00	10.27	

Drainage/Utilities/Subgrade		Default Number of Vehicles	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
Override of Default Number of Vehicles	Program-estimate				pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	
				Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
				Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
				Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
				Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
				Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1.00				Model Default Tier	Cranes	0.56	2.47	6.67	0.29	0.27	0.01	568.03	0.18	0.00	573.92
				Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
				Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1.00				Model Default Tier	Excavators	0.30	3.38	3.19	0.15	0.14	0.01	536.03	0.17	0.00	541.59
				Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00				Model Default Tier	Rubber Tired Loaders	0.42	1.71	5.25	0.18	0.16	0.01	619.57	0.19	0.01	626.01
				Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
User-Defined Off-road Equipment					<i>If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab</i>										
Number of Vehicles		Equipment Tier		Type	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Drainage/Utilities/Sub-Grade					pounds per day	1.28	7.56	15.11	0.62	0.57	0.02	1,723.63	0.54	0.02	1,741.53
Drainage/Utilities/Sub-Grade					tons per phase	0.01	0.06	0.12	0.00	0.00	0.00	13.27	0.00	0.00	13.41

Paving	Default	Mitigation Option			ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
	Number of Vehicles	Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1.00		Model Default Tier	Cranes	0.56	2.47	6.67	0.29	0.27	0.01	568.03	0.18	0.00	573.92	
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1.00		Model Default Tier	Excavators	0.30	3.38	3.19	0.15	0.14	0.01	536.03	0.17	0.00	541.59	
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1.00		Model Default Tier	Rubber Tired Loaders	0.42	1.71	5.25	0.18	0.16	0.01	619.57	0.19	0.01	626.01	
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
User-Defined Off-road Equipment					<i>If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab</i>										
	Number of Vehicles		Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day	
	0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
				Paving	pounds per day	1.28	7.56	15.11	0.62	0.57	0.02	1,723.63	0.54	0.02	1,741.53
				Paving	tons per phase	0.00	0.02	0.05	0.00	0.00	0.00	5.69	0.00	0.00	5.75
Total Emissions all Phases (tons per construction period) =>					0.02	0.14	0.26	0.01	0.01	0.00	31.67	0.01	0.00	32.00	

Equipment default values for horsepower and hours/day can be overridden in cells D391 through D424 and F391 through F424.

Equipment	User Override of Horsepower	Default Values Horsepower	User Override of Hours/day	Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		78		8
Bore/Drill Rigs		206		8
Cement and Mortar Mixers		9		8
Concrete/Industrial Saws		81		8
Cranes		226		8
Crawler Tractors		208		8
Crushing/Proc. Equipment		85		8
Excavators		163		8
Forklifts		89		8
Generator Sets		84		8
Graders		175		8
Off-Highway Tractors		123		8
Off-Highway Trucks		400		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		167		8
Pavers		126		8
Paving Equipment		131		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		81		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		255		8
Rubber Tired Loaders		200		8
Scrapers		362		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		254		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		98		8
Trenchers		81		8
Welders		46		8

END OF DATA ENTRY SHEET

Year	ROG	Weighted - Grubbing	Weighted - Grading	Weighted - Drainage	Weighted - Paving	CO	Weighted - Grubbing	Weighted - Grading	Weighted - Drainage	Weighted - Paving	NOx
2014	0.0642	-	-	-	-	2.2203	-	-	-	-	0.2535
2015	0.0542	-	-	-	-	1.9680	-	-	-	-	0.2228
2016	0.0451	-	-	-	-	1.7328	-	-	-	-	0.1945
2017	0.0362	-	-	-	-	1.5134	-	-	-	-	0.1685
2018	0.0290	0.0290	0.0290	0.0290	0.0290	1.3269	1.3269	1.3269	1.3269	1.3269	0.1463
2019	0.0242	-	-	-	-	1.1906	-	-	-	-	0.1280
2020	0.0210	-	-	-	-	1.0764	-	-	-	-	0.1134
2021	0.0190	-	-	-	-	0.9903	-	-	-	-	0.1016
2022	0.0172	-	-	-	-	0.9178	-	-	-	-	0.0915
2023	0.0156	-	-	-	-	0.8529	-	-	-	-	0.0825
2024	0.0142	-	-	-	-	0.8010	-	-	-	-	0.0748
2025	0.0130	-	-	-	-	0.7506	-	-	-	-	0.0681
Total		0.0290	0.0290	0.0290	0.0290		1.3269	1.3269	1.3269	1.3269	

Heavy-Heavy Duty Diesel Truck

Water Truck Commute Emissions (EMFAC2014- web 1.0.7, T7 Single Unit Construction Truck)

Model Year	ROG	Weighted-Grubbing	Weighted - Grading	Weighted - Drainage	Weighted - Paving	CO	Weighted-Grubbing	Weighted - Grading	Weighted - Drainage	Weighted - Paving	NOx
2014	0.4443	-	-	-	-	1.5669	-	-	-	-	10.5435
2015	0.3630	-	-	-	-	1.2778	-	-	-	-	9.2817
2016	0.2888	-	-	-	-	1.0218	-	-	-	-	7.9708
2017	0.2042	-	-	-	-	0.7425	-	-	-	-	6.5368
2018	0.1428	0.1428	0.1428	0.1428	0.1428	0.5447	0.5447	0.5447	0.5447	0.5447	5.4026
2019	0.1341	-	-	-	-	0.5235	-	-	-	-	4.9686
2020	0.1053	-	-	-	-	0.4360	-	-	-	-	4.1285
2021	0.1016	-	-	-	-	0.4327	-	-	-	-	3.6453
2022	0.0978	-	-	-	-	0.4291	-	-	-	-	3.2324
2023	0.0637	-	-	-	-	0.3718	-	-	-	-	1.3091
2024	0.0640	-	-	-	-	0.3746	-	-	-	-	1.2913
2025	0.0644	-	-	-	-	0.3774	-	-	-	-	1.2796
Total		0.1428	0.1428	0.1428	0.1428		0.5447	0.5447	0.5447	0.5447	

Year	ROG	Weighted - Grubbing	Weighted - Grading	Weighted - Drainage	Weighted - Paving	CO	Weighted - Grubbing	Weighted - Grading	Weighted - Drainage	Weighted - Paving	NOx
name in EMF	ROG	ROG	ROG	ROG	ROG	CO	CO	CO	CO	CO	NOx
vlookup	ROG_RUNE	ROG_RUNE	ROG_RUNE	ROG_RUNE	ROG_RUNE	CO_RUNEX	CO_RUNEX	CO_RUNEX	CO_RUNEX	CO_RUNEX	NOx_RUNEX
index	13					27					30
2014	0.0090	-	-	-	-	0.4347	-	-	-	-	0.0459
2015	0.0092	-	-	-	-	0.4481	-	-	-	-	0.0466
2016	0.0093	-	-	-	-	0.4619	-	-	-	-	0.0471
2017	0.0093	-	-	-	-	0.4754	-	-	-	-	0.0470
2018	0.0093	0.0093	0.0093	0.0093	0.0093	0.4880	0.4880	0.4880	0.4880	0.4880	0.0470
2019	0.0092	-	-	-	-	0.5028	-	-	-	-	0.0467
2020	0.0092	-	-	-	-	0.5135	-	-	-	-	0.0463
2021	0.0091	-	-	-	-	0.5231	-	-	-	-	0.0456
2022	0.0089	-	-	-	-	0.5316	-	-	-	-	0.0447
2023	0.0087	-	-	-	-	0.5357	-	-	-	-	0.0434
2024	0.0084	-	-	-	-	0.5363	-	-	-	-	0.0418
2025	0.0081	-	-	-	-	0.5275	-	-	-	-	0.0402
Total		0.0093	0.0093	0.0093	0.0093		0.4880	0.4880	0.4880	0.4880	

Heavy-Heavy Duty Diesel Truck

Water Truck Commute Emissions (EMFAC2014- web 1.0.7, T7 Single Unit Construction Truck)

Model Year	ROG	Weighted-Grubbing	Weighted - Grading	Weighted - Drainage	Weighted - Paving	CO	Weighted-Grubbing	Weighted - Grading	Weighted - Drainage	Weighted - Paving	NOx
2014	0.0708	-	-	-	-	0.3424	-	-	-	-	1.9074
2015	0.0681	-	-	-	-	0.3440	-	-	-	-	1.7034
2016	0.0670	-	-	-	-	0.3476	-	-	-	-	1.5954
2017	0.0667	-	-	-	-	0.3529	-	-	-	-	1.5424
2018	0.0668	0.0668	0.0668	0.0668	0.0668	0.3579	0.3579	0.3579	0.3579	0.3579	1.5083
2019	0.0668	-	-	-	-	0.3617	-	-	-	-	1.4760
2020	0.0670	-	-	-	-	0.3671	-	-	-	-	1.4633
2021	0.0669	-	-	-	-	0.3698	-	-	-	-	1.4282
2022	0.0668	-	-	-	-	0.3717	-	-	-	-	1.3902
2023	0.0627	-	-	-	-	0.3699	-	-	-	-	1.2003
2024	0.0632	-	-	-	-	0.3728	-	-	-	-	1.1998
2025	0.0637	-	-	-	-	0.3759	-	-	-	-	1.2027
Total		0.0668	0.0668	0.0668	0.0668		0.3579	0.3579	0.3579	0.3579	

	B	C	D	E	F	G	H	I	J	K	L	M	
5	Emissions (g/bhp-hr)		ROG	ROG	ROG	ROG		CO	CO	CO	CO		
6	Aerial Lifts		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -		
7		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	Paving	NOx	
8		2014	0.2023	-	-	-	-	3.2195	-	-	-	-	3.3728
9		2015	0.1906	-	-	-	-	3.2178	-	-	-	-	3.1134
10		2016	0.1655	-	-	-	-	3.2010	-	-	-	-	2.7222
11		2017	0.1427	-	-	-	-	3.1843	-	-	-	-	2.3637
12		2018	0.1219	0.1219	0.1219	0.1219	0.1219	3.1669	3.1669	3.1669	3.1669	3.1669	2.0636
13		2019	0.1182	-	-	-	-	3.1725	-	-	-	-	1.9766
14		2020	0.1149	-	-	-	-	3.1768	-	-	-	-	1.8686
15		2021	0.1088	-	-	-	-	3.1762	-	-	-	-	1.7437
16		2022	0.1047	-	-	-	-	3.1760	-	-	-	-	1.6266
17		2023	0.1005	-	-	-	-	3.1703	-	-	-	-	1.5481
18		2024	0.1005	-	-	-	-	3.1726	-	-	-	-	1.5279
19		2025	0.0988	-	-	-	-	3.1674	-	-	-	-	1.5108
20	Aerial Lifts Total			0.1219	0.1219	0.1219	0.1219		3.1669	3.1669	3.1669	3.1669	
21													
22													
23													
24	Air Compressors		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -		
25		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	Paving	NOx	
26		2014	0.9010	-	-	-	-	3.8800	-	-	-	-	5.6080
27		2015	0.8210	-	-	-	-	3.8400	-	-	-	-	5.1900
28		2016	0.7440	-	-	-	-	3.8040	-	-	-	-	4.7900
29		2017	0.6710	-	-	-	-	3.7720	-	-	-	-	4.4120
30		2018	0.6030	0.6030	0.6030	0.6030	0.6030	3.7440	3.7440	3.7440	3.7440	3.7440	4.0500
31		2019	0.5380	-	-	-	-	3.7180	-	-	-	-	3.7060
32		2020	0.4890	-	-	-	-	3.6980	-	-	-	-	3.4000
33		2021	0.4420	-	-	-	-	3.6700	-	-	-	-	3.0830
34		2022	0.4130	-	-	-	-	3.6620	-	-	-	-	2.8440
35		2023	0.3870	-	-	-	-	3.6570	-	-	-	-	2.6310
36		2024	0.3650	-	-	-	-	3.6550	-	-	-	-	2.4610
37		2025	0.3450	-	-	-	-	3.6530	-	-	-	-	2.3130
38	Air Compressors Total			0.6030	0.6030	0.6030	0.6030		3.7440	3.7440	3.7440	3.7440	
39													
40													
41													
42	Bore/Drill Rigs		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -		
43		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	Paving	NOx	
44		2014	0.2173	-	-	-	-	1.1744	-	-	-	-	3.5245
45		2015	0.2133	-	-	-	-	1.1783	-	-	-	-	3.3245
46		2016	0.1925	-	-	-	-	1.1330	-	-	-	-	2.9021
47		2017	0.1735	-	-	-	-	1.1021	-	-	-	-	2.5215
48		2018	0.1545	0.1545	0.1545	0.1545	0.1545	1.0733	1.0733	1.0733	1.0733	1.0733	2.1531
49		2019	0.1434	-	-	-	-	1.0606	-	-	-	-	1.8943
50		2020	0.1424	-	-	-	-	1.0677	-	-	-	-	1.8073
51		2021	0.1325	-	-	-	-	1.0642	-	-	-	-	1.5510
52		2022	0.1150	-	-	-	-	1.0473	-	-	-	-	1.1629
53		2023	0.1104	-	-	-	-	1.0431	-	-	-	-	1.0465
54		2024	0.1080	-	-	-	-	1.0459	-	-	-	-	0.9754
55		2025	0.1074	-	-	-	-	1.0448	-	-	-	-	0.9572
56	Bore/Drill Rigs Total			0.1545	0.1545	0.1545	0.1545		1.0733	1.0733	1.0733	1.0733	
57													
58													
59													
60	Cement and Mortar Mixers		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -		
61		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	Paving	NOx	
62		2014	0.6660	-	-	-	-	3.4690	-	-	-	-	4.1910
63		2015	0.6630	-	-	-	-	3.4690	-	-	-	-	4.1680
64		2016	0.6620	-	-	-	-	3.4690	-	-	-	-	4.1530
65		2017	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1450
66		2018	0.6610	0.6610	0.6610	0.6610	0.6610	3.4690	3.4690	3.4690	3.4690	3.4690	4.1420
67		2019	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
68		2020	0.6610	-	-	-	-	3.4700	-	-	-	-	4.1420
69		2021	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
70		2022	0.6610	-	-	-	-	3.4700	-	-	-	-	4.1420
71		2023	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
72		2024	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
73		2025	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
74	Cement and Mortar Mixers Total			0.6610	0.6610	0.6610	0.6610		3.4690	3.4690	3.4690	3.4690	
75													
76													
77													
78	Concrete/Industrial Saws		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -		
79		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	Paving	NOx	
80		2014	0.7490	-	-	-	-	3.6750	-	-	-	-	5.1600
81		2015	0.6830	-	-	-	-	3.6470	-	-	-	-	4.7890
82		2016	0.6200	-	-	-	-	3.6200	-	-	-	-	4.4320
83		2017	0.5570	-	-	-	-	3.5950	-	-	-	-	4.0860
84		2018	0.4980	0.4980	0.4980	0.4980	0.4980	3.5710	3.5710	3.5710	3.5710	3.5710	3.7540
85		2019	0.4430	-	-	-	-	3.5500	-	-	-	-	3.4410
86		2020	0.4010	-	-	-	-	3.5350	-	-	-	-	3.1630
87		2021	0.3690	-	-	-	-	3.5230	-	-	-	-	2.9130
88		2022	0.3430	-	-	-	-	3.5140	-	-	-	-	2.6860
89		2023	0.3200	-	-	-	-	3.5070	-	-	-	-	2.4780

	B	C	D	E	F	G	H	I	J	K	L	M
132	Crushing/Proc. Equipment		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
133		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
134	2014	0.8770	-	-	-	-	3.8980	-	-	-	-	5.4680
135	2015	0.7970	-	-	-	-	3.8590	-	-	-	-	5.0400
136	2016	0.7200	-	-	-	-	3.8230	-	-	-	-	4.6310
137	2017	0.6470	-	-	-	-	3.7910	-	-	-	-	4.2440
138	2018	0.5800	0.5800	0.5800	0.5800	0.5800	3.7630	3.7630	3.7630	3.7630	3.7630	3.8810
139	2019	0.5190	-	-	-	-	3.7390	-	-	-	-	3.5440
140	2020	0.4730	-	-	-	-	3.7220	-	-	-	-	3.2490
141	2021	0.4380	-	-	-	-	3.7110	-	-	-	-	2.9890
142	2022	0.4100	-	-	-	-	3.7040	-	-	-	-	2.7580
143	2023	0.3850	-	-	-	-	3.7000	-	-	-	-	2.5520
144	2024	0.3640	-	-	-	-	3.6970	-	-	-	-	2.3890
145	2025	0.3450	-	-	-	-	3.6940	-	-	-	-	2.2480
146	Crushing/Proc. Equipment Total		0.5800	0.5800	0.5800	0.5800		3.7630	3.7630	3.7630	3.7630	
147												
148												
149												
150	Excavators		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
151		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
152	2014	0.3900	-	-	-	-	3.1544	-	-	-	-	4.6570
153	2015	0.3837	-	-	-	-	3.1676	-	-	-	-	4.4807
154	2016	0.3575	-	-	-	-	3.1577	-	-	-	-	4.0810
155	2017	0.3336	-	-	-	-	3.1509	-	-	-	-	3.6997
156	2018	0.2731	0.2731	0.2731	0.2731	0.2731	3.0934	3.0934	3.0934	3.0934	3.0934	2.9236
157	2019	0.2462	-	-	-	-	3.0816	-	-	-	-	2.5326
158	2020	0.2314	-	-	-	-	3.0860	-	-	-	-	2.2784
159	2021	0.2164	-	-	-	-	3.0898	-	-	-	-	2.0336
160	2022	0.1912	-	-	-	-	3.0740	-	-	-	-	1.6781
161	2023	0.1782	-	-	-	-	3.0765	-	-	-	-	1.4625
162	2024	0.1702	-	-	-	-	3.0834	-	-	-	-	1.3248
163	2025	0.1578	-	-	-	-	3.0780	-	-	-	-	1.1537
164	Excavators Total		0.2731	0.2731	0.2731	0.2731		3.0934	3.0934	3.0934	3.0934	
165												
166												
167												
168	Forklifts		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
169		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
170	2014	0.7945	-	-	-	-	4.0794	-	-	-	-	6.8483
171	2015	0.7684	-	-	-	-	4.0635	-	-	-	-	6.6009
172	2016	0.7229	-	-	-	-	4.0231	-	-	-	-	6.2219
173	2017	0.6719	-	-	-	-	3.9788	-	-	-	-	5.8177
174	2018	0.5674	0.5674	0.5674	0.5674	0.5674	3.8582	3.8582	3.8582	3.8582	3.8582	5.0153
175	2019	0.5095	-	-	-	-	3.8039	-	-	-	-	4.5497
176	2020	0.4587	-	-	-	-	3.7595	-	-	-	-	4.1330
177	2021	0.4120	-	-	-	-	3.7200	-	-	-	-	3.7559
178	2022	0.3618	-	-	-	-	3.6751	-	-	-	-	3.3602
179	2023	0.3266	-	-	-	-	3.6466	-	-	-	-	3.0569
180	2024	0.3000	-	-	-	-	3.6291	-	-	-	-	2.8143
181	2025	0.2768	-	-	-	-	3.6114	-	-	-	-	2.6073
182	Forklifts Total		0.5674	0.5674	0.5674	0.5674		3.8582	3.8582	3.8582	3.8582	
183												
184												
185												
186	Generator Sets		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
187		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
188	2014	0.7210	-	-	-	-	3.5320	-	-	-	-	5.1470
189	2015	0.6510	-	-	-	-	3.4990	-	-	-	-	4.7690
190	2016	0.5830	-	-	-	-	3.4690	-	-	-	-	4.4100
191	2017	0.5200	-	-	-	-	3.4420	-	-	-	-	4.0720
192	2018	0.4610	0.4610	0.4610	0.4610	0.4610	3.4180	3.4180	3.4180	3.4180	3.4180	3.7520
193	2019	0.4050	-	-	-	-	3.3960	-	-	-	-	3.4460
194	2020	0.3640	-	-	-	-	3.3800	-	-	-	-	3.1730
195	2021	0.3260	-	-	-	-	3.3610	-	-	-	-	2.8880
196	2022	0.3010	-	-	-	-	3.3530	-	-	-	-	2.6710
197	2023	0.2790	-	-	-	-	3.3470	-	-	-	-	2.4770
198	2024	0.2600	-	-	-	-	3.3420	-	-	-	-	2.3210
199	2025	0.2430	-	-	-	-	3.3380	-	-	-	-	2.1850
200	Generator Sets Total		0.4610	0.4610	0.4610	0.4610		3.4180	3.4180	3.4180	3.4180	
201												
202												
203												
204	Graders		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
205		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
206	2014	0.8469	-	-	-	-	3.9508	-	-	-	-	8.7021
207	2015	0.8439	-	-	-	-	3.9585	-	-	-	-	8.6374
208	2016	0.8097	-	-	-	-	3.9162	-	-	-	-	8.2497
209	2017	0.7571	-	-	-	-	3.8452	-	-	-	-	7.6627
210	2018	0.6614	0.6614	0.6614	0.6614	0.6614	3.7096	3.7096	3.7096	3.7096	3.7096	6.6047
211	2019	0.6088	-	-	-	-	3.6559	-	-	-	-	6.0135
212	2020	0.5667	-	-	-	-	3.6210	-	-	-	-	5.5305
213	2021	0.5053	-	-	-	-	3.5590	-	-	-	-	4.8395
214	2022	0.4403	-	-	-	-	3.4928	-	-	-	-	4.1249
215	2023	0.3898	-	-	-	-	3.4501	-	-	-	-	3.5479
216	2024	0.3638	-	-	-	-	3.4324	-	-	-	-	3.2022
217	2025	0.3288	-	-	-	-	3.4176	-	-	-	-	2.7740

	B	C	D	E	F	G	H	I	J	K	L	M
218	Graders Total		0.6614	0.6614	0.6614	0.6614		3.7096	3.7096	3.7096	3.7096	
219												
220												
221												
222	Off-Highway Tractors		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
223		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
224	2014	0.4242	-	-	-	-	3.2651	-	-	-	-	5.0253
225	2015	0.4017	-	-	-	-	3.2642	-	-	-	-	4.7237
226	2016	0.3910	-	-	-	-	3.2781	-	-	-	-	4.5109
227	2017	0.3559	-	-	-	-	3.2589	-	-	-	-	4.0259
228	2018	0.3149	0.3149	0.3149	0.3149	0.3149	3.2191	3.2191	3.2191	3.2191	3.2191	3.4976
229	2019	0.2941	-	-	-	-	3.2190	-	-	-	-	3.2076
230	2020	0.2710	-	-	-	-	3.2151	-	-	-	-	2.8903
231	2021	0.2587	-	-	-	-	3.2195	-	-	-	-	2.6596
232	2022	0.2312	-	-	-	-	3.1859	-	-	-	-	2.2388
233	2023	0.2010	-	-	-	-	3.1433	-	-	-	-	1.7848
234	2024	0.1826	-	-	-	-	3.1328	-	-	-	-	1.4958
235	2025	0.1752	-	-	-	-	3.1425	-	-	-	-	1.3486
236	Off-Highway Tractors Total		0.3149	0.3149	0.3149	0.3149		3.2191	3.2191	3.2191	3.2191	
237												
238												
239												
240	Off-Highway Trucks		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
241		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
242	2014	0.3934	-	-	-	-	2.0752	-	-	-	-	4.6858
243	2015	0.3845	-	-	-	-	2.0367	-	-	-	-	4.5279
244	2016	0.3514	-	-	-	-	1.8852	-	-	-	-	4.0480
245	2017	0.3253	-	-	-	-	1.7477	-	-	-	-	3.6684
246	2018	0.2870	0.2870	0.2870	0.2870	0.2870	1.5595	1.5595	1.5595	1.5595	1.5595	3.0900
247	2019	0.2635	-	-	-	-	1.4835	-	-	-	-	2.6685
248	2020	0.2461	-	-	-	-	1.4142	-	-	-	-	2.3468
249	2021	0.2249	-	-	-	-	1.3378	-	-	-	-	1.9536
250	2022	0.1961	-	-	-	-	1.2466	-	-	-	-	1.4898
251	2023	0.1870	-	-	-	-	1.2206	-	-	-	-	1.3243
252	2024	0.1845	-	-	-	-	1.2064	-	-	-	-	1.2352
253	2025	0.1773	-	-	-	-	1.1823	-	-	-	-	1.0638
254	Off-Highway Trucks Total		0.2870	0.2870	0.2870	0.2870		1.5595	1.5595	1.5595	1.5595	
255												
256												
257												
258	Other Construction Equipment		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
259		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
260	2014	0.5665	-	-	-	-	3.3852	-	-	-	-	6.3719
261	2015	0.5571	-	-	-	-	3.3818	-	-	-	-	6.2305
262	2016	0.5244	-	-	-	-	3.3567	-	-	-	-	5.8176
263	2017	0.5004	-	-	-	-	3.3377	-	-	-	-	5.4942
264	2018	0.4364	0.4364	0.4364	0.4364	0.4364	3.2635	3.2635	3.2635	3.2635	3.2635	4.7550
265	2019	0.4121	-	-	-	-	3.2562	-	-	-	-	4.4331
266	2020	0.3877	-	-	-	-	3.2353	-	-	-	-	4.1120
267	2021	0.3295	-	-	-	-	3.1828	-	-	-	-	3.4385
268	2022	0.2951	-	-	-	-	3.1554	-	-	-	-	2.9944
269	2023	0.2735	-	-	-	-	3.1415	-	-	-	-	2.6982
270	2024	0.2605	-	-	-	-	3.1495	-	-	-	-	2.5202
271	2025	0.2347	-	-	-	-	3.1365	-	-	-	-	2.1674
272	Other Construction Equipment Total		0.4364	0.4364	0.4364	0.4364		3.2635	3.2635	3.2635	3.2635	
273												
274												
275												
276	Other General Industrial Equipment		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
277		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
278	2014	0.7887	-	-	-	-	4.0901	-	-	-	-	6.7228
279	2015	0.7607	-	-	-	-	4.0811	-	-	-	-	6.5016
280	2016	0.7155	-	-	-	-	4.0454	-	-	-	-	6.1441
281	2017	0.6600	-	-	-	-	3.9981	-	-	-	-	5.7214
282	2018	0.5573	0.5573	0.5573	0.5573	0.5573	3.8763	3.8763	3.8763	3.8763	3.8763	4.9546
283	2019	0.4997	-	-	-	-	3.8213	-	-	-	-	4.4967
284	2020	0.4460	-	-	-	-	3.7707	-	-	-	-	4.0608
285	2021	0.4037	-	-	-	-	3.7403	-	-	-	-	3.7177
286	2022	0.3387	-	-	-	-	3.6682	-	-	-	-	3.1997
287	2023	0.3076	-	-	-	-	3.6470	-	-	-	-	2.9239
288	2024	0.2872	-	-	-	-	3.6393	-	-	-	-	2.7078
289	2025	0.2575	-	-	-	-	3.6120	-	-	-	-	2.4389
290	Other General Industrial Equipment Total		0.5573	0.5573	0.5573	0.5573		3.8763	3.8763	3.8763	3.8763	
291												
292												
293												
294	Other Material Handling Equipment		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
295		ROG	Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
296	2014	0.5283	-	-	-	-	3.4306	-	-	-	-	5.7976
297	2015	0.5251	-	-	-	-	3.4330	-	-	-	-	5.6445
298	2016	0.4888	-	-	-	-	3.4182	-	-	-	-	5.2115
299	2017	0.4269	-	-	-	-	3.3512	-	-	-	-	4.4881
300	2018	0.3265	0.3265	0.3265	0.3265	0.3265	3.2180	3.2180	3.2180	3.2180	3.2180	3.3323
301	2019	0.2796	-	-	-	-	3.1852	-	-	-	-	2.7737
302	2020	0.2520	-	-	-	-	3.1709	-	-	-	-	2.3665
303	2021	0.2488	-	-	-	-	3.1964	-	-	-	-	2.2463

	B	C	D	E	F	G	H	I	J	K	L	M	
304		2022	0.2256	-	-	-	-	3.1761	-	-	-	1.8938	
305		2023	0.2169	-	-	-	-	3.1707	-	-	-	1.7690	
306		2024	0.2083	-	-	-	-	3.1811	-	-	-	1.6386	
307		2025	0.1892	-	-	-	-	3.1679	-	-	-	1.3958	
308	Other Material Handling Equipment Total			0.3265	0.3265	0.3265	0.3265		3.2180	3.2180	3.2180	3.2180	
309													
310													
311													
312	Pavers			Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
313		ROG		Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
314		2014	0.5024	-	-	-	-	3.1146	-	-	-	-	5.7363
315		2015	0.4894	-	-	-	-	3.1155	-	-	-	-	5.5367
316		2016	0.4332	-	-	-	-	3.0802	-	-	-	-	4.8740
317		2017	0.3889	-	-	-	-	3.0628	-	-	-	-	4.3531
318		2018	0.3387	0.3387	0.3387	0.3387	0.3387	3.0391	3.0391	3.0391	3.0391	3.0391	3.7472
319		2019	0.2988	-	-	-	-	3.0132	-	-	-	-	3.2447
320		2020	0.2728	-	-	-	-	3.0097	-	-	-	-	2.9183
321		2021	0.2557	-	-	-	-	3.0165	-	-	-	-	2.6948
322		2022	0.2148	-	-	-	-	2.9948	-	-	-	-	2.1796
323		2023	0.1993	-	-	-	-	2.9940	-	-	-	-	1.9552
324		2024	0.1907	-	-	-	-	3.0042	-	-	-	-	1.8088
325		2025	0.1805	-	-	-	-	3.0071	-	-	-	-	1.6440
326	Pavers Total			0.3387	0.3387	0.3387	0.3387		3.0391	3.0391	3.0391	3.0391	
327													
328													
329													
330	Paving Equipment			Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
331		ROG		Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
332		2014	0.4151	-	-	-	-	3.0969	-	-	-	-	5.2157
333		2015	0.4108	-	-	-	-	3.1040	-	-	-	-	4.9656
334		2016	0.3718	-	-	-	-	3.0811	-	-	-	-	4.3217
335		2017	0.3425	-	-	-	-	3.0732	-	-	-	-	3.8963
336		2018	0.2837	0.2837	0.2837	0.2837	0.2837	3.0260	3.0260	3.0260	3.0260	3.0260	3.1721
337		2019	0.2541	-	-	-	-	3.0109	-	-	-	-	2.6924
338		2020	0.2475	-	-	-	-	3.0239	-	-	-	-	2.5550
339		2021	0.2291	-	-	-	-	3.0323	-	-	-	-	2.3151
340		2022	0.2127	-	-	-	-	3.0378	-	-	-	-	2.0733
341		2023	0.2037	-	-	-	-	3.0506	-	-	-	-	1.9126
342		2024	0.1966	-	-	-	-	3.0662	-	-	-	-	1.7851
343		2025	0.1752	-	-	-	-	3.0384	-	-	-	-	1.5090
344	Paving Equipment Total			0.2837	0.2837	0.2837	0.2837		3.0260	3.0260	3.0260	3.0260	
345													
346													
347													
348	Plate Compactors			Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
349		ROG		Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
350		2014	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
351		2015	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
352		2016	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
353		2017	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
354		2018	0.6610	0.6610	0.6610	0.6610	0.6610	3.4700	3.4700	3.4700	3.4700	3.4700	4.1420
355		2019	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
356		2020	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
357		2021	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
358		2022	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
359		2023	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
360		2024	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
361		2025	0.6610	-	-	-	-	3.4690	-	-	-	-	4.1420
362	Plate Compactors Total			0.6610	0.6610	0.6610	0.6610		3.4700	3.4700	3.4700	3.4700	
363													
364													
365													
366	Pressure Washers			Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
367		ROG		Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
368		2014	0.7830	-	-	-	-	3.7230	-	-	-	-	5.3690
369		2015	0.7470	-	-	-	-	3.6570	-	-	-	-	5.1410
370		2016	0.7200	-	-	-	-	3.6220	-	-	-	-	4.9780
371		2017	0.6990	-	-	-	-	3.5990	-	-	-	-	4.8470
372		2018	0.6790	0.6790	0.6790	0.6790	0.6790	3.5800	3.5800	3.5800	3.5800	3.5800	4.7280
373		2019	0.6620	-	-	-	-	3.5620	-	-	-	-	4.6170
374		2020	0.6460	-	-	-	-	3.5460	-	-	-	-	4.5160
375		2021	0.6340	-	-	-	-	3.5310	-	-	-	-	4.4410
376		2022	0.6260	-	-	-	-	3.5190	-	-	-	-	4.3900
377		2023	0.6180	-	-	-	-	3.5080	-	-	-	-	4.3450
378		2024	0.6120	-	-	-	-	3.4990	-	-	-	-	4.3050
379		2025	0.6070	-	-	-	-	3.4910	-	-	-	-	4.2690
380	Pressure Washers Total			0.6790	0.6790	0.6790	0.6790		3.5800	3.5800	3.5800	3.5800	
381													
382													
383													
384	Pumps			Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
385		ROG		Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
386		2014	0.7510	-	-	-	-	3.5870	-	-	-	-	5.2260
387		2015	0.6790	-	-	-	-	3.5540	-	-	-	-	4.8420
388		2016	0.6100	-	-	-	-	3.5230	-	-	-	-	4.4780
389		2017	0.5460	-	-	-	-	3.4950	-	-	-	-	4.1340

	B	C	D	E	F	G	H	I	J	K	L	M
390	2018	0.4850	0.4850	0.4850	0.4850	0.4850	3.4710	3.4710	3.4710	3.4710	3.4710	3.8080
391	2019	0.4290	-	-	-	-	3.4490	-	-	-	-	3.4970
392	2020	0.3860	-	-	-	-	3.4320	-	-	-	-	3.2190
393	2021	0.3470	-	-	-	-	3.4120	-	-	-	-	2.9280
394	2022	0.3210	-	-	-	-	3.4040	-	-	-	-	2.7080
395	2023	0.2990	-	-	-	-	3.3980	-	-	-	-	2.5110
396	2024	0.2790	-	-	-	-	3.3930	-	-	-	-	2.3520
397	2025	0.2610	-	-	-	-	3.3890	-	-	-	-	2.2130
398	Pumps Total		0.4850	0.4850	0.4850	0.4850		3.4710	3.4710	3.4710	3.4710	
399												
400												
401												
402	Rollers		Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted	
403	ROG		Grubbing	Grading	Drainage	Paving	CO	Grubbing	Grading	Drainage	- Paving	NOx
404	2014	0.6950	-	-	-	-	3.8092	-	-	-	-	6.3904
405	2015	0.6833	-	-	-	-	3.8089	-	-	-	-	6.2716
406	2016	0.6282	-	-	-	-	3.7554	-	-	-	-	5.8056

	N	O	P	Q	R	S	T	U	V
5	NOx	NOx	NOx	NOx		PM10	PM10	PM10	PM10
6	Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
7	Grubbing	Grading	Drainage	Paving	PM10	Grubbing	Grading	Drainage	Paving
8	-	-	-	-	0.1608	-	-	-	-
9	-	-	-	-	0.1431	-	-	-	-
10	-	-	-	-	0.1119	-	-	-	-
11	-	-	-	-	0.0834	-	-	-	-
12	2.0636	2.0636	2.0636	2.0636	0.0571	0.0571	0.0571	0.0571	0.0571
13	-	-	-	-	0.0485	-	-	-	-
14	-	-	-	-	0.0416	-	-	-	-
15	-	-	-	-	0.0333	-	-	-	-
16	-	-	-	-	0.0302	-	-	-	-
17	-	-	-	-	0.0267	-	-	-	-
18	-	-	-	-	0.0265	-	-	-	-
19	-	-	-	-	0.0259	-	-	-	-
20	2.0636	2.0636	2.0636	2.0636		0.0571	0.0571	0.0571	0.0571
21									
22									
23									
24	Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
25	Grubbing	Grading	Drainage	Paving	PM10	Grubbing	Grading	Drainage	Paving
26	-	-	-	-	0.4950	-	-	-	-
27	-	-	-	-	0.4460	-	-	-	-
28	-	-	-	-	0.3970	-	-	-	-
29	-	-	-	-	0.3500	-	-	-	-
30	4.0500	4.0500	4.0500	4.0500	0.3040	0.3040	0.3040	0.3040	0.3040
31	-	-	-	-	0.2600	-	-	-	-
32	-	-	-	-	0.2240	-	-	-	-
33	-	-	-	-	0.1900	-	-	-	-
34	-	-	-	-	0.1650	-	-	-	-
35	-	-	-	-	0.1430	-	-	-	-
36	-	-	-	-	0.1230	-	-	-	-
37	-	-	-	-	0.1040	-	-	-	-
38	4.0500	4.0500	4.0500	4.0500		0.3040	0.3040	0.3040	0.3040
39									
40									
41									
42	Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
43	Grubbing	Grading	Drainage	Paving	PM10	Grubbing	Grading	Drainage	Paving
44	-	-	-	-	0.1049	-	-	-	-
45	-	-	-	-	0.0996	-	-	-	-
46	-	-	-	-	0.0852	-	-	-	-
47	-	-	-	-	0.0725	-	-	-	-
48	2.1531	2.1531	2.1531	2.1531	0.0608	0.0608	0.0608	0.0608	0.0608
49	-	-	-	-	0.0537	-	-	-	-
50	-	-	-	-	0.0521	-	-	-	-
51	-	-	-	-	0.0470	-	-	-	-
52	-	-	-	-	0.0373	-	-	-	-
53	-	-	-	-	0.0339	-	-	-	-
54	-	-	-	-	0.0321	-	-	-	-
55	-	-	-	-	0.0314	-	-	-	-
56	2.1531	2.1531	2.1531	2.1531		0.0608	0.0608	0.0608	0.0608
57									
58									
59									
60	Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
61	Grubbing	Grading	Drainage	Paving	PM10	Grubbing	Grading	Drainage	Paving
62	-	-	-	-	0.1770	-	-	-	-
63	-	-	-	-	0.1710	-	-	-	-
64	-	-	-	-	0.1670	-	-	-	-
65	-	-	-	-	0.1650	-	-	-	-
66	4.1420	4.1420	4.1420	4.1420	0.1630	0.1630	0.1630	0.1630	0.1630
67	-	-	-	-	0.1620	-	-	-	-
68	-	-	-	-	0.1610	-	-	-	-
69	-	-	-	-	0.1610	-	-	-	-
70	-	-	-	-	0.1610	-	-	-	-
71	-	-	-	-	0.1610	-	-	-	-
72	-	-	-	-	0.1610	-	-	-	-
73	-	-	-	-	0.1610	-	-	-	-
74	4.1420	4.1420	4.1420	4.1420		0.1630	0.1630	0.1630	0.1630
75									
76									
77									
78	Weighted -	Weighted -	Weighted -	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
79	Grubbing	Grading	Drainage	Paving	PM10	Grubbing	Grading	Drainage	Paving
80	-	-	-	-	0.4120	-	-	-	-
81	-	-	-	-	0.3720	-	-	-	-
82	-	-	-	-	0.3330	-	-	-	-
83	-	-	-	-	0.2940	-	-	-	-
84	3.7540	3.7540	3.7540	3.7540	0.2560	0.2560	0.2560	0.2560	0.2560
85	-	-	-	-	0.2200	-	-	-	-
86	-	-	-	-	0.1900	-	-	-	-
87	-	-	-	-	0.1660	-	-	-	-
88	-	-	-	-	0.1440	-	-	-	-
89	-	-	-	-	0.1230	-	-	-	-

	N	O	P	Q	R	S	T	U	V
132	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
133	- Grubbing	- Grading	- Drainage	Paving	PM10	- Grubbing	- Grading	- Drainage	- Paving
134	-	-	-	-	0.4810	-	-	-	-
135	-	-	-	-	0.4300	-	-	-	-
136	-	-	-	-	0.3790	-	-	-	-
137	-	-	-	-	0.3300	-	-	-	-
138	3.8810	3.8810	3.8810	3.8810	0.2840	0.2840	0.2840	0.2840	0.2840
139	-	-	-	-	0.2410	-	-	-	-
140	-	-	-	-	0.2060	-	-	-	-
141	-	-	-	-	0.1780	-	-	-	-
142	-	-	-	-	0.1540	-	-	-	-
143	-	-	-	-	0.1320	-	-	-	-
144	-	-	-	-	0.1120	-	-	-	-
145	-	-	-	-	0.0950	-	-	-	-
146	3.8810	3.8810	3.8810	3.8810		0.2840	0.2840	0.2840	0.2840
147									
148									
149									
150	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
151	- Grubbing	- Grading	- Drainage	Paving	PM10	- Grubbing	- Grading	- Drainage	- Paving
152	-	-	-	-	0.2289	-	-	-	-
153	-	-	-	-	0.2212	-	-	-	-
154	-	-	-	-	0.2008	-	-	-	-
155	-	-	-	-	0.1820	-	-	-	-
156	2.9236	2.9236	2.9236	2.9236	0.1418	0.1418	0.1418	0.1418	0.1418
157	-	-	-	-	0.1221	-	-	-	-
158	-	-	-	-	0.1104	-	-	-	-
159	-	-	-	-	0.0986	-	-	-	-
160	-	-	-	-	0.0811	-	-	-	-
161	-	-	-	-	0.0716	-	-	-	-
162	-	-	-	-	0.0653	-	-	-	-
163	-	-	-	-	0.0566	-	-	-	-
164	2.9236	2.9236	2.9236	2.9236		0.1418	0.1418	0.1418	0.1418
165									
166									
167									
168	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
169	- Grubbing	- Grading	- Drainage	Paving	PM10	- Grubbing	- Grading	- Drainage	- Paving
170	-	-	-	-	0.5737	-	-	-	-
171	-	-	-	-	0.5545	-	-	-	-
172	-	-	-	-	0.5203	-	-	-	-
173	-	-	-	-	0.4800	-	-	-	-
174	5.0153	5.0153	5.0153	5.0153	0.4002	0.4002	0.4002	0.4002	0.4002
175	-	-	-	-	0.3525	-	-	-	-
176	-	-	-	-	0.3079	-	-	-	-
177	-	-	-	-	0.2666	-	-	-	-
178	-	-	-	-	0.2226	-	-	-	-
179	-	-	-	-	0.1889	-	-	-	-
180	-	-	-	-	0.1625	-	-	-	-
181	-	-	-	-	0.1396	-	-	-	-
182	5.0153	5.0153	5.0153	5.0153		0.4002	0.4002	0.4002	0.4002
183									
184									
185									
186	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
187	- Grubbing	- Grading	- Drainage	Paving	PM10	- Grubbing	- Grading	- Drainage	- Paving
188	-	-	-	-	0.3850	-	-	-	-
189	-	-	-	-	0.3470	-	-	-	-
190	-	-	-	-	0.3090	-	-	-	-
191	-	-	-	-	0.2740	-	-	-	-
192	3.7520	3.7520	3.7520	3.7520	0.2390	0.2390	0.2390	0.2390	0.2390
193	-	-	-	-	0.2060	-	-	-	-
194	-	-	-	-	0.1790	-	-	-	-
195	-	-	-	-	0.1530	-	-	-	-
196	-	-	-	-	0.1340	-	-	-	-
197	-	-	-	-	0.1170	-	-	-	-
198	-	-	-	-	0.1010	-	-	-	-
199	-	-	-	-	0.0870	-	-	-	-
200	3.7520	3.7520	3.7520	3.7520		0.2390	0.2390	0.2390	0.2390
201									
202									
203									
204	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
205	- Grubbing	- Grading	- Drainage	Paving	PM10	- Grubbing	- Grading	- Drainage	- Paving
206	-	-	-	-	0.4884	-	-	-	-
207	-	-	-	-	0.4857	-	-	-	-
208	-	-	-	-	0.4635	-	-	-	-
209	-	-	-	-	0.4304	-	-	-	-
210	6.6047	6.6047	6.6047	6.6047	0.3713	0.3713	0.3713	0.3713	0.3713
211	-	-	-	-	0.3365	-	-	-	-
212	-	-	-	-	0.3085	-	-	-	-
213	-	-	-	-	0.2700	-	-	-	-
214	-	-	-	-	0.2293	-	-	-	-
215	-	-	-	-	0.1953	-	-	-	-
216	-	-	-	-	0.1768	-	-	-	-
217	-	-	-	-	0.1521	-	-	-	-

	N	O	P	Q	R	S	T	U	V
218	6.6047	6.6047	6.6047	6.6047		0.3713	0.3713	0.3713	0.3713
219									
220									
221									
222	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
223	- Grubbing	- Grading	- Drainage	Paving	PM10	- Grubbing	- Grading	- Drainage	- Paving
224	-	-	-	-	0.2577	-	-	-	-
225	-	-	-	-	0.2393	-	-	-	-
226	-	-	-	-	0.2290	-	-	-	-
227	-	-	-	-	0.2049	-	-	-	-
228	3.4976	3.4976	3.4976	3.4976	0.1756	0.1756	0.1756	0.1756	0.1756
229	-	-	-	-	0.1586	-	-	-	-
230	-	-	-	-	0.1402	-	-	-	-
231	-	-	-	-	0.1286	-	-	-	-
232	-	-	-	-	0.1073	-	-	-	-
233	-	-	-	-	0.0854	-	-	-	-
234	-	-	-	-	0.0715	-	-	-	-
235	-	-	-	-	0.0647	-	-	-	-
236	3.4976	3.4976	3.4976	3.4976	0.1756	0.1756	0.1756	0.1756	0.1756
237									
238									
239									
240	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
241	- Grubbing	- Grading	- Drainage	Paving	PM10	- Grubbing	- Grading	- Drainage	- Paving
242	-	-	-	-	0.1795	-	-	-	-
243	-	-	-	-	0.1730	-	-	-	-
244	-	-	-	-	0.1527	-	-	-	-
245	-	-	-	-	0.1362	-	-	-	-
246	3.0900	3.0900	3.0900	3.0900	0.1128	0.1128	0.1128	0.1128	0.1128
247	-	-	-	-	0.0970	-	-	-	-
248	-	-	-	-	0.0855	-	-	-	-
249	-	-	-	-	0.0717	-	-	-	-
250	-	-	-	-	0.0542	-	-	-	-
251	-	-	-	-	0.0479	-	-	-	-
252	-	-	-	-	0.0445	-	-	-	-
253	-	-	-	-	0.0380	-	-	-	-
254	3.0900	3.0900	3.0900	3.0900	0.1128	0.1128	0.1128	0.1128	0.1128
255									
256									
257									
258	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
259	- Grubbing	- Grading	- Drainage	Paving	PM10	- Grubbing	- Grading	- Drainage	- Paving
260	-	-	-	-	0.3332	-	-	-	-
261	-	-	-	-	0.3264	-	-	-	-
262	-	-	-	-	0.3059	-	-	-	-
263	-	-	-	-	0.2903	-	-	-	-
264	4.7550	4.7550	4.7550	4.7550	0.2502	0.2502	0.2502	0.2502	0.2502
265	-	-	-	-	0.2335	-	-	-	-
266	-	-	-	-	0.2170	-	-	-	-
267	-	-	-	-	0.1798	-	-	-	-
268	-	-	-	-	0.1562	-	-	-	-
269	-	-	-	-	0.1405	-	-	-	-
270	-	-	-	-	0.1300	-	-	-	-
271	-	-	-	-	0.1121	-	-	-	-
272	4.7550	4.7550	4.7550	4.7550	0.2502	0.2502	0.2502	0.2502	0.2502
273									
274									
275									
276	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
277	- Grubbing	- Grading	- Drainage	Paving	PM10	- Grubbing	- Grading	- Drainage	- Paving
278	-	-	-	-	0.5739	-	-	-	-
279	-	-	-	-	0.5528	-	-	-	-
280	-	-	-	-	0.5178	-	-	-	-
281	-	-	-	-	0.4705	-	-	-	-
282	4.9546	4.9546	4.9546	4.9546	0.3917	0.3917	0.3917	0.3917	0.3917
283	-	-	-	-	0.3429	-	-	-	-
284	-	-	-	-	0.2959	-	-	-	-
285	-	-	-	-	0.2559	-	-	-	-
286	-	-	-	-	0.1991	-	-	-	-
287	-	-	-	-	0.1685	-	-	-	-
288	-	-	-	-	0.1459	-	-	-	-
289	-	-	-	-	0.1181	-	-	-	-
290	4.9546	4.9546	4.9546	4.9546	0.3917	0.3917	0.3917	0.3917	0.3917
291									
292									
293									
294	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
295	- Grubbing	- Grading	- Drainage	Paving	PM10	- Grubbing	- Grading	- Drainage	- Paving
296	-	-	-	-	0.3128	-	-	-	-
297	-	-	-	-	0.3060	-	-	-	-
298	-	-	-	-	0.2795	-	-	-	-
299	-	-	-	-	0.2379	-	-	-	-
300	3.3323	3.3323	3.3323	3.3323	0.1725	0.1725	0.1725	0.1725	0.1725
301	-	-	-	-	0.1388	-	-	-	-
302	-	-	-	-	0.1181	-	-	-	-
303	-	-	-	-	0.1138	-	-	-	-

	N	O	P	Q	R	S	T	U	V
304	-	-	-	-	0.1028	-	-	-	-
305	-	-	-	-	0.0959	-	-	-	-
306	-	-	-	-	0.0880	-	-	-	-
307	-	-	-	-	0.0724	-	-	-	-
308	3.3323	3.3323	3.3323	3.3323		0.1725	0.1725	0.1725	0.1725
309									
310									
311									
312	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
313	- Grubbing	- Grading	- Drainage	Paving	PM10	Grubbing	Grading	Drainage	Paving
314	-	-	-	-	0.2869	-	-	-	-
315	-	-	-	-	0.2774	-	-	-	-
316	-	-	-	-	0.2422	-	-	-	-
317	-	-	-	-	0.2142	-	-	-	-
318	3.7472	3.7472	3.7472	3.7472	0.1831	0.1831	0.1831	0.1831	0.1831
319	-	-	-	-	0.1589	-	-	-	-
320	-	-	-	-	0.1419	-	-	-	-
321	-	-	-	-	0.1302	-	-	-	-
322	-	-	-	-	0.1036	-	-	-	-
323	-	-	-	-	0.0920	-	-	-	-
324	-	-	-	-	0.0845	-	-	-	-
325	-	-	-	-	0.0770	-	-	-	-
326	3.7472	3.7472	3.7472	3.7472		0.1831	0.1831	0.1831	0.1831
327									
328									
329									
330	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
331	- Grubbing	- Grading	- Drainage	Paving	PM10	Grubbing	Grading	Drainage	Paving
332	-	-	-	-	0.2488	-	-	-	-
333	-	-	-	-	0.2423	-	-	-	-
334	-	-	-	-	0.2145	-	-	-	-
335	-	-	-	-	0.1946	-	-	-	-
336	3.1721	3.1721	3.1721	3.1721	0.1553	0.1553	0.1553	0.1553	0.1553
337	-	-	-	-	0.1336	-	-	-	-
338	-	-	-	-	0.1278	-	-	-	-
339	-	-	-	-	0.1143	-	-	-	-
340	-	-	-	-	0.1011	-	-	-	-
341	-	-	-	-	0.0930	-	-	-	-
342	-	-	-	-	0.0862	-	-	-	-
343	-	-	-	-	0.0746	-	-	-	-
344	3.1721	3.1721	3.1721	3.1721		0.1553	0.1553	0.1553	0.1553
345									
346									
347									
348	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
349	- Grubbing	- Grading	- Drainage	Paving	PM10	Grubbing	Grading	Drainage	Paving
350	-	-	-	-	0.1610	-	-	-	-
351	-	-	-	-	0.1610	-	-	-	-
352	-	-	-	-	0.1610	-	-	-	-
353	-	-	-	-	0.1610	-	-	-	-
354	4.1420	4.1420	4.1420	4.1420	0.1610	0.1610	0.1610	0.1610	0.1610
355	-	-	-	-	0.1610	-	-	-	-
356	-	-	-	-	0.1610	-	-	-	-
357	-	-	-	-	0.1610	-	-	-	-
358	-	-	-	-	0.1610	-	-	-	-
359	-	-	-	-	0.1610	-	-	-	-
360	-	-	-	-	0.1610	-	-	-	-
361	-	-	-	-	0.1610	-	-	-	-
362	4.1420	4.1420	4.1420	4.1420		0.1610	0.1610	0.1610	0.1610
363									
364									
365									
366	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
367	- Grubbing	- Grading	- Drainage	Paving	PM10	Grubbing	Grading	Drainage	Paving
368	-	-	-	-	0.2980	-	-	-	-
369	-	-	-	-	0.2800	-	-	-	-
370	-	-	-	-	0.2640	-	-	-	-
371	-	-	-	-	0.2500	-	-	-	-
372	4.7280	4.7280	4.7280	4.7280	0.2370	0.2370	0.2370	0.2370	0.2370
373	-	-	-	-	0.2240	-	-	-	-
374	-	-	-	-	0.2120	-	-	-	-
375	-	-	-	-	0.2010	-	-	-	-
376	-	-	-	-	0.1930	-	-	-	-
377	-	-	-	-	0.1860	-	-	-	-
378	-	-	-	-	0.1810	-	-	-	-
379	-	-	-	-	0.1780	-	-	-	-
380	4.7280	4.7280	4.7280	4.7280		0.2370	0.2370	0.2370	0.2370
381									
382									
383									
384	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
385	- Grubbing	- Grading	- Drainage	Paving	PM10	Grubbing	Grading	Drainage	Paving
386	-	-	-	-	0.4030	-	-	-	-
387	-	-	-	-	0.3640	-	-	-	-
388	-	-	-	-	0.3250	-	-	-	-
389	-	-	-	-	0.2870	-	-	-	-

	N	O	P	Q	R	S	T	U	V
390	3.8080	3.8080	3.8080	3.8080	0.2520	0.2520	0.2520	0.2520	0.2520
391	-	-	-	-	0.2170	-	-	-	-
392	-	-	-	-	0.1890	-	-	-	-
393	-	-	-	-	0.1620	-	-	-	-
394	-	-	-	-	0.1420	-	-	-	-
395	-	-	-	-	0.1230	-	-	-	-
396	-	-	-	-	0.1070	-	-	-	-
397	-	-	-	-	0.0920	-	-	-	-
398	3.8080	3.8080	3.8080	3.8080		0.2520	0.2520	0.2520	0.2520
399									
400									
401									
402	Weighted	Weighted	Weighted	Weighted -		Weighted -	Weighted -	Weighted -	Weighted -
403	- Grubbing	- Grading	- Drainage	Paving	PM10	- Grubbing	- Grading	- Drainage	- Paving
404	-	-	-	-	0.4759	-	-	-	-
405	-	-	-	-	0.4674	-	-	-	-
406	-	-	-	-	0.4275	-	-	-	-

Off-road Equipment Tier 4 Emission Factors

HP Bin		Emission Factor (g/bhp-hr)				
Low HP	High HP	ROG	CO	NOx	PM10	PM2.5
0	11	0.30	6.00	5.32	0.30	0.28
11	25	0.30	4.90	5.32	0.30	0.28
25	50	0.19	4.10	3.33	0.02	0.02
50	75	0.19	3.70	3.33	0.02	0.02
75	100	0.15	3.70	0.30	0.02	0.01
100	175	0.15	3.70	0.30	0.02	0.01
175	300	0.15	2.60	0.30	0.02	0.01
300	600	0.15	2.60	0.30	0.02	0.01
600	750	0.15	2.60	0.30	0.02	0.01
750	1200	0.15	2.60	2.60	0.03	0.03
1200	9999	0.15	2.60	2.60	0.03	0.03

92
95
1.07

Note:

1. Tier 4 Emission Factors are converted from EPA Non-road Diesel Engine Standards. Available at www.epa.gov
2. Assume PM2.5 is 92% of PM10.

% of PM2.5 in PM10 (from CEIDARS)

% of NOx in NMHC+NOx (from http://www.arb.ca.gov/msprog/moyer/guidelines/2005_Carl_Moyer_Guidelir
VOC/NMHC

www.arb.ca.gov/msprog/ordiesel/documents/Off-Road_Diesel_Std.xls

nes_Part4.pdf)

Default Horsepower and Load Factor

OFFROAD Equipment Type	Horsepower	Load Factor
Aerial Lifts	63	0.31
Air Compressors	78	0.48
Bore/Drill Rigs	206	0.5
Cement and Mortar Mixers	9	0.56
Concrete/Industrial Saws	81	0.73
Cranes	226	0.29
Crawler Tractors	208	0.43
Crushing/Proc. Equipment	85	0.78
Excavators	163	0.38
Forklifts	89	0.2
Generator Sets	84	0.74
Graders	175	0.41
Off-Highway Tractors	123	0.44
Off-Highway Trucks	400	0.38
Other Construction Equipment	172	0.42
Other General Industrial Equipment	88	0.34
Other Material Handling Equipment	167	0.4
Pavers	126	0.42
Paving Equipment	131	0.36
Plate Compactors	8	0.43
Pressure Washers	13	0.3
Pumps	84	0.74
Rollers	81	0.38
Rough Terrain Forklifts	100	0.4
Rubber Tired Dozers	255	0.4
Rubber Tired Loaders	200	0.36
Scrapers	362	0.48
Signal Boards	6	0.82
Skid Steer Loaders	65	0.37
Surfacing Equipment	254	0.3
Sweepers/Scrubbers	64	0.46
Tractors/Loaders/Backhoes	98	0.37
Trenchers	81	0.5
Welders	46	0.45

Default Horsepower and Load Factor from CalEEMod Appendix D: Table 3.3

Sacramento Valley Air Basin Fleet Average Emission Factors (Diesel)

2014

2014		g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr
Equipment	MaxHP	ROG	CO	NOX	SOX
Aerial Lifts	15	0.261	3.233	4.096	0.005
Aerial Lifts	25	0.261	3.233	4.096	0.005
Aerial Lifts	50	0.261	3.233	4.096	0.005
Aerial Lifts	120	0.202	3.220	3.373	0.005
Aerial Lifts	500	0.236	0.983	4.602	0.005
Aerial Lifts	750	0.299	1.178	3.761	0.005
Air Compressors					
	15	0.891	3.723	5.445	0.008
Air Compressors					
	25	0.960	2.780	5.000	0.007
Air Compressors					
	50	2.076	6.181	5.421	0.007
Air Compressors					
	120	0.901	3.880	5.608	0.006
Air Compressors					
	175	0.621	3.227	4.973	0.006
Air Compressors					
	250	0.405	1.237	4.399	0.006
Air Compressors					
	500	0.373	1.249	3.855	0.005
Air Compressors					
	750	0.378	1.249	3.991	0.005
Air Compressors					
	1000	0.445	1.493	5.512	0.005
Bore/Drill Rigs					
	15	0.834	4.691	5.332	0.006
Bore/Drill Rigs					
	25	0.834	4.691	5.332	0.006
Bore/Drill Rigs					
	50	0.834	4.691	5.332	0.006
Bore/Drill Rigs					
	120	0.319	3.327	4.195	0.005
Bore/Drill Rigs					
	175	0.308	3.040	4.066	0.005
Bore/Drill Rigs					
	250	0.217	1.174	3.525	0.005
Bore/Drill Rigs					
	500	0.202	1.239	3.186	0.005
Bore/Drill Rigs					
	750	0.157	1.087	2.373	0.005
Bore/Drill Rigs					
	1000	0.105	0.951	2.984	0.005

Cement and Mortar Mixers	15	0.666	3.469	4.191	0.008
Cement and Mortar Mixers	25	0.837	2.570	4.793	0.007
Concrete/Industrial Saws	25	0.685	2.339	4.332	0.007
Concrete/Industrial Saws	50	1.626	5.313	5.172	0.007
Concrete/Industrial Saws	120	0.749	3.675	5.160	0.006
Concrete/Industrial Saws	175	0.517	3.080	4.531	0.006
Cranes	50	2.115	7.126	6.093	0.005
Cranes	120	1.245	4.923	10.302	0.005
Cranes	175	0.793	3.932	8.471	0.005
Cranes	250	0.661	2.726	7.860	0.005
Cranes	500	0.483	4.177	6.264	0.005
Cranes	750	0.280	1.635	4.327	0.005
Cranes	9999	0.120	0.948	2.281	0.005
Crawler Tractors	50	2.521	8.047	6.396	0.005
Crawler Tractors	120	0.884	4.168	7.524	0.005
Crawler Tractors	175	0.629	3.459	6.875	0.005
Crawler Tractors	250	0.454	1.838	6.238	0.005
Crawler Tractors	500	0.412	2.911	5.616	0.005
Crawler Tractors	750	0.347	1.675	4.895	0.005
Crawler Tractors	1000	0.475	2.080	7.426	0.005
Crushing/Proc. Equipment	50	2.012	6.212	5.399	0.007
Crushing/Proc. Equipment	120	0.877	3.898	5.468	0.006
Crushing/Proc. Equipment	175	0.612	3.256	4.823	0.006
Crushing/Proc. Equipment	250	0.405	1.228	4.239	0.006
Crushing/Proc. Equipment	500	0.377	1.230	3.702	0.005
Crushing/Proc. Equipment	750	0.378	1.218	3.844	0.005
Crushing/Proc. Equipment	9999	0.456	1.460	5.391	0.005

Dumpers/Tenders	25	0.705	2.364	4.433	0.007
Excavators	25	0.825	4.844	4.965	0.005
Excavators	50	0.825	4.844	4.965	0.005
Excavators	120	0.513	3.663	5.131	0.005
Excavators	175	0.390	3.154	4.657	0.005
Excavators	250	0.294	1.346	4.374	0.005
Excavators	500	0.233	1.327	3.353	0.005
Excavators	750	0.239	1.347	3.541	0.005
Forklifts	50	2.114	7.321	6.006	0.005
Forklifts	120	0.795	4.079	6.848	0.005
Forklifts	175	0.578	3.521	6.352	0.005
Forklifts	250	0.615	2.501	7.276	0.005
Forklifts	500	0.541	4.252	6.353	0.005
Generator Sets	15	0.783	3.723	5.369	0.008
Generator Sets	25	0.821	2.780	5.000	0.007
Generator Sets	50	1.427	4.683	5.048	0.007
Generator Sets	120	0.721	3.532	5.147	0.006
Generator Sets	175	0.486	2.945	4.565	0.006
Generator Sets	250	0.311	1.130	4.025	0.006
Generator Sets	500	0.279	1.157	3.603	0.005
Generator Sets	750	0.289	1.157	3.724	0.005
Generator Sets	9999	0.389	1.377	5.150	0.005
Graders	50	3.094	9.065	6.550	0.005
Graders	120	1.269	4.920	9.986	0.005
Graders	175	0.847	3.951	8.702	0.005
Graders	250	0.390	1.462	5.740	0.005
Graders	500	0.314	1.791	3.714	0.005
Graders	750	0.437	1.483	3.876	0.005
Off-Highway Tractors	120	0.698	3.972	6.281	0.005
Off-Highway Tractors	175	0.424	3.265	5.025	0.005
Off-Highway Tractors	250	0.405	1.628	5.661	0.005
Off-Highway Tractors	750	0.267	1.334	4.007	0.005
Off-Highway Tractors	1000	0.085	0.947	2.279	0.005
Off-Highway Trucks	175	0.513	3.473	5.219	0.005
Off-Highway Trucks	250	0.483	1.932	5.441	0.005

Off-Highway Trucks	500	0.393	2.075	4.686	0.005
Off-Highway Trucks	750	0.485	2.953	5.578	0.005
Off-Highway Trucks	1000	0.415	1.779	6.365	0.005
Other Construction Equipment	15	1.301	5.602	5.565	0.005
Other Construction Equipment	25	1.301	5.602	5.565	0.005
Other Construction Equipment	50	1.301	5.602	5.565	0.005
Other Construction Equipment	120	0.729	3.906	6.633	0.005
Other Construction Equipment	175	0.567	3.385	6.372	0.005
Other Construction Equipment	500	0.330	2.476	4.561	0.005
Other General Industrial Equipment	15	1.521	6.288	5.584	0.005
Other General Industrial Equipment	25	1.521	6.288	5.584	0.005
Other General Industrial Equipment	50	1.521	6.288	5.584	0.005
Other General Industrial Equipment	120	0.789	4.090	6.723	0.005
Other General Industrial Equipment	175	0.523	3.469	5.792	0.005
Other General Industrial Equipment	250	0.488	2.054	6.153	0.005
Other General Industrial Equipment	500	0.355	2.499	4.565	0.005

Other General Industrial Equipment	750	0.256	1.489	3.622	0.005
Other General Industrial Equipment	1000	0.346	1.080	6.379	0.005
Other Material Handling Equipment	50	1.695	6.590	5.751	0.005
Other Material Handling Equipment	120	0.558	3.779	5.372	0.005
Other Material Handling Equipment	175	0.528	3.431	5.798	0.005
Other Material Handling Equipment	250	0.475	1.936	6.173	0.005
Other Material Handling Equipment	500	0.331	1.927	4.357	0.005
Other Material Handling Equipment	9999	0.141	0.978	3.436	0.005
Pavers	25	1.898	6.381	5.717	0.005
Pavers	50	1.898	6.381	5.717	0.005
Pavers	120	0.683	3.773	6.199	0.005
Pavers	175	0.502	3.115	5.736	0.005
Pavers	250	0.208	1.023	4.140	0.005
Pavers	500	0.180	1.005	3.047	0.005
Paving Equipment	25	1.053	4.952	5.184	0.005
Paving Equipment	50	1.053	4.952	5.184	0.005
Paving Equipment	120	0.677	3.837	6.370	0.005
Paving Equipment	175	0.415	3.097	5.216	0.005
Paving Equipment	250	0.310	1.370	4.782	0.005
Plate Compactors	15	0.661	3.469	4.142	0.008
Pressure Washers	15	0.783	3.723	5.369	0.008
Pressure Washers	25	0.821	2.780	5.000	0.007
Pressure Washers	50	1.096	3.951	4.873	0.007
Pressure Washers	120	0.634	3.367	4.912	0.006
Pressure Washers	175	0.469	2.923	4.513	0.006

Pressure Washers	250	0.137	0.986	1.047	0.006
Pumps	15	0.891	3.723	5.445	0.008
Pumps	25	0.960	2.780	5.000	0.007
Pumps	50	1.538	4.929	5.107	0.007
Pumps	120	0.751	3.587	5.226	0.006
Pumps	175	0.508	2.989	4.635	0.006
Pumps	250	0.326	1.149	4.090	0.006
Pumps	500	0.294	1.181	3.648	0.005
Pumps	750	0.303	1.181	3.770	0.005
Pumps	9999	0.399	1.406	5.210	0.005
Rollers	15	1.308	5.243	5.393	0.005
Rollers	25	1.308	5.243	5.393	0.005
Rollers	50	1.308	5.243	5.393	0.005
Rollers	120	0.695	3.809	6.390	0.005
Rollers	175	0.368	2.998	4.724	0.005
Rollers	250	0.381	1.760	5.403	0.005
Rollers	500	0.378	3.318	5.183	0.005
Rough Terrain Forklifts	50	1.182	4.887	5.226	0.005
Rough Terrain Forklifts	120	0.351	3.367	4.467	0.005
Rough Terrain Forklifts	175	0.221	2.852	3.594	0.005
Rough Terrain Forklifts	250	0.186	1.212	2.984	0.005
Rough Terrain Forklifts	500	0.170	0.954	3.500	0.005
Rubber Tired Dozers	175	0.961	4.226	9.834	0.005
Rubber Tired Dozers	250	0.721	2.712	7.972	0.005
Rubber Tired Dozers	500	0.707	6.165	8.058	0.005
Rubber Tired Dozers	750	0.513	2.756	7.147	0.005
Rubber Tired Dozers	1000	0.691	3.096	6.849	0.005
Rubber Tired Loaders	25	2.115	7.770	6.103	0.005
Rubber Tired Loaders	50	2.115	7.770	6.103	0.005
Rubber Tired Loaders	120	0.868	4.268	7.129	0.005
Rubber Tired Loaders	175	0.605	3.585	6.272	0.005

Rubber Tired Loaders	250	0.407	1.486	5.495	0.005
Rubber Tired Loaders	500	0.421	2.407	5.194	0.005
Rubber Tired Loaders	750	0.406	1.946	4.810	0.005
Rubber Tired Loaders	1000	0.414	1.457	6.692	0.005
Scrapers	120	0.719	4.100	7.065	0.005
Scrapers	175	0.718	3.807	7.907	0.005
Scrapers	250	0.742	3.061	8.815	0.005
Scrapers	500	0.479	3.898	6.233	0.005
Scrapers	750	0.369	2.846	5.012	0.005
Signal Boards	15	0.661	3.469	4.142	0.008
Signal Boards	50	1.625	5.231	5.139	0.007
Signal Boards	120	0.759	3.658	5.186	0.006
Signal Boards	175	0.520	3.058	4.582	0.006
Signal Boards	250	0.408	1.402	4.857	0.007
Skid Steer Loaders	25	0.664	4.016	4.541	0.005
Skid Steer Loaders	50	0.664	4.016	4.541	0.005
Skid Steer Loaders	120	0.304	3.338	4.013	0.005
Surfacing Equipment	50	1.141	4.877	5.425	0.006
Surfacing Equipment	120	0.559	3.580	5.520	0.005
Surfacing Equipment	175	0.472	3.012	5.711	0.005
Surfacing Equipment	250	0.306	1.434	5.102	0.005
Surfacing Equipment	500	0.237	1.501	3.895	0.005
Surfacing Equipment	750	0.174	1.020	3.284	0.005
Sweepers/Scrubbers	15	1.767	6.592	5.752	0.005
Sweepers/Scrubbers	25	1.767	6.592	5.752	0.005
Sweepers/Scrubbers	50	1.767	6.592	5.752	0.005
Sweepers/Scrubbers	120	0.833	4.071	6.934	0.005
Sweepers/Scrubbers	175	0.875	4.042	9.108	0.005
Sweepers/Scrubbers	250	0.505	2.066	6.704	0.005
Tractors/Loaders/Bac khoes	25	1.336	5.772	5.369	0.005

Tractors/Loaders/Bac khoes	50	1.336	5.772	5.369	0.005
Tractors/Loaders/Bac khoes	120	0.582	3.827	5.581	0.005
Tractors/Loaders/Bac khoes	175	0.423	3.239	4.938	0.005
Tractors/Loaders/Bac khoes	250	0.327	1.376	4.922	0.005
Tractors/Loaders/Bac khoes	500	0.312	1.878	4.488	0.005
Tractors/Loaders/Bac khoes	750	0.305	1.833	4.243	0.005
Trenchers	15	1.268	5.293	5.455	0.005
Trenchers	25	1.268	5.293	5.455	0.005
Trenchers	50	1.268	5.293	5.455	0.005
Trenchers	120	0.818	3.999	7.217	0.005
Trenchers	175	0.693	3.668	7.699	0.005
Trenchers	250	0.497	2.070	6.484	0.005
Trenchers	500	0.306	2.035	4.370	0.005
Trenchers	750	0.118	0.964	1.825	0.005
Welders	15	0.891	3.723	5.445	0.008
Welders	25	0.960	2.780	5.000	0.007
Welders	50	1.900	5.749	5.308	0.007
Welders	120	0.849	3.774	5.481	0.006
Welders	175	0.581	3.141	4.862	0.006
Welders	250	0.376	1.207	4.297	0.006
Welders	500	0.343	1.227	3.788	0.005
Water Trucks	175	0.513	3.473	5.219	0.005
Water Trucks	250	0.483	1.932	5.441	0.005
Water Trucks	500	0.393	2.075	4.686	0.005
Water Trucks	750	0.485	2.953	5.578	0.005
Water Trucks	1000	0.415	1.779	6.365	0.005

2015

g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr
PM10	PM2.5	CO2	CH4	N2O
0.158	0.145	574.665	0.170	0.005
0.158	0.145	574.665	0.170	0.005
0.158	0.145	574.665	0.170	0.005
0.161	0.148	516.703	0.153	0.004
0.101	0.093	516.638	0.153	0.004
0.109	0.109	568.299	0.027	0.004
0.341	0.341	568.300	0.080	0.005
0.291	0.291	568.299	0.086	0.005
0.505	0.505	568.299	0.187	0.005
0.495	0.495	568.299	0.081	0.004
0.272	0.272	568.299	0.056	0.004
0.134	0.134	568.299	0.036	0.004
0.125	0.125	568.299	0.033	0.004
0.128	0.128	568.299	0.034	0.004
0.157	0.157	568.300	0.040	0.004
0.382	0.351	591.442	0.175	0.005
0.382	0.351	591.442	0.175	0.005
0.382	0.351	591.442	0.175	0.005
0.249	0.229	501.365	0.148	0.004
0.186	0.171	524.052	0.155	0.004
0.105	0.097	512.336	0.151	0.004
0.101	0.093	506.154	0.150	0.004
0.081	0.074	525.240	0.155	0.004
0.058	0.054	516.600	0.153	0.004

2015	g/hp/hr	
Equipment	MaxHP	
	ROG	
Aerial Lifts	15	0.248
Aerial Lifts	25	0.248
Aerial Lifts	50	0.248
Aerial Lifts	120	0.191
Aerial Lifts	500	0.239
Aerial Lifts	750	0.278
Air Compressors		
	15	0.840
Air Compressors		
	25	0.894
Air Compressors		
	50	1.868
Air Compressors		
	120	0.821
Air Compressors		
	175	0.571
Air Compressors		
	250	0.381
Air Compressors		
	500	0.354
Air Compressors		
	750	0.358
Air Compressors		
	1000	0.409
Bore/Drill Rigs		
	15	0.847
Bore/Drill Rigs		
	25	0.847
Bore/Drill Rigs		
	50	0.847
Bore/Drill Rigs		
	120	0.318
Bore/Drill Rigs		
	175	0.302
Bore/Drill Rigs		
	250	0.213
Bore/Drill Rigs		
	500	0.199
Bore/Drill Rigs		
	750	0.162
Bore/Drill Rigs		
	1000	0.109

0.177	0.177	568.299	0.060	0.005
0.253	0.253	568.299	0.075	0.005
0.164	0.164	568.299	0.061	0.005
0.424	0.424	568.299	0.146	0.005
0.412	0.412	568.299	0.067	0.004
0.228	0.228	568.299	0.046	0.004
0.607	0.559	567.006	0.168	0.005
0.765	0.704	514.029	0.152	0.004
0.457	0.421	519.511	0.154	0.004
0.360	0.331	517.683	0.153	0.004
0.260	0.239	516.578	0.153	0.004
0.151	0.139	515.607	0.152	0.004
0.054	0.050	516.638	0.153	0.004
0.743	0.684	564.564	0.167	0.005
0.629	0.578	522.119	0.154	0.004
0.374	0.344	516.404	0.153	0.004
0.241	0.222	518.036	0.153	0.004
0.217	0.200	520.515	0.154	0.004
0.179	0.164	517.861	0.153	0.004
0.218	0.201	520.005	0.154	0.004
0.494	0.494	568.299	0.181	0.005
0.481	0.481	568.299	0.079	0.004
0.265	0.265	568.299	0.055	0.004
0.130	0.130	568.299	0.036	0.004
0.121	0.121	568.299	0.034	0.004
0.123	0.123	568.299	0.034	0.004
0.155	0.155	568.299	0.041	0.004

Cement and Mortar Mixers	15	0.663
Cement and Mortar Mixers	25	0.811
Concrete/Industrial Saws	25	0.685
Concrete/Industrial Saws	50	1.470
Concrete/Industrial Saws	120	0.683
Concrete/Industrial Saws	175	0.475
Cranes	50	2.087
Cranes	120	1.214
Cranes	175	0.782
Cranes	250	0.642
Cranes	500	0.475
Cranes	750	0.286
Cranes	9999	0.131
Crawler Tractors	50	2.513
Crawler Tractors	120	0.885
Crawler Tractors	175	0.632
Crawler Tractors	250	0.451
Crawler Tractors	500	0.408
Crawler Tractors	750	0.351
Crawler Tractors	1000	0.479
Crushing/Proc. Equipment	50	1.796
Crushing/Proc. Equipment	120	0.797
Crushing/Proc. Equipment	175	0.562
Crushing/Proc. Equipment	250	0.382
Crushing/Proc. Equipment	500	0.358
Crushing/Proc. Equipment	750	0.358
Crushing/Proc. Equipment	9999	0.422

0.200	0.200	568.300	0.063	0.005
0.380	0.350	575.267	0.170	0.005
0.380	0.350	575.267	0.170	0.005
0.382	0.352	511.306	0.151	0.004
0.229	0.211	516.907	0.153	0.004
0.139	0.128	517.323	0.153	0.004
0.108	0.099	515.215	0.152	0.004
0.114	0.105	511.945	0.151	0.004
0.656	0.604	575.112	0.170	0.005
0.574	0.528	516.062	0.153	0.004
0.345	0.318	516.694	0.153	0.004
0.330	0.304	518.028	0.153	0.004
0.289	0.266	518.345	0.153	0.004
0.298	0.298	568.299	0.070	0.005
0.272	0.272	568.299	0.074	0.005
0.389	0.389	568.299	0.128	0.005
0.385	0.385	568.299	0.065	0.004
0.212	0.212	568.299	0.043	0.004
0.111	0.111	568.300	0.028	0.004
0.104	0.104	568.299	0.025	0.004
0.106	0.106	568.299	0.026	0.004
0.138	0.138	568.299	0.035	0.004
0.867	0.798	539.122	0.159	0.005
0.832	0.765	515.382	0.152	0.004
0.488	0.449	527.834	0.156	0.004
0.185	0.171	522.330	0.154	0.004
0.143	0.131	517.377	0.153	0.004
0.138	0.138	568.299	0.039	0.004
0.513	0.472	520.824	0.154	0.004
0.258	0.237	518.164	0.153	0.004
0.203	0.187	514.370	0.152	0.004
0.133	0.122	516.904	0.153	0.004
0.054	0.050	516.638	0.153	0.004
0.292	0.269	514.057	0.152	0.004
0.236	0.217	512.833	0.152	0.004

Dumpers/Tenders	25	0.696
Excavators	25	0.833
Excavators	50	0.833
Excavators	120	0.507
Excavators	175	0.384
Excavators	250	0.289
Excavators	500	0.232
Excavators	750	0.242
Forklifts	50	2.073
Forklifts	120	0.768
Forklifts	175	0.566
Forklifts	250	0.565
Forklifts	500	0.454
Generator Sets	15	0.747
Generator Sets	25	0.793
Generator Sets	50	1.281
Generator Sets	120	0.651
Generator Sets	175	0.440
Generator Sets	250	0.287
Generator Sets	500	0.258
Generator Sets	750	0.267
Generator Sets	9999	0.351
Graders	50	3.119
Graders	120	1.239
Graders	175	0.844
Graders	250	0.396
Graders	500	0.326
Graders	750	0.414
Off-Highway Tractors	120	0.674
Off-Highway Tractors	175	0.402
Off-Highway Tractors	250	0.400
Off-Highway Tractors	750	0.262
Off-Highway Tractors	1000	0.096
Off-Highway Trucks	175	0.508
Off-Highway Trucks	250	0.473

0.180	0.165	521.057	0.154	0.004
0.231	0.212	521.230	0.154	0.004
0.187	0.172	516.939	0.153	0.004
0.502	0.462	578.959	0.171	0.005
0.502	0.462	578.959	0.171	0.005
0.502	0.462	578.959	0.171	0.005
0.518	0.476	515.285	0.152	0.004
0.333	0.307	514.552	0.152	0.004
0.168	0.155	520.944	0.154	0.004
0.544	0.500	575.871	0.170	0.005
0.544	0.500	575.871	0.170	0.005
0.544	0.500	575.871	0.170	0.005
0.574	0.528	514.389	0.152	0.004
0.312	0.287	516.414	0.153	0.004
0.255	0.234	517.916	0.153	0.004
0.172	0.159	517.595	0.153	0.004

Off-Highway Trucks	500	0.385
Off-Highway Trucks	750	0.452
Off-Highway Trucks	1000	0.411
Other Construction Equipment	15	1.309
Other Construction Equipment	25	1.309
Other Construction Equipment	50	1.309
Other Construction Equipment	120	0.723
Other Construction Equipment	175	0.557
Other Construction Equipment	500	0.324
Other General Industrial Equipment	15	1.495
Other General Industrial Equipment	25	1.495
Other General Industrial Equipment	50	1.495
Other General Industrial Equipment	120	0.761
Other General Industrial Equipment	175	0.495
Other General Industrial Equipment	250	0.452
Other General Industrial Equipment	500	0.353

0.115	0.106	518.180	0.153	0.004
0.167	0.153	516.638	0.153	0.004
0.575	0.529	573.170	0.169	0.005
0.412	0.379	518.316	0.153	0.004
0.313	0.288	516.818	0.153	0.004
0.242	0.223	516.011	0.153	0.004
0.169	0.155	514.714	0.152	0.004
0.067	0.061	516.638	0.153	0.004
0.595	0.547	577.016	0.171	0.005
0.595	0.547	577.016	0.171	0.005
0.483	0.444	514.377	0.152	0.004
0.287	0.264	516.745	0.153	0.004
0.105	0.097	518.723	0.153	0.004
0.101	0.093	512.191	0.151	0.004
0.437	0.402	569.482	0.168	0.005
0.437	0.402	569.482	0.168	0.005
0.486	0.447	518.076	0.153	0.004
0.249	0.229	515.034	0.152	0.004
0.158	0.146	516.900	0.153	0.004
0.161	0.161	568.299	0.059	0.005
0.298	0.298	568.299	0.070	0.005
0.272	0.272	568.299	0.074	0.005
0.332	0.332	568.299	0.098	0.005
0.332	0.332	568.299	0.057	0.004
0.206	0.206	568.299	0.042	0.004

Other General Industrial Equipment	750	0.251
Other General Industrial Equipment	1000	0.355
Other Material Handling Equipment	50	1.733
Other Material Handling Equipment	120	0.528
Other Material Handling Equipment	175	0.525
Other Material Handling Equipment	250	0.423
Other Material Handling Equipment	500	0.333
Other Material Handling Equipment	9999	0.148
Pavers	25	1.853
Pavers	50	1.853
Pavers	120	0.680
Pavers	175	0.489
Pavers	250	0.214
Pavers	500	0.176
Paving Equipment	25	0.981
Paving Equipment	50	0.981
Paving Equipment	120	0.661
Paving Equipment	175	0.411
Paving Equipment	250	0.315
Plate Compactors	15	0.661
Pressure Washers	15	0.747
Pressure Washers	25	0.793
Pressure Washers	50	0.976
Pressure Washers	120	0.567
Pressure Washers	175	0.427

0.014	0.014	568.299	0.012	0.004
0.341	0.341	568.299	0.080	0.005
0.291	0.291	568.299	0.086	0.005
0.409	0.409	568.299	0.138	0.005
0.403	0.403	568.299	0.067	0.004
0.222	0.222	568.299	0.045	0.004
0.115	0.115	568.299	0.029	0.004
0.108	0.108	568.299	0.026	0.004
0.110	0.110	568.299	0.027	0.004
0.141	0.141	568.299	0.036	0.004
0.484	0.445	575.795	0.170	0.005
0.484	0.445	575.795	0.170	0.005
0.484	0.445	575.795	0.170	0.005
0.476	0.438	518.787	0.153	0.004
0.219	0.202	516.591	0.153	0.004
0.191	0.176	517.811	0.153	0.004
0.202	0.185	522.052	0.154	0.004
0.436	0.401	575.353	0.170	0.005
0.261	0.240	517.260	0.153	0.004
0.140	0.128	516.091	0.153	0.004
0.087	0.080	517.766	0.153	0.004
0.076	0.070	511.657	0.151	0.004
0.563	0.518	518.335	0.153	0.004
0.393	0.361	520.011	0.154	0.004
0.376	0.346	524.676	0.155	0.004
0.258	0.237	517.790	0.153	0.004
0.236	0.236	568.300	0.062	0.004
0.676	0.622	573.522	0.170	0.005
0.676	0.622	573.522	0.170	0.005
0.619	0.569	510.010	0.151	0.004
0.350	0.322	515.769	0.152	0.004

Pressure Washers	250	0.121
Pumps	15	0.840
Pumps	25	0.894
Pumps	50	1.384
Pumps	120	0.679
Pumps	175	0.461
Pumps	250	0.302
Pumps	500	0.273
Pumps	750	0.281
Pumps	9999	0.363
Rollers	15	1.311
Rollers	25	1.311
Rollers	50	1.311
Rollers	120	0.683
Rollers	175	0.364
Rollers	250	0.347
Rollers	500	0.371
Rough Terrain Forklifts	50	1.189
Rough Terrain Forklifts	120	0.338
Rough Terrain Forklifts	175	0.217
Rough Terrain Forklifts	250	0.140
Rough Terrain Forklifts	500	0.174
Rubber Tired Dozers	175	0.965
Rubber Tired Dozers	250	0.728
Rubber Tired Dozers	500	0.708
Rubber Tired Dozers	750	0.518
Rubber Tired Dozers	1000	0.661
Rubber Tired Loaders	25	2.108
Rubber Tired Loaders	50	2.108
Rubber Tired Loaders	120	0.856
Rubber Tired Loaders	175	0.595

0.187	0.172	514.217	0.152	0.004
0.196	0.180	512.510	0.152	0.004
0.190	0.175	499.695	0.148	0.004
0.195	0.179	515.307	0.152	0.004
0.526	0.484	529.945	0.157	0.004
0.419	0.385	524.171	0.155	0.004
0.403	0.371	512.853	0.152	0.004
0.251	0.231	517.361	0.153	0.004
0.190	0.174	517.394	0.153	0.004
0.161	0.161	568.299	0.059	0.005
0.422	0.422	568.299	0.146	0.005
0.414	0.414	568.299	0.068	0.004
0.228	0.228	568.299	0.046	0.004
0.141	0.141	686.695	0.036	0.004
0.286	0.263	577.076	0.171	0.005
0.286	0.263	577.076	0.171	0.005
0.235	0.216	517.062	0.153	0.004
0.434	0.400	582.725	0.172	0.005
0.391	0.360	516.338	0.153	0.004
0.273	0.251	515.820	0.152	0.004
0.149	0.137	521.452	0.154	0.004
0.126	0.116	513.616	0.152	0.004
0.103	0.095	516.321	0.153	0.004
0.603	0.555	574.943	0.170	0.005
0.603	0.555	574.943	0.170	0.005
0.603	0.555	574.943	0.170	0.005
0.610	0.562	518.893	0.153	0.004
0.503	0.463	517.806	0.153	0.004
0.265	0.244	514.527	0.152	0.004
0.488	0.449	564.042	0.167	0.005

Rubber Tired Loaders	250	0.406
Rubber Tired Loaders	500	0.415
Rubber Tired Loaders	750	0.395
Rubber Tired Loaders	1000	0.420
Scrapers	120	0.731
Scrapers	175	0.714
Scrapers	250	0.730
Scrapers	500	0.472
Scrapers	750	0.360
Signal Boards	15	0.661
Signal Boards	50	1.461
Signal Boards	120	0.687
Signal Boards	175	0.474
Signal Boards	250	0.380
Skid Steer Loaders	25	0.639
Skid Steer Loaders	50	0.639
Skid Steer Loaders	120	0.294
Surfacing Equipment	50	1.028
Surfacing Equipment	120	0.548
Surfacing Equipment	175	0.477
Surfacing Equipment	250	0.310
Surfacing Equipment	500	0.241
Surfacing Equipment	750	0.178
Sweepers/Scrubbers	15	1.808
Sweepers/Scrubbers	25	1.808
Sweepers/Scrubbers	50	1.808
Sweepers/Scrubbers	120	0.833
Sweepers/Scrubbers	175	0.839
Sweepers/Scrubbers	250	0.513
Tractors/Loaders/Backhoes	25	1.307

0.488	0.449	564.042	0.167	0.005
0.438	0.403	523.017	0.155	0.004
0.248	0.229	513.890	0.152	0.004
0.159	0.146	515.175	0.152	0.004
0.152	0.140	517.124	0.153	0.004
0.154	0.141	511.337	0.151	0.004
0.501	0.461	577.728	0.171	0.005
0.501	0.461	577.728	0.171	0.005
0.501	0.461	577.728	0.171	0.005
0.563	0.518	520.766	0.154	0.004
0.395	0.364	512.148	0.151	0.004
0.258	0.237	517.719	0.153	0.004
0.161	0.148	513.744	0.152	0.004
0.061	0.056	519.658	0.154	0.004
0.341	0.341	568.300	0.080	0.005
0.291	0.291	568.299	0.086	0.005
0.473	0.473	568.300	0.171	0.005
0.464	0.464	568.299	0.076	0.004
0.255	0.255	568.299	0.052	0.004
0.128	0.128	568.299	0.034	0.004
0.119	0.119	568.299	0.031	0.004
0.292	0.269	514.057	0.152	0.004
0.236	0.217	512.833	0.152	0.004
0.180	0.165	521.057	0.154	0.004
0.231	0.212	521.230	0.154	0.004
0.187	0.172	516.939	0.153	0.004

Tractors/Loaders/Backhoes	50	1.307
Tractors/Loaders/Backhoes	120	0.569
Tractors/Loaders/Backhoes	175	0.421
Tractors/Loaders/Backhoes	250	0.326
Tractors/Loaders/Backhoes	500	0.312
Tractors/Loaders/Backhoes	750	0.308
Trenchers	15	1.259
Trenchers	25	1.259
Trenchers	50	1.259
Trenchers	120	0.817
Trenchers	175	0.697
Trenchers	250	0.502
Trenchers	500	0.311
Trenchers	750	0.114
Welders	15	0.840
Welders	25	0.894
Welders	50	1.715
Welders	120	0.772
Welders	175	0.532
Welders	250	0.352
Welders	500	0.324
Water Trucks	175	0.508
Water Trucks	250	0.473
Water Trucks	500	0.385
Water Trucks	750	0.452
Water Trucks	1000	0.411

2016

| g/hp/hr |
|---------|---------|---------|---------|---------|---------|---------|---------|
| CO | NOX | SOX | PM10 | PM2.5 | CO2 | CH4 | N2O |
| 3.233 | 3.933 | 0.005 | 0.136 | 0.125 | 568.831 | 0.170 | 0.005 |
| 3.233 | 3.933 | 0.005 | 0.136 | 0.125 | 568.831 | 0.170 | 0.005 |
| 3.233 | 3.933 | 0.005 | 0.136 | 0.125 | 568.831 | 0.170 | 0.005 |
| 3.218 | 3.113 | 0.005 | 0.143 | 0.132 | 511.457 | 0.153 | 0.004 |
| 0.988 | 4.621 | 0.005 | 0.102 | 0.094 | 511.392 | 0.153 | 0.004 |
| 1.130 | 3.380 | 0.005 | 0.098 | 0.098 | 568.299 | 0.025 | 0.004 |
| 3.658 | 5.196 | 0.008 | 0.311 | 0.311 | 568.299 | 0.075 | 0.005 |
| 2.666 | 4.890 | 0.007 | 0.270 | 0.270 | 568.299 | 0.080 | 0.005 |
| 5.968 | 5.223 | 0.007 | 0.459 | 0.459 | 568.299 | 0.168 | 0.005 |
| 3.840 | 5.190 | 0.006 | 0.446 | 0.446 | 568.299 | 0.074 | 0.004 |
| 3.218 | 4.504 | 0.006 | 0.245 | 0.245 | 568.299 | 0.051 | 0.004 |
| 1.207 | 3.967 | 0.006 | 0.121 | 0.121 | 568.299 | 0.034 | 0.004 |
| 1.198 | 3.455 | 0.005 | 0.113 | 0.113 | 568.300 | 0.032 | 0.004 |
| 1.198 | 3.586 | 0.005 | 0.116 | 0.116 | 568.299 | 0.032 | 0.004 |
| 1.370 | 5.157 | 0.005 | 0.142 | 0.142 | 568.299 | 0.036 | 0.004 |
| 4.735 | 5.303 | 0.006 | 0.379 | 0.349 | 585.171 | 0.175 | 0.005 |
| 4.735 | 5.303 | 0.006 | 0.379 | 0.349 | 585.171 | 0.175 | 0.005 |
| 4.735 | 5.303 | 0.006 | 0.379 | 0.349 | 585.171 | 0.175 | 0.005 |
| 3.335 | 4.028 | 0.005 | 0.239 | 0.220 | 496.949 | 0.148 | 0.004 |
| 3.035 | 3.904 | 0.005 | 0.176 | 0.162 | 517.207 | 0.154 | 0.004 |
| 1.178 | 3.325 | 0.005 | 0.100 | 0.092 | 506.505 | 0.151 | 0.004 |
| 1.256 | 3.003 | 0.005 | 0.096 | 0.088 | 499.902 | 0.149 | 0.004 |
| 1.105 | 2.376 | 0.005 | 0.081 | 0.074 | 520.473 | 0.155 | 0.004 |
| 0.956 | 2.994 | 0.005 | 0.059 | 0.054 | 511.253 | 0.153 | 0.004 |

3.469	4.168	0.008	0.171	0.171	568.300	0.059	0.005
2.531	4.712	0.007	0.240	0.240	568.299	0.073	0.005
2.339	4.332	0.007	0.162	0.162	568.299	0.061	0.005
5.165	4.989	0.007	0.386	0.386	568.299	0.132	0.005
3.647	4.789	0.006	0.372	0.372	568.300	0.061	0.004
3.077	4.112	0.006	0.207	0.207	568.299	0.042	0.004
7.125	6.075	0.005	0.601	0.553	561.224	0.168	0.005
4.884	10.060	0.005	0.747	0.687	508.837	0.152	0.004
3.918	8.325	0.005	0.450	0.414	514.260	0.154	0.004
2.653	7.622	0.005	0.348	0.320	512.448	0.153	0.004
4.110	6.124	0.005	0.253	0.233	511.197	0.153	0.004
1.643	4.312	0.005	0.152	0.140	510.334	0.152	0.004
0.957	2.295	0.005	0.055	0.051	511.392	0.153	0.004
8.076	6.377	0.005	0.741	0.682	558.888	0.167	0.005
4.189	7.494	0.005	0.630	0.580	516.843	0.154	0.004
3.479	6.849	0.005	0.376	0.346	511.306	0.153	0.004
1.816	6.143	0.005	0.237	0.218	512.897	0.153	0.004
2.845	5.483	0.005	0.212	0.195	515.373	0.154	0.004
1.664	4.883	0.005	0.179	0.165	512.540	0.153	0.004
2.088	7.463	0.005	0.220	0.202	514.830	0.154	0.004
5.996	5.195	0.007	0.446	0.446	568.299	0.162	0.005
3.859	5.040	0.006	0.430	0.430	568.299	0.071	0.004
3.247	4.343	0.006	0.237	0.237	568.299	0.050	0.004
1.201	3.801	0.006	0.117	0.117	568.299	0.034	0.004
1.184	3.304	0.005	0.109	0.109	568.299	0.032	0.004
1.176	3.422	0.005	0.111	0.111	568.299	0.032	0.004
1.343	5.019	0.005	0.140	0.140	568.299	0.038	0.004

2.350	4.402	0.007	0.187	0.187	568.299	0.062	0.005
4.925	4.918	0.005	0.375	0.345	569.512	0.170	0.005
4.925	4.918	0.005	0.375	0.345	569.512	0.170	0.005
3.679	5.019	0.005	0.374	0.344	506.173	0.151	0.004
3.168	4.481	0.005	0.221	0.204	511.687	0.153	0.004
1.331	4.182	0.005	0.133	0.122	512.056	0.153	0.004
1.317	3.214	0.005	0.104	0.096	509.868	0.152	0.004
1.354	3.473	0.005	0.113	0.104	506.682	0.151	0.004
7.300	5.931	0.005	0.643	0.591	569.274	0.170	0.005
4.063	6.601	0.005	0.555	0.510	510.823	0.153	0.004
3.520	6.135	0.005	0.335	0.308	511.448	0.153	0.004
2.325	6.697	0.005	0.298	0.274	512.769	0.153	0.004
3.300	5.332	0.005	0.237	0.218	513.083	0.153	0.004
3.658	5.141	0.008	0.280	0.280	568.299	0.067	0.005
2.666	4.890	0.007	0.256	0.256	568.299	0.071	0.005
4.538	4.858	0.007	0.353	0.353	568.299	0.115	0.005
3.499	4.769	0.006	0.347	0.347	568.299	0.058	0.004
2.938	4.138	0.006	0.191	0.191	568.299	0.039	0.004
1.104	3.633	0.006	0.100	0.100	568.300	0.025	0.004
1.114	3.231	0.005	0.094	0.094	568.299	0.023	0.004
1.114	3.347	0.005	0.096	0.096	568.299	0.024	0.004
1.269	4.822	0.005	0.124	0.124	568.299	0.031	0.004
9.144	6.570	0.005	0.874	0.804	533.681	0.159	0.005
4.884	9.738	0.005	0.813	0.748	509.597	0.152	0.004
3.958	8.637	0.005	0.486	0.447	522.218	0.156	0.004
1.466	5.728	0.005	0.186	0.171	517.128	0.154	0.004
1.791	3.721	0.005	0.144	0.133	512.098	0.153	0.004
1.420	3.501	0.005	0.124	0.124	568.299	0.037	0.004
3.965	6.067	0.005	0.494	0.455	515.320	0.154	0.004
3.264	4.724	0.005	0.239	0.220	512.608	0.153	0.004
1.605	5.528	0.005	0.199	0.183	509.190	0.152	0.004
1.172	3.874	0.005	0.126	0.116	511.081	0.153	0.004
0.960	2.300	0.005	0.056	0.051	511.392	0.153	0.004
3.489	5.104	0.005	0.284	0.262	508.701	0.152	0.004
1.900	5.242	0.005	0.227	0.209	507.809	0.152	0.004

2.037	4.528	0.005	0.173	0.159	515.842	0.154	0.004
2.620	5.124	0.005	0.209	0.192	514.644	0.154	0.004
1.772	6.280	0.005	0.185	0.170	511.137	0.153	0.004
5.681	5.564	0.005	0.503	0.463	573.020	0.171	0.005
5.681	5.564	0.005	0.503	0.463	573.020	0.171	0.005
5.681	5.564	0.005	0.503	0.463	573.020	0.171	0.005
3.916	6.536	0.005	0.512	0.471	510.171	0.152	0.004
3.382	6.231	0.005	0.326	0.300	509.307	0.152	0.004
2.407	4.415	0.005	0.163	0.150	515.195	0.154	0.004
6.325	5.524	0.005	0.532	0.490	570.024	0.170	0.005
6.325	5.524	0.005	0.532	0.490	570.024	0.170	0.005
6.325	5.524	0.005	0.532	0.490	570.024	0.170	0.005
4.081	6.502	0.005	0.553	0.509	509.166	0.152	0.004
3.454	5.397	0.005	0.294	0.270	511.171	0.153	0.004
1.926	5.643	0.005	0.230	0.211	512.658	0.153	0.004
2.436	4.425	0.005	0.167	0.154	512.340	0.153	0.004

1.491	3.365	0.005	0.109	0.100	512.919	0.153	0.004
1.094	6.448	0.005	0.171	0.158	511.392	0.153	0.004
6.756	5.799	0.005	0.586	0.539	567.351	0.169	0.005
3.758	4.983	0.005	0.383	0.352	513.054	0.153	0.004
3.433	5.645	0.005	0.306	0.282	511.571	0.153	0.004
1.742	5.532	0.005	0.207	0.191	510.772	0.153	0.004
1.918	4.272	0.005	0.166	0.152	509.489	0.152	0.004
0.984	3.458	0.005	0.068	0.063	511.392	0.153	0.004
6.340	5.637	0.005	0.579	0.533	571.086	0.171	0.005
6.340	5.637	0.005	0.579	0.533	571.086	0.171	0.005
3.788	6.141	0.005	0.479	0.441	509.377	0.152	0.004
3.115	5.537	0.005	0.277	0.255	511.646	0.153	0.004
1.031	4.161	0.005	0.107	0.098	513.468	0.153	0.004
0.978	2.917	0.005	0.097	0.089	506.097	0.151	0.004
4.869	5.028	0.005	0.407	0.374	563.553	0.168	0.005
4.869	5.028	0.005	0.407	0.374	563.553	0.168	0.005
3.833	6.145	0.005	0.471	0.433	513.167	0.153	0.004
3.104	4.966	0.005	0.242	0.223	509.894	0.152	0.004
1.379	4.772	0.005	0.159	0.146	511.654	0.153	0.004
3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.005
3.657	5.141	0.008	0.280	0.280	568.299	0.067	0.005
2.666	4.890	0.007	0.256	0.256	568.299	0.071	0.005
3.833	4.685	0.007	0.300	0.300	568.299	0.088	0.005
3.336	4.551	0.006	0.297	0.297	568.299	0.051	0.004
2.917	4.115	0.006	0.187	0.187	568.299	0.038	0.004

0.986	0.690	0.006	0.010	0.010	568.299	0.010	0.004
3.658	5.196	0.008	0.311	0.311	568.299	0.075	0.005
2.666	4.890	0.007	0.270	0.270	568.299	0.080	0.005
4.775	4.916	0.007	0.371	0.371	568.300	0.124	0.005
3.554	4.842	0.006	0.364	0.364	568.300	0.061	0.004
2.983	4.202	0.006	0.200	0.200	568.299	0.041	0.004
1.122	3.693	0.006	0.104	0.104	568.299	0.027	0.004
1.134	3.272	0.005	0.097	0.097	568.299	0.024	0.004
1.134	3.389	0.005	0.099	0.099	568.299	0.025	0.004
1.293	4.878	0.005	0.127	0.127	568.299	0.032	0.004
5.290	5.365	0.005	0.481	0.443	569.921	0.170	0.005
5.290	5.365	0.005	0.481	0.443	569.921	0.170	0.005
5.290	5.365	0.005	0.481	0.443	569.921	0.170	0.005
3.809	6.272	0.005	0.467	0.430	513.505	0.153	0.004
3.006	4.630	0.005	0.216	0.198	511.394	0.153	0.004
1.650	4.932	0.005	0.171	0.157	512.823	0.153	0.004
3.245	5.031	0.005	0.195	0.179	517.285	0.154	0.004
4.933	5.190	0.005	0.431	0.397	569.488	0.170	0.005
3.366	4.280	0.005	0.247	0.228	512.086	0.153	0.004
2.859	3.420	0.005	0.133	0.122	510.854	0.153	0.004
1.012	2.463	0.005	0.058	0.054	512.164	0.153	0.004
0.958	3.521	0.005	0.077	0.071	506.435	0.151	0.004
4.238	9.844	0.005	0.564	0.519	513.055	0.153	0.004
2.720	7.984	0.005	0.394	0.362	514.736	0.154	0.004
6.102	7.997	0.005	0.373	0.343	519.147	0.155	0.004
2.761	7.158	0.005	0.259	0.238	512.525	0.153	0.004
2.901	6.556	0.005	0.222	0.222	568.299	0.059	0.004
7.834	6.112	0.005	0.675	0.621	567.672	0.170	0.005
7.834	6.112	0.005	0.675	0.621	567.672	0.170	0.005
4.274	7.012	0.005	0.606	0.558	505.023	0.151	0.004
3.588	6.097	0.005	0.341	0.313	510.468	0.152	0.004

1.480	5.369	0.005	0.183	0.169	508.913	0.152	0.004
2.332	5.020	0.005	0.190	0.174	506.372	0.151	0.004
1.789	4.556	0.005	0.179	0.165	495.310	0.148	0.004
1.462	6.713	0.005	0.197	0.181	510.045	0.152	0.004
4.137	7.105	0.005	0.535	0.492	524.560	0.157	0.004
3.809	7.765	0.005	0.415	0.382	518.829	0.155	0.004
3.008	8.663	0.005	0.395	0.364	507.570	0.152	0.004
3.788	6.086	0.005	0.246	0.226	511.947	0.153	0.004
2.685	4.839	0.005	0.182	0.167	512.084	0.153	0.004
3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.005
5.068	4.943	0.007	0.382	0.382	568.299	0.131	0.005
3.624	4.791	0.006	0.371	0.371	568.299	0.062	0.004
3.052	4.136	0.006	0.205	0.205	568.299	0.042	0.004
1.371	4.365	0.007	0.127	0.127	686.695	0.034	0.004
4.004	4.436	0.005	0.267	0.246	571.420	0.171	0.005
4.004	4.436	0.005	0.267	0.246	571.420	0.171	0.005
3.338	3.811	0.005	0.220	0.203	511.595	0.153	0.004
4.692	5.255	0.006	0.402	0.370	576.771	0.172	0.005
3.575	5.374	0.005	0.378	0.348	510.142	0.152	0.004
3.027	5.733	0.005	0.276	0.254	510.548	0.152	0.004
1.442	5.112	0.005	0.151	0.139	516.058	0.154	0.004
1.513	3.900	0.005	0.127	0.116	508.399	0.152	0.004
1.024	3.287	0.005	0.104	0.096	511.116	0.153	0.004
6.754	5.772	0.005	0.611	0.562	569.106	0.170	0.005
6.754	5.772	0.005	0.611	0.562	569.106	0.170	0.005
6.754	5.772	0.005	0.611	0.562	569.106	0.170	0.005
4.097	6.886	0.005	0.610	0.561	513.625	0.153	0.004
3.982	8.697	0.005	0.479	0.441	512.549	0.153	0.004
2.078	6.745	0.005	0.268	0.246	509.304	0.152	0.004
5.791	5.320	0.005	0.477	0.439	558.709	0.167	0.005

5.791	5.320	0.005	0.477	0.439	558.709	0.167	0.005
3.832	5.422	0.005	0.424	0.390	517.365	0.155	0.004
3.256	4.836	0.005	0.244	0.225	508.682	0.152	0.004
1.374	4.783	0.005	0.155	0.143	509.627	0.152	0.004
1.884	4.348	0.005	0.149	0.137	511.869	0.153	0.004
1.823	4.185	0.005	0.152	0.140	506.147	0.151	0.004
5.323	5.406	0.005	0.493	0.454	571.667	0.171	0.005
5.323	5.406	0.005	0.493	0.454	571.667	0.171	0.005
5.323	5.406	0.005	0.493	0.454	571.667	0.171	0.005
4.014	7.179	0.005	0.562	0.517	515.396	0.154	0.004
3.684	7.674	0.005	0.396	0.364	506.943	0.151	0.004
2.080	6.510	0.005	0.260	0.239	512.433	0.153	0.004
2.051	4.383	0.005	0.163	0.150	508.330	0.152	0.004
0.965	1.623	0.005	0.053	0.049	514.400	0.154	0.004
3.658	5.196	0.008	0.311	0.311	568.299	0.075	0.005
2.666	4.890	0.007	0.270	0.270	568.299	0.080	0.005
5.562	5.113	0.007	0.430	0.430	568.300	0.154	0.005
3.738	5.077	0.006	0.419	0.419	568.299	0.069	0.004
3.133	4.408	0.006	0.230	0.230	568.299	0.048	0.004
1.178	3.880	0.006	0.116	0.116	568.299	0.031	0.004
1.176	3.398	0.005	0.108	0.108	568.299	0.029	0.004
3.489	5.104	0.005	0.284	0.262	508.701	0.152	0.004
1.900	5.242	0.005	0.227	0.209	507.809	0.152	0.004
2.037	4.528	0.005	0.173	0.159	515.842	0.154	0.004
2.620	5.124	0.005	0.209	0.192	514.644	0.154	0.004
1.772	6.280	0.005	0.185	0.170	511.137	0.153	0.004

2016		g/hp/hr						
Equipment	MaxHP	ROG	CO	NOX	SOX	PM10	PM2.5	CO2
Aerial Lifts	15	0.228	3.197	3.676	0.005	0.105	0.096	562.996
Aerial Lifts	25	0.228	3.197	3.676	0.005	0.105	0.096	562.996
Aerial Lifts	50	0.228	3.197	3.676	0.005	0.105	0.096	562.996
Aerial Lifts	120	0.166	3.201	2.722	0.005	0.112	0.103	506.211
Aerial Lifts	500	0.243	0.992	4.639	0.005	0.103	0.095	506.147
Aerial Lifts	750	0.257	1.089	3.015	0.005	0.088	0.088	568.299
Air Compressors								
	15	0.809	3.622	5.023	0.008	0.289	0.289	568.299
Air Compressors								
	25	0.855	2.604	4.803	0.007	0.255	0.255	568.299
Air Compressors								
	50	1.670	5.779	5.042	0.007	0.415	0.415	568.299
Air Compressors								
	120	0.744	3.804	4.790	0.006	0.397	0.397	568.299
Air Compressors								
	175	0.522	3.211	4.052	0.006	0.219	0.219	568.299
Air Compressors								
	250	0.359	1.182	3.553	0.006	0.109	0.109	568.299
Air Compressors								
	500	0.337	1.155	3.080	0.005	0.102	0.102	568.299
Air Compressors								
	750	0.340	1.155	3.201	0.005	0.104	0.104	568.299
Air Compressors								
	1000	0.383	1.295	4.854	0.005	0.131	0.131	568.299
Bore/Drill Rigs								
	15	0.869	4.797	5.298	0.006	0.383	0.352	579.326
Bore/Drill Rigs								
	25	0.869	4.797	5.298	0.006	0.383	0.352	579.326
Bore/Drill Rigs								
	50	0.869	4.797	5.298	0.006	0.383	0.352	579.326
Bore/Drill Rigs								
	120	0.307	3.326	3.821	0.005	0.221	0.204	491.655
Bore/Drill Rigs								
	175	0.286	3.023	3.616	0.005	0.162	0.149	511.433
Bore/Drill Rigs								
	250	0.193	1.133	2.902	0.005	0.085	0.078	502.128
Bore/Drill Rigs								
	500	0.171	1.133	2.510	0.005	0.077	0.071	494.761
Bore/Drill Rigs								
	750	0.153	1.120	2.166	0.005	0.072	0.066	514.883
Bore/Drill Rigs								
	1000	0.115	0.964	3.008	0.005	0.059	0.055	506.000

Cement and Mortar Mixers	15	0.662	3.469	4.153	0.008	0.167	0.167	568.300
Cement and Mortar Mixers	25	0.788	2.496	4.636	0.007	0.227	0.227	568.299
Concrete/Industrial Saws	25	0.685	2.339	4.332	0.007	0.161	0.161	568.299
Concrete/Industrial Saws	50	1.322	5.029	4.818	0.007	0.350	0.350	568.300
Concrete/Industrial Saws	120	0.620	3.620	4.432	0.006	0.333	0.333	568.300
Concrete/Industrial Saws	175	0.435	3.074	3.708	0.006	0.186	0.186	568.299
Cranes	50	2.130	7.268	6.110	0.005	0.610	0.561	555.441
Cranes	120	1.154	4.797	9.608	0.005	0.710	0.653	503.599
Cranes	175	0.744	3.862	7.887	0.005	0.427	0.393	508.952
Cranes	250	0.623	2.582	7.381	0.005	0.335	0.308	507.155
Cranes	500	0.443	3.834	5.649	0.005	0.233	0.215	506.088
Cranes	750	0.292	1.650	4.314	0.005	0.153	0.141	505.070
Cranes	9999	0.142	0.966	2.309	0.005	0.057	0.052	506.147
Crawler Tractors	50	2.519	8.104	6.317	0.005	0.733	0.674	553.214
Crawler Tractors	120	0.869	4.185	7.346	0.005	0.619	0.570	511.268
Crawler Tractors	175	0.624	3.482	6.721	0.005	0.371	0.341	506.034
Crawler Tractors	250	0.449	1.803	6.047	0.005	0.233	0.215	507.355
Crawler Tractors	500	0.398	2.744	5.279	0.005	0.205	0.188	510.339
Crawler Tractors	750	0.346	1.621	4.724	0.005	0.174	0.160	507.253
Crawler Tractors	1000	0.483	2.094	7.499	0.005	0.222	0.204	509.667
Crushing/Proc. Equipment	50	1.593	5.801	5.006	0.007	0.399	0.399	568.299
Crushing/Proc. Equipment	120	0.720	3.823	4.631	0.006	0.379	0.379	568.299
Crushing/Proc. Equipment	175	0.513	3.241	3.883	0.006	0.210	0.210	568.299
Crushing/Proc. Equipment	250	0.360	1.178	3.381	0.006	0.105	0.105	568.299
Crushing/Proc. Equipment	500	0.340	1.146	2.928	0.005	0.098	0.098	568.299
Crushing/Proc. Equipment	750	0.339	1.140	3.021	0.005	0.099	0.099	568.299
Crushing/Proc. Equipment	9999	0.397	1.274	4.700	0.005	0.127	0.127	568.299

Dumpers/Tenders	25	0.690	2.342	4.378	0.007	0.175	0.175	568.299
Excavators	25	0.815	4.942	4.824	0.005	0.359	0.330	563.803
Excavators	50	0.815	4.942	4.824	0.005	0.359	0.330	563.803
Excavators	120	0.476	3.661	4.708	0.005	0.344	0.317	500.966
Excavators	175	0.358	3.158	4.081	0.005	0.201	0.185	506.495
Excavators	250	0.262	1.277	3.667	0.005	0.116	0.107	506.544
Excavators	500	0.213	1.233	2.815	0.005	0.091	0.083	504.290
Excavators	750	0.242	1.349	3.358	0.005	0.110	0.101	501.660
Forklifts	50	1.864	6.935	5.662	0.005	0.583	0.537	563.435
Forklifts	120	0.723	4.023	6.222	0.005	0.520	0.479	505.583
Forklifts	175	0.530	3.473	5.675	0.005	0.310	0.285	506.203
Forklifts	250	0.539	2.226	6.353	0.005	0.280	0.258	507.510
Forklifts	500	0.353	2.572	4.042	0.005	0.174	0.160	507.821
Generator Sets	15	0.720	3.622	4.978	0.008	0.264	0.264	568.299
Generator Sets	25	0.773	2.604	4.803	0.007	0.244	0.244	568.299
Generator Sets	50	1.146	4.410	4.685	0.007	0.318	0.318	568.299
Generator Sets	120	0.583	3.469	4.410	0.006	0.309	0.309	568.299
Generator Sets	175	0.396	2.934	3.731	0.006	0.170	0.170	568.299
Generator Sets	250	0.265	1.081	3.259	0.006	0.090	0.090	568.299
Generator Sets	500	0.239	1.077	2.882	0.005	0.084	0.084	568.299
Generator Sets	750	0.247	1.077	2.989	0.005	0.086	0.086	568.300
Generator Sets	9999	0.324	1.204	4.542	0.005	0.113	0.113	568.299
Graders	50	3.085	9.106	6.520	0.005	0.864	0.795	528.244
Graders	120	1.193	4.829	9.415	0.005	0.780	0.718	503.161
Graders	175	0.810	3.916	8.250	0.005	0.464	0.426	516.131
Graders	250	0.398	1.459	5.663	0.005	0.184	0.169	511.696
Graders	500	0.334	1.774	3.686	0.005	0.144	0.133	506.506
Graders	750	0.393	1.367	3.154	0.005	0.112	0.112	568.299
Off-Highway Tractors	120	0.625	3.925	5.647	0.005	0.454	0.418	509.447
Off-Highway Tractors	175	0.391	3.278	4.511	0.005	0.229	0.211	507.629
Off-Highway Tractors	250	0.359	1.472	4.930	0.005	0.171	0.157	504.123
Off-Highway Tractors	750	0.252	1.143	3.573	0.005	0.117	0.108	505.762
Off-Highway Tractors	1000	0.107	0.973	2.320	0.005	0.057	0.053	506.147
Off-Highway Trucks	175	0.473	3.459	4.647	0.005	0.258	0.237	503.552
Off-Highway Trucks	250	0.446	1.824	4.826	0.005	0.208	0.191	502.473

Off-Highway Trucks	500	0.351	1.885	4.048	0.005	0.153	0.141	509.860
Off-Highway Trucks	750	0.418	2.436	4.642	0.005	0.187	0.172	508.392
Off-Highway Trucks	1000	0.393	1.707	6.035	0.005	0.175	0.161	505.722
Other Construction Equipment	15	1.281	5.677	5.499	0.005	0.492	0.453	566.978
Other Construction Equipment	25	1.281	5.677	5.499	0.005	0.492	0.453	566.978
Other Construction Equipment	50	1.281	5.677	5.499	0.005	0.492	0.453	566.978
Other Construction Equipment	120	0.703	3.909	6.325	0.005	0.496	0.456	505.349
Other Construction Equipment	175	0.524	3.357	5.818	0.005	0.306	0.282	503.964
Other Construction Equipment	500	0.308	2.285	4.090	0.005	0.151	0.139	509.706
Other General Industrial Equipment	15	1.421	6.259	5.407	0.005	0.507	0.466	564.178
Other General Industrial Equipment	25	1.421	6.259	5.407	0.005	0.507	0.466	564.178
Other General Industrial Equipment	50	1.421	6.259	5.407	0.005	0.507	0.466	564.178
Other General Industrial Equipment	120	0.716	4.045	6.144	0.005	0.518	0.476	503.944
Other General Industrial Equipment	175	0.470	3.437	5.055	0.005	0.276	0.254	505.928
Other General Industrial Equipment	250	0.437	1.867	5.407	0.005	0.217	0.200	507.400
Other General Industrial Equipment	500	0.342	2.367	4.150	0.005	0.159	0.146	507.085

Other General Industrial Equipment	750	0.243	1.491	3.102	0.005	0.100	0.092	507.658
Other General Industrial Equipment	1000	0.242	1.045	4.746	0.005	0.112	0.103	506.147
Other Material Handling Equipment	50	1.765	6.892	5.802	0.005	0.593	0.546	561.532
Other Material Handling Equipment	120	0.514	3.766	4.798	0.005	0.367	0.338	507.792
Other Material Handling Equipment	175	0.489	3.418	5.212	0.005	0.280	0.257	506.324
Other Material Handling Equipment	250	0.398	1.643	5.196	0.005	0.189	0.174	505.534
Other Material Handling Equipment	500	0.323	1.871	4.053	0.005	0.156	0.143	504.263
Other Material Handling Equipment	9999	0.159	0.997	3.489	0.005	0.070	0.065	506.147
Pavers	25	1.827	6.340	5.579	0.005	0.569	0.523	565.234
Pavers	50	1.827	6.340	5.579	0.005	0.569	0.523	565.234
Pavers	120	0.650	3.769	5.886	0.005	0.457	0.420	503.780
Pavers	175	0.433	3.080	4.874	0.005	0.242	0.223	506.540
Pavers	250	0.214	1.036	4.024	0.005	0.104	0.096	508.070
Pavers	500	0.180	0.983	2.885	0.005	0.096	0.089	500.936
Paving Equipment	25	0.991	4.937	4.985	0.005	0.404	0.371	557.706
Paving Equipment	50	0.991	4.937	4.985	0.005	0.404	0.371	557.706
Paving Equipment	120	0.623	3.796	5.733	0.005	0.438	0.403	507.910
Paving Equipment	175	0.372	3.081	4.322	0.005	0.215	0.197	504.820
Paving Equipment	250	0.297	1.331	4.428	0.005	0.148	0.136	506.197
Plate Compactors	15	0.661	3.469	4.142	0.008	0.161	0.161	568.299
Pressure Washers	15	0.720	3.622	4.978	0.008	0.264	0.264	568.299
Pressure Washers	25	0.773	2.604	4.803	0.007	0.244	0.244	568.299
Pressure Washers	50	0.865	3.729	4.515	0.007	0.269	0.269	568.299
Pressure Washers	120	0.504	3.308	4.209	0.006	0.264	0.264	568.299
Pressure Washers	175	0.386	2.913	3.726	0.006	0.168	0.168	568.299

Pressure Washers	250	0.107	0.986	0.399	0.006	0.009	0.009	568.299
Pumps	15	0.809	3.622	5.023	0.008	0.289	0.289	568.299
Pumps	25	0.855	2.604	4.803	0.007	0.255	0.255	568.299
Pumps	50	1.240	4.640	4.742	0.007	0.335	0.335	568.299
Pumps	120	0.610	3.523	4.478	0.006	0.325	0.325	568.299
Pumps	175	0.417	2.978	3.789	0.006	0.179	0.179	568.299
Pumps	250	0.280	1.099	3.313	0.006	0.094	0.094	568.299
Pumps	500	0.254	1.093	2.919	0.005	0.088	0.088	568.299
Pumps	750	0.262	1.093	3.028	0.005	0.089	0.089	568.299
Pumps	9999	0.335	1.223	4.596	0.005	0.116	0.116	568.300
Rollers	15	1.259	5.231	5.236	0.005	0.459	0.423	563.972
Rollers	25	1.259	5.231	5.236	0.005	0.459	0.423	563.972
Rollers	50	1.259	5.231	5.236	0.005	0.459	0.423	563.972
Rollers	120	0.628	3.755	5.806	0.005	0.428	0.393	508.199
Rollers	175	0.338	2.993	4.239	0.005	0.197	0.181	505.904
Rollers	250	0.308	1.507	4.395	0.005	0.150	0.138	507.694
Rollers	500	0.334	2.956	4.456	0.005	0.173	0.159	513.415
Rough Terrain Forklifts	50	1.159	4.918	5.099	0.005	0.415	0.382	563.360
Rough Terrain Forklifts	120	0.302	3.342	3.840	0.005	0.213	0.196	507.066
Rough Terrain Forklifts	175	0.209	2.865	3.209	0.005	0.124	0.115	505.596
Rough Terrain Forklifts	250	0.144	1.018	2.468	0.005	0.059	0.054	506.896
Rough Terrain Forklifts	500	0.178	0.962	3.542	0.005	0.078	0.072	501.213
Rubber Tired Dozers	175	0.968	4.249	9.853	0.005	0.566	0.521	507.774
Rubber Tired Dozers	250	0.736	2.729	7.995	0.005	0.395	0.364	509.462
Rubber Tired Dozers	500	0.688	5.828	7.710	0.005	0.359	0.330	513.311
Rubber Tired Dozers	750	0.523	2.765	7.168	0.005	0.260	0.239	507.260
Rubber Tired Dozers	1000	0.631	2.723	6.277	0.005	0.208	0.208	568.300
Rubber Tired Loaders	25	2.055	7.791	6.053	0.005	0.660	0.607	561.903
Rubber Tired Loaders	50	2.055	7.791	6.053	0.005	0.660	0.607	561.903
Rubber Tired Loaders	120	0.803	4.212	6.583	0.005	0.565	0.520	499.594
Rubber Tired Loaders	175	0.565	3.562	5.726	0.005	0.319	0.294	505.131

Rubber Tired Loaders	250	0.393	1.452	5.115	0.005	0.175	0.161	503.654
Rubber Tired Loaders	500	0.391	2.155	4.627	0.005	0.174	0.160	500.431
Rubber Tired Loaders	750	0.373	1.703	4.172	0.005	0.164	0.151	491.918
Rubber Tired Loaders	1000	0.425	1.464	6.724	0.005	0.198	0.182	504.780
Scrapers	120	0.742	4.173	7.143	0.005	0.543	0.500	519.167
Scrapers	175	0.688	3.781	7.384	0.005	0.397	0.365	513.436
Scrapers	250	0.684	2.840	8.109	0.005	0.367	0.338	502.255
Scrapers	500	0.452	3.606	5.757	0.005	0.232	0.214	506.350
Scrapers	750	0.340	2.482	4.484	0.005	0.168	0.154	506.638
Signal Boards	15	0.661	3.469	4.142	0.008	0.161	0.161	568.299
Signal Boards	50	1.306	4.921	4.761	0.007	0.343	0.343	568.299
Signal Boards	120	0.618	3.594	4.414	0.006	0.330	0.330	568.299
Signal Boards	175	0.430	3.047	3.708	0.006	0.183	0.183	568.299
Signal Boards	250	0.354	1.344	3.894	0.007	0.114	0.114	686.695
Skid Steer Loaders	25	0.599	3.957	4.268	0.005	0.241	0.221	565.228
Skid Steer Loaders	50	0.599	3.957	4.268	0.005	0.241	0.221	565.228
Skid Steer Loaders	120	0.273	3.328	3.534	0.005	0.197	0.182	506.297
Surfacing Equipment	50	1.045	4.763	5.273	0.006	0.406	0.374	570.815
Surfacing Equipment	120	0.522	3.550	5.051	0.005	0.349	0.321	505.087
Surfacing Equipment	175	0.458	3.006	5.458	0.005	0.265	0.244	504.558
Surfacing Equipment	250	0.307	1.429	5.048	0.005	0.148	0.137	510.706
Surfacing Equipment	500	0.217	1.425	3.468	0.005	0.111	0.102	502.471
Surfacing Equipment	750	0.162	1.000	2.880	0.005	0.093	0.085	506.967
Sweepers/Scrubbers	15	1.781	6.785	5.726	0.005	0.603	0.555	563.269
Sweepers/Scrubbers	25	1.781	6.785	5.726	0.005	0.603	0.555	563.269
Sweepers/Scrubbers	50	1.781	6.785	5.726	0.005	0.603	0.555	563.269
Sweepers/Scrubbers	120	0.783	4.059	6.454	0.005	0.571	0.525	508.357
Sweepers/Scrubbers	175	0.746	3.839	7.787	0.005	0.419	0.385	507.292
Sweepers/Scrubbers	250	0.521	2.089	6.782	0.005	0.270	0.248	504.080
Tractors/Loaders/Backhoes	25	1.250	5.741	5.214	0.005	0.455	0.418	553.400

Tractors/Loaders/Backhoes	50	1.250	5.741	5.214	0.005	0.455	0.418	553.400
Tractors/Loaders/Backhoes	120	0.538	3.811	5.142	0.005	0.396	0.364	511.346
Tractors/Loaders/Backhoes	175	0.389	3.232	4.379	0.005	0.222	0.204	502.629
Tractors/Loaders/Backhoes	250	0.311	1.347	4.426	0.005	0.145	0.133	504.401
Tractors/Loaders/Backhoes	500	0.284	1.786	3.787	0.005	0.131	0.121	505.270
Tractors/Loaders/Backhoes	750	0.300	1.674	4.022	0.005	0.144	0.133	500.955
Trenchers	15	1.219	5.285	5.298	0.005	0.475	0.437	565.994
Trenchers	25	1.219	5.285	5.298	0.005	0.475	0.437	565.994
Trenchers	50	1.219	5.285	5.298	0.005	0.475	0.437	565.994
Trenchers	120	0.788	3.988	6.902	0.005	0.541	0.498	509.903
Trenchers	175	0.583	3.507	6.503	0.005	0.328	0.302	501.781
Trenchers	250	0.487	2.030	6.312	0.005	0.251	0.231	507.145
Trenchers	500	0.296	1.966	4.099	0.005	0.150	0.138	504.410
Trenchers	750	0.120	0.971	1.630	0.005	0.054	0.050	509.143
Welders	15	0.809	3.622	5.023	0.008	0.289	0.289	568.299
Welders	25	0.855	2.604	4.803	0.007	0.255	0.255	568.299
Welders	50	1.540	5.395	4.936	0.007	0.389	0.389	568.299
Welders	120	0.699	3.705	4.692	0.006	0.375	0.375	568.300
Welders	175	0.486	3.128	3.973	0.006	0.206	0.206	568.299
Welders	250	0.330	1.153	3.481	0.006	0.104	0.104	568.299
Welders	500	0.306	1.134	3.032	0.005	0.097	0.097	568.299
Water Trucks	175	0.473	3.459	4.647	0.005	0.258	0.237	503.552
Water Trucks	250	0.446	1.824	4.826	0.005	0.208	0.191	502.473
Water Trucks	500	0.351	1.885	4.048	0.005	0.153	0.141	509.860
Water Trucks	750	0.418	2.436	4.642	0.005	0.187	0.172	508.392
Water Trucks	1000	0.393	1.707	6.035	0.005	0.175	0.161	505.722

2017

g/hp/hr	g/hp/hr
CH4	N2O
0.170	0.005
0.170	0.005
0.170	0.005
0.153	0.004
0.153	0.004
0.023	0.004
0.073	0.005
0.077	0.005
0.150	0.005
0.067	0.004
0.047	0.004
0.032	0.004
0.030	0.004
0.030	0.004
0.034	0.004
0.175	0.005
0.175	0.005
0.175	0.005
0.148	0.004
0.154	0.004
0.152	0.004
0.149	0.004
0.155	0.004
0.153	0.004

2017		g/hp/hr	g/hp/hr
Equipment	MaxHP	ROG	CO
Aerial Lifts	15	0.209	3.169
Aerial Lifts	25	0.209	3.169
Aerial Lifts	50	0.209	3.169
Aerial Lifts	120	0.143	3.184
Aerial Lifts	500	0.246	0.997
Aerial Lifts	750	0.239	1.059
Air Compressors			
	15	0.786	3.599
Air Compressors			
	25	0.830	2.564
Air Compressors			
	50	1.481	5.604
Air Compressors			
	120	0.671	3.772
Air Compressors			
	175	0.477	3.207
Air Compressors			
	250	0.339	1.162
Air Compressors			
	500	0.321	1.123
Air Compressors			
	750	0.323	1.123
Air Compressors			
	1000	0.362	1.246
Bore/Drill Rigs			
	15	0.804	4.652
Bore/Drill Rigs			
	25	0.804	4.652
Bore/Drill Rigs			
	50	0.804	4.652
Bore/Drill Rigs			
	120	0.298	3.331
Bore/Drill Rigs			
	175	0.245	3.001
Bore/Drill Rigs			
	250	0.174	1.102
Bore/Drill Rigs			
	500	0.166	1.119
Bore/Drill Rigs			
	750	0.155	1.137
Bore/Drill Rigs			
	1000	0.121	0.971

0.059	0.005
0.071	0.005
0.061	0.005
0.119	0.005
0.055	0.004
0.039	0.004
0.168	0.005
0.152	0.004
0.154	0.004
0.153	0.004
0.153	0.004
0.152	0.004
0.153	0.004
0.167	0.005
0.154	0.004
0.153	0.004
0.153	0.004
0.154	0.004
0.153	0.004
0.154	0.004
0.143	0.005
0.065	0.004
0.046	0.004
0.032	0.004
0.030	0.004
0.030	0.004
0.035	0.004

Cement and Mortar Mixers	15	0.661	3.469
Cement and Mortar Mixers	25	0.767	2.466
Concrete/Industrial Saws	25	0.685	2.340
Concrete/Industrial Saws	50	1.175	4.894
Concrete/Industrial Saws	120	0.557	3.595
Concrete/Industrial Saws	175	0.395	3.073
Cranes	50	2.173	7.408
Cranes	120	1.097	4.710
Cranes	175	0.696	3.787
Cranes	250	0.561	2.385
Cranes	500	0.410	3.547
Cranes	750	0.287	1.633
Cranes	9999	0.152	0.974
Crawler Tractors	50	2.459	8.006
Crawler Tractors	120	0.849	4.176
Crawler Tractors	175	0.614	3.483
Crawler Tractors	250	0.430	1.742
Crawler Tractors	500	0.385	2.635
Crawler Tractors	750	0.324	1.522
Crawler Tractors	1000	0.486	2.100
Crushing/Proc. Equipment	50	1.402	5.623
Crushing/Proc. Equipment	120	0.647	3.791
Crushing/Proc. Equipment	175	0.468	3.236
Crushing/Proc. Equipment	250	0.340	1.160
Crushing/Proc. Equipment	500	0.324	1.118
Crushing/Proc. Equipment	750	0.323	1.114
Crushing/Proc. Equipment	9999	0.378	1.231

0.062	0.005
0.170	0.005
0.170	0.005
0.151	0.004
0.153	0.004
0.153	0.004
0.152	0.004
0.151	0.004
0.170	0.005
0.153	0.004
0.153	0.004
0.153	0.004
0.153	0.004
0.065	0.005
0.069	0.005
0.103	0.005
0.052	0.004
0.035	0.004
0.023	0.004
0.021	0.004
0.022	0.004
0.029	0.004
0.159	0.005
0.152	0.004
0.156	0.004
0.154	0.004
0.153	0.004
0.035	0.004
0.154	0.004
0.153	0.004
0.152	0.004
0.153	0.004
0.153	0.004
0.152	0.004
0.152	0.004

Dumpers/Tenders	25	0.687	2.340
Excavators	25	0.771	4.889
Excavators	50	0.771	4.889
Excavators	120	0.440	3.639
Excavators	175	0.334	3.151
Excavators	250	0.247	1.249
Excavators	500	0.200	1.199
Excavators	750	0.210	1.228
Forklifts	50	1.703	6.673
Forklifts	120	0.672	3.979
Forklifts	175	0.508	3.452
Forklifts	250	0.496	2.092
Forklifts	500	0.338	2.508
Generator Sets	15	0.699	3.599
Generator Sets	25	0.757	2.564
Generator Sets	50	1.017	4.292
Generator Sets	120	0.520	3.442
Generator Sets	175	0.356	2.931
Generator Sets	250	0.245	1.063
Generator Sets	500	0.224	1.048
Generator Sets	750	0.230	1.048
Generator Sets	9999	0.301	1.161
Graders	50	3.007	8.978
Graders	120	1.164	4.810
Graders	175	0.757	3.845
Graders	250	0.396	1.449
Graders	500	0.334	1.707
Graders	750	0.372	1.323
Off-Highway Tractors	120	0.586	3.901
Off-Highway Tractors	175	0.356	3.259
Off-Highway Tractors	250	0.328	1.403
Off-Highway Tractors	750	0.248	1.145
Off-Highway Tractors	1000	0.118	0.985
Off-Highway Trucks	175	0.441	3.436
Off-Highway Trucks	250	0.417	1.753

0.154	0.004
0.153	0.004
0.153	0.004
0.171	0.005
0.171	0.005
0.171	0.005
0.152	0.004
0.152	0.004
0.154	0.004
0.170	0.005
0.170	0.005
0.170	0.005
0.152	0.004
0.153	0.004
0.153	0.004
0.153	0.004

Off-Highway Trucks	500	0.325	1.748
Off-Highway Trucks	750	0.394	2.356
Off-Highway Trucks	1000	0.362	1.546
Other Construction Equipment	15	1.244	5.655
Other Construction Equipment	25	1.244	5.655
Other Construction Equipment	50	1.244	5.655
Other Construction Equipment	120	0.676	3.885
Other Construction Equipment	175	0.500	3.338
Other Construction Equipment	500	0.290	2.121
Other General Industrial Equipment	15	1.349	6.179
Other General Industrial Equipment	25	1.349	6.179
Other General Industrial Equipment	50	1.349	6.179
Other General Industrial Equipment	120	0.660	3.998
Other General Industrial Equipment	175	0.437	3.399
Other General Industrial Equipment	250	0.411	1.780
Other General Industrial Equipment	500	0.334	2.365

0.153	0.004
0.153	0.004
0.169	0.005
0.153	0.004
0.153	0.004
0.153	0.004
0.153	0.004
0.152	0.004
0.153	0.004
0.171	0.005
0.171	0.005
0.152	0.004
0.153	0.004
0.153	0.004
0.151	0.004
0.168	0.005
0.168	0.005
0.153	0.004
0.152	0.004
0.153	0.004
0.059	0.005
0.065	0.005
0.069	0.005
0.078	0.005
0.045	0.004
0.034	0.004

Other General Industrial Equipment	750	0.219	1.480
Other General Industrial Equipment	1000	0.251	1.057
Other Material Handling Equipment	50	1.615	6.635
Other Material Handling Equipment	120	0.488	3.758
Other Material Handling Equipment	175	0.427	3.351
Other Material Handling Equipment	250	0.359	1.512
Other Material Handling Equipment	500	0.325	1.863
Other Material Handling Equipment	9999	0.169	1.010
Pavers	25	1.731	6.199
Pavers	50	1.731	6.199
Pavers	120	0.625	3.759
Pavers	175	0.389	3.063
Pavers	250	0.208	1.037
Pavers	500	0.168	0.979
Paving Equipment	25	0.926	4.804
Paving Equipment	50	0.926	4.804
Paving Equipment	120	0.563	3.741
Paving Equipment	175	0.343	3.073
Paving Equipment	250	0.288	1.333
Plate Compactors	15	0.661	3.469
Pressure Washers	15	0.699	3.599
Pressure Washers	25	0.757	2.564
Pressure Washers	50	0.760	3.632
Pressure Washers	120	0.444	3.283
Pressure Washers	175	0.346	2.910

0.009	0.004
0.073	0.005
0.077	0.005
0.111	0.005
0.055	0.004
0.037	0.004
0.025	0.004
0.022	0.004
0.023	0.004
0.030	0.004
0.170	0.005
0.170	0.005
0.170	0.005
0.153	0.004
0.153	0.004
0.153	0.004
0.155	0.004
0.170	0.005
0.153	0.004
0.153	0.004
0.153	0.004
0.153	0.004
0.151	0.004
0.153	0.004
0.154	0.004
0.155	0.004
0.153	0.004
0.057	0.004
0.170	0.005
0.170	0.005
0.151	0.004
0.152	0.004

Pressure Washers	250	0.102	0.986
Pumps	15	0.786	3.599
Pumps	25	0.830	2.564
Pumps	50	1.104	4.514
Pumps	120	0.546	3.495
Pumps	175	0.376	2.975
Pumps	250	0.260	1.080
Pumps	500	0.239	1.062
Pumps	750	0.244	1.062
Pumps	9999	0.313	1.177
Rollers	15	1.198	5.147
Rollers	25	1.198	5.147
Rollers	50	1.198	5.147
Rollers	120	0.580	3.713
Rollers	175	0.314	2.981
Rollers	250	0.274	1.408
Rollers	500	0.297	2.685
Rough Terrain Forklifts	50	1.108	4.833
Rough Terrain Forklifts	120	0.271	3.318
Rough Terrain Forklifts	175	0.194	2.866
Rough Terrain Forklifts	250	0.148	1.024
Rough Terrain Forklifts	500	0.182	0.966
Rubber Tired Dozers	175	0.903	4.149
Rubber Tired Dozers	250	0.707	2.655
Rubber Tired Dozers	500	0.662	5.526
Rubber Tired Dozers	750	0.526	2.767
Rubber Tired Dozers	1000	0.602	2.560
Rubber Tired Loaders	25	1.957	7.660
Rubber Tired Loaders	50	1.957	7.660
Rubber Tired Loaders	120	0.757	4.171
Rubber Tired Loaders	175	0.522	3.518

0.152	0.004
0.151	0.004
0.148	0.004
0.152	0.004
0.157	0.004
0.155	0.004
0.152	0.004
0.153	0.004
0.153	0.004
0.059	0.005
0.117	0.005
0.055	0.004
0.038	0.004
0.031	0.004
0.171	0.005
0.171	0.005
0.153	0.004
0.172	0.005
0.152	0.004
0.152	0.004
0.154	0.004
0.152	0.004
0.153	0.004
0.170	0.005
0.170	0.005
0.170	0.005
0.153	0.004
0.153	0.004
0.152	0.004
0.167	0.005

Rubber Tired Loaders	250	0.373	1.417
Rubber Tired Loaders	500	0.369	2.060
Rubber Tired Loaders	750	0.367	1.700
Rubber Tired Loaders	1000	0.415	1.456
Scrapers	120	0.754	4.207
Scrapers	175	0.629	3.705
Scrapers	250	0.627	2.647
Scrapers	500	0.425	3.337
Scrapers	750	0.325	2.295
Signal Boards	15	0.661	3.469
Signal Boards	50	1.158	4.785
Signal Boards	120	0.553	3.566
Signal Boards	175	0.388	3.044
Signal Boards	250	0.330	1.323
Skid Steer Loaders	25	0.568	3.919
Skid Steer Loaders	50	0.568	3.919
Skid Steer Loaders	120	0.255	3.319
Surfacing Equipment	50	0.928	4.603
Surfacing Equipment	120	0.508	3.556
Surfacing Equipment	175	0.455	3.003
Surfacing Equipment	250	0.274	1.343
Surfacing Equipment	500	0.204	1.396
Surfacing Equipment	750	0.160	1.003
Sweepers/Scrubbers	15	1.712	6.719
Sweepers/Scrubbers	25	1.712	6.719
Sweepers/Scrubbers	50	1.712	6.719
Sweepers/Scrubbers	120	0.721	4.010
Sweepers/Scrubbers	175	0.711	3.784
Sweepers/Scrubbers	250	0.513	2.090
Tractors/Loaders/Backhoes	25	1.194	5.689

0.167	0.005
0.154	0.004
0.152	0.004
0.152	0.004
0.152	0.004
0.151	0.004
0.171	0.005
0.171	0.005
0.171	0.005
0.154	0.004
0.151	0.004
0.153	0.004
0.152	0.004
0.154	0.004
0.073	0.005
0.077	0.005
0.138	0.005
0.063	0.004
0.043	0.004
0.029	0.004
0.027	0.004
0.152	0.004
0.152	0.004
0.154	0.004
0.153	0.004
0.153	0.004

Tractors/Loaders/Backhoes	50	1.194	5.689
Tractors/Loaders/Backhoes	120	0.501	3.782
Tractors/Loaders/Backhoes	175	0.354	3.200
Tractors/Loaders/Backhoes	250	0.291	1.304
Tractors/Loaders/Backhoes	500	0.272	1.739
Tractors/Loaders/Backhoes	750	0.296	1.646
Trenchers	15	1.149	5.197
Trenchers	25	1.149	5.197
Trenchers	50	1.149	5.197
Trenchers	120	0.762	3.968
Trenchers	175	0.536	3.434
Trenchers	250	0.486	2.037
Trenchers	500	0.265	1.966
Trenchers	750	0.114	0.972
Welders	15	0.786	3.599
Welders	25	0.830	2.564
Welders	50	1.372	5.239
Welders	120	0.630	3.675
Welders	175	0.442	3.124
Welders	250	0.310	1.133
Welders	500	0.290	1.102
Water Trucks	175	0.441	3.436
Water Trucks	250	0.417	1.753
Water Trucks	500	0.325	1.748
Water Trucks	750	0.394	2.356
Water Trucks	1000	0.362	1.546

4.362	0.007	0.171	0.171	568.299	0.062	0.005
4.678	0.005	0.332	0.305	554.910	0.170	0.005
4.678	0.005	0.332	0.305	554.910	0.170	0.005
4.380	0.005	0.310	0.286	493.409	0.151	0.004
3.700	0.005	0.182	0.168	498.522	0.153	0.004
3.319	0.005	0.105	0.097	498.436	0.153	0.004
2.507	0.005	0.081	0.075	496.810	0.152	0.004
2.719	0.005	0.090	0.083	494.550	0.152	0.004
5.450	0.005	0.536	0.493	554.677	0.170	0.005
5.818	0.005	0.480	0.442	497.725	0.153	0.004
5.362	0.005	0.294	0.270	498.334	0.153	0.004
5.751	0.005	0.252	0.232	499.621	0.153	0.004
3.780	0.005	0.161	0.148	499.927	0.153	0.004
4.847	0.008	0.250	0.250	568.299	0.063	0.005
4.729	0.007	0.233	0.233	568.299	0.068	0.005
4.522	0.007	0.285	0.285	568.299	0.091	0.005
4.072	0.006	0.274	0.274	568.299	0.046	0.004
3.347	0.006	0.151	0.151	568.299	0.032	0.004
2.910	0.006	0.081	0.081	568.299	0.022	0.004
2.579	0.005	0.076	0.076	568.299	0.020	0.004
2.660	0.005	0.077	0.077	568.299	0.020	0.004
4.293	0.005	0.104	0.104	568.299	0.027	0.004
6.423	0.005	0.843	0.776	520.075	0.159	0.005
9.191	0.005	0.759	0.698	495.919	0.152	0.004
7.663	0.005	0.430	0.396	506.748	0.155	0.004
5.525	0.005	0.180	0.166	503.802	0.154	0.004
3.557	0.005	0.139	0.128	498.600	0.153	0.004
2.835	0.005	0.100	0.100	568.299	0.033	0.004
5.317	0.005	0.423	0.389	501.245	0.154	0.004
4.026	0.005	0.205	0.189	499.245	0.153	0.004
4.382	0.005	0.151	0.139	496.498	0.152	0.004
3.324	0.005	0.112	0.103	497.618	0.153	0.004
2.340	0.005	0.059	0.054	498.280	0.153	0.004
4.236	0.005	0.233	0.215	495.924	0.152	0.004
4.368	0.005	0.189	0.174	494.794	0.152	0.004

Dumpers/Trailers
Excavators
Forklifts
Generator Sets
Graders
Off-Highway Tractors
Off-Highway Trucks
Off-Highway Trucks

2.592	0.005	0.086	0.079	499.767	0.153	0.004
4.787	0.005	0.115	0.105	498.280	0.153	0.004
5.574	0.005	0.546	0.502	552.804	0.169	0.005
4.561	0.005	0.341	0.314	499.899	0.153	0.004
4.488	0.005	0.238	0.219	498.454	0.153	0.004
4.705	0.005	0.163	0.150	497.676	0.153	0.004
3.971	0.005	0.154	0.141	496.425	0.152	0.004
3.520	0.005	0.072	0.067	498.280	0.153	0.004
5.437	0.005	0.540	0.497	556.453	0.171	0.005
5.437	0.005	0.540	0.497	556.453	0.171	0.005
5.692	0.005	0.437	0.402	495.925	0.152	0.004
4.353	0.005	0.214	0.197	498.967	0.153	0.004
3.809	0.005	0.100	0.092	499.562	0.153	0.004
2.487	0.005	0.087	0.081	491.784	0.151	0.004
4.728	0.005	0.359	0.331	548.648	0.168	0.005
4.728	0.005	0.359	0.331	548.648	0.168	0.005
5.207	0.005	0.391	0.359	500.165	0.153	0.004
3.896	0.005	0.195	0.179	497.148	0.152	0.004
4.121	0.005	0.142	0.130	498.732	0.153	0.004
4.142	0.008	0.161	0.161	568.299	0.059	0.005
4.847	0.008	0.250	0.250	568.299	0.063	0.005
4.729	0.007	0.233	0.233	568.299	0.068	0.005
4.355	0.007	0.240	0.240	568.299	0.068	0.005
3.888	0.006	0.233	0.233	568.300	0.040	0.004
3.349	0.006	0.149	0.149	568.299	0.031	0.004

Other General Industrial Equipment
Other General Industrial Equipment
Other Material Handling Equipment
Other Material Handling Equipment
Other Material Handling Equipment
Other Material Handling Equipment
Other Material Handling Equipment
Other Material Handling Equipment
Other Material Handling Equipment
Other Material Handling Equipment
Pavers
Paving Equipment
Plate Compactors
Pressure Washers

0.317	0.006	0.009	0.009	568.299	0.009	0.004
4.887	0.008	0.272	0.272	568.299	0.070	0.005
4.729	0.007	0.243	0.243	568.299	0.074	0.005
4.578	0.007	0.301	0.301	568.299	0.099	0.005
4.134	0.006	0.287	0.287	568.299	0.049	0.004
3.400	0.006	0.159	0.159	568.299	0.033	0.004
2.958	0.006	0.084	0.084	568.299	0.023	0.004
2.613	0.005	0.079	0.079	568.299	0.021	0.004
2.695	0.005	0.080	0.080	568.299	0.022	0.004
4.343	0.005	0.106	0.106	568.299	0.028	0.004
5.098	0.005	0.436	0.401	555.020	0.170	0.005
5.098	0.005	0.436	0.401	555.020	0.170	0.005
5.098	0.005	0.436	0.401	555.020	0.170	0.005
5.411	0.005	0.392	0.361	500.153	0.153	0.004
3.874	0.005	0.180	0.166	497.909	0.153	0.004
3.921	0.005	0.129	0.119	499.702	0.153	0.004
3.840	0.005	0.150	0.138	505.832	0.155	0.004
4.903	0.005	0.382	0.352	554.623	0.170	0.005
3.418	0.005	0.182	0.167	499.168	0.153	0.004
2.902	0.005	0.112	0.103	497.777	0.153	0.004
2.474	0.005	0.059	0.054	499.001	0.153	0.004
3.568	0.005	0.079	0.073	493.336	0.151	0.004
9.129	0.005	0.525	0.483	499.410	0.153	0.004
7.671	0.005	0.376	0.345	501.548	0.154	0.004
7.333	0.005	0.341	0.313	505.849	0.155	0.004
7.172	0.005	0.260	0.239	499.367	0.153	0.004
6.013	0.005	0.195	0.195	568.299	0.054	0.004
5.954	0.005	0.633	0.582	553.583	0.170	0.005
5.954	0.005	0.633	0.582	553.583	0.170	0.005
6.236	0.005	0.530	0.487	491.853	0.151	0.004
5.195	0.005	0.290	0.266	497.353	0.152	0.004

Pressure Washers
Pumps
Rollers
Rough Terrain Forklifts
Rubber Tired Dozers
Rubber Tired Loaders

4.755	0.005	0.162	0.149	495.950	0.152	0.004
4.253	0.005	0.160	0.148	492.276	0.151	0.004
4.050	0.005	0.160	0.147	484.366	0.148	0.004
6.553	0.005	0.192	0.177	496.897	0.152	0.004
7.179	0.005	0.551	0.507	511.112	0.157	0.004
6.671	0.005	0.359	0.331	505.331	0.155	0.004
7.399	0.005	0.333	0.306	494.523	0.152	0.004
5.340	0.005	0.214	0.197	498.457	0.153	0.004
4.216	0.005	0.156	0.143	498.693	0.153	0.004
4.142	0.008	0.161	0.161	568.299	0.059	0.005
4.590	0.007	0.306	0.306	568.299	0.104	0.005
4.059	0.006	0.290	0.290	568.299	0.049	0.004
3.305	0.006	0.161	0.161	568.299	0.035	0.004
3.452	0.007	0.101	0.101	686.695	0.029	0.004
4.113	0.005	0.218	0.200	556.714	0.171	0.005
4.113	0.005	0.218	0.200	556.714	0.171	0.005
3.286	0.005	0.177	0.163	498.326	0.153	0.004
5.064	0.006	0.365	0.336	564.477	0.173	0.005
4.942	0.005	0.337	0.310	498.360	0.153	0.004
5.393	0.005	0.264	0.243	496.274	0.152	0.004
4.468	0.005	0.129	0.119	501.847	0.154	0.004
3.106	0.005	0.103	0.094	496.885	0.152	0.004
2.770	0.005	0.090	0.083	499.712	0.153	0.004
5.626	0.005	0.582	0.535	554.513	0.170	0.005
5.626	0.005	0.582	0.535	554.513	0.170	0.005
5.626	0.005	0.582	0.535	554.513	0.170	0.005
6.020	0.005	0.520	0.479	500.456	0.153	0.004
7.424	0.005	0.395	0.363	499.407	0.153	0.004
6.509	0.005	0.264	0.243	496.244	0.152	0.004
5.110	0.005	0.433	0.399	544.929	0.167	0.005

Rubber Tired Loaders
Scrapers
Signal Boards
Skid Steer Loaders
Skid Steer Loaders
Skid Steer Loaders
Surfacing Equipment
Sweepers/S crubbers
Tractors/Loaders/Backhoes

5.110	0.005	0.433	0.399	544.929	0.167	0.005
4.809	0.005	0.362	0.333	502.795	0.154	0.004
3.879	0.005	0.197	0.182	493.912	0.151	0.004
4.041	0.005	0.132	0.121	496.845	0.152	0.004
3.490	0.005	0.122	0.112	497.113	0.152	0.004
3.862	0.005	0.139	0.128	492.953	0.151	0.004
5.166	0.005	0.449	0.413	557.460	0.171	0.005
5.166	0.005	0.449	0.413	557.460	0.171	0.005
5.166	0.005	0.449	0.413	557.460	0.171	0.005
6.679	0.005	0.523	0.481	501.992	0.154	0.004
5.927	0.005	0.300	0.276	493.764	0.151	0.004
6.194	0.005	0.250	0.230	499.228	0.153	0.004
3.442	0.005	0.129	0.119	497.020	0.152	0.004
1.430	0.005	0.046	0.042	501.183	0.154	0.004
4.887	0.008	0.272	0.272	568.299	0.070	0.005
4.729	0.007	0.243	0.243	568.299	0.074	0.005
4.768	0.007	0.350	0.350	568.299	0.123	0.005
4.328	0.006	0.332	0.332	568.299	0.056	0.004
3.562	0.006	0.183	0.183	568.299	0.039	0.004
3.105	0.006	0.094	0.094	568.299	0.028	0.004
2.713	0.005	0.088	0.088	568.299	0.026	0.004
4.236	0.005	0.233	0.215	495.924	0.152	0.004
4.368	0.005	0.189	0.174	494.794	0.152	0.004
3.668	0.005	0.136	0.125	501.437	0.154	0.004
4.257	0.005	0.170	0.157	500.199	0.153	0.004
5.653	0.005	0.159	0.146	497.115	0.152	0.004

Tractors/Loaders/Backhoes
Trenchers
Welders
Water Trucks

	g/hp/hr								
MaxHP	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O
15	0.182	3.116	3.210	0.005	0.054	0.050	545.494	0.170	0.005
25	0.182	3.116	3.210	0.005	0.054	0.050	545.494	0.170	0.005
50	0.182	3.116	3.210	0.005	0.054	0.050	545.494	0.170	0.005
120	0.122	3.167	2.064	0.005	0.057	0.053	490.474	0.153	0.004
500	0.062	0.937	0.634	0.005	0.009	0.008	490.412	0.153	0.004
750	0.225	1.037	2.385	0.005	0.071	0.071	568.299	0.020	0.004
15	0.766	3.580	4.762	0.008	0.256	0.256	568.299	0.069	0.005
25	0.807	2.531	4.661	0.007	0.232	0.232	568.300	0.072	0.005
50	1.300	5.439	4.707	0.007	0.329	0.329	568.299	0.117	0.005
120	0.603	3.744	4.050	0.006	0.304	0.304	568.300	0.054	0.004
175	0.435	3.205	3.228	0.006	0.170	0.170	568.299	0.039	0.004
250	0.321	1.146	2.797	0.006	0.087	0.087	568.300	0.029	0.004
500	0.307	1.101	2.465	0.005	0.083	0.083	568.299	0.027	0.004
750	0.309	1.101	2.533	0.005	0.084	0.084	568.299	0.027	0.004
1000	0.343	1.210	4.325	0.005	0.111	0.111	568.299	0.030	0.004
15	0.767	4.569	4.869	0.006	0.329	0.303	554.204	0.173	0.005
25	0.767	4.569	4.869	0.006	0.329	0.303	554.204	0.173	0.005
50	0.767	4.569	4.869	0.006	0.329	0.303	554.204	0.173	0.005
120	0.269	3.323	3.400	0.005	0.184	0.170	479.672	0.149	0.004
175	0.203	2.961	2.357	0.005	0.103	0.095	495.073	0.154	0.004
250	0.155	1.073	2.153	0.005	0.061	0.056	484.561	0.151	0.004
500	0.135	1.032	1.746	0.005	0.052	0.048	485.689	0.151	0.004
750	0.126	1.006	1.679	0.005	0.055	0.050	489.730	0.153	0.004
1000	0.125	0.978	3.032	0.005	0.060	0.056	490.243	0.153	0.004

15	0.661	3.469	4.142	0.008	0.163	0.163	568.299	0.059	0.005
25	0.749	2.440	4.504	0.007	0.205	0.205	568.299	0.067	0.005
25	0.685	2.339	4.332	0.007	0.161	0.161	568.299	0.061	0.005
50	1.032	4.766	4.492	0.007	0.277	0.277	568.299	0.093	0.005
120	0.498	3.571	3.754	0.006	0.256	0.256	568.299	0.044	0.004
175	0.359	3.072	2.945	0.006	0.145	0.145	568.299	0.032	0.004
50	2.072	7.247	6.004	0.005	0.624	0.574	538.122	0.168	0.005
120	0.932	4.452	7.931	0.005	0.583	0.536	488.117	0.152	0.004
175	0.621	3.666	6.557	0.005	0.351	0.323	493.045	0.154	0.004
250	0.483	2.134	5.773	0.005	0.250	0.230	491.407	0.153	0.004
500	0.370	3.187	4.634	0.005	0.187	0.172	490.891	0.153	0.004
750	0.271	1.613	3.769	0.005	0.137	0.126	489.054	0.152	0.004
9999	0.162	0.983	2.335	0.005	0.059	0.054	490.412	0.153	0.004
50	2.446	8.009	6.163	0.005	0.704	0.648	536.141	0.167	0.005
120	0.798	4.123	6.723	0.005	0.566	0.521	494.922	0.154	0.004
175	0.555	3.421	5.859	0.005	0.326	0.299	490.000	0.153	0.004
250	0.398	1.654	5.290	0.005	0.200	0.184	491.606	0.153	0.004
500	0.344	2.382	4.373	0.005	0.169	0.156	493.510	0.154	0.004
750	0.296	1.445	3.834	0.005	0.142	0.130	491.266	0.153	0.004
1000	0.489	2.105	7.564	0.005	0.225	0.207	494.105	0.154	0.004
50	1.225	5.461	4.657	0.007	0.310	0.310	568.299	0.110	0.005
120	0.580	3.763	3.881	0.006	0.284	0.284	568.299	0.052	0.004
175	0.427	3.234	3.049	0.006	0.161	0.161	568.299	0.038	0.004
250	0.322	1.146	2.622	0.006	0.083	0.083	568.299	0.029	0.004
500	0.309	1.099	2.312	0.005	0.079	0.079	568.299	0.027	0.004
750	0.308	1.097	2.358	0.005	0.079	0.079	568.299	0.027	0.004
9999	0.361	1.198	4.168	0.005	0.107	0.107	568.299	0.032	0.004

25	0.686	2.339	4.350	0.007	0.169	0.169	568.299	0.061	0.005
25	0.687	4.700	4.395	0.005	0.284	0.261	545.347	0.170	0.005
50	0.687	4.700	4.395	0.005	0.284	0.261	545.347	0.170	0.005
120	0.368	3.562	3.764	0.005	0.251	0.230	486.056	0.151	0.004
175	0.273	3.093	2.924	0.005	0.142	0.130	490.673	0.153	0.004
250	0.202	1.152	2.594	0.005	0.079	0.073	490.257	0.153	0.004
500	0.175	1.140	2.050	0.005	0.066	0.061	489.103	0.152	0.004
750	0.189	1.224	2.266	0.005	0.076	0.070	487.653	0.152	0.004
50	1.393	6.103	5.052	0.005	0.447	0.411	545.919	0.170	0.005
120	0.567	3.858	5.015	0.005	0.400	0.368	489.866	0.153	0.004
175	0.427	3.336	4.430	0.005	0.241	0.222	490.466	0.153	0.004
250	0.425	1.835	4.938	0.005	0.207	0.191	491.733	0.153	0.004
500	0.282	1.878	3.019	0.005	0.125	0.115	492.034	0.153	0.004
15	0.679	3.580	4.728	0.008	0.237	0.237	568.299	0.061	0.005
25	0.744	2.531	4.661	0.007	0.224	0.224	568.299	0.067	0.005
50	0.895	4.182	4.366	0.007	0.253	0.253	568.299	0.080	0.005
120	0.461	3.418	3.752	0.006	0.239	0.239	568.299	0.041	0.004
175	0.319	2.930	2.989	0.006	0.133	0.133	568.299	0.028	0.004
250	0.226	1.048	2.582	0.006	0.072	0.072	568.299	0.020	0.004
500	0.211	1.028	2.310	0.005	0.069	0.069	568.299	0.019	0.004
750	0.215	1.028	2.370	0.005	0.070	0.070	568.299	0.019	0.004
9999	0.280	1.128	4.058	0.005	0.095	0.095	568.299	0.025	0.004
50	2.809	8.626	6.180	0.005	0.790	0.726	511.910	0.159	0.005
120	1.075	4.697	8.520	0.005	0.697	0.641	487.698	0.152	0.004
175	0.661	3.710	6.605	0.005	0.371	0.342	497.377	0.155	0.004
250	0.384	1.416	5.271	0.005	0.171	0.158	495.431	0.154	0.004
500	0.324	1.564	3.345	0.005	0.130	0.119	490.576	0.153	0.004
750	0.353	1.286	2.543	0.005	0.090	0.090	568.299	0.031	0.004
120	0.522	3.832	4.787	0.005	0.373	0.343	492.871	0.153	0.004
175	0.315	3.219	3.498	0.005	0.176	0.162	491.313	0.153	0.004
250	0.272	1.295	3.454	0.005	0.119	0.109	488.677	0.152	0.004
750	0.196	1.119	2.166	0.005	0.081	0.074	490.182	0.153	0.004
1000	0.129	0.998	2.359	0.005	0.060	0.055	490.412	0.153	0.004
175	0.383	3.383	3.543	0.005	0.192	0.177	488.044	0.152	0.004
250	0.341	1.543	3.451	0.005	0.141	0.130	487.635	0.152	0.004

500	0.287	1.560	3.090	0.005	0.113	0.104	493.506	0.154	0.004
750	0.348	2.176	3.691	0.005	0.143	0.132	492.114	0.153	0.004
1000	0.297	1.357	4.858	0.005	0.127	0.116	487.790	0.152	0.004
15	1.169	5.541	5.272	0.005	0.449	0.413	548.939	0.171	0.005
25	1.169	5.541	5.272	0.005	0.449	0.413	548.939	0.171	0.005
50	1.169	5.541	5.272	0.005	0.449	0.413	548.939	0.171	0.005
120	0.598	3.799	5.441	0.005	0.417	0.383	490.018	0.153	0.004
175	0.436	3.263	4.755	0.005	0.250	0.230	487.986	0.152	0.004
500	0.251	1.813	3.167	0.005	0.115	0.105	493.360	0.154	0.004
15	1.154	5.827	4.979	0.005	0.414	0.381	546.639	0.170	0.005
25	1.154	5.827	4.979	0.005	0.414	0.381	546.639	0.170	0.005
50	1.154	5.827	4.979	0.005	0.414	0.381	546.639	0.170	0.005
120	0.557	3.876	4.955	0.005	0.392	0.360	488.278	0.152	0.004
175	0.318	3.237	3.237	0.005	0.172	0.158	490.200	0.153	0.004
250	0.303	1.455	3.648	0.005	0.135	0.124	491.626	0.153	0.004
500	0.254	1.583	2.907	0.005	0.104	0.095	491.321	0.153	0.004

750	0.217	1.483	2.419	0.005	0.083	0.076	491.876	0.153	0.004
1000	0.257	1.066	4.810	0.005	0.116	0.107	490.412	0.153	0.004
50	1.289	6.061	5.182	0.005	0.457	0.420	544.075	0.169	0.005
120	0.407	3.675	3.944	0.005	0.271	0.249	492.006	0.153	0.004
175	0.327	3.218	3.332	0.005	0.173	0.159	490.583	0.153	0.004
250	0.316	1.388	4.092	0.005	0.135	0.124	489.817	0.153	0.004
500	0.296	1.633	3.524	0.005	0.134	0.123	488.587	0.152	0.004
9999	0.180	1.023	3.551	0.005	0.074	0.068	490.412	0.153	0.004
25	1.539	5.849	5.121	0.005	0.478	0.440	547.079	0.170	0.005
50	1.539	5.849	5.121	0.005	0.478	0.440	547.079	0.170	0.005
120	0.536	3.660	5.019	0.005	0.375	0.345	488.181	0.152	0.004
175	0.339	3.039	3.747	0.005	0.183	0.168	491.322	0.153	0.004
250	0.198	1.034	3.474	0.005	0.092	0.085	491.543	0.153	0.004
500	0.164	0.981	2.320	0.005	0.083	0.076	484.277	0.151	0.004
25	0.737	4.416	4.312	0.005	0.286	0.263	540.612	0.168	0.005
50	0.737	4.416	4.312	0.005	0.286	0.263	540.612	0.168	0.005
120	0.449	3.607	4.270	0.005	0.302	0.278	492.118	0.153	0.004
175	0.284	3.026	3.172	0.005	0.155	0.143	489.202	0.152	0.004
250	0.258	1.281	3.587	0.005	0.123	0.113	490.683	0.153	0.004
15	0.661	3.470	4.142	0.008	0.161	0.161	568.300	0.059	0.005
15	0.679	3.580	4.728	0.008	0.237	0.237	568.299	0.061	0.005
25	0.744	2.531	4.661	0.007	0.224	0.224	568.299	0.067	0.005
50	0.661	3.542	4.202	0.007	0.212	0.212	568.299	0.059	0.005
120	0.388	3.260	3.584	0.006	0.203	0.203	568.299	0.035	0.004
175	0.309	2.908	2.989	0.006	0.132	0.132	568.299	0.027	0.004

250	0.099	0.986	0.277	0.006	0.009	0.009	568.299	0.008	0.004
15	0.766	3.580	4.762	0.008	0.256	0.256	568.299	0.069	0.005
25	0.807	2.531	4.661	0.007	0.232	0.232	568.299	0.072	0.005
50	0.973	4.397	4.422	0.007	0.267	0.267	568.299	0.087	0.005
120	0.485	3.471	3.808	0.006	0.252	0.252	568.299	0.043	0.004
175	0.338	2.974	3.035	0.006	0.140	0.140	568.299	0.030	0.004
250	0.242	1.065	2.624	0.006	0.075	0.075	568.299	0.021	0.004
500	0.226	1.041	2.340	0.005	0.071	0.071	568.299	0.020	0.004
750	0.230	1.041	2.401	0.005	0.072	0.072	568.299	0.020	0.004
9999	0.293	1.144	4.105	0.005	0.098	0.098	568.299	0.026	0.004
15	1.064	4.923	4.842	0.005	0.387	0.356	546.291	0.170	0.005
25	1.064	4.923	4.842	0.005	0.387	0.356	546.291	0.170	0.005
50	1.064	4.923	4.842	0.005	0.387	0.356	546.291	0.170	0.005
120	0.481	3.610	4.650	0.005	0.320	0.294	492.212	0.153	0.004
175	0.265	2.949	3.181	0.005	0.147	0.136	490.181	0.153	0.004
250	0.211	1.243	2.995	0.005	0.094	0.086	491.664	0.153	0.004
500	0.245	2.231	3.098	0.005	0.119	0.110	497.996	0.155	0.004
50	1.070	4.768	4.735	0.005	0.359	0.330	545.869	0.170	0.005
120	0.222	3.270	2.845	0.005	0.136	0.125	491.211	0.153	0.004
175	0.164	2.842	2.342	0.005	0.088	0.081	489.987	0.153	0.004
250	0.152	1.029	2.487	0.005	0.060	0.055	491.100	0.153	0.004
500	0.145	0.958	2.701	0.005	0.060	0.055	485.954	0.151	0.004
175	0.802	3.990	8.021	0.005	0.461	0.424	491.492	0.153	0.004
250	0.669	2.512	7.208	0.005	0.350	0.322	493.634	0.154	0.004
500	0.598	4.982	6.502	0.005	0.300	0.276	498.186	0.155	0.004
750	0.506	2.759	6.727	0.005	0.248	0.228	491.473	0.153	0.004
1000	0.574	2.413	5.764	0.005	0.183	0.183	568.299	0.051	0.004
25	1.765	7.299	5.679	0.005	0.576	0.530	545.053	0.170	0.005
50	1.765	7.299	5.679	0.005	0.576	0.530	545.053	0.170	0.005
120	0.655	4.047	5.470	0.005	0.452	0.416	484.093	0.151	0.004
175	0.448	3.423	4.368	0.005	0.242	0.223	489.511	0.152	0.004

250	0.334	1.346	4.131	0.005	0.140	0.129	487.902	0.152	0.004
500	0.334	1.868	3.726	0.005	0.140	0.128	484.571	0.151	0.004
750	0.331	1.555	3.544	0.005	0.140	0.129	476.566	0.148	0.004
1000	0.336	1.213	5.673	0.005	0.154	0.142	488.404	0.152	0.004
120	0.740	4.204	7.036	0.005	0.543	0.499	502.829	0.157	0.004
175	0.539	3.568	5.641	0.005	0.303	0.279	497.340	0.155	0.004
250	0.557	2.407	6.563	0.005	0.290	0.267	486.991	0.152	0.004
500	0.369	2.828	4.568	0.005	0.180	0.166	490.773	0.153	0.004
750	0.294	1.965	3.746	0.005	0.135	0.124	490.578	0.153	0.004
15	0.661	3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.005
50	1.018	4.657	4.427	0.007	0.270	0.270	568.299	0.091	0.005
120	0.492	3.541	3.723	0.006	0.252	0.252	568.299	0.044	0.004
175	0.351	3.043	2.930	0.006	0.141	0.141	568.299	0.031	0.004
250	0.309	1.306	3.040	0.007	0.090	0.090	686.695	0.027	0.004
25	0.487	3.787	3.890	0.005	0.178	0.164	547.558	0.171	0.005
50	0.487	3.787	3.890	0.005	0.178	0.164	547.558	0.171	0.005
120	0.216	3.282	2.860	0.005	0.140	0.129	490.094	0.153	0.004
50	0.779	4.353	4.820	0.006	0.320	0.294	555.736	0.173	0.005
120	0.414	3.489	4.284	0.005	0.269	0.247	491.317	0.153	0.004
175	0.375	2.976	4.475	0.005	0.215	0.198	488.441	0.152	0.004
250	0.241	1.234	3.989	0.005	0.113	0.104	494.139	0.154	0.004
500	0.157	1.226	2.204	0.005	0.076	0.070	487.872	0.152	0.004
750	0.143	0.993	2.269	0.005	0.078	0.072	488.860	0.152	0.004
15	1.545	6.444	5.399	0.005	0.531	0.488	545.758	0.170	0.005
25	1.545	6.444	5.399	0.005	0.531	0.488	545.758	0.170	0.005
50	1.545	6.444	5.399	0.005	0.531	0.488	545.758	0.170	0.005
120	0.600	3.882	5.136	0.005	0.428	0.394	492.554	0.153	0.004
175	0.589	3.588	6.071	0.005	0.320	0.294	491.521	0.153	0.004
250	0.350	1.605	4.302	0.005	0.169	0.156	488.409	0.152	0.004
25	0.992	5.310	4.764	0.005	0.363	0.334	536.112	0.167	0.005

50	0.992	5.310	4.764	0.005	0.363	0.334	536.112	0.167	0.005
120	0.420	3.692	4.154	0.005	0.294	0.271	494.124	0.154	0.004
175	0.297	3.137	3.168	0.005	0.160	0.147	485.775	0.151	0.004
250	0.259	1.242	3.460	0.005	0.112	0.103	489.456	0.152	0.004
500	0.222	1.445	2.669	0.005	0.092	0.085	486.294	0.151	0.004
750	0.271	1.601	3.402	0.005	0.124	0.114	485.010	0.151	0.004
15	1.039	5.018	4.960	0.005	0.409	0.377	548.361	0.171	0.005
25	1.039	5.018	4.960	0.005	0.409	0.377	548.361	0.171	0.005
50	1.039	5.018	4.960	0.005	0.409	0.377	548.361	0.171	0.005
120	0.658	3.855	5.915	0.005	0.450	0.414	493.715	0.154	0.004
175	0.470	3.331	5.127	0.005	0.261	0.240	485.925	0.151	0.004
250	0.419	1.849	5.296	0.005	0.212	0.195	491.565	0.153	0.004
500	0.256	1.974	3.211	0.005	0.121	0.112	489.628	0.152	0.004
750	0.094	0.966	1.025	0.005	0.029	0.026	494.643	0.154	0.004
15	0.766	3.580	4.762	0.008	0.256	0.256	568.300	0.069	0.005
25	0.807	2.531	4.661	0.007	0.232	0.232	568.299	0.072	0.005
50	1.210	5.092	4.607	0.007	0.311	0.311	568.299	0.109	0.005
120	0.564	3.648	3.980	0.006	0.290	0.290	568.299	0.050	0.004
175	0.402	3.123	3.176	0.006	0.162	0.162	568.299	0.036	0.004
250	0.292	1.118	2.751	0.006	0.084	0.084	568.299	0.026	0.004
500	0.277	1.080	2.430	0.005	0.080	0.080	568.299	0.025	0.004
175	0.383	3.383	3.543	0.005	0.192	0.177	488.044	0.152	0.004
250	0.341	1.543	3.451	0.005	0.141	0.130	487.635	0.152	0.004
500	0.287	1.560	3.090	0.005	0.113	0.104	493.506	0.154	0.004
750	0.348	2.176	3.691	0.005	0.143	0.132	492.114	0.153	0.004
1000	0.297	1.357	4.858	0.005	0.127	0.116	487.790	0.152	0.004

2019

2019		g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr
Equipment	MaxHP	ROG	CO	NOX	SOX	PM10
Aerial Lifts	15	0.172	3.115	3.079	0.005	0.042
Aerial Lifts	25	0.172	3.115	3.079	0.005	0.042
Aerial Lifts	50	0.172	3.115	3.079	0.005	0.042
Aerial Lifts	120	0.118	3.173	1.977	0.005	0.049
Aerial Lifts	500	0.066	0.941	0.636	0.005	0.009
Aerial Lifts	750	0.212	1.023	2.117	0.005	0.064
Air Compressors						
	15	0.748	3.562	4.647	0.008	0.241
Air Compressors						
	25	0.787	2.501	4.596	0.007	0.222
Air Compressors						
	50	1.129	5.283	4.546	0.007	0.287
Air Compressors						
	120	0.538	3.718	3.706	0.006	0.260
Air Compressors						
	175	0.401	3.204	2.874	0.006	0.150
Air Compressors						
	250	0.304	1.132	2.469	0.006	0.078
Air Compressors						
	500	0.293	1.086	2.193	0.005	0.075
Air Compressors						
	750	0.294	1.086	2.247	0.005	0.076
Air Compressors						
	1000	0.324	1.182	4.073	0.005	0.102
Bore/Drill Rigs						
	15	0.722	4.497	4.718	0.006	0.303
Bore/Drill Rigs						
	25	0.722	4.497	4.718	0.006	0.303
Bore/Drill Rigs						
	50	0.722	4.497	4.718	0.006	0.303
Bore/Drill Rigs						
	120	0.267	3.332	3.321	0.005	0.180
Bore/Drill Rigs						
	175	0.181	2.956	2.018	0.005	0.088
Bore/Drill Rigs						
	250	0.143	1.061	1.894	0.005	0.054
Bore/Drill Rigs						
	500	0.129	1.034	1.551	0.005	0.048
Bore/Drill Rigs						
	750	0.117	0.971	1.449	0.005	0.048
Bore/Drill Rigs						
	1000	0.129	0.983	3.041	0.005	0.061

Cement and Mortar Mixers	15	0.661	3.469	4.142	0.008	0.162
Cement and Mortar Mixers	25	0.735	2.417	4.469	0.007	0.196
Concrete/Industrial Saws	25	0.685	2.339	4.332	0.007	0.161
Concrete/Industrial Saws	50	0.899	4.645	4.338	0.007	0.242
Concrete/Industrial Saws	120	0.443	3.550	3.441	0.006	0.220
Concrete/Industrial Saws	175	0.330	3.072	2.618	0.006	0.128
Cranes	50	2.045	7.245	5.952	0.005	0.615
Cranes	120	0.803	4.265	6.958	0.005	0.501
Cranes	175	0.568	3.598	5.949	0.005	0.318
Cranes	250	0.427	1.941	5.084	0.005	0.216
Cranes	500	0.349	2.969	4.297	0.005	0.173
Cranes	750	0.252	1.446	3.428	0.005	0.124
Cranes	9999	0.172	0.991	2.349	0.005	0.060
Crawler Tractors	50	2.225	7.589	5.855	0.005	0.640
Crawler Tractors	120	0.757	4.088	6.393	0.005	0.535
Crawler Tractors	175	0.517	3.379	5.382	0.005	0.300
Crawler Tractors	250	0.380	1.604	4.972	0.005	0.188
Crawler Tractors	500	0.319	2.219	3.934	0.005	0.153
Crawler Tractors	750	0.266	1.356	3.343	0.005	0.123
Crawler Tractors	1000	0.460	2.020	7.212	0.005	0.211
Crushing/Proc. Equipment	50	1.064	5.316	4.495	0.007	0.269
Crushing/Proc. Equipment	120	0.519	3.739	3.544	0.006	0.241
Crushing/Proc. Equipment	175	0.394	3.233	2.700	0.006	0.141
Crushing/Proc. Equipment	250	0.304	1.134	2.300	0.006	0.074
Crushing/Proc. Equipment	500	0.295	1.087	2.046	0.005	0.071
Crushing/Proc. Equipment	750	0.294	1.085	2.085	0.005	0.071
Crushing/Proc. Equipment	9999	0.345	1.173	3.927	0.005	0.098

Dumpers/Tenders	25	0.686	2.339	4.341	0.007	0.167
Excavators	25	0.637	4.597	4.199	0.005	0.250
Excavators	50	0.637	4.597	4.199	0.005	0.250
Excavators	120	0.325	3.524	3.369	0.005	0.211
Excavators	175	0.246	3.082	2.533	0.005	0.122
Excavators	250	0.186	1.127	2.242	0.005	0.068
Excavators	500	0.162	1.114	1.780	0.005	0.058
Excavators	750	0.176	1.173	1.987	0.005	0.067
Forklifts	50	1.244	5.880	4.862	0.005	0.401
Forklifts	120	0.510	3.804	4.550	0.005	0.353
Forklifts	175	0.382	3.288	3.865	0.005	0.210
Forklifts	250	0.374	1.677	4.250	0.005	0.175
Forklifts	500	0.268	1.814	2.751	0.005	0.112
Generator Sets	15	0.662	3.562	4.617	0.008	0.224
Generator Sets	25	0.731	2.501	4.596	0.007	0.214
Generator Sets	50	0.779	4.076	4.215	0.007	0.222
Generator Sets	120	0.405	3.396	3.446	0.006	0.206
Generator Sets	175	0.290	2.929	2.669	0.006	0.118
Generator Sets	250	0.211	1.036	2.285	0.006	0.064
Generator Sets	500	0.199	1.015	2.056	0.005	0.062
Generator Sets	750	0.202	1.015	2.104	0.005	0.062
Generator Sets	9999	0.261	1.103	3.829	0.005	0.087
Graders	50	2.616	8.279	5.945	0.005	0.737
Graders	120	1.032	4.642	8.159	0.005	0.665
Graders	175	0.609	3.656	6.014	0.005	0.337
Graders	250	0.360	1.359	4.866	0.005	0.156
Graders	500	0.323	1.528	3.218	0.005	0.124
Graders	750	0.335	1.255	2.276	0.005	0.080
Off-Highway Tractors	120	0.473	3.795	4.421	0.005	0.331
Off-Highway Tractors	175	0.294	3.219	3.208	0.005	0.159
Off-Highway Tractors	250	0.239	1.218	2.914	0.005	0.098
Off-Highway Tractors	750	0.205	1.129	2.177	0.005	0.082
Off-Highway Tractors	1000	0.140	1.010	2.378	0.005	0.062
Off-Highway Trucks	175	0.323	3.326	2.825	0.005	0.149
Off-Highway Trucks	250	0.307	1.461	2.985	0.005	0.119

Off-Highway Trucks	500	0.264	1.483	2.669	0.005	0.097
Off-Highway Trucks	750	0.327	2.041	3.320	0.005	0.129
Off-Highway Trucks	1000	0.295	1.356	4.765	0.005	0.124
Other Construction Equipment	15	1.152	5.541	5.203	0.005	0.437
Other Construction Equipment	25	1.152	5.541	5.203	0.005	0.437
Other Construction Equipment	50	1.152	5.541	5.203	0.005	0.437
Other Construction Equipment	120	0.550	3.754	5.048	0.005	0.379
Other Construction Equipment	175	0.412	3.256	4.433	0.005	0.234
Other Construction Equipment	500	0.234	1.667	2.855	0.005	0.103
Other General Industrial Equipment	15	1.042	5.662	4.807	0.005	0.374
Other General Industrial Equipment	25	1.042	5.662	4.807	0.005	0.374
Other General Industrial Equipment	50	1.042	5.662	4.807	0.005	0.374
Other General Industrial Equipment	120	0.500	3.821	4.497	0.005	0.343
Other General Industrial Equipment	175	0.302	3.241	2.999	0.005	0.157
Other General Industrial Equipment	250	0.259	1.299	3.020	0.005	0.106
Other General Industrial Equipment	500	0.239	1.561	2.575	0.005	0.092

Other General Industrial Equipment	750	0.199	1.474	2.115	0.005	0.076
Other General Industrial Equipment	1000	0.264	1.076	4.834	0.005	0.117
Other Material Handling Equipment	50	1.275	6.139	5.179	0.005	0.452
Other Material Handling Equipment	120	0.360	3.636	3.566	0.005	0.231
Other Material Handling Equipment	175	0.280	3.185	2.774	0.005	0.139
Other Material Handling Equipment	250	0.300	1.341	3.817	0.005	0.123
Other Material Handling Equipment	500	0.291	1.620	3.371	0.005	0.128
Other Material Handling Equipment	9999	0.190	1.036	3.583	0.005	0.076
Pavers	25	1.418	5.657	4.916	0.005	0.436
Pavers	50	1.418	5.657	4.916	0.005	0.436
Pavers	120	0.496	3.622	4.670	0.005	0.346
Pavers	175	0.299	3.013	3.245	0.005	0.159
Pavers	250	0.187	1.032	3.111	0.005	0.084
Pavers	500	0.167	0.986	2.270	0.005	0.081
Paving Equipment	25	0.705	4.408	4.238	0.005	0.270
Paving Equipment	50	0.705	4.408	4.238	0.005	0.270
Paving Equipment	120	0.425	3.598	4.042	0.005	0.281
Paving Equipment	175	0.254	3.011	2.692	0.005	0.134
Paving Equipment	250	0.241	1.244	3.251	0.005	0.112
Plate Compactors	15	0.661	3.469	4.142	0.008	0.161
Pressure Washers	15	0.662	3.562	4.617	0.008	0.224
Pressure Washers	25	0.731	2.501	4.596	0.007	0.214
Pressure Washers	50	0.569	3.457	4.053	0.007	0.184
Pressure Washers	120	0.337	3.240	3.295	0.006	0.174
Pressure Washers	175	0.280	2.907	2.670	0.006	0.117

Pressure Washers	250	0.098	0.986	0.265	0.006	0.009
Pumps	15	0.748	3.562	4.647	0.008	0.241
Pumps	25	0.787	2.501	4.596	0.007	0.222
Pumps	50	0.849	4.284	4.269	0.007	0.235
Pumps	120	0.429	3.449	3.497	0.006	0.217
Pumps	175	0.309	2.974	2.711	0.006	0.124
Pumps	250	0.226	1.052	2.323	0.006	0.067
Pumps	500	0.214	1.027	2.084	0.005	0.064
Pumps	750	0.217	1.027	2.133	0.005	0.065
Pumps	9999	0.273	1.118	3.873	0.005	0.089
Rollers	15	0.972	4.778	4.645	0.005	0.349
Rollers	25	0.972	4.778	4.645	0.005	0.349
Rollers	50	0.972	4.778	4.645	0.005	0.349
Rollers	120	0.423	3.557	4.179	0.005	0.275
Rollers	175	0.231	2.933	2.699	0.005	0.124
Rollers	250	0.211	1.249	2.883	0.005	0.092
Rollers	500	0.234	2.101	2.908	0.005	0.111
Rough Terrain Forklifts	50	1.009	4.674	4.557	0.005	0.328
Rough Terrain Forklifts	120	0.202	3.258	2.622	0.005	0.117
Rough Terrain Forklifts	175	0.149	2.841	2.058	0.005	0.075
Rough Terrain Forklifts	250	0.109	0.974	1.639	0.005	0.036
Rough Terrain Forklifts	500	0.116	0.950	1.961	0.005	0.043
Rubber Tired Dozers	175	0.759	3.949	7.520	0.005	0.433
Rubber Tired Dozers	250	0.651	2.459	6.929	0.005	0.338
Rubber Tired Dozers	500	0.572	4.743	6.143	0.005	0.283
Rubber Tired Dozers	750	0.455	2.598	6.122	0.005	0.218
Rubber Tired Dozers	1000	0.547	2.281	5.528	0.005	0.171
Rubber Tired Loaders	25	1.602	6.978	5.432	0.005	0.518
Rubber Tired Loaders	50	1.602	6.978	5.432	0.005	0.518
Rubber Tired Loaders	120	0.595	3.979	5.006	0.005	0.402
Rubber Tired Loaders	175	0.405	3.381	3.859	0.005	0.213

Rubber Tired Loaders	250	0.309	1.302	3.745	0.005	0.126
Rubber Tired Loaders	500	0.306	1.725	3.288	0.005	0.123
Rubber Tired Loaders	750	0.293	1.452	3.019	0.005	0.118
Rubber Tired Loaders	1000	0.323	1.208	5.459	0.005	0.146
Scrapers	120	0.718	4.197	6.841	0.005	0.526
Scrapers	175	0.510	3.533	5.264	0.005	0.283
Scrapers	250	0.501	2.233	5.831	0.005	0.257
Scrapers	500	0.343	2.595	4.156	0.005	0.163
Scrapers	750	0.277	1.829	3.431	0.005	0.123
Signal Boards	15	0.661	3.470	4.142	0.008	0.161
Signal Boards	50	0.887	4.538	4.272	0.007	0.236
Signal Boards	120	0.437	3.519	3.410	0.006	0.216
Signal Boards	175	0.321	3.043	2.601	0.006	0.125
Signal Boards	250	0.291	1.292	2.676	0.007	0.080
Skid Steer Loaders	25	0.446	3.740	3.750	0.005	0.154
Skid Steer Loaders	50	0.446	3.740	3.750	0.005	0.154
Skid Steer Loaders	120	0.199	3.277	2.656	0.005	0.122
Surfacing Equipment	50	0.643	4.100	4.420	0.006	0.250
Surfacing Equipment	120	0.355	3.449	3.823	0.005	0.226
Surfacing Equipment	175	0.357	2.972	4.239	0.005	0.204
Surfacing Equipment	250	0.217	1.216	3.400	0.005	0.101
Surfacing Equipment	500	0.146	1.214	1.899	0.005	0.068
Surfacing Equipment	750	0.142	0.994	2.179	0.005	0.076
Sweepers/Scrubbers	15	1.431	6.268	5.225	0.005	0.491
Sweepers/Scrubbers	25	1.431	6.268	5.225	0.005	0.491
Sweepers/Scrubbers	50	1.431	6.268	5.225	0.005	0.491
Sweepers/Scrubbers	120	0.550	3.846	4.773	0.005	0.387
Sweepers/Scrubbers	175	0.523	3.449	5.301	0.005	0.277
Sweepers/Scrubbers	250	0.235	1.230	2.866	0.005	0.099
Tractors/Loaders/Backhoes	25	0.920	5.203	4.609	0.005	0.330

Tractors/Loaders/Backhoes	50	0.920	5.203	4.609	0.005	0.330
Tractors/Loaders/Backhoes	120	0.368	3.638	3.693	0.005	0.247
Tractors/Loaders/Backhoes	175	0.270	3.122	2.784	0.005	0.140
Tractors/Loaders/Backhoes	250	0.245	1.220	3.147	0.005	0.102
Tractors/Loaders/Backhoes	500	0.206	1.389	2.345	0.005	0.082
Tractors/Loaders/Backhoes	750	0.262	1.603	3.120	0.005	0.117
Trenchers	15	0.955	4.892	4.785	0.005	0.377
Trenchers	25	0.955	4.892	4.785	0.005	0.377
Trenchers	50	0.955	4.892	4.785	0.005	0.377
Trenchers	120	0.631	3.837	5.695	0.005	0.431
Trenchers	175	0.460	3.342	4.960	0.005	0.255
Trenchers	250	0.405	1.810	5.047	0.005	0.203
Trenchers	500	0.254	1.987	3.128	0.005	0.118
Trenchers	750	0.078	0.956	0.707	0.005	0.015
Welders	15	0.748	3.562	4.647	0.008	0.241
Welders	25	0.787	2.501	4.596	0.007	0.222
Welders	50	1.055	4.950	4.449	0.007	0.273
Welders	120	0.503	3.623	3.648	0.006	0.250
Welders	175	0.370	3.122	2.832	0.006	0.143
Welders	250	0.276	1.104	2.432	0.006	0.075
Welders	500	0.264	1.065	2.163	0.005	0.072
Water Trucks	175	0.323	3.326	2.825	0.005	0.149
Water Trucks	250	0.307	1.461	2.985	0.005	0.119
Water Trucks	500	0.264	1.483	2.669	0.005	0.097
Water Trucks	750	0.327	2.041	3.320	0.005	0.129
Water Trucks	1000	0.295	1.356	4.765	0.005	0.124

2020

g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr
PM2.5	CO2	CH4	N2O
0.038	536.743	0.170	0.005
0.038	536.743	0.170	0.005
0.038	536.743	0.170	0.005
0.045	482.606	0.153	0.004
0.008	482.545	0.153	0.004
0.064	568.299	0.019	0.004
0.241	568.299	0.067	0.005
0.222	568.299	0.071	0.005
0.287	568.299	0.101	0.005
0.260	568.299	0.048	0.004
0.150	568.299	0.036	0.004
0.078	568.299	0.027	0.004
0.075	568.299	0.026	0.004
0.076	568.299	0.026	0.004
0.102	568.299	0.029	0.004
0.278	545.293	0.173	0.005
0.278	545.293	0.173	0.005
0.278	545.293	0.173	0.005
0.166	472.453	0.150	0.004
0.081	487.355	0.154	0.004
0.049	475.790	0.151	0.004
0.044	477.046	0.151	0.004
0.044	481.836	0.152	0.004
0.056	482.359	0.153	0.004

2020		g/hp/hr	g/hp/hr
Equipment	MaxHP	ROG	CO
Aerial Lifts	15	0.168	3.099
Aerial Lifts	25	0.168	3.099
Aerial Lifts	50	0.168	3.099
Aerial Lifts	120	0.115	3.177
Aerial Lifts	500	0.069	0.946
Aerial Lifts	750	0.200	1.013
Air Compressor s	15	0.731	3.546
Air Compressor s	25	0.769	2.473
Air Compressor s	50	1.001	5.164
Air Compressor s	120	0.489	3.698
Air Compressor s	175	0.374	3.203
Air Compressor s	250	0.288	1.121
Air Compressor s	500	0.279	1.076
Air Compressor s	750	0.280	1.076
Air Compressor s	1000	0.306	1.158
Bore/Drill Rigs	15	0.716	4.510
Bore/Drill Rigs	25	0.716	4.510
Bore/Drill Rigs	50	0.716	4.510
Bore/Drill Rigs	120	0.246	3.323
Bore/Drill Rigs	175	0.174	2.969
Bore/Drill Rigs	250	0.142	1.068
Bore/Drill Rigs	500	0.125	1.013
Bore/Drill Rigs	750	0.109	0.974
Bore/Drill Rigs	1000	0.133	0.988

0.162	568.299	0.059	0.005
0.196	568.299	0.066	0.005
0.161	568.299	0.061	0.005
0.242	568.299	0.081	0.005
0.220	568.300	0.040	0.004
0.128	568.299	0.029	0.004
0.566	529.463	0.168	0.005
0.460	480.325	0.152	0.004
0.292	485.182	0.154	0.004
0.198	483.462	0.153	0.004
0.159	483.142	0.153	0.004
0.114	481.119	0.152	0.004
0.055	482.545	0.153	0.004
0.589	525.977	0.166	0.005
0.492	486.991	0.154	0.004
0.276	481.622	0.152	0.004
0.173	483.449	0.153	0.004
0.141	485.865	0.154	0.004
0.113	483.388	0.153	0.004
0.194	486.255	0.154	0.004
0.269	568.299	0.096	0.005
0.241	568.299	0.046	0.004
0.141	568.299	0.035	0.004
0.074	568.299	0.027	0.004
0.071	568.299	0.026	0.004
0.071	568.299	0.026	0.004
0.098	568.299	0.031	0.004

Cement and Mortar Mixers	15	0.661	3.470
Cement and Mortar Mixers	25	0.723	2.397
Concrete/Industrial Saws	25	0.685	2.339
Concrete/Industrial Saws	50	0.798	4.552
Concrete/Industrial Saws	120	0.401	3.535
Concrete/Industrial Saws	175	0.306	3.072
Cranes	50	2.084	7.376
Cranes	120	0.732	4.171
Cranes	175	0.537	3.562
Cranes	250	0.384	1.790
Cranes	500	0.321	2.660
Cranes	750	0.242	1.444
Cranes	9999	0.182	0.999
Crawler Tractors	50	2.053	7.300
Crawler Tractors	120	0.715	4.044
Crawler Tractors	175	0.476	3.340
Crawler Tractors	250	0.360	1.555
Crawler Tractors	500	0.301	2.088
Crawler Tractors	750	0.256	1.310
Crawler Tractors	1000	0.463	2.028
Crushing/Proc. Equipment	50	0.947	5.211
Crushing/Proc. Equipment	120	0.473	3.722
Crushing/Proc. Equipment	175	0.367	3.234
Crushing/Proc. Equipment	250	0.289	1.125
Crushing/Proc. Equipment	500	0.281	1.078
Crushing/Proc. Equipment	750	0.281	1.077
Crushing/Proc. Equipment	9999	0.329	1.153

0.167	568.299	0.061	0.005
0.230	536.913	0.170	0.005
0.230	536.913	0.170	0.005
0.194	478.245	0.151	0.004
0.112	482.684	0.153	0.004
0.063	482.250	0.153	0.004
0.053	481.236	0.152	0.004
0.062	479.288	0.152	0.004
0.369	537.161	0.170	0.005
0.324	482.007	0.153	0.004
0.193	482.598	0.153	0.004
0.161	483.844	0.153	0.004
0.103	484.140	0.153	0.004
0.224	568.299	0.059	0.005
0.214	568.299	0.066	0.005
0.222	568.299	0.070	0.005
0.206	568.299	0.036	0.004
0.118	568.299	0.026	0.004
0.064	568.299	0.019	0.004
0.062	568.299	0.018	0.004
0.062	568.299	0.018	0.004
0.087	568.299	0.023	0.004
0.678	503.751	0.159	0.005
0.612	479.901	0.152	0.004
0.310	489.042	0.155	0.004
0.144	486.329	0.154	0.004
0.115	482.588	0.153	0.004
0.080	568.299	0.030	0.004
0.305	484.269	0.153	0.004
0.146	483.431	0.153	0.004
0.090	481.275	0.152	0.004
0.075	482.309	0.153	0.004
0.057	482.545	0.153	0.004
0.138	480.362	0.152	0.004
0.110	480.170	0.152	0.004

Dumpers/Te nders	25	0.685	2.339
Excavators	25	0.593	4.500
Excavators	50	0.593	4.500
Excavators	120	0.299	3.505
Excavators	175	0.231	3.086
Excavators	250	0.177	1.118
Excavators	500	0.153	1.102
Excavators	750	0.170	1.145
Forklifts	50	1.124	5.706
Forklifts	120	0.459	3.760
Forklifts	175	0.338	3.249
Forklifts	250	0.293	1.442
Forklifts	500	0.251	1.478
Generator Sets	15	0.646	3.546
Generator Sets	25	0.721	2.473
Generator Sets	50	0.691	3.995
Generator Sets	120	0.364	3.380
Generator Sets	175	0.267	2.930
Generator Sets	250	0.198	1.026
Generator Sets	500	0.188	1.005
Generator Sets	750	0.191	1.005
Generator Sets	9999	0.242	1.082
Graders	50	2.516	8.134
Graders	120	0.976	4.561
Graders	175	0.567	3.621
Graders	250	0.352	1.342
Graders	500	0.322	1.526
Graders	750	0.319	1.229
Off-Highway Tractors	120	0.448	3.788
Off-Highway Tractors	175	0.271	3.215
Off-Highway Tractors	250	0.221	1.181
Off-Highway Tractors	750	0.201	1.131
Off-Highway Tractors	1000	0.150	1.022
Off-Highway Trucks	175	0.310	3.339
Off-Highway Trucks	250	0.275	1.391

0.089	485.383	0.154	0.004
0.118	483.218	0.153	0.004
0.114	480.348	0.152	0.004
0.402	539.735	0.171	0.005
0.402	539.735	0.171	0.005
0.402	539.735	0.171	0.005
0.349	482.218	0.153	0.004
0.215	480.452	0.152	0.004
0.094	485.413	0.154	0.004
0.344	537.869	0.170	0.005
0.344	537.869	0.170	0.005
0.344	537.869	0.170	0.005
0.316	480.444	0.152	0.004
0.144	482.336	0.153	0.004
0.097	483.739	0.153	0.004
0.085	483.439	0.153	0.004

Off-Highway Trucks	500	0.246	1.414
Off-Highway Trucks	750	0.312	2.027
Off-Highway Trucks	1000	0.303	1.372
Other Construction Equipment	15	1.072	5.404
Other Construction Equipment	25	1.072	5.404
Other Construction Equipment	50	1.072	5.404
Other Construction Equipment	120	0.519	3.732
Other Construction Equipment	175	0.388	3.235
Other Construction Equipment	500	0.224	1.634
Other General Industrial Equipment	15	0.946	5.504
Other General Industrial Equipment	25	0.946	5.504
Other General Industrial Equipment	50	0.946	5.504
Other General Industrial Equipment	120	0.446	3.771
Other General Industrial Equipment	175	0.268	3.229
Other General Industrial Equipment	250	0.237	1.239
Other General Industrial Equipment	500	0.208	1.344

0.070	483.985	0.153	0.004
0.108	482.545	0.153	0.004
0.416	535.347	0.169	0.005
0.212	484.113	0.153	0.004
0.128	482.713	0.153	0.004
0.113	481.959	0.153	0.004
0.118	480.748	0.152	0.004
0.070	482.545	0.153	0.004
0.401	538.325	0.170	0.005
0.401	538.325	0.170	0.005
0.318	480.251	0.152	0.004
0.146	483.394	0.153	0.004
0.077	483.574	0.153	0.004
0.075	476.971	0.151	0.004
0.248	531.861	0.168	0.005
0.248	531.861	0.168	0.005
0.258	484.387	0.153	0.004
0.123	481.225	0.152	0.004
0.103	482.644	0.153	0.004
0.161	568.299	0.059	0.005
0.224	568.299	0.059	0.005
0.214	568.299	0.066	0.005
0.184	568.299	0.051	0.005
0.174	568.299	0.030	0.004
0.117	568.299	0.025	0.004

Other General Industrial Equipment	750	0.175	1.462
Other General Industrial Equipment	1000	0.271	1.085
Other Material Handling Equipment	50	1.245	6.167
Other Material Handling Equipment	120	0.307	3.589
Other Material Handling Equipment	175	0.252	3.171
Other Material Handling Equipment	250	0.291	1.319
Other Material Handling Equipment	500	0.283	1.523
Other Material Handling Equipment	9999	0.200	1.049
Pavers	25	1.318	5.523
Pavers	50	1.318	5.523
Pavers	120	0.470	3.604
Pavers	175	0.273	3.010
Pavers	250	0.176	1.028
Pavers	500	0.165	0.987
Paving Equipment	25	0.621	4.223
Paving Equipment	50	0.621	4.223
Paving Equipment	120	0.397	3.582
Paving Equipment	175	0.248	3.024
Paving Equipment	250	0.244	1.252
Plate Compactors	15	0.661	3.469
Pressure Washers	15	0.646	3.546
Pressure Washers	25	0.721	2.473
Pressure Washers	50	0.499	3.393
Pressure Washers	120	0.298	3.225
Pressure Washers	175	0.258	2.907

0.009	568.299	0.008	0.004
0.241	568.300	0.067	0.005
0.222	568.300	0.071	0.005
0.235	568.299	0.076	0.005
0.217	568.299	0.038	0.004
0.124	568.299	0.027	0.004
0.067	568.299	0.020	0.004
0.064	568.300	0.019	0.004
0.065	568.299	0.019	0.004
0.089	568.299	0.024	0.004
0.321	537.546	0.170	0.005
0.321	537.546	0.170	0.005
0.321	537.546	0.170	0.005
0.253	484.336	0.153	0.004
0.114	482.453	0.153	0.004
0.084	483.777	0.153	0.004
0.102	489.977	0.155	0.004
0.302	537.329	0.170	0.005
0.108	483.311	0.153	0.004
0.069	482.119	0.153	0.004
0.034	483.088	0.153	0.004
0.040	477.254	0.151	0.004
0.398	483.559	0.153	0.004
0.311	485.172	0.154	0.004
0.260	490.383	0.155	0.004
0.201	483.579	0.153	0.004
0.171	568.299	0.049	0.004
0.476	536.225	0.170	0.005
0.476	536.225	0.170	0.005
0.370	475.864	0.151	0.004
0.196	481.736	0.152	0.004

Pressure Washers	250	0.098	0.986
Pumps	15	0.731	3.546
Pumps	25	0.769	2.473
Pumps	50	0.755	4.197
Pumps	120	0.386	3.432
Pumps	175	0.285	2.974
Pumps	250	0.212	1.042
Pumps	500	0.203	1.017
Pumps	750	0.205	1.017
Pumps	9999	0.255	1.096
Rollers	15	0.926	4.725
Rollers	25	0.926	4.725
Rollers	50	0.926	4.725
Rollers	120	0.388	3.531
Rollers	175	0.215	2.933
Rollers	250	0.209	1.253
Rollers	500	0.235	2.113
Rough Terrain Forklifts	50	0.999	4.686
Rough Terrain Forklifts	120	0.189	3.256
Rough Terrain Forklifts	175	0.143	2.845
Rough Terrain Forklifts	250	0.112	0.978
Rough Terrain Forklifts	500	0.089	0.942
Rubber Tired Dozers	175	0.726	3.893
Rubber Tired Dozers	250	0.620	2.371
Rubber Tired Dozers	500	0.535	4.411
Rubber Tired Dozers	750	0.457	2.601
Rubber Tired Dozers	1000	0.522	2.164
Rubber Tired Loaders	25	1.481	6.768
Rubber Tired Loaders	50	1.481	6.768
Rubber Tired Loaders	120	0.556	3.948
Rubber Tired Loaders	175	0.379	3.368

0.116	480.100	0.152	0.004
0.113	477.042	0.151	0.004
0.109	471.187	0.149	0.004
0.135	480.523	0.152	0.004
0.483	494.100	0.156	0.004
0.261	489.255	0.155	0.004
0.236	479.032	0.152	0.004
0.150	482.732	0.153	0.004
0.113	482.596	0.153	0.004
0.161	568.299	0.059	0.005
0.236	568.300	0.080	0.005
0.216	568.299	0.039	0.004
0.125	568.299	0.029	0.004
0.080	686.695	0.026	0.004
0.141	539.267	0.171	0.005
0.141	539.267	0.171	0.005
0.112	482.384	0.153	0.004
0.230	547.046	0.173	0.005
0.208	484.076	0.153	0.004
0.187	479.672	0.152	0.004
0.093	486.842	0.154	0.004
0.063	481.897	0.153	0.004
0.070	480.166	0.152	0.004
0.452	537.002	0.170	0.005
0.452	537.002	0.170	0.005
0.452	537.002	0.170	0.005
0.356	484.652	0.153	0.004
0.255	483.636	0.153	0.004
0.091	480.574	0.152	0.004
0.304	527.684	0.167	0.005

Rubber Tired Loaders	250	0.290	1.269
Rubber Tired Loaders	500	0.289	1.630
Rubber Tired Loaders	750	0.277	1.400
Rubber Tired Loaders	1000	0.312	1.204
Scrapers	120	0.701	4.198
Scrapers	175	0.478	3.501
Scrapers	250	0.446	2.065
Scrapers	500	0.320	2.401
Scrapers	750	0.262	1.725
Signal Boards	15	0.661	3.469
Signal Boards	50	0.788	4.448
Signal Boards	120	0.395	3.504
Signal Boards	175	0.298	3.043
Signal Boards	250	0.274	1.281
Skid Steer Loaders	25	0.439	3.764
Skid Steer Loaders	50	0.439	3.764
Skid Steer Loaders	120	0.188	3.277
Surfacing Equipment	50	0.536	3.934
Surfacing Equipment	120	0.330	3.439
Surfacing Equipment	175	0.308	2.931
Surfacing Equipment	250	0.212	1.218
Surfacing Equipment	500	0.146	1.219
Surfacing Equipment	750	0.142	0.996
Sweepers/Scrubbers	15	1.344	6.155
Sweepers/Scrubbers	25	1.344	6.155
Sweepers/Scrubbers	50	1.344	6.155
Sweepers/Scrubbers	120	0.520	3.828
Sweepers/Scrubbers	175	0.462	3.359
Sweepers/Scrubbers	250	0.207	1.137
Tractors/Loaders/Backhoes	25	0.830	5.035

0.304	527.684	0.167	0.005
0.227	485.855	0.154	0.004
0.129	477.915	0.151	0.004
0.094	481.421	0.152	0.004
0.075	479.083	0.152	0.004
0.107	478.922	0.152	0.004
0.347	539.104	0.171	0.005
0.347	539.104	0.171	0.005
0.347	539.104	0.171	0.005
0.396	485.364	0.154	0.004
0.234	478.129	0.151	0.004
0.187	484.117	0.153	0.004
0.109	482.165	0.153	0.004
0.014	484.542	0.153	0.004
0.241	568.299	0.067	0.005
0.222	568.299	0.071	0.005
0.273	568.299	0.095	0.005
0.250	568.299	0.045	0.004
0.143	568.300	0.033	0.004
0.075	568.299	0.024	0.004
0.072	568.300	0.023	0.004
0.138	480.362	0.152	0.004
0.110	480.170	0.152	0.004
0.089	485.383	0.154	0.004
0.118	483.218	0.153	0.004
0.114	480.348	0.152	0.004

Tractors/Loaders/Backhoes	50	0.830	5.035
Tractors/Loaders/Backhoes	120	0.331	3.601
Tractors/Loaders/Backhoes	175	0.246	3.105
Tractors/Loaders/Backhoes	250	0.225	1.196
Tractors/Loaders/Backhoes	500	0.194	1.358
Tractors/Loaders/Backhoes	750	0.268	1.610
Trenchers	15	0.905	4.833
Trenchers	25	0.905	4.833
Trenchers	50	0.905	4.833
Trenchers	120	0.610	3.833
Trenchers	175	0.421	3.330
Trenchers	250	0.392	1.774
Trenchers	500	0.233	1.859
Trenchers	750	0.070	0.950
Welders	15	0.731	3.546
Welders	25	0.769	2.473
Welders	50	0.937	4.840
Welders	120	0.455	3.605
Welders	175	0.344	3.122
Welders	250	0.261	1.093
Welders	500	0.252	1.055
Water Trucks	175	0.310	3.339
Water Trucks	250	0.275	1.391
Water Trucks	500	0.246	1.414
Water Trucks	750	0.312	2.027
Water Trucks	1000	0.303	1.372

4.336	0.007	0.165	0.165	568.299	0.061	0.005
4.031	0.005	0.222	0.204	525.368	0.170	0.005
4.031	0.005	0.222	0.204	525.368	0.170	0.005
3.090	0.005	0.185	0.170	468.055	0.151	0.004
2.278	0.005	0.110	0.102	472.289	0.153	0.004
2.027	0.005	0.061	0.057	471.883	0.153	0.004
1.572	0.005	0.052	0.048	470.296	0.152	0.004
1.797	0.005	0.061	0.056	468.871	0.152	0.004
4.686	0.005	0.360	0.331	525.483	0.170	0.005
4.133	0.005	0.308	0.283	471.529	0.153	0.004
3.320	0.005	0.180	0.165	472.106	0.153	0.004
3.241	0.005	0.126	0.116	473.326	0.153	0.004
2.440	0.005	0.097	0.089	473.615	0.153	0.004
4.516	0.008	0.212	0.212	568.299	0.058	0.005
4.538	0.007	0.205	0.205	568.299	0.065	0.005
4.075	0.007	0.194	0.194	568.299	0.062	0.005
3.173	0.006	0.179	0.179	568.299	0.032	0.004
2.380	0.006	0.105	0.105	568.299	0.024	0.004
2.016	0.006	0.057	0.057	568.299	0.017	0.004
1.816	0.005	0.055	0.055	568.299	0.017	0.004
1.858	0.005	0.056	0.056	568.299	0.017	0.004
3.608	0.005	0.079	0.079	568.300	0.021	0.004
5.825	0.005	0.709	0.652	492.862	0.159	0.005
7.725	0.005	0.622	0.572	469.337	0.152	0.004
5.530	0.005	0.309	0.284	478.040	0.155	0.004
4.678	0.005	0.150	0.138	475.304	0.154	0.004
3.107	0.005	0.121	0.111	471.980	0.153	0.004
2.031	0.005	0.072	0.072	568.299	0.028	0.004
4.183	0.005	0.307	0.283	474.148	0.153	0.004
2.890	0.005	0.140	0.129	472.917	0.153	0.004
2.575	0.005	0.086	0.079	470.943	0.152	0.004
2.047	0.005	0.076	0.070	471.815	0.153	0.004
2.396	0.005	0.063	0.058	472.055	0.153	0.004
2.628	0.005	0.137	0.126	470.097	0.152	0.004
2.507	0.005	0.098	0.090	470.168	0.152	0.004

Dumpers/Trailers
Excavators
Forklifts
Generator Sets
Graders
Off-Highway Tractors
Off-Highway Trucks
Off-Highway Trucks

1.676	0.005	0.062	0.057	473.464	0.153	0.004
4.857	0.005	0.119	0.109	472.055	0.153	0.004
5.139	0.005	0.439	0.404	523.709	0.169	0.005
3.104	0.005	0.182	0.168	473.588	0.153	0.004
2.367	0.005	0.118	0.109	472.219	0.153	0.004
3.599	0.005	0.115	0.106	471.482	0.153	0.004
3.210	0.005	0.120	0.110	470.297	0.152	0.004
3.614	0.005	0.078	0.072	472.055	0.153	0.004
4.764	0.005	0.402	0.370	526.210	0.170	0.005
4.764	0.005	0.402	0.370	526.210	0.170	0.005
4.427	0.005	0.325	0.299	469.882	0.152	0.004
2.918	0.005	0.142	0.131	472.775	0.153	0.004
2.777	0.005	0.076	0.070	472.834	0.153	0.004
2.134	0.005	0.077	0.071	466.206	0.151	0.004
3.952	0.005	0.217	0.200	520.124	0.168	0.005
3.952	0.005	0.217	0.200	520.124	0.168	0.005
3.781	0.005	0.256	0.235	473.325	0.153	0.004
2.555	0.005	0.128	0.118	470.736	0.152	0.004
3.220	0.005	0.111	0.102	472.151	0.153	0.004
4.142	0.008	0.161	0.161	568.299	0.059	0.005
4.516	0.008	0.212	0.212	568.299	0.058	0.005
4.538	0.007	0.205	0.205	568.299	0.065	0.005
3.917	0.007	0.161	0.161	568.299	0.045	0.005
3.036	0.006	0.151	0.151	568.299	0.026	0.004
2.383	0.006	0.104	0.104	568.299	0.023	0.004

Other General Industrial Equipment
Other General Industrial Equipment
Other Material Handling Equipment
Pavers
Paving Equipment
Plate Compactors
Pressure Washers

0.265	0.006	0.009	0.009	568.299	0.008	0.004
4.542	0.008	0.227	0.227	568.299	0.066	0.005
4.538	0.007	0.212	0.212	568.299	0.069	0.005
4.128	0.007	0.206	0.206	568.299	0.068	0.005
3.219	0.006	0.189	0.189	568.299	0.034	0.004
2.418	0.006	0.111	0.111	568.299	0.025	0.004
2.050	0.006	0.060	0.060	568.299	0.019	0.004
1.841	0.005	0.057	0.057	568.300	0.018	0.004
1.884	0.005	0.058	0.058	568.299	0.018	0.004
3.649	0.005	0.081	0.081	568.300	0.023	0.004
4.534	0.005	0.329	0.303	525.880	0.170	0.005
4.534	0.005	0.329	0.303	525.880	0.170	0.005
4.534	0.005	0.329	0.303	525.880	0.170	0.005
3.882	0.005	0.248	0.228	473.859	0.153	0.004
2.452	0.005	0.113	0.104	471.918	0.153	0.004
2.751	0.005	0.089	0.082	473.367	0.153	0.004
2.828	0.005	0.109	0.101	479.325	0.155	0.004
4.495	0.005	0.316	0.291	525.622	0.170	0.005
2.452	0.005	0.103	0.094	472.984	0.153	0.004
1.869	0.005	0.068	0.063	471.715	0.153	0.004
1.609	0.005	0.037	0.034	472.567	0.153	0.004
1.302	0.005	0.028	0.026	465.771	0.151	0.004
7.185	0.005	0.411	0.378	473.012	0.153	0.004
6.503	0.005	0.319	0.293	474.793	0.154	0.004
5.641	0.005	0.259	0.238	479.757	0.155	0.004
6.123	0.005	0.218	0.201	473.056	0.153	0.004
5.306	0.005	0.160	0.160	568.299	0.047	0.004
5.254	0.005	0.474	0.436	524.697	0.170	0.005
5.254	0.005	0.474	0.436	524.697	0.170	0.005
4.686	0.005	0.367	0.338	465.674	0.151	0.004
3.517	0.005	0.194	0.178	471.214	0.152	0.004

Pressure Washers
Pumps
Rollers
Rough Terrain Forklifts
Rubber Tired Dozers
Rubber Tired Loaders

3.421	0.005	0.114	0.105	469.513	0.152	0.004
3.017	0.005	0.112	0.103	466.783	0.151	0.004
2.767	0.005	0.108	0.099	462.193	0.150	0.004
5.253	0.005	0.139	0.127	469.935	0.152	0.004
6.677	0.005	0.510	0.469	483.745	0.157	0.004
4.869	0.005	0.262	0.241	478.608	0.155	0.004
5.089	0.005	0.223	0.205	468.988	0.152	0.004
3.783	0.005	0.148	0.136	472.175	0.153	0.004
3.126	0.005	0.113	0.104	471.778	0.153	0.004
4.142	0.008	0.161	0.161	568.299	0.059	0.005
4.132	0.007	0.206	0.206	568.299	0.071	0.005
3.134	0.006	0.187	0.187	568.299	0.035	0.004
2.309	0.006	0.110	0.110	568.299	0.026	0.004
2.350	0.007	0.071	0.071	686.695	0.024	0.004
3.691	0.005	0.145	0.133	527.758	0.171	0.005
3.691	0.005	0.145	0.133	527.758	0.171	0.005
2.505	0.005	0.108	0.100	471.908	0.153	0.004
4.239	0.006	0.216	0.199	535.528	0.173	0.005
3.612	0.005	0.206	0.190	473.819	0.153	0.004
3.672	0.005	0.175	0.161	469.208	0.152	0.004
3.222	0.005	0.097	0.089	476.426	0.154	0.004
1.838	0.005	0.067	0.062	471.633	0.153	0.004
2.094	0.005	0.074	0.068	469.625	0.152	0.004
5.095	0.005	0.463	0.426	525.328	0.170	0.005
5.095	0.005	0.463	0.426	525.328	0.170	0.005
5.095	0.005	0.463	0.426	525.328	0.170	0.005
4.482	0.005	0.360	0.331	474.116	0.153	0.004
4.608	0.005	0.237	0.218	473.122	0.153	0.004
2.486	0.005	0.079	0.073	470.126	0.152	0.004
4.398	0.005	0.288	0.265	515.874	0.167	0.005

Rubber Tired Loaders
Scrapers
Signal Boards
Skid Steer Loaders
Skid Steer Loaders
Skid Steer Loaders
Surfacing Equipment
Sweepers/S crubbers
Tractors/Loaders/Backhoes

4.398	0.005	0.288	0.265	515.874	0.167	0.005
3.326	0.005	0.210	0.194	475.154	0.154	0.004
2.415	0.005	0.122	0.112	467.513	0.151	0.004
2.738	0.005	0.090	0.083	470.500	0.152	0.004
2.080	0.005	0.073	0.067	468.245	0.151	0.004
3.119	0.005	0.117	0.108	468.660	0.152	0.004
4.677	0.005	0.356	0.328	527.096	0.171	0.005
4.677	0.005	0.356	0.328	527.096	0.171	0.005
4.677	0.005	0.356	0.328	527.096	0.171	0.005
5.520	0.005	0.413	0.380	475.127	0.154	0.004
4.460	0.005	0.228	0.210	467.735	0.151	0.004
4.809	0.005	0.195	0.179	473.595	0.153	0.004
2.775	0.005	0.105	0.097	470.637	0.152	0.004
0.560	0.005	0.009	0.008	472.656	0.153	0.004
4.542	0.008	0.227	0.227	568.299	0.066	0.005
4.538	0.007	0.212	0.212	568.299	0.069	0.005
4.304	0.007	0.238	0.238	568.299	0.084	0.005
3.351	0.006	0.216	0.216	568.299	0.041	0.004
2.523	0.006	0.127	0.127	568.299	0.031	0.004
2.143	0.006	0.066	0.066	568.299	0.023	0.004
1.910	0.005	0.064	0.064	568.299	0.022	0.004
2.628	0.005	0.137	0.126	470.097	0.152	0.004
2.507	0.005	0.098	0.090	470.168	0.152	0.004
2.347	0.005	0.086	0.079	474.579	0.154	0.004
3.058	0.005	0.120	0.110	472.750	0.153	0.004
4.794	0.005	0.125	0.115	469.889	0.152	0.004

Tractors/Loaders/Backhoes
Trenchers
Welders
Water Trucks

	g/hp/hr								
MaxHP	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O
15	0.165	3.114	2.922	0.005	0.027	0.024	525.074	0.170	0.005
25	0.165	3.114	2.922	0.005	0.027	0.024	525.074	0.170	0.005
50	0.165	3.114	2.922	0.005	0.027	0.024	525.074	0.170	0.005
120	0.109	3.176	1.744	0.005	0.033	0.031	472.114	0.153	0.004
500	0.072	0.951	0.640	0.005	0.009	0.008	472.055	0.153	0.004
750	0.187	1.004	1.610	0.005	0.050	0.050	568.299	0.016	0.004
15	0.717	3.531	4.462	0.008	0.214	0.214	568.299	0.064	0.005
25	0.752	2.446	4.497	0.007	0.201	0.201	568.299	0.067	0.005
50	0.887	5.021	4.221	0.007	0.212	0.212	568.299	0.080	0.005
120	0.442	3.670	3.083	0.006	0.190	0.190	568.299	0.039	0.004
175	0.343	3.192	2.218	0.006	0.115	0.115	568.299	0.030	0.004
250	0.268	1.108	1.859	0.006	0.060	0.060	568.299	0.024	0.004
500	0.261	1.064	1.663	0.005	0.058	0.058	568.299	0.023	0.004
750	0.262	1.064	1.699	0.005	0.058	0.058	568.299	0.023	0.004
1000	0.284	1.134	3.565	0.005	0.082	0.082	568.300	0.025	0.004
15	0.711	4.548	4.634	0.006	0.291	0.268	535.378	0.173	0.005
25	0.711	4.548	4.634	0.006	0.291	0.268	535.378	0.173	0.005
50	0.711	4.548	4.634	0.006	0.291	0.268	535.378	0.173	0.005
120	0.217	3.306	2.737	0.005	0.131	0.121	464.973	0.150	0.004
175	0.154	2.961	1.598	0.005	0.070	0.064	477.048	0.154	0.004
250	0.133	1.064	1.551	0.005	0.047	0.043	467.992	0.151	0.004
500	0.117	1.015	1.221	0.005	0.041	0.038	469.816	0.152	0.004
750	0.098	0.972	0.955	0.005	0.033	0.031	474.079	0.153	0.004
1000	0.136	0.993	3.058	0.005	0.061	0.057	471.816	0.153	0.004

15	0.661	3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.005
25	0.712	2.381	4.419	0.007	0.180	0.180	568.299	0.064	0.005
25	0.685	2.340	4.332	0.007	0.161	0.161	568.299	0.061	0.005
50	0.722	4.481	4.063	0.007	0.184	0.184	568.300	0.065	0.005
120	0.369	3.523	2.913	0.006	0.166	0.166	568.299	0.033	0.004
175	0.286	3.072	2.055	0.006	0.101	0.101	568.299	0.025	0.004
50	2.115	7.489	6.014	0.005	0.631	0.581	517.900	0.168	0.005
120	0.651	4.065	5.731	0.005	0.398	0.366	469.887	0.152	0.004
175	0.498	3.516	5.113	0.005	0.273	0.251	474.546	0.154	0.004
250	0.350	1.678	4.104	0.005	0.167	0.153	472.906	0.153	0.004
500	0.295	2.448	3.443	0.005	0.139	0.127	472.455	0.153	0.004
750	0.228	1.440	2.727	0.005	0.107	0.098	470.550	0.152	0.004
9999	0.192	1.008	2.374	0.005	0.061	0.057	472.055	0.153	0.004
50	2.064	7.349	5.615	0.005	0.591	0.543	516.108	0.167	0.005
120	0.673	4.005	5.657	0.005	0.466	0.429	476.437	0.154	0.004
175	0.436	3.310	4.395	0.005	0.245	0.225	471.421	0.153	0.004
250	0.343	1.515	4.334	0.005	0.163	0.150	472.925	0.153	0.004
500	0.283	2.024	3.276	0.005	0.129	0.119	474.484	0.154	0.004
750	0.239	1.270	2.825	0.005	0.104	0.096	473.094	0.153	0.004
1000	0.399	1.896	6.399	0.005	0.182	0.167	471.822	0.153	0.004
50	0.862	5.136	4.211	0.007	0.201	0.201	568.299	0.077	0.005
120	0.438	3.711	2.989	0.006	0.178	0.178	568.299	0.039	0.004
175	0.344	3.235	2.114	0.006	0.109	0.109	568.299	0.031	0.004
250	0.274	1.119	1.756	0.006	0.057	0.057	568.299	0.024	0.004
500	0.268	1.072	1.574	0.005	0.055	0.055	568.300	0.024	0.004
750	0.268	1.072	1.606	0.005	0.055	0.055	568.299	0.024	0.004
9999	0.314	1.136	3.487	0.005	0.080	0.080	568.299	0.028	0.004

25	0.685	2.339	4.333	0.007	0.163	0.163	568.299	0.061	0.005
25	0.562	4.461	3.919	0.005	0.202	0.186	525.377	0.170	0.005
50	0.562	4.461	3.919	0.005	0.202	0.186	525.377	0.170	0.005
120	0.275	3.492	2.849	0.005	0.161	0.148	467.791	0.151	0.004
175	0.216	3.090	2.034	0.005	0.099	0.091	472.359	0.153	0.004
250	0.163	1.103	1.706	0.005	0.052	0.048	471.793	0.153	0.004
500	0.143	1.088	1.332	0.005	0.045	0.041	469.616	0.152	0.004
750	0.165	1.150	1.619	0.005	0.056	0.052	469.547	0.152	0.004
50	1.002	5.535	4.520	0.005	0.318	0.292	525.483	0.170	0.005
120	0.412	3.720	3.756	0.005	0.267	0.245	471.529	0.153	0.004
175	0.308	3.231	2.921	0.005	0.158	0.145	472.106	0.153	0.004
250	0.249	1.337	2.582	0.005	0.099	0.091	473.326	0.153	0.004
500	0.254	1.485	2.303	0.005	0.094	0.086	473.615	0.153	0.004
15	0.634	3.531	4.441	0.008	0.201	0.201	568.299	0.057	0.005
25	0.712	2.446	4.497	0.007	0.196	0.196	568.299	0.064	0.005
50	0.613	3.905	3.916	0.007	0.165	0.165	568.299	0.055	0.005
120	0.326	3.361	2.888	0.006	0.153	0.153	568.299	0.029	0.004
175	0.243	2.925	2.068	0.006	0.091	0.091	568.299	0.021	0.004
250	0.183	1.016	1.730	0.006	0.049	0.049	568.299	0.016	0.004
500	0.175	0.996	1.562	0.005	0.048	0.048	568.299	0.015	0.004
750	0.177	0.996	1.596	0.005	0.048	0.048	568.299	0.016	0.004
9999	0.220	1.060	3.372	0.005	0.070	0.070	568.300	0.019	0.004
50	2.235	7.626	5.485	0.005	0.631	0.581	492.935	0.159	0.005
120	0.901	4.452	7.125	0.005	0.570	0.524	469.070	0.152	0.004
175	0.505	3.559	4.839	0.005	0.270	0.248	478.529	0.155	0.004
250	0.335	1.307	4.381	0.005	0.139	0.128	474.539	0.154	0.004
500	0.322	1.460	3.013	0.005	0.117	0.108	471.898	0.153	0.004
750	0.303	1.207	1.808	0.005	0.064	0.064	568.299	0.027	0.004
120	0.395	3.743	3.773	0.005	0.261	0.240	474.516	0.154	0.004
175	0.259	3.220	2.660	0.005	0.129	0.118	472.924	0.153	0.004
250	0.200	1.162	2.113	0.005	0.072	0.067	471.003	0.152	0.004
750	0.181	1.122	1.715	0.005	0.063	0.058	471.806	0.153	0.004
1000	0.160	1.033	2.414	0.005	0.064	0.059	472.055	0.153	0.004
175	0.278	3.324	2.246	0.005	0.113	0.104	470.290	0.152	0.004
250	0.249	1.348	2.109	0.005	0.082	0.076	470.193	0.152	0.004

500	0.225	1.338	1.954	0.005	0.072	0.066	474.542	0.154	0.004
750	0.293	1.935	2.668	0.005	0.106	0.098	472.991	0.153	0.004
1000	0.256	1.252	4.158	0.005	0.099	0.091	471.055	0.152	0.004
15	1.010	5.307	4.902	0.005	0.382	0.351	527.783	0.171	0.005
25	1.010	5.307	4.902	0.005	0.382	0.351	527.783	0.171	0.005
50	1.010	5.307	4.902	0.005	0.382	0.351	527.783	0.171	0.005
120	0.482	3.703	4.456	0.005	0.323	0.298	472.275	0.153	0.004
175	0.330	3.183	3.438	0.005	0.180	0.165	469.764	0.152	0.004
500	0.215	1.599	2.428	0.005	0.090	0.083	475.212	0.154	0.004
15	0.831	5.314	4.425	0.005	0.289	0.266	526.176	0.170	0.005
25	0.831	5.314	4.425	0.005	0.289	0.266	526.176	0.170	0.005
50	0.831	5.314	4.425	0.005	0.289	0.266	526.176	0.170	0.005
120	0.404	3.740	3.718	0.005	0.256	0.235	470.000	0.152	0.004
175	0.254	3.234	2.347	0.005	0.121	0.111	471.850	0.153	0.004
250	0.204	1.171	2.094	0.005	0.070	0.064	473.223	0.153	0.004
500	0.195	1.330	1.796	0.005	0.064	0.059	472.929	0.153	0.004

750	0.166	1.463	1.387	0.005	0.054	0.050	473.464	0.153	0.004
1000	0.276	1.093	4.876	0.005	0.120	0.110	472.055	0.153	0.004
50	1.108	5.960	4.966	0.005	0.396	0.364	523.709	0.169	0.005
120	0.294	3.602	2.956	0.005	0.166	0.152	473.588	0.153	0.004
175	0.249	3.196	2.246	0.005	0.114	0.105	472.219	0.153	0.004
250	0.269	1.309	3.082	0.005	0.102	0.094	471.482	0.153	0.004
500	0.254	1.442	2.602	0.005	0.101	0.093	470.297	0.152	0.004
9999	0.073	0.972	2.318	0.005	0.020	0.018	472.055	0.153	0.004
25	1.208	5.302	4.602	0.005	0.370	0.340	526.515	0.170	0.005
50	1.208	5.302	4.602	0.005	0.370	0.340	526.515	0.170	0.005
120	0.420	3.563	4.026	0.005	0.285	0.263	469.774	0.152	0.004
175	0.256	3.016	2.695	0.005	0.130	0.120	472.555	0.153	0.004
250	0.166	1.024	2.484	0.005	0.070	0.064	472.477	0.153	0.004
500	0.164	0.988	2.053	0.005	0.074	0.068	465.591	0.151	0.004
25	0.587	4.211	3.882	0.005	0.200	0.184	520.397	0.168	0.005
50	0.587	4.211	3.882	0.005	0.200	0.184	520.397	0.168	0.005
120	0.355	3.554	3.451	0.005	0.219	0.202	473.221	0.153	0.004
175	0.229	3.032	2.315	0.005	0.114	0.105	470.650	0.152	0.004
250	0.211	1.209	2.582	0.005	0.092	0.085	472.151	0.153	0.004
15	0.661	3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.005
15	0.634	3.531	4.441	0.008	0.201	0.201	568.299	0.057	0.005
25	0.712	2.446	4.497	0.007	0.196	0.196	568.299	0.064	0.005
50	0.439	3.329	3.765	0.007	0.136	0.136	568.299	0.039	0.005
120	0.264	3.210	2.766	0.006	0.129	0.129	568.299	0.023	0.004
175	0.238	2.907	2.118	0.006	0.093	0.093	568.299	0.021	0.004

250	0.098	0.986	0.265	0.006	0.009	0.009	568.299	0.008	0.004
15	0.717	3.531	4.462	0.008	0.214	0.214	568.299	0.064	0.005
25	0.752	2.446	4.497	0.007	0.201	0.201	568.299	0.067	0.005
50	0.671	4.099	3.966	0.007	0.175	0.175	568.299	0.060	0.005
120	0.347	3.412	2.928	0.006	0.162	0.162	568.300	0.031	0.004
175	0.260	2.968	2.101	0.006	0.096	0.096	568.299	0.023	0.004
250	0.197	1.031	1.759	0.006	0.052	0.052	568.299	0.017	0.004
500	0.189	1.007	1.584	0.005	0.050	0.050	568.299	0.017	0.004
750	0.191	1.007	1.618	0.005	0.050	0.050	568.299	0.017	0.004
9999	0.233	1.074	3.409	0.005	0.072	0.072	568.300	0.021	0.004
15	0.848	4.597	4.351	0.005	0.294	0.270	525.791	0.170	0.005
25	0.848	4.597	4.351	0.005	0.294	0.270	525.791	0.170	0.005
50	0.848	4.597	4.351	0.005	0.294	0.270	525.791	0.170	0.005
120	0.353	3.507	3.589	0.005	0.219	0.202	473.901	0.153	0.004
175	0.193	2.926	2.117	0.005	0.097	0.090	471.980	0.153	0.004
250	0.197	1.228	2.493	0.005	0.081	0.075	473.470	0.153	0.004
500	0.221	1.950	2.589	0.005	0.100	0.092	479.329	0.155	0.004
50	0.969	4.657	4.411	0.005	0.304	0.280	525.384	0.170	0.005
120	0.175	3.252	2.285	0.005	0.089	0.082	473.110	0.153	0.004
175	0.130	2.845	1.617	0.005	0.060	0.055	471.758	0.153	0.004
250	0.115	0.984	1.612	0.005	0.037	0.034	472.547	0.153	0.004
500	0.092	0.946	1.302	0.005	0.028	0.026	465.744	0.151	0.004
175	0.691	3.848	6.790	0.005	0.386	0.356	472.975	0.153	0.004
250	0.601	2.317	6.296	0.005	0.306	0.281	474.798	0.154	0.004
500	0.492	4.041	5.081	0.005	0.232	0.214	478.987	0.155	0.004
750	0.458	2.604	6.123	0.005	0.218	0.201	473.046	0.153	0.004
1000	0.497	2.057	5.095	0.005	0.150	0.150	568.299	0.044	0.004
25	1.326	6.449	4.974	0.005	0.409	0.377	524.551	0.170	0.005
50	1.326	6.449	4.974	0.005	0.409	0.377	524.551	0.170	0.005
120	0.498	3.892	4.215	0.005	0.316	0.291	466.421	0.151	0.004
175	0.346	3.354	3.119	0.005	0.171	0.157	471.080	0.152	0.004

250	0.266	1.240	2.998	0.005	0.100	0.092	469.564	0.152	0.004
500	0.264	1.529	2.610	0.005	0.097	0.090	467.928	0.151	0.004
750	0.271	1.397	2.641	0.005	0.102	0.094	462.055	0.149	0.004
1000	0.294	1.206	4.975	0.005	0.128	0.118	471.258	0.152	0.004
120	0.704	4.218	6.659	0.005	0.512	0.471	483.713	0.156	0.004
175	0.432	3.456	4.341	0.005	0.232	0.213	478.654	0.155	0.004
250	0.391	1.884	4.367	0.005	0.189	0.174	469.126	0.152	0.004
500	0.299	2.255	3.445	0.005	0.134	0.123	472.464	0.153	0.004
750	0.250	1.658	2.887	0.005	0.105	0.097	471.786	0.153	0.004
15	0.661	3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.005
50	0.714	4.380	4.002	0.007	0.179	0.179	568.299	0.064	0.005
120	0.363	3.493	2.889	0.006	0.162	0.162	568.299	0.032	0.004
175	0.278	3.043	2.043	0.006	0.098	0.098	568.299	0.025	0.004
250	0.260	1.273	2.053	0.007	0.063	0.063	686.695	0.023	0.004
25	0.409	3.732	3.573	0.005	0.126	0.116	527.450	0.171	0.005
50	0.409	3.732	3.573	0.005	0.126	0.116	527.450	0.171	0.005
120	0.178	3.277	2.366	0.005	0.096	0.089	471.977	0.153	0.004
50	0.507	3.932	4.189	0.006	0.204	0.188	535.784	0.173	0.005
120	0.312	3.436	3.461	0.005	0.191	0.175	474.091	0.153	0.004
175	0.258	2.919	3.099	0.005	0.145	0.134	469.169	0.152	0.004
250	0.207	1.219	2.994	0.005	0.092	0.085	476.802	0.154	0.004
500	0.141	1.202	1.753	0.005	0.064	0.058	471.748	0.153	0.004
750	0.125	0.992	1.597	0.005	0.062	0.057	470.409	0.152	0.004
15	1.219	5.900	4.849	0.005	0.412	0.379	525.328	0.170	0.005
25	1.219	5.900	4.849	0.005	0.412	0.379	525.328	0.170	0.005
50	1.219	5.900	4.849	0.005	0.412	0.379	525.328	0.170	0.005
120	0.440	3.757	3.962	0.005	0.291	0.268	474.116	0.153	0.004
175	0.385	3.247	3.707	0.005	0.187	0.172	473.122	0.153	0.004
250	0.164	1.108	1.758	0.005	0.055	0.051	470.126	0.152	0.004
25	0.756	4.902	4.226	0.005	0.255	0.234	515.121	0.167	0.005

50	0.756	4.902	4.226	0.005	0.255	0.234	515.121	0.167	0.005
120	0.296	3.571	2.995	0.005	0.177	0.163	475.362	0.154	0.004
175	0.221	3.091	2.062	0.005	0.104	0.096	467.529	0.151	0.004
250	0.209	1.186	2.369	0.005	0.080	0.074	470.572	0.152	0.004
500	0.179	1.341	1.776	0.005	0.064	0.059	469.303	0.152	0.004
750	0.247	1.433	2.754	0.005	0.104	0.096	466.456	0.151	0.004
15	0.809	4.666	4.459	0.005	0.313	0.288	527.017	0.170	0.005
25	0.809	4.666	4.459	0.005	0.313	0.288	527.017	0.170	0.005
50	0.809	4.666	4.459	0.005	0.313	0.288	527.017	0.170	0.005
120	0.556	3.789	5.106	0.005	0.371	0.341	475.287	0.154	0.004
175	0.407	3.304	4.272	0.005	0.219	0.201	467.734	0.151	0.004
250	0.356	1.668	4.360	0.005	0.172	0.158	473.854	0.153	0.004
500	0.221	1.865	2.491	0.005	0.100	0.092	470.701	0.152	0.004
750	0.066	0.947	0.475	0.005	0.009	0.008	472.529	0.153	0.004
15	0.717	3.531	4.462	0.008	0.214	0.214	568.299	0.064	0.005
25	0.752	2.446	4.497	0.007	0.201	0.201	568.299	0.067	0.005
50	0.829	4.708	4.133	0.007	0.203	0.203	568.299	0.074	0.005
120	0.411	3.579	3.042	0.006	0.184	0.184	568.299	0.037	0.004
175	0.315	3.112	2.189	0.006	0.110	0.110	568.299	0.028	0.004
250	0.243	1.081	1.836	0.006	0.057	0.057	568.299	0.021	0.004
500	0.236	1.044	1.642	0.005	0.055	0.055	568.299	0.021	0.004
175	0.278	3.324	2.246	0.005	0.113	0.104	470.290	0.152	0.004
250	0.249	1.348	2.109	0.005	0.082	0.076	470.193	0.152	0.004
500	0.225	1.338	1.954	0.005	0.072	0.066	474.542	0.154	0.004
750	0.293	1.935	2.668	0.005	0.106	0.098	472.991	0.153	0.004
1000	0.256	1.252	4.158	0.005	0.099	0.091	471.055	0.152	0.004

2022

AvgHP

2022		g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr
Equipment	MaxHP	ROG	CO	NOX	SOX	PM10	PM2.5
Aerial Lifts	15	0.162	3.112	2.907	0.005	0.024	0.022
Aerial Lifts	25	0.162	3.112	2.907	0.005	0.024	0.022
Aerial Lifts	50	0.162	3.112	2.907	0.005	0.024	0.022
Aerial Lifts	120	0.105	3.176	1.627	0.005	0.030	0.028
Aerial Lifts	500	0.075	0.956	0.642	0.005	0.009	0.008
Aerial Lifts	750	0.177	0.998	1.424	0.005	0.044	0.044
Air Compressor s	15	0.707	3.519	4.408	0.008	0.203	0.203
Air Compressor s	25	0.739	2.426	4.470	0.007	0.193	0.193
Air Compressor s	50	0.814	4.959	4.093	0.007	0.183	0.183
Air Compressor s	120	0.413	3.662	2.844	0.006	0.165	0.165
Air Compressor s	175	0.322	3.194	1.959	0.006	0.101	0.101
Air Compressor s	250	0.255	1.102	1.617	0.006	0.052	0.052
Air Compressor s	500	0.249	1.059	1.472	0.005	0.051	0.051
Air Compressor s	750	0.250	1.059	1.502	0.005	0.051	0.051
Air Compressor s	1000	0.269	1.117	3.378	0.005	0.075	0.075
Bore/Drill Rigs	15	0.631	4.334	4.285	0.006	0.241	0.221
Bore/Drill Rigs	25	0.631	4.334	4.285	0.006	0.241	0.221
Bore/Drill Rigs	50	0.631	4.334	4.285	0.006	0.241	0.221
Bore/Drill Rigs	120	0.191	3.260	2.425	0.005	0.107	0.099
Bore/Drill Rigs	175	0.137	2.954	1.288	0.005	0.057	0.052
Bore/Drill Rigs	250	0.115	1.047	1.163	0.005	0.037	0.034
Bore/Drill Rigs	500	0.108	1.002	1.035	0.005	0.035	0.032
Bore/Drill Rigs	750	0.091	0.975	0.773	0.005	0.028	0.026
Bore/Drill Rigs	1000	0.057	0.945	2.278	0.005	0.018	0.017

Cement and Mortar Mixers	15	0.661	3.470	4.142	0.008	0.161	0.161
Cement and Mortar Mixers	25	0.704	2.367	4.399	0.007	0.175	0.175
Concrete/Industrial Saws	25	0.685	2.339	4.332	0.007	0.161	0.161
Concrete/Industrial Saws	50	0.660	4.422	3.936	0.007	0.158	0.158
Concrete/Industrial Saws	120	0.343	3.514	2.686	0.006	0.144	0.144
Concrete/Industrial Saws	175	0.267	3.072	1.806	0.006	0.089	0.089
Cranes	50	2.028	7.368	5.899	0.005	0.603	0.555
Cranes	120	0.578	3.972	5.149	0.005	0.346	0.318
Cranes	175	0.457	3.475	4.617	0.005	0.246	0.227
Cranes	250	0.316	1.602	3.541	0.005	0.147	0.135
Cranes	500	0.261	2.212	2.894	0.005	0.117	0.108
Cranes	750	0.200	1.283	2.251	0.005	0.089	0.082
Cranes	9999	0.201	1.015	2.386	0.005	0.062	0.057
Crawler Tractors	50	1.899	7.041	5.380	0.005	0.539	0.496
Crawler Tractors	120	0.600	3.925	5.101	0.005	0.408	0.375
Crawler Tractors	175	0.389	3.264	3.827	0.005	0.214	0.197
Crawler Tractors	250	0.306	1.440	3.737	0.005	0.141	0.130
Crawler Tractors	500	0.254	1.916	2.744	0.005	0.111	0.102
Crawler Tractors	750	0.198	1.186	2.126	0.005	0.079	0.073
Crawler Tractors	1000	0.357	1.732	5.923	0.005	0.162	0.149
Crushing/Proc. Equipment	50	0.795	5.081	4.083	0.007	0.172	0.172
Crushing/Proc. Equipment	120	0.410	3.704	2.758	0.006	0.154	0.154
Crushing/Proc. Equipment	175	0.323	3.237	1.861	0.006	0.095	0.095
Crushing/Proc. Equipment	250	0.260	1.114	1.521	0.006	0.050	0.050
Crushing/Proc. Equipment	500	0.255	1.067	1.389	0.005	0.048	0.048
Crushing/Proc. Equipment	750	0.256	1.067	1.416	0.005	0.048	0.048
Crushing/Proc. Equipment	9999	0.300	1.121	3.310	0.005	0.073	0.073

Dumpers/Tractors	25	0.685	2.339	4.332	0.007	0.162	0.162
Excavators	25	0.478	4.273	3.700	0.005	0.160	0.147
Excavators	50	0.478	4.273	3.700	0.005	0.160	0.147
Excavators	120	0.252	3.473	2.606	0.005	0.138	0.127
Excavators	175	0.191	3.074	1.678	0.005	0.081	0.075
Excavators	250	0.148	1.092	1.386	0.005	0.044	0.040
Excavators	500	0.128	1.061	1.040	0.005	0.035	0.032
Excavators	750	0.150	1.144	1.287	0.005	0.047	0.043
Forklifts	50	0.859	5.304	4.312	0.005	0.270	0.248
Forklifts	120	0.362	3.675	3.360	0.005	0.223	0.205
Forklifts	175	0.273	3.197	2.480	0.005	0.132	0.122
Forklifts	250	0.236	1.317	2.319	0.005	0.090	0.083
Forklifts	500	0.232	1.219	1.991	0.005	0.077	0.071
Generator Sets	15	0.626	3.519	4.390	0.008	0.193	0.193
Generator Sets	25	0.706	2.426	4.470	0.007	0.188	0.188
Generator Sets	50	0.560	3.858	3.796	0.007	0.143	0.143
Generator Sets	120	0.301	3.353	2.671	0.006	0.134	0.134
Generator Sets	175	0.226	2.926	1.830	0.006	0.081	0.081
Generator Sets	250	0.173	1.010	1.508	0.006	0.043	0.043
Generator Sets	500	0.166	0.990	1.384	0.005	0.042	0.042
Generator Sets	750	0.168	0.990	1.412	0.005	0.043	0.043
Generator Sets	9999	0.206	1.045	3.202	0.005	0.063	0.063
Graders	50	2.106	7.428	5.332	0.005	0.595	0.547
Graders	120	0.796	4.330	6.360	0.005	0.493	0.453
Graders	175	0.440	3.493	4.125	0.005	0.229	0.211
Graders	250	0.307	1.273	3.888	0.005	0.124	0.114
Graders	500	0.311	1.390	2.802	0.005	0.108	0.100
Graders	750	0.289	1.187	1.606	0.005	0.057	0.057
Off-Highway Tractors	120	0.348	3.710	3.400	0.005	0.219	0.202
Off-Highway Tractors	175	0.231	3.186	2.239	0.005	0.107	0.099
Off-Highway Tractors	250	0.180	1.143	1.732	0.005	0.060	0.055
Off-Highway Tractors	750	0.171	1.121	1.433	0.005	0.055	0.050
Off-Highway Tractors	1000	0.170	1.044	2.432	0.005	0.066	0.060
Off-Highway Trucks	175	0.241	3.284	1.811	0.005	0.088	0.081
Off-Highway Trucks	250	0.215	1.279	1.618	0.005	0.064	0.059

Off-Highway Trucks	500	0.196	1.247	1.490	0.005	0.054	0.050
Off-Highway Trucks	750	0.263	1.746	2.268	0.005	0.088	0.081
Off-Highway Trucks	1000	0.234	1.214	3.842	0.005	0.086	0.079
Other Construction Equipment	15	0.920	5.167	4.741	0.005	0.348	0.320
Other Construction Equipment	25	0.920	5.167	4.741	0.005	0.348	0.320
Other Construction Equipment	50	0.920	5.167	4.741	0.005	0.348	0.320
Other Construction Equipment	120	0.440	3.666	4.098	0.005	0.288	0.265
Other Construction Equipment	175	0.295	3.155	2.994	0.005	0.156	0.144
Other Construction Equipment	500	0.188	1.438	1.975	0.005	0.074	0.068
Other General Industrial Equipment	15	0.702	5.076	4.197	0.005	0.238	0.219
Other General Industrial Equipment	25	0.702	5.076	4.197	0.005	0.238	0.219
Other General Industrial Equipment	50	0.702	5.076	4.197	0.005	0.238	0.219
Other General Industrial Equipment	120	0.339	3.668	3.200	0.005	0.199	0.183
Other General Industrial Equipment	175	0.244	3.233	2.150	0.005	0.111	0.102
Other General Industrial Equipment	250	0.187	1.138	1.759	0.005	0.057	0.052
Other General Industrial Equipment	500	0.175	1.171	1.433	0.005	0.050	0.046

Other General Industrial Equipment	750	0.149	1.457	1.062	0.005	0.046	0.042
Other General Industrial Equipment	1000	0.187	1.039	3.942	0.005	0.079	0.073
Other Material Handling Equipment	50	1.103	5.984	4.920	0.005	0.385	0.354
Other Material Handling Equipment	120	0.247	3.557	2.567	0.005	0.121	0.111
Other Material Handling Equipment	175	0.226	3.176	1.894	0.005	0.103	0.095
Other Material Handling Equipment	250	0.229	1.239	2.425	0.005	0.083	0.076
Other Material Handling Equipment	500	0.226	1.346	2.063	0.005	0.083	0.077
Other Material Handling Equipment	9999	0.076	0.978	2.328	0.005	0.020	0.018
Pavers	25	1.092	5.114	4.421	0.005	0.330	0.303
Pavers	50	1.092	5.114	4.421	0.005	0.330	0.303
Pavers	120	0.373	3.525	3.659	0.005	0.248	0.228
Pavers	175	0.215	2.995	2.180	0.005	0.104	0.095
Pavers	250	0.140	1.012	1.900	0.005	0.055	0.050
Pavers	500	0.150	0.982	1.810	0.005	0.063	0.058
Paving Equipment	25	0.572	4.244	3.836	0.005	0.188	0.173
Paving Equipment	50	0.572	4.244	3.836	0.005	0.188	0.173
Paving Equipment	120	0.296	3.501	3.000	0.005	0.171	0.157
Paving Equipment	175	0.213	3.038	2.073	0.005	0.101	0.093
Paving Equipment	250	0.196	1.204	2.228	0.005	0.083	0.076
Plate Compactors	15	0.661	3.469	4.142	0.008	0.161	0.161
Pressure Washers	15	0.626	3.519	4.390	0.008	0.193	0.193
Pressure Washers	25	0.706	2.426	4.470	0.007	0.188	0.188
Pressure Washers	50	0.398	3.291	3.649	0.007	0.117	0.117
Pressure Washers	120	0.241	3.202	2.560	0.006	0.112	0.112
Pressure Washers	175	0.221	2.907	1.871	0.006	0.082	0.082

Pressure Washers	250	0.098	0.986	0.265	0.006	0.009	0.009
Pumps	15	0.707	3.519	4.408	0.008	0.203	0.203
Pumps	25	0.739	2.426	4.470	0.007	0.193	0.193
Pumps	50	0.614	4.048	3.846	0.007	0.152	0.152
Pumps	120	0.321	3.404	2.708	0.006	0.142	0.142
Pumps	175	0.242	2.969	1.860	0.006	0.085	0.085
Pumps	250	0.186	1.025	1.534	0.006	0.045	0.045
Pumps	500	0.180	1.001	1.404	0.005	0.044	0.044
Pumps	750	0.181	1.001	1.432	0.005	0.044	0.044
Pumps	9999	0.219	1.058	3.236	0.005	0.065	0.065
Rollers	15	0.738	4.402	4.128	0.005	0.250	0.230
Rollers	25	0.738	4.402	4.128	0.005	0.250	0.230
Rollers	50	0.738	4.402	4.128	0.005	0.250	0.230
Rollers	120	0.310	3.470	3.219	0.005	0.186	0.171
Rollers	175	0.164	2.913	1.714	0.005	0.079	0.072
Rollers	250	0.187	1.228	2.212	0.005	0.077	0.071
Rollers	500	0.218	1.955	2.463	0.005	0.097	0.089
Rough Terrain Forklifts	50	0.789	4.304	4.041	0.005	0.238	0.219
Rough Terrain Forklifts	120	0.159	3.244	2.098	0.005	0.073	0.067
Rough Terrain Forklifts	175	0.120	2.844	1.405	0.005	0.051	0.047
Rough Terrain Forklifts	250	0.119	0.989	1.617	0.005	0.037	0.034
Rough Terrain Forklifts	500	0.068	0.937	0.558	0.005	0.009	0.008
Rubber Tired Dozers	175	0.600	3.752	5.808	0.005	0.326	0.300
Rubber Tired Dozers	250	0.480	2.056	5.046	0.005	0.240	0.220
Rubber Tired Dozers	500	0.475	3.895	4.808	0.005	0.220	0.202
Rubber Tired Dozers	750	0.460	2.607	6.122	0.005	0.218	0.201
Rubber Tired Dozers	1000	0.475	1.961	4.896	0.005	0.140	0.140
Rubber Tired Loaders	25	1.179	6.204	4.748	0.005	0.354	0.326
Rubber Tired Loaders	50	1.179	6.204	4.748	0.005	0.354	0.326
Rubber Tired Loaders	120	0.440	3.839	3.768	0.005	0.267	0.245
Rubber Tired Loaders	175	0.295	3.302	2.518	0.005	0.136	0.125

Rubber Tired Loaders	250	0.226	1.188	2.347	0.005	0.079	0.072
Rubber Tired Loaders	500	0.237	1.441	2.175	0.005	0.081	0.075
Rubber Tired Loaders	750	0.233	1.315	2.097	0.005	0.080	0.074
Rubber Tired Loaders	1000	0.193	1.162	3.617	0.005	0.075	0.069
Scrapers	120	0.681	4.205	6.455	0.005	0.494	0.454
Scrapers	175	0.390	3.417	3.833	0.005	0.204	0.187
Scrapers	250	0.341	1.743	3.669	0.005	0.160	0.147
Scrapers	500	0.264	2.052	2.879	0.005	0.112	0.103
Scrapers	750	0.224	1.508	2.475	0.005	0.090	0.083
Signal Boards	15	0.661	3.469	4.142	0.008	0.161	0.161
Signal Boards	50	0.655	4.325	3.880	0.007	0.154	0.154
Signal Boards	120	0.337	3.484	2.668	0.006	0.141	0.141
Signal Boards	175	0.260	3.044	1.801	0.006	0.086	0.086
Signal Boards	250	0.247	1.266	1.782	0.007	0.055	0.055
Skid Steer Loaders	25	0.365	3.656	3.433	0.005	0.103	0.095
Skid Steer Loaders	50	0.365	3.656	3.433	0.005	0.103	0.095
Skid Steer Loaders	120	0.164	3.270	2.189	0.005	0.081	0.075
Surfacing Equipment	50	0.428	3.772	3.911	0.006	0.154	0.142
Surfacing Equipment	120	0.293	3.409	3.250	0.005	0.175	0.161
Surfacing Equipment	175	0.239	2.910	2.701	0.005	0.130	0.120
Surfacing Equipment	250	0.196	1.217	2.667	0.005	0.085	0.078
Surfacing Equipment	500	0.132	1.160	1.557	0.005	0.057	0.053
Surfacing Equipment	750	0.115	0.988	1.355	0.005	0.052	0.048
Sweepers/Scrubbers	15	1.008	5.451	4.490	0.005	0.335	0.308
Sweepers/Scrubbers	25	1.008	5.451	4.490	0.005	0.335	0.308
Sweepers/Scrubbers	50	1.008	5.451	4.490	0.005	0.335	0.308
Sweepers/Scrubbers	120	0.372	3.692	3.472	0.005	0.232	0.214
Sweepers/Scrubbers	175	0.321	3.222	3.002	0.005	0.145	0.133
Sweepers/Scrubbers	250	0.152	1.101	1.605	0.005	0.050	0.046
Tractors/Loaders/Backhoes	25	0.688	4.760	4.030	0.005	0.218	0.200

Tractors/Loaders/Backhoes	50	0.688	4.760	4.030	0.005	0.218	0.200
Tractors/Loaders/Backhoes	120	0.260	3.536	2.647	0.005	0.142	0.131
Tractors/Loaders/Backhoes	175	0.200	3.079	1.753	0.005	0.089	0.082
Tractors/Loaders/Backhoes	250	0.187	1.162	1.943	0.005	0.067	0.062
Tractors/Loaders/Backhoes	500	0.160	1.280	1.437	0.005	0.053	0.049
Tractors/Loaders/Backhoes	750	0.232	1.353	2.453	0.005	0.094	0.087
Trenchers	15	0.722	4.518	4.269	0.005	0.275	0.253
Trenchers	25	0.722	4.518	4.269	0.005	0.275	0.253
Trenchers	50	0.722	4.518	4.269	0.005	0.275	0.253
Trenchers	120	0.529	3.778	4.913	0.005	0.348	0.320
Trenchers	175	0.396	3.313	4.103	0.005	0.212	0.195
Trenchers	250	0.335	1.663	3.853	0.005	0.161	0.148
Trenchers	500	0.212	1.872	2.212	0.005	0.094	0.086
Trenchers	750	0.057	0.945	0.301	0.005	0.009	0.008
Welders	15	0.707	3.519	4.408	0.008	0.203	0.203
Welders	25	0.739	2.426	4.470	0.007	0.193	0.193
Welders	50	0.758	4.645	4.007	0.007	0.175	0.175
Welders	120	0.382	3.570	2.808	0.006	0.160	0.160
Welders	175	0.295	3.113	1.935	0.006	0.097	0.097
Welders	250	0.231	1.074	1.598	0.006	0.050	0.050
Welders	500	0.225	1.038	1.454	0.005	0.049	0.049
Water Trucks	175	0.241	3.284	1.811	0.005	0.088	0.081
Water Trucks	250	0.215	1.279	1.618	0.005	0.064	0.059
Water Trucks	500	0.196	1.247	1.490	0.005	0.054	0.050
Water Trucks	750	0.263	1.746	2.268	0.005	0.088	0.081
Water Trucks	1000	0.234	1.214	3.842	0.005	0.086	0.079

2023

g/hp/hr	g/hp/hr	g/hp/hr
CO2	CH4	N2O
525.074	0.170	0.005
525.074	0.170	0.005
525.074	0.170	0.005
472.114	0.153	0.004
472.055	0.153	0.004
568.299	0.016	0.004
568.299	0.063	0.005
568.299	0.066	0.005
568.299	0.073	0.005
568.299	0.037	0.004
568.299	0.029	0.004
568.300	0.023	0.004
568.299	0.022	0.004
568.299	0.022	0.004
568.300	0.024	0.004
529.870	0.171	0.005
529.870	0.171	0.005
529.870	0.171	0.005
462.267	0.150	0.004
477.372	0.154	0.004
468.760	0.152	0.004
467.192	0.151	0.004
477.141	0.154	0.004
472.921	0.153	0.004

2023		g/hp/hr	g/hp/hr	g/hp/hr
Equipment	MaxHP	ROG	CO	NOX
Aerial Lifts	15	0.163	3.122	2.897
Aerial Lifts	25	0.163	3.122	2.897
Aerial Lifts	50	0.163	3.122	2.897
Aerial Lifts	120	0.101	3.170	1.548
Aerial Lifts	500	0.079	0.961	0.645
Aerial Lifts	750	0.169	0.995	1.265
Air Compressor s	15	0.698	3.508	4.359
Air Compressor s	25	0.728	2.407	4.447
Air Compressor s	50	0.753	4.913	3.975
Air Compressor s	120	0.387	3.657	2.631
Air Compressor s	175	0.303	3.197	1.748
Air Compressor s	250	0.243	1.099	1.420
Air Compressor s	500	0.238	1.055	1.305
Air Compressor s	750	0.239	1.055	1.331
Air Compressor s	1000	0.256	1.102	3.221
Bore/Drill Rigs	15	0.606	4.311	4.208
Bore/Drill Rigs	25	0.606	4.311	4.208
Bore/Drill Rigs	50	0.606	4.311	4.208
Bore/Drill Rigs	120	0.187	3.258	2.357
Bore/Drill Rigs	175	0.125	2.969	1.078
Bore/Drill Rigs	250	0.110	1.043	1.047
Bore/Drill Rigs	500	0.101	0.989	0.898
Bore/Drill Rigs	750	0.091	0.982	0.717
Bore/Drill Rigs	1000	0.053	0.936	2.262

568.299	0.059	0.005
568.299	0.063	0.005
568.299	0.061	0.005
568.300	0.059	0.005
568.299	0.031	0.004
568.300	0.024	0.004
517.872	0.168	0.005
469.993	0.152	0.004
474.589	0.154	0.004
472.983	0.153	0.004
472.181	0.153	0.004
470.476	0.152	0.004
472.055	0.153	0.004
516.148	0.167	0.005
476.022	0.154	0.004
471.567	0.153	0.004
472.098	0.153	0.004
474.412	0.153	0.004
472.876	0.153	0.004
470.701	0.152	0.004
568.299	0.071	0.005
568.299	0.037	0.004
568.299	0.029	0.004
568.299	0.023	0.004
568.299	0.023	0.004
568.299	0.023	0.004
568.299	0.027	0.004

Cement and Mortar Mixers	15	0.661	3.469	4.142
Cement and Mortar Mixers	25	0.697	2.356	4.382
Concrete/Industrial Saws	25	0.685	2.340	4.332
Concrete/Industrial Saws	50	0.606	4.372	3.815
Concrete/Industrial Saws	120	0.320	3.507	2.478
Concrete/Industrial Saws	175	0.250	3.072	1.599
Cranes	50	2.047	7.453	5.923
Cranes	120	0.552	3.944	4.875
Cranes	175	0.423	3.443	4.222
Cranes	250	0.297	1.553	3.229
Cranes	500	0.236	2.010	2.511
Cranes	750	0.195	1.282	2.073
Cranes	9999	0.211	1.023	2.399
Crawler Tractors	50	1.873	7.027	5.325
Crawler Tractors	120	0.558	3.889	4.762
Crawler Tractors	175	0.347	3.235	3.330
Crawler Tractors	250	0.276	1.395	3.187
Crawler Tractors	500	0.241	1.852	2.476
Crawler Tractors	750	0.184	1.159	1.867
Crawler Tractors	1000	0.268	1.610	4.770
Crushing/Proc. Equipment	50	0.739	5.039	3.962
Crushing/Proc. Equipment	120	0.385	3.700	2.552
Crushing/Proc. Equipment	175	0.304	3.240	1.654
Crushing/Proc. Equipment	250	0.248	1.111	1.330
Crushing/Proc. Equipment	500	0.244	1.064	1.227
Crushing/Proc. Equipment	750	0.244	1.065	1.251
Crushing/Proc. Equipment	9999	0.287	1.107	3.160

568.299	0.061	0.005
525.447	0.170	0.005
525.447	0.170	0.005
467.626	0.151	0.004
472.192	0.153	0.004
472.041	0.153	0.004
469.711	0.152	0.004
469.289	0.152	0.004
525.483	0.170	0.005
471.529	0.153	0.004
472.106	0.153	0.004
473.326	0.153	0.004
473.615	0.153	0.004
568.299	0.056	0.005
568.299	0.063	0.005
568.299	0.050	0.005
568.299	0.027	0.004
568.299	0.020	0.004
568.299	0.015	0.004
568.299	0.015	0.004
568.299	0.015	0.004
568.299	0.018	0.004
493.025	0.160	0.005
469.630	0.152	0.004
478.566	0.155	0.004
474.239	0.153	0.004
471.928	0.153	0.004
568.299	0.026	0.004
475.234	0.154	0.004
472.811	0.153	0.004
471.131	0.152	0.004
471.939	0.153	0.004
472.055	0.153	0.004
470.181	0.152	0.004
469.615	0.152	0.004

Dumpers/Trucks	25	0.685	2.339	4.332
Excavators	25	0.450	4.234	3.594
Excavators	50	0.450	4.234	3.594
Excavators	120	0.230	3.454	2.381
Excavators	175	0.178	3.076	1.462
Excavators	250	0.142	1.090	1.209
Excavators	500	0.122	1.051	0.893
Excavators	750	0.144	1.132	1.159
Forklifts	50	0.766	5.166	4.152
Forklifts	120	0.327	3.647	3.057
Forklifts	175	0.244	3.180	2.112
Forklifts	250	0.204	1.235	1.807
Forklifts	500	0.220	1.216	1.788
Generator Sets	15	0.618	3.508	4.345
Generator Sets	25	0.701	2.407	4.447
Generator Sets	50	0.514	3.819	3.685
Generator Sets	120	0.279	3.347	2.477
Generator Sets	175	0.211	2.927	1.635
Generator Sets	250	0.164	1.006	1.328
Generator Sets	500	0.158	0.986	1.228
Generator Sets	750	0.160	0.986	1.253
Generator Sets	9999	0.194	1.031	3.058
Graders	50	1.947	7.191	5.148
Graders	120	0.719	4.228	5.740
Graders	175	0.390	3.450	3.548
Graders	250	0.284	1.252	3.441
Graders	500	0.309	1.385	2.705
Graders	750	0.276	1.170	1.425
Off-Highway Tractors	120	0.316	3.687	3.095
Off-Highway Tractors	175	0.201	3.143	1.785
Off-Highway Tractors	250	0.171	1.138	1.491
Off-Highway Tractors	750	0.168	1.124	1.289
Off-Highway Tractors	1000	0.180	1.055	2.449
Off-Highway Trucks	175	0.236	3.304	1.683
Off-Highway Trucks	250	0.207	1.273	1.456

474.714	0.154	0.004
473.977	0.153	0.004
472.344	0.153	0.004
529.183	0.171	0.005
529.183	0.171	0.005
529.183	0.171	0.005
472.318	0.153	0.004
469.613	0.152	0.004
475.998	0.154	0.004
526.176	0.170	0.005
526.176	0.170	0.005
526.176	0.170	0.005
470.000	0.152	0.004
471.850	0.153	0.004
473.223	0.153	0.004
472.929	0.153	0.004

Off-Highway Trucks	500	0.187	1.221	1.324
Off-Highway Trucks	750	0.263	1.719	2.182
Off-Highway Trucks	1000	0.214	1.194	3.544
Other Construction Equipment	15	0.866	5.074	4.594
Other Construction Equipment	25	0.866	5.074	4.594
Other Construction Equipment	50	0.866	5.074	4.594
Other Construction Equipment	120	0.406	3.632	3.790
Other Construction Equipment	175	0.274	3.142	2.698
Other Construction Equipment	500	0.180	1.396	1.812
Other General Industrial Equipment	15	0.603	4.883	3.993
Other General Industrial Equipment	25	0.603	4.883	3.993
Other General Industrial Equipment	50	0.603	4.883	3.993
Other General Industrial Equipment	120	0.308	3.647	2.924
Other General Industrial Equipment	175	0.201	3.175	1.609
Other General Industrial Equipment	250	0.181	1.140	1.530
Other General Industrial Equipment	500	0.164	1.121	1.256

473.464	0.153	0.004
472.055	0.153	0.004
523.709	0.169	0.005
473.588	0.153	0.004
472.219	0.153	0.004
471.482	0.153	0.004
470.297	0.152	0.004
472.055	0.153	0.004
526.896	0.170	0.005
526.896	0.170	0.005
470.185	0.152	0.004
472.760	0.153	0.004
472.372	0.153	0.004
466.004	0.151	0.004
520.659	0.168	0.005
520.659	0.168	0.005
473.448	0.153	0.004
470.665	0.152	0.004
472.169	0.153	0.004
568.299	0.059	0.005
568.299	0.056	0.005
568.299	0.063	0.005
568.300	0.035	0.005
568.299	0.021	0.004
568.299	0.019	0.004

Other General Industrial Equipment	750	0.111	1.105	0.626
Other General Industrial Equipment	1000	0.193	1.049	3.956
Other Material Handling Equipment	50	1.011	5.757	4.684
Other Material Handling Equipment	120	0.225	3.515	2.298
Other Material Handling Equipment	175	0.217	3.171	1.769
Other Material Handling Equipment	250	0.207	1.209	2.004
Other Material Handling Equipment	500	0.218	1.344	1.870
Other Material Handling Equipment	9999	0.054	0.939	2.268
Pavers	25	1.007	5.007	4.285
Pavers	50	1.007	5.007	4.285
Pavers	120	0.349	3.507	3.427
Pavers	175	0.199	2.994	1.955
Pavers	250	0.130	1.010	1.611
Pavers	500	0.152	0.987	1.771
Paving Equipment	25	0.541	4.241	3.774
Paving Equipment	50	0.541	4.241	3.774
Paving Equipment	120	0.278	3.503	2.837
Paving Equipment	175	0.204	3.051	1.913
Paving Equipment	250	0.175	1.165	1.885
Plate Compactors	15	0.661	3.469	4.142
Pressure Washers	15	0.618	3.508	4.345
Pressure Washers	25	0.701	2.407	4.447
Pressure Washers	50	0.363	3.260	3.541
Pressure Washers	120	0.222	3.196	2.377
Pressure Washers	175	0.205	2.907	1.665

568.299	0.008	0.004
568.299	0.063	0.005
568.299	0.066	0.005
568.299	0.055	0.005
568.299	0.029	0.004
568.299	0.021	0.004
568.299	0.016	0.004
568.300	0.016	0.004
568.300	0.016	0.004
568.299	0.019	0.004
525.691	0.170	0.005
525.691	0.170	0.005
525.691	0.170	0.005
473.929	0.153	0.004
471.948	0.153	0.004
473.514	0.153	0.004
478.982	0.155	0.004
525.015	0.170	0.005
473.089	0.153	0.004
471.677	0.153	0.004
472.541	0.153	0.004
466.560	0.151	0.004
473.912	0.153	0.004
474.617	0.154	0.004
479.311	0.155	0.004
473.035	0.153	0.004
568.299	0.042	0.004
524.791	0.170	0.005
524.791	0.170	0.005
466.494	0.151	0.004
470.927	0.152	0.004

Pressure Washers	250	0.098	0.986	0.265
Pumps	15	0.698	3.508	4.359
Pumps	25	0.728	2.407	4.447
Pumps	50	0.565	4.007	3.734
Pumps	120	0.299	3.398	2.511
Pumps	175	0.227	2.971	1.662
Pumps	250	0.177	1.021	1.351
Pumps	500	0.171	0.998	1.246
Pumps	750	0.173	0.998	1.271
Pumps	9999	0.207	1.043	3.090
Rollers	15	0.661	4.252	3.921
Rollers	25	0.661	4.252	3.921
Rollers	50	0.661	4.252	3.921
Rollers	120	0.287	3.455	3.003
Rollers	175	0.150	2.909	1.483
Rollers	250	0.188	1.234	2.173
Rollers	500	0.211	1.956	2.290
Rough Terrain Forklifts				
	50	0.690	4.125	3.853
Rough Terrain Forklifts				
	120	0.150	3.242	1.984
Rough Terrain Forklifts				
	175	0.111	2.843	1.218
Rough Terrain Forklifts				
	250	0.116	0.990	1.474
Rough Terrain Forklifts				
	500	0.069	0.938	0.558
Rubber Tired Dozers	175	0.588	3.766	5.656
Rubber Tired Dozers	250	0.393	1.783	4.090
Rubber Tired Dozers	500	0.447	3.686	4.408
Rubber Tired Dozers	750	0.423	2.591	5.334
Rubber Tired Dozers	1000	0.453	1.874	4.709
Rubber Tired Loaders	25	1.049	5.972	4.521
Rubber Tired Loaders	50	1.049	5.972	4.521
Rubber Tired Loaders	120	0.412	3.827	3.512
Rubber Tired Loaders	175	0.269	3.292	2.196

469.904	0.152	0.004
468.129	0.151	0.004
463.819	0.150	0.004
472.858	0.153	0.004
483.448	0.156	0.004
478.741	0.155	0.004
469.269	0.152	0.004
473.230	0.153	0.004
471.279	0.152	0.004
568.300	0.059	0.005
568.299	0.059	0.005
568.299	0.030	0.004
568.299	0.023	0.004
686.695	0.022	0.004
527.273	0.171	0.005
527.273	0.171	0.005
472.432	0.153	0.004
535.836	0.173	0.005
473.636	0.153	0.004
469.126	0.152	0.004
476.951	0.154	0.004
470.525	0.152	0.004
470.400	0.152	0.004
525.328	0.170	0.005
525.328	0.170	0.005
525.328	0.170	0.005
474.116	0.153	0.004
473.122	0.153	0.004
470.126	0.152	0.004
514.461	0.166	0.005

Rubber Tired Loaders	250	0.210	1.171	2.060
Rubber Tired Loaders	500	0.217	1.384	1.866
Rubber Tired Loaders	750	0.227	1.323	1.927
Rubber Tired Loaders	1000	0.193	1.174	3.528
Scrapers	120	0.630	4.144	6.026
Scrapers	175	0.361	3.395	3.479
Scrapers	250	0.317	1.678	3.284
Scrapers	500	0.253	1.975	2.666
Scrapers	750	0.222	1.513	2.386
Signal Boards	15	0.661	3.469	4.142
Signal Boards	50	0.603	4.282	3.767
Signal Boards	120	0.315	3.478	2.472
Signal Boards	175	0.244	3.045	1.602
Signal Boards	250	0.235	1.263	1.562
Skid Steer Loaders	25	0.353	3.654	3.371
Skid Steer Loaders	50	0.353	3.654	3.371
Skid Steer Loaders	120	0.153	3.266	2.039
Surfacing Equipment	50	0.437	3.832	3.924
Surfacing Equipment	120	0.270	3.396	3.058
Surfacing Equipment	175	0.224	2.914	2.455
Surfacing Equipment	250	0.192	1.219	2.502
Surfacing Equipment	500	0.132	1.163	1.476
Surfacing Equipment	750	0.100	0.985	1.081
Sweepers/Scrubbers	15	0.759	4.971	4.127
Sweepers/Scrubbers	25	0.759	4.971	4.127
Sweepers/Scrubbers	50	0.759	4.971	4.127
Sweepers/Scrubbers	120	0.351	3.695	3.285
Sweepers/Scrubbers	175	0.292	3.223	2.609
Sweepers/Scrubbers	250	0.159	1.114	1.610
Tractors/Loaders/Backhoes	25	0.621	4.629	3.857

514.461	0.166	0.005
475.898	0.154	0.004
467.800	0.151	0.004
470.124	0.152	0.004
469.256	0.152	0.004
466.633	0.151	0.004
527.026	0.171	0.005
527.026	0.171	0.005
527.026	0.171	0.005
475.326	0.154	0.004
467.734	0.151	0.004
473.851	0.153	0.004
470.585	0.152	0.004
474.289	0.153	0.004
568.300	0.063	0.005
568.299	0.066	0.005
568.299	0.068	0.005
568.299	0.034	0.004
568.300	0.026	0.004
568.299	0.020	0.004
568.300	0.020	0.004
470.181	0.152	0.004
469.615	0.152	0.004
474.714	0.154	0.004
473.977	0.153	0.004
472.344	0.153	0.004

Tractors/Loaders/Backhoes	50	0.621	4.629	3.857
Tractors/Loaders/Backhoes	120	0.239	3.525	2.426
Tractors/Loaders/Backhoes	175	0.184	3.078	1.521
Tractors/Loaders/Backhoes	250	0.169	1.148	1.588
Tractors/Loaders/Backhoes	500	0.152	1.279	1.247
Tractors/Loaders/Backhoes	750	0.234	1.361	2.419
Trenchers	15	0.642	4.302	3.959
Trenchers	25	0.642	4.302	3.959
Trenchers	50	0.642	4.302	3.959
Trenchers	120	0.504	3.768	4.700
Trenchers	175	0.359	3.291	3.657
Trenchers	250	0.328	1.639	3.737
Trenchers	500	0.199	1.723	2.005
Trenchers	750	0.060	0.951	0.303
Welders	15	0.698	3.508	4.359
Welders	25	0.728	2.407	4.447
Welders	50	0.697	4.596	3.891
Welders	120	0.357	3.564	2.599
Welders	175	0.277	3.115	1.726
Welders	250	0.2	1.071	1.404
Welders	500	0.215	1.034	1.289
Water Trucks	175	0.236	3.304	1.683
Water Trucks	250	0.207	1.273	1.456
Water Trucks	500	0.187	1.221	1.324
Water Trucks	750	0.263	1.719	2.182
Water Trucks	1000	0.214	1.194	3.544

2024

g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr
SOX	PM10	PM2.5	CO2	CH4	N2O
0.005	0.023	0.021	525.074	0.170	0.005
0.005	0.023	0.021	525.074	0.170	0.005
0.005	0.023	0.021	525.074	0.170	0.005
0.005	0.027	0.025	472.114	0.153	0.004
0.005	0.009	0.009	472.055	0.153	0.004
0.005	0.038	0.038	568.299	0.015	0.004
0.008	0.194	0.194	568.299	0.063	0.005
0.007	0.186	0.186	568.299	0.065	0.005
0.007	0.156	0.156	568.299	0.067	0.005
0.006	0.143	0.143	568.299	0.034	0.004
0.006	0.089	0.089	568.299	0.027	0.004
0.006	0.045	0.045	568.299	0.021	0.004
0.005	0.044	0.044	568.299	0.021	0.004
0.005	0.044	0.044	568.299	0.021	0.004
0.005	0.068	0.068	568.299	0.023	0.004
0.006	0.226	0.208	531.986	0.172	0.005
0.006	0.226	0.208	531.986	0.172	0.005
0.006	0.226	0.208	531.986	0.172	0.005
0.005	0.102	0.093	461.214	0.149	0.004
0.005	0.048	0.044	479.647	0.155	0.004
0.005	0.034	0.031	469.706	0.152	0.004
0.005	0.030	0.028	464.041	0.150	0.004
0.005	0.026	0.024	479.220	0.155	0.004
0.005	0.018	0.016	472.020	0.153	0.004

2024	
Equipment	MaxHP
Aerial Lifts	15
Aerial Lifts	25
Aerial Lifts	50
Aerial Lifts	120
Aerial Lifts	500
Aerial Lifts	750
Air Compressor s	15
Air Compressor s	25
Air Compressor s	50
Air Compressor s	120
Air Compressor s	175
Air Compressor s	250
Air Compressor s	500
Air Compressor s	750
Air Compressor s	1000
Bore/Drill Rigs	15
Bore/Drill Rigs	25
Bore/Drill Rigs	50
Bore/Drill Rigs	120
Bore/Drill Rigs	175
Bore/Drill Rigs	250
Bore/Drill Rigs	500
Bore/Drill Rigs	750
Bore/Drill Rigs	1000

0.008	0.161	0.161	568.299	0.059	0.005
0.007	0.172	0.172	568.299	0.062	0.005
0.007	0.161	0.161	568.299	0.061	0.005
0.007	0.134	0.134	568.299	0.054	0.005
0.006	0.123	0.123	568.300	0.028	0.004
0.006	0.077	0.077	568.299	0.022	0.004
0.005	0.608	0.559	517.872	0.168	0.005
0.005	0.323	0.297	469.889	0.152	0.004
0.005	0.224	0.206	474.595	0.154	0.004
0.005	0.135	0.124	472.974	0.153	0.004
0.005	0.102	0.093	472.294	0.153	0.004
0.005	0.084	0.077	470.251	0.152	0.004
0.005	0.063	0.058	472.055	0.153	0.004
0.005	0.526	0.484	516.159	0.167	0.005
0.005	0.373	0.343	476.158	0.154	0.004
0.005	0.185	0.170	471.781	0.153	0.004
0.005	0.124	0.114	471.624	0.153	0.004
0.005	0.102	0.094	474.613	0.154	0.004
0.005	0.069	0.064	472.530	0.153	0.004
0.005	0.118	0.109	473.666	0.153	0.004
0.007	0.146	0.146	568.299	0.066	0.005
0.006	0.132	0.132	568.299	0.034	0.004
0.006	0.083	0.083	568.299	0.027	0.004
0.006	0.043	0.043	568.299	0.022	0.004
0.005	0.042	0.042	568.299	0.022	0.004
0.005	0.042	0.042	568.300	0.022	0.004
0.005	0.066	0.066	568.299	0.025	0.004

Cement and Mortar Mixers	15
Cement and Mortar Mixers	25
Concrete/Industrial Saws	25
Concrete/Industrial Saws	50
Concrete/Industrial Saws	120
Concrete/Industrial Saws	175
Cranes	50
Cranes	120
Cranes	175
Cranes	250
Cranes	500
Cranes	750
Cranes	9999
Crawler Tractors	50
Crawler Tractors	120
Crawler Tractors	175
Crawler Tractors	250
Crawler Tractors	500
Crawler Tractors	750
Crawler Tractors	1000
Crushing/Proc. Equipment	50
Crushing/Proc. Equipment	120
Crushing/Proc. Equipment	175
Crushing/Proc. Equipment	250
Crushing/Proc. Equipment	500
Crushing/Proc. Equipment	750
Crushing/Proc. Equipment	9999

0.007	0.162	0.162	568.299	0.061	0.005
0.005	0.139	0.128	525.429	0.170	0.005
0.005	0.139	0.128	525.429	0.170	0.005
0.005	0.116	0.107	467.157	0.151	0.004
0.005	0.072	0.066	472.277	0.153	0.004
0.005	0.039	0.036	472.213	0.153	0.004
0.005	0.030	0.028	469.889	0.152	0.004
0.005	0.043	0.040	468.683	0.152	0.004
0.005	0.232	0.213	525.483	0.170	0.005
0.005	0.189	0.174	471.529	0.153	0.004
0.005	0.111	0.102	472.106	0.153	0.004
0.005	0.069	0.063	473.326	0.153	0.004
0.005	0.069	0.063	473.615	0.153	0.004
0.008	0.186	0.186	568.299	0.055	0.005
0.007	0.182	0.182	568.299	0.063	0.005
0.007	0.124	0.124	568.299	0.046	0.005
0.006	0.117	0.117	568.299	0.025	0.004
0.006	0.071	0.071	568.299	0.019	0.004
0.006	0.038	0.038	568.299	0.014	0.004
0.005	0.037	0.037	568.299	0.014	0.004
0.005	0.037	0.037	568.299	0.014	0.004
0.005	0.058	0.058	568.299	0.017	0.004
0.005	0.549	0.505	494.020	0.160	0.005
0.005	0.436	0.401	469.286	0.152	0.004
0.005	0.195	0.180	478.463	0.155	0.004
0.005	0.112	0.103	473.926	0.153	0.004
0.005	0.105	0.097	471.031	0.152	0.004
0.005	0.051	0.051	568.300	0.024	0.004
0.005	0.187	0.172	476.087	0.154	0.004
0.005	0.085	0.079	472.996	0.153	0.004
0.005	0.053	0.049	470.845	0.152	0.004
0.005	0.051	0.047	471.932	0.153	0.004
0.005	0.067	0.062	472.055	0.153	0.004
0.005	0.081	0.074	470.292	0.152	0.004
0.005	0.059	0.054	469.446	0.152	0.004

Dumpers/Trailers	25
Excavators	25
Excavators	50
Excavators	120
Excavators	175
Excavators	250
Excavators	500
Excavators	750
Forklifts	50
Forklifts	120
Forklifts	175
Forklifts	250
Forklifts	500
Generator Sets	15
Generator Sets	25
Generator Sets	50
Generator Sets	120
Generator Sets	175
Generator Sets	250
Generator Sets	500
Generator Sets	750
Generator Sets	9999
Graders	50
Graders	120
Graders	175
Graders	250
Graders	500
Graders	750
Off-Highway Tractors	120
Off-Highway Tractors	175
Off-Highway Tractors	250
Off-Highway Tractors	750
Off-Highway Tractors	1000
Off-Highway Trucks	175
Off-Highway Trucks	250

0.005	0.048	0.044	475.049	0.154	0.004
0.005	0.084	0.078	473.767	0.153	0.004
0.005	0.074	0.068	472.857	0.153	0.004
0.006	0.322	0.296	529.339	0.171	0.005
0.006	0.322	0.296	529.339	0.171	0.005
0.006	0.322	0.296	529.339	0.171	0.005
0.005	0.259	0.238	471.990	0.153	0.004
0.005	0.141	0.129	469.558	0.152	0.004
0.005	0.069	0.063	476.185	0.154	0.004
0.005	0.194	0.179	526.176	0.170	0.005
0.005	0.194	0.179	526.176	0.170	0.005
0.005	0.194	0.179	526.176	0.170	0.005
0.005	0.169	0.155	470.000	0.152	0.004
0.005	0.080	0.074	471.850	0.153	0.004
0.005	0.051	0.047	473.223	0.153	0.004
0.005	0.043	0.040	472.929	0.153	0.004

Off-Highway Trucks	500
Off-Highway Trucks	750
Off-Highway Trucks	1000
Other Construction Equipment	15
Other Construction Equipment	25
Other Construction Equipment	50
Other Construction Equipment	120
Other Construction Equipment	175
Other Construction Equipment	500
Other General Industrial Equipment	15
Other General Industrial Equipment	25
Other General Industrial Equipment	50
Other General Industrial Equipment	120
Other General Industrial Equipment	175
Other General Industrial Equipment	250
Other General Industrial Equipment	500

0.005	0.023	0.021	473.464	0.153	0.004
0.005	0.080	0.073	472.055	0.153	0.004
0.005	0.340	0.313	523.709	0.169	0.005
0.005	0.104	0.095	473.588	0.153	0.004
0.005	0.096	0.088	472.219	0.153	0.004
0.005	0.069	0.064	471.482	0.153	0.004
0.005	0.078	0.072	470.297	0.152	0.004
0.005	0.018	0.017	472.055	0.153	0.004
0.005	0.299	0.275	526.860	0.170	0.005
0.005	0.299	0.275	526.860	0.170	0.005
0.005	0.226	0.208	470.084	0.152	0.004
0.005	0.092	0.085	472.718	0.153	0.004
0.005	0.047	0.043	472.605	0.153	0.004
0.005	0.062	0.057	466.004	0.151	0.004
0.005	0.173	0.159	521.114	0.169	0.005
0.005	0.173	0.159	521.114	0.169	0.005
0.005	0.153	0.140	473.427	0.153	0.004
0.005	0.093	0.086	470.663	0.152	0.004
0.005	0.070	0.065	472.169	0.153	0.004
0.008	0.161	0.161	568.299	0.059	0.005
0.008	0.186	0.186	568.299	0.055	0.005
0.007	0.182	0.182	568.299	0.063	0.005
0.007	0.101	0.101	568.299	0.032	0.005
0.006	0.097	0.097	568.299	0.020	0.004
0.006	0.072	0.072	568.299	0.018	0.004

Other General Industrial Equipment	750
Other General Industrial Equipment	1000
Other Material Handling Equipment	50
Other Material Handling Equipment	120
Other Material Handling Equipment	175
Other Material Handling Equipment	250
Other Material Handling Equipment	500
Other Material Handling Equipment	9999
Pavers	25
Pavers	50
Pavers	120
Pavers	175
Pavers	250
Pavers	500
Paving Equipment	25
Paving Equipment	50
Paving Equipment	120
Paving Equipment	175
Paving Equipment	250
Plate Compactors	15
Pressure Washers	15
Pressure Washers	25
Pressure Washers	50
Pressure Washers	120
Pressure Washers	175

0.006	0.009	0.009	568.299	0.008	0.004
0.008	0.194	0.194	568.299	0.063	0.005
0.007	0.186	0.186	568.299	0.065	0.005
0.007	0.131	0.131	568.299	0.051	0.005
0.006	0.123	0.123	568.299	0.026	0.004
0.006	0.075	0.075	568.299	0.020	0.004
0.006	0.040	0.040	568.299	0.015	0.004
0.005	0.038	0.038	568.300	0.015	0.004
0.005	0.039	0.039	568.299	0.015	0.004
0.005	0.059	0.059	568.299	0.018	0.004
0.005	0.212	0.195	525.862	0.170	0.005
0.005	0.212	0.195	525.862	0.170	0.005
0.005	0.212	0.195	525.862	0.170	0.005
0.005	0.165	0.152	473.936	0.153	0.004
0.005	0.068	0.062	471.935	0.153	0.004
0.005	0.076	0.070	473.516	0.153	0.004
0.005	0.093	0.085	478.303	0.155	0.004
0.005	0.204	0.187	524.802	0.170	0.005
0.005	0.064	0.059	473.158	0.153	0.004
0.005	0.044	0.040	471.622	0.153	0.004
0.005	0.034	0.032	472.778	0.153	0.004
0.005	0.009	0.008	466.554	0.151	0.004
0.005	0.316	0.291	473.901	0.153	0.004
0.005	0.184	0.169	474.597	0.154	0.004
0.005	0.202	0.185	479.468	0.155	0.004
0.005	0.196	0.180	473.023	0.153	0.004
0.005	0.131	0.131	568.299	0.040	0.004
0.005	0.304	0.279	524.304	0.170	0.005
0.005	0.304	0.279	524.304	0.170	0.005
0.005	0.239	0.219	466.558	0.151	0.004
0.005	0.118	0.108	470.660	0.152	0.004

Pressure Washers	250
Pumps	15
Pumps	25
Pumps	50
Pumps	120
Pumps	175
Pumps	250
Pumps	500
Pumps	750
Pumps	9999
Rollers	15
Rollers	25
Rollers	50
Rollers	120
Rollers	175
Rollers	250
Rollers	500
Rough Terrain Forklifts	50
Rough Terrain Forklifts	120
Rough Terrain Forklifts	175
Rough Terrain Forklifts	250
Rough Terrain Forklifts	500
Rubber Tired Dozers	175
Rubber Tired Dozers	250
Rubber Tired Dozers	500
Rubber Tired Dozers	750
Rubber Tired Dozers	1000
Rubber Tired Loaders	25
Rubber Tired Loaders	50
Rubber Tired Loaders	120
Rubber Tired Loaders	175

0.005	0.069	0.064	469.824	0.152	0.004
0.005	0.069	0.064	468.466	0.152	0.004
0.005	0.075	0.069	464.555	0.150	0.004
0.005	0.071	0.065	472.303	0.153	0.004
0.005	0.458	0.421	483.030	0.156	0.004
0.005	0.184	0.169	478.681	0.155	0.004
0.005	0.144	0.133	469.560	0.152	0.004
0.005	0.105	0.096	473.177	0.153	0.004
0.005	0.087	0.080	471.295	0.152	0.004
0.008	0.161	0.161	568.299	0.059	0.005
0.007	0.132	0.132	568.299	0.054	0.005
0.006	0.122	0.122	568.299	0.028	0.004
0.006	0.075	0.075	568.299	0.022	0.004
0.007	0.048	0.048	686.695	0.021	0.004
0.005	0.093	0.086	527.423	0.171	0.005
0.005	0.093	0.086	527.423	0.171	0.005
0.005	0.069	0.063	472.656	0.153	0.004
0.006	0.156	0.143	535.930	0.173	0.005
0.005	0.157	0.144	474.470	0.154	0.004
0.005	0.119	0.110	470.014	0.152	0.004
0.005	0.082	0.075	476.961	0.154	0.004
0.005	0.056	0.051	470.375	0.152	0.004
0.005	0.040	0.037	472.447	0.153	0.004
0.005	0.249	0.229	525.328	0.170	0.005
0.005	0.249	0.229	525.328	0.170	0.005
0.005	0.249	0.229	525.328	0.170	0.005
0.005	0.210	0.193	474.116	0.153	0.004
0.005	0.126	0.116	473.122	0.153	0.004
0.005	0.050	0.046	470.126	0.152	0.004
0.005	0.185	0.170	513.796	0.166	0.005

Rubber Tired Loaders	250
Rubber Tired Loaders	500
Rubber Tired Loaders	750
Rubber Tired Loaders	1000
Scrapers	120
Scrapers	175
Scrapers	250
Scrapers	500
Scrapers	750
Signal Boards	15
Signal Boards	50
Signal Boards	120
Signal Boards	175
Signal Boards	250
Skid Steer Loaders	25
Skid Steer Loaders	50
Skid Steer Loaders	120
Surfacing Equipment	50
Surfacing Equipment	120
Surfacing Equipment	175
Surfacing Equipment	250
Surfacing Equipment	500
Surfacing Equipment	750
Sweepers/S crubbers	15
Sweepers/S crubbers	25
Sweepers/S crubbers	50
Sweepers/S crubbers	120
Sweepers/S crubbers	175
Sweepers/S crubbers	250
Tractors/Loaders/Backhoes	25

0.005	0.185	0.170	513.796	0.166	0.005
0.005	0.120	0.110	476.431	0.154	0.004
0.005	0.077	0.070	468.821	0.152	0.004
0.005	0.058	0.053	469.752	0.152	0.004
0.005	0.047	0.043	469.465	0.152	0.004
0.005	0.095	0.087	466.676	0.151	0.004
0.005	0.220	0.202	527.095	0.171	0.005
0.005	0.220	0.202	527.095	0.171	0.005
0.005	0.220	0.202	527.095	0.171	0.005
0.005	0.326	0.300	475.690	0.154	0.004
0.005	0.186	0.171	467.733	0.151	0.004
0.005	0.155	0.143	473.849	0.153	0.004
0.005	0.085	0.078	471.613	0.153	0.004
0.005	0.009	0.008	474.471	0.154	0.004
0.008	0.194	0.194	568.300	0.063	0.005
0.007	0.186	0.186	568.299	0.065	0.005
0.007	0.151	0.151	568.299	0.062	0.005
0.006	0.139	0.139	568.299	0.032	0.004
0.006	0.085	0.085	568.299	0.025	0.004
0.006	0.044	0.044	568.299	0.019	0.004
0.005	0.042	0.042	568.299	0.019	0.004
0.005	0.081	0.074	470.292	0.152	0.004
0.005	0.059	0.054	469.446	0.152	0.004
0.005	0.048	0.044	475.049	0.154	0.004
0.005	0.084	0.078	473.767	0.153	0.004
0.005	0.074	0.068	472.857	0.153	0.004

Tractors/Loaders/Backhoes	50
Tractors/Loaders/Backhoes	120
Tractors/Loaders/Backhoes	175
Tractors/Loaders/Backhoes	250
Tractors/Loaders/Backhoes	500
Tractors/Loaders/Backhoes	750
Trenchers	15
Trenchers	25
Trenchers	50
Trenchers	120
Trenchers	175
Trenchers	250
Trenchers	500
Trenchers	750
Welders	15
Welders	25
Welders	50
Welders	120
Welders	175
Welders	250
Welders	500
Water Trucks	175
Water Trucks	250
Water Trucks	500
Water Trucks	750
Water Trucks	1000

2025

| g/hp/hr |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| ROG | CO | NOX | SOX | PM10 | PM2.5 | CO2 | CH4 | N2O |
| 0.159 | 3.113 | 2.888 | 0.005 | 0.022 | 0.020 | 525.074 | 0.170 | 0.005 |
| 0.159 | 3.113 | 2.888 | 0.005 | 0.022 | 0.020 | 525.074 | 0.170 | 0.005 |
| 0.159 | 3.113 | 2.888 | 0.005 | 0.022 | 0.020 | 525.074 | 0.170 | 0.005 |
| 0.101 | 3.173 | 1.528 | 0.005 | 0.027 | 0.024 | 472.114 | 0.153 | 0.004 |
| 0.082 | 0.966 | 0.647 | 0.005 | 0.009 | 0.009 | 472.055 | 0.153 | 0.004 |
| 0.161 | 0.991 | 1.115 | 0.005 | 0.033 | 0.033 | 568.299 | 0.014 | 0.004 |
| 0.690 | 3.499 | 4.316 | 0.008 | 0.188 | 0.188 | 568.300 | 0.062 | 0.005 |
| 0.718 | 2.390 | 4.426 | 0.007 | 0.181 | 0.181 | 568.300 | 0.064 | 0.005 |
| 0.702 | 4.880 | 3.864 | 0.007 | 0.135 | 0.135 | 568.299 | 0.063 | 0.005 |
| 0.365 | 3.655 | 2.461 | 0.006 | 0.123 | 0.123 | 568.299 | 0.032 | 0.004 |
| 0.286 | 3.202 | 1.561 | 0.006 | 0.077 | 0.077 | 568.299 | 0.025 | 0.004 |
| 0.232 | 1.096 | 1.247 | 0.006 | 0.039 | 0.039 | 568.299 | 0.020 | 0.004 |
| 0.228 | 1.053 | 1.148 | 0.005 | 0.038 | 0.038 | 568.299 | 0.020 | 0.004 |
| 0.228 | 1.053 | 1.171 | 0.005 | 0.038 | 0.038 | 568.299 | 0.020 | 0.004 |
| 0.243 | 1.090 | 3.082 | 0.005 | 0.061 | 0.061 | 568.299 | 0.021 | 0.004 |
| 0.609 | 4.331 | 4.159 | 0.006 | 0.219 | 0.202 | 529.866 | 0.171 | 0.005 |
| 0.609 | 4.331 | 4.159 | 0.006 | 0.219 | 0.202 | 529.866 | 0.171 | 0.005 |
| 0.609 | 4.331 | 4.159 | 0.006 | 0.219 | 0.202 | 529.866 | 0.171 | 0.005 |
| 0.177 | 3.251 | 2.216 | 0.005 | 0.090 | 0.083 | 461.208 | 0.149 | 0.004 |
| 0.125 | 2.978 | 1.029 | 0.005 | 0.046 | 0.043 | 478.944 | 0.155 | 0.004 |
| 0.108 | 1.046 | 0.975 | 0.005 | 0.032 | 0.030 | 470.712 | 0.152 | 0.004 |
| 0.103 | 0.994 | 0.861 | 0.005 | 0.029 | 0.027 | 464.480 | 0.150 | 0.004 |
| 0.089 | 0.985 | 0.671 | 0.005 | 0.026 | 0.024 | 480.225 | 0.155 | 0.004 |
| 0.057 | 0.943 | 2.273 | 0.005 | 0.018 | 0.017 | 471.926 | 0.153 | 0.004 |

0.661	3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.005
0.693	2.349	4.369	0.007	0.170	0.170	568.299	0.062	0.005
0.685	2.339	4.332	0.007	0.161	0.161	568.299	0.061	0.005
0.561	4.330	3.701	0.007	0.115	0.115	568.300	0.050	0.005
0.300	3.500	2.315	0.006	0.106	0.106	568.299	0.027	0.004
0.235	3.072	1.418	0.006	0.067	0.067	568.299	0.021	0.004
1.937	7.269	5.788	0.005	0.577	0.531	517.872	0.168	0.005
0.524	3.906	4.619	0.005	0.301	0.277	469.903	0.152	0.004
0.381	3.389	3.703	0.005	0.196	0.181	474.636	0.154	0.004
0.281	1.502	2.966	0.005	0.123	0.114	472.964	0.153	0.004
0.231	1.933	2.383	0.005	0.096	0.089	472.066	0.153	0.004
0.191	1.283	1.900	0.005	0.080	0.073	470.331	0.152	0.004
0.220	1.031	2.411	0.005	0.064	0.059	472.055	0.153	0.004
1.756	6.685	4.975	0.005	0.466	0.429	515.466	0.167	0.005
0.513	3.852	4.409	0.005	0.335	0.309	476.234	0.154	0.004
0.326	3.227	3.041	0.005	0.170	0.157	471.829	0.153	0.004
0.264	1.370	2.953	0.005	0.115	0.106	471.860	0.153	0.004
0.228	1.780	2.244	0.005	0.093	0.085	474.025	0.153	0.004
0.181	1.159	1.767	0.005	0.066	0.061	472.283	0.153	0.004
0.263	1.588	4.689	0.005	0.115	0.106	474.645	0.154	0.004
0.694	5.008	3.850	0.007	0.125	0.125	568.299	0.062	0.005
0.364	3.697	2.389	0.006	0.112	0.112	568.299	0.032	0.004
0.287	3.243	1.472	0.006	0.071	0.071	568.299	0.025	0.004
0.236	1.109	1.165	0.006	0.036	0.036	568.299	0.021	0.004
0.232	1.062	1.077	0.005	0.035	0.035	568.299	0.021	0.004
0.233	1.063	1.098	0.005	0.036	0.036	568.299	0.021	0.004
0.274	1.096	3.029	0.005	0.059	0.059	568.299	0.024	0.004

0.685	2.340	4.332	0.007	0.161	0.161	568.299	0.061	0.005
0.417	4.205	3.508	0.005	0.120	0.110	525.979	0.170	0.005
0.417	4.205	3.508	0.005	0.120	0.110	525.979	0.170	0.005
0.217	3.453	2.248	0.005	0.102	0.094	467.384	0.151	0.004
0.170	3.083	1.325	0.005	0.065	0.060	472.428	0.153	0.004
0.139	1.090	1.108	0.005	0.036	0.033	472.442	0.153	0.004
0.121	1.054	0.831	0.005	0.029	0.026	469.711	0.152	0.004
0.142	1.134	1.105	0.005	0.041	0.037	468.652	0.152	0.004
0.692	5.089	4.039	0.005	0.203	0.187	525.483	0.170	0.005
0.300	3.629	2.814	0.005	0.163	0.150	471.529	0.153	0.004
0.224	3.174	1.861	0.005	0.096	0.088	472.106	0.153	0.004
0.196	1.218	1.625	0.005	0.061	0.057	473.326	0.153	0.004
0.218	1.219	1.723	0.005	0.065	0.060	473.615	0.153	0.004
0.612	3.499	4.305	0.008	0.181	0.181	568.299	0.055	0.005
0.697	2.390	4.426	0.007	0.178	0.178	568.299	0.062	0.005
0.475	3.787	3.582	0.007	0.107	0.107	568.299	0.042	0.005
0.260	3.342	2.321	0.006	0.101	0.101	568.299	0.023	0.004
0.197	2.929	1.462	0.006	0.062	0.062	568.299	0.017	0.004
0.155	1.003	1.169	0.006	0.033	0.033	568.299	0.014	0.004
0.151	0.983	1.082	0.005	0.032	0.032	568.300	0.013	0.004
0.152	0.983	1.104	0.005	0.032	0.032	568.299	0.013	0.004
0.183	1.018	2.929	0.005	0.052	0.052	568.300	0.016	0.004
1.850	7.051	5.028	0.005	0.520	0.479	493.791	0.160	0.005
0.683	4.200	5.434	0.005	0.408	0.375	469.821	0.152	0.004
0.364	3.432	3.202	0.005	0.177	0.163	478.497	0.155	0.004
0.262	1.225	3.073	0.005	0.100	0.092	473.669	0.153	0.004
0.293	1.356	2.432	0.005	0.095	0.088	470.266	0.152	0.004
0.264	1.155	1.265	0.005	0.046	0.046	568.300	0.023	0.004
0.302	3.691	2.949	0.005	0.171	0.157	476.371	0.154	0.004
0.183	3.133	1.496	0.005	0.072	0.066	473.097	0.153	0.004
0.169	1.135	1.377	0.005	0.049	0.045	470.689	0.152	0.004
0.169	1.130	1.235	0.005	0.048	0.044	471.925	0.153	0.004
0.189	1.066	2.466	0.005	0.068	0.063	472.055	0.153	0.004
0.224	3.325	1.494	0.005	0.070	0.064	470.264	0.152	0.004
0.202	1.259	1.355	0.005	0.054	0.050	469.113	0.152	0.004

0.185	1.206	1.235	0.005	0.045	0.041	475.220	0.154	0.004
0.259	1.650	2.085	0.005	0.079	0.073	473.839	0.153	0.004
0.209	1.200	3.439	0.005	0.069	0.064	473.097	0.153	0.004
0.828	5.032	4.510	0.006	0.305	0.281	529.209	0.171	0.005
0.828	5.032	4.510	0.006	0.305	0.281	529.209	0.171	0.005
0.828	5.032	4.510	0.006	0.305	0.281	529.209	0.171	0.005
0.382	3.620	3.582	0.005	0.237	0.218	472.125	0.153	0.004
0.261	3.150	2.520	0.005	0.130	0.120	469.545	0.152	0.004
0.175	1.382	1.677	0.005	0.064	0.059	476.484	0.154	0.004
0.546	4.780	3.859	0.005	0.165	0.152	526.176	0.170	0.005
0.546	4.780	3.859	0.005	0.165	0.152	526.176	0.170	0.005
0.546	4.780	3.859	0.005	0.165	0.152	526.176	0.170	0.005
0.287	3.639	2.708	0.005	0.146	0.134	470.000	0.152	0.004
0.191	3.185	1.448	0.005	0.073	0.067	471.850	0.153	0.004
0.173	1.141	1.319	0.005	0.046	0.042	473.223	0.153	0.004
0.158	1.110	1.153	0.005	0.040	0.036	472.929	0.153	0.004

0.115	1.112	0.628	0.005	0.023	0.021	473.464	0.153	0.004
0.198	1.058	3.971	0.005	0.080	0.074	472.055	0.153	0.004
0.943	5.669	4.579	0.005	0.314	0.289	523.709	0.169	0.005
0.220	3.510	2.222	0.005	0.096	0.089	473.588	0.153	0.004
0.208	3.181	1.639	0.005	0.088	0.081	472.219	0.153	0.004
0.210	1.218	1.986	0.005	0.068	0.063	471.482	0.153	0.004
0.212	1.262	1.756	0.005	0.072	0.066	470.297	0.152	0.004
0.058	0.946	2.278	0.005	0.018	0.017	472.055	0.153	0.004
0.950	4.956	4.203	0.005	0.279	0.257	526.857	0.170	0.005
0.950	4.956	4.203	0.005	0.279	0.257	526.857	0.170	0.005
0.337	3.508	3.277	0.005	0.213	0.196	470.226	0.152	0.004
0.191	3.004	1.809	0.005	0.085	0.078	472.661	0.153	0.004
0.119	1.009	1.343	0.005	0.041	0.038	473.236	0.153	0.004
0.143	0.986	1.548	0.005	0.054	0.049	467.171	0.151	0.004
0.523	4.275	3.743	0.005	0.164	0.151	521.058	0.169	0.005
0.523	4.275	3.743	0.005	0.164	0.151	521.058	0.169	0.005
0.262	3.503	2.673	0.005	0.135	0.125	473.175	0.153	0.004
0.197	3.066	1.785	0.005	0.086	0.079	470.661	0.152	0.004
0.138	1.114	1.296	0.005	0.048	0.044	472.212	0.153	0.004
0.661	3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.005
0.612	3.499	4.305	0.008	0.181	0.181	568.299	0.055	0.005
0.697	2.390	4.426	0.007	0.178	0.178	568.299	0.062	0.005
0.333	3.233	3.441	0.007	0.087	0.087	568.299	0.030	0.005
0.204	3.191	2.229	0.006	0.084	0.084	568.299	0.018	0.004
0.191	2.907	1.482	0.006	0.062	0.062	568.299	0.017	0.004

0.098	0.986	0.265	0.006	0.009	0.009	568.299	0.008	0.004
0.690	3.499	4.316	0.008	0.188	0.188	568.299	0.062	0.005
0.718	2.390	4.426	0.007	0.181	0.181	568.299	0.064	0.005
0.523	3.974	3.630	0.007	0.114	0.114	568.299	0.047	0.005
0.279	3.393	2.352	0.006	0.107	0.107	568.299	0.025	0.004
0.213	2.973	1.486	0.006	0.065	0.065	568.299	0.019	0.004
0.168	1.018	1.189	0.006	0.034	0.034	568.300	0.015	0.004
0.164	0.994	1.098	0.005	0.033	0.033	568.299	0.014	0.004
0.164	0.994	1.120	0.005	0.034	0.034	568.299	0.014	0.004
0.196	1.031	2.960	0.005	0.054	0.054	568.299	0.017	0.004
0.621	4.207	3.824	0.005	0.193	0.177	525.957	0.170	0.005
0.621	4.207	3.824	0.005	0.193	0.177	525.957	0.170	0.005
0.621	4.207	3.824	0.005	0.193	0.177	525.957	0.170	0.005
0.272	3.451	2.843	0.005	0.151	0.138	474.007	0.153	0.004
0.141	2.914	1.324	0.005	0.061	0.056	472.012	0.153	0.004
0.179	1.214	1.977	0.005	0.070	0.064	473.512	0.153	0.004
0.210	1.961	2.216	0.005	0.090	0.083	477.900	0.155	0.004
0.570	3.918	3.653	0.005	0.166	0.152	524.924	0.170	0.005
0.145	3.245	1.914	0.005	0.058	0.054	473.063	0.153	0.004
0.103	2.834	1.044	0.005	0.039	0.036	471.535	0.153	0.004
0.119	0.995	1.480	0.005	0.035	0.032	472.853	0.153	0.004
0.066	0.937	0.476	0.005	0.009	0.008	466.548	0.151	0.004
0.532	3.696	5.014	0.005	0.279	0.257	473.515	0.153	0.004
0.399	1.797	4.090	0.005	0.184	0.170	474.585	0.154	0.004
0.417	3.457	4.030	0.005	0.182	0.168	479.394	0.155	0.004
0.425	2.596	5.334	0.005	0.196	0.180	473.011	0.153	0.004
0.433	1.796	4.532	0.005	0.123	0.123	568.299	0.039	0.004
1.009	5.987	4.468	0.005	0.286	0.263	524.230	0.170	0.005
1.009	5.987	4.468	0.005	0.286	0.263	524.230	0.170	0.005
0.397	3.832	3.339	0.005	0.221	0.203	466.808	0.151	0.004
0.246	3.288	1.884	0.005	0.101	0.092	470.357	0.152	0.004

0.197	1.161	1.806	0.005	0.060	0.056	469.788	0.152	0.004
0.209	1.352	1.702	0.005	0.063	0.058	468.513	0.152	0.004
0.226	1.333	1.881	0.005	0.072	0.066	464.866	0.150	0.004
0.201	1.191	3.544	0.005	0.071	0.066	472.345	0.153	0.004
0.575	4.095	5.632	0.005	0.414	0.381	482.701	0.156	0.004
0.336	3.372	3.156	0.005	0.167	0.153	478.809	0.155	0.004
0.301	1.627	3.014	0.005	0.133	0.123	469.352	0.152	0.004
0.245	1.921	2.477	0.005	0.098	0.090	472.846	0.153	0.004
0.213	1.461	2.187	0.005	0.081	0.074	471.429	0.153	0.004
0.661	3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.005
0.559	4.247	3.662	0.007	0.114	0.114	568.299	0.050	0.005
0.296	3.474	2.315	0.006	0.105	0.105	568.299	0.026	0.004
0.229	3.047	1.427	0.006	0.065	0.065	568.299	0.020	0.004
0.224	1.259	1.370	0.007	0.041	0.041	686.695	0.020	0.004
0.350	3.671	3.346	0.005	0.089	0.082	527.801	0.171	0.005
0.350	3.671	3.346	0.005	0.089	0.082	527.801	0.171	0.005
0.147	3.264	1.948	0.005	0.063	0.058	472.847	0.153	0.004
0.333	3.662	3.721	0.006	0.116	0.107	536.030	0.173	0.005
0.251	3.389	2.883	0.005	0.142	0.131	475.381	0.154	0.004
0.228	2.930	2.464	0.005	0.120	0.111	470.077	0.152	0.004
0.176	1.183	2.236	0.005	0.071	0.065	477.096	0.154	0.004
0.134	1.168	1.478	0.005	0.056	0.051	470.252	0.152	0.004
0.094	0.985	0.947	0.005	0.035	0.032	472.983	0.153	0.004
0.746	5.003	4.079	0.005	0.239	0.219	525.328	0.170	0.005
0.746	5.003	4.079	0.005	0.239	0.219	525.328	0.170	0.005
0.746	5.003	4.079	0.005	0.239	0.219	525.328	0.170	0.005
0.332	3.693	3.098	0.005	0.189	0.173	474.116	0.153	0.004
0.266	3.234	2.253	0.005	0.107	0.099	473.122	0.153	0.004
0.164	1.127	1.614	0.005	0.051	0.047	470.126	0.152	0.004
0.590	4.609	3.768	0.005	0.166	0.153	513.852	0.166	0.005

0.590	4.609	3.768	0.005	0.166	0.153	513.852	0.166	0.005
0.227	3.532	2.288	0.005	0.105	0.097	476.731	0.154	0.004
0.176	3.089	1.376	0.005	0.069	0.063	469.403	0.152	0.004
0.168	1.151	1.491	0.005	0.055	0.050	469.914	0.152	0.004
0.150	1.277	1.163	0.005	0.044	0.041	470.084	0.152	0.004
0.221	1.311	2.215	0.005	0.085	0.079	466.638	0.151	0.004
0.601	4.233	3.834	0.005	0.197	0.181	527.022	0.170	0.005
0.601	4.233	3.834	0.005	0.197	0.181	527.022	0.170	0.005
0.601	4.233	3.834	0.005	0.197	0.181	527.022	0.170	0.005
0.494	3.769	4.593	0.005	0.318	0.292	475.632	0.154	0.004
0.364	3.311	3.667	0.005	0.187	0.172	467.733	0.151	0.004
0.312	1.598	3.483	0.005	0.146	0.134	473.846	0.153	0.004
0.192	1.668	1.859	0.005	0.080	0.074	469.994	0.152	0.004
0.064	0.958	0.304	0.005	0.009	0.008	474.478	0.154	0.004
0.690	3.499	4.316	0.008	0.188	0.188	568.299	0.062	0.005
0.718	2.390	4.426	0.007	0.181	0.181	568.299	0.064	0.005
0.646	4.557	3.782	0.007	0.130	0.130	568.299	0.058	0.005
0.336	3.560	2.430	0.006	0.120	0.120	568.299	0.030	0.004
0.261	3.118	1.541	0.006	0.074	0.074	568.299	0.023	0.004
0.210	1.068	1.234	0.006	0.038	0.038	568.299	0.018	0.004
0.206	1.032	1.135	0.005	0.037	0.037	568.299	0.018	0.004
0.224	3.325	1.494	0.005	0.070	0.064	470.264	0.152	0.004
0.202	1.259	1.355	0.005	0.054	0.050	469.113	0.152	0.004
0.185	1.206	1.235	0.005	0.045	0.041	475.220	0.154	0.004
0.259	1.650	2.085	0.005	0.079	0.073	473.839	0.153	0.004
0.209	1.200	3.439	0.005	0.069	0.064	473.097	0.153	0.004

2025		g/hp/hr						
Equipment	MaxHP	ROG	CO	NOX	SOX	PM10	PM2.5	CO2
Aerial Lifts	15	0.154	3.088	2.879	0.005	0.021	0.019	525.074
Aerial Lifts	25	0.154	3.088	2.879	0.005	0.021	0.019	525.074
Aerial Lifts	50	0.154	3.088	2.879	0.005	0.021	0.019	525.074
Aerial Lifts	120	0.099	3.167	1.511	0.005	0.026	0.024	472.114
Aerial Lifts	500	0.085	0.970	0.649	0.005	0.009	0.009	472.055
Aerial Lifts	750	0.153	0.989	0.974	0.005	0.028	0.028	568.299
Air Compressor s	15	0.683	3.491	4.278	0.008	0.183	0.183	568.300
Air Compressor s	25	0.709	2.376	4.407	0.007	0.177	0.177	568.299
Air Compressor s	50	0.659	4.851	3.755	0.007	0.116	0.116	568.299
Air Compressor s	120	0.345	3.653	2.313	0.006	0.104	0.104	568.299
Air Compressor s	175	0.269	3.205	1.383	0.006	0.065	0.065	568.299
Air Compressor s	250	0.220	1.094	1.086	0.006	0.033	0.033	568.299
Air Compressor s	500	0.217	1.051	1.001	0.005	0.032	0.032	568.299
Air Compressor s	750	0.217	1.051	1.021	0.005	0.032	0.032	568.299
Air Compressor s	1000	0.231	1.079	2.954	0.005	0.055	0.055	568.299
Bore/Drill Rigs	15	0.591	4.273	3.978	0.006	0.193	0.178	532.821
Bore/Drill Rigs	25	0.591	4.273	3.978	0.006	0.193	0.178	532.821
Bore/Drill Rigs	50	0.591	4.273	3.978	0.006	0.193	0.178	532.821
Bore/Drill Rigs	120	0.155	3.218	1.964	0.005	0.067	0.062	459.829
Bore/Drill Rigs	175	0.114	2.974	0.888	0.005	0.039	0.036	478.266
Bore/Drill Rigs	250	0.107	1.045	0.957	0.005	0.031	0.029	470.654
Bore/Drill Rigs	500	0.102	0.997	0.823	0.005	0.028	0.026	467.289
Bore/Drill Rigs	750	0.085	0.983	0.596	0.005	0.023	0.021	481.250
Bore/Drill Rigs	1000	0.062	0.953	2.289	0.005	0.019	0.017	471.917

Cement and Mortar Mixers	15	0.661	3.469	4.142	0.008	0.161	0.161	568.299
Cement and Mortar Mixers	25	0.689	2.344	4.357	0.007	0.168	0.168	568.299
Concrete/Industrial Saws	25	0.685	2.339	4.332	0.007	0.161	0.161	568.299
Concrete/Industrial Saws	50	0.525	4.297	3.592	0.007	0.099	0.099	568.299
Concrete/Industrial Saws	120	0.283	3.495	2.176	0.006	0.089	0.089	568.300
Concrete/Industrial Saws	175	0.220	3.073	1.249	0.006	0.056	0.056	568.300
Cranes	50	1.811	7.072	5.636	0.005	0.543	0.499	517.872
Cranes	120	0.463	3.831	4.135	0.005	0.260	0.240	469.533
Cranes	175	0.334	3.335	3.160	0.005	0.166	0.153	474.748
Cranes	250	0.265	1.470	2.681	0.005	0.114	0.105	472.980
Cranes	500	0.218	1.834	2.154	0.005	0.088	0.081	471.967
Cranes	750	0.172	1.274	1.638	0.005	0.068	0.062	470.276
Cranes	9999	0.229	1.038	2.422	0.005	0.065	0.060	472.055
Crawler Tractors	50	1.744	6.686	4.936	0.005	0.456	0.420	516.128
Crawler Tractors	120	0.454	3.788	3.961	0.005	0.285	0.262	476.134
Crawler Tractors	175	0.298	3.209	2.688	0.005	0.150	0.138	471.592
Crawler Tractors	250	0.232	1.308	2.462	0.005	0.096	0.088	471.622
Crawler Tractors	500	0.208	1.717	1.920	0.005	0.081	0.074	474.007
Crawler Tractors	750	0.167	1.122	1.545	0.005	0.057	0.052	472.408
Crawler Tractors	1000	0.260	1.593	4.598	0.005	0.112	0.103	475.490
Crushing/Proc. Equipment	50	0.656	4.982	3.742	0.007	0.107	0.107	568.299
Crushing/Proc. Equipment	120	0.345	3.694	2.248	0.006	0.095	0.095	568.299
Crushing/Proc. Equipment	175	0.270	3.246	1.301	0.006	0.060	0.060	568.299
Crushing/Proc. Equipment	250	0.224	1.108	1.012	0.006	0.031	0.031	568.299
Crushing/Proc. Equipment	500	0.221	1.061	0.937	0.005	0.030	0.030	568.299
Crushing/Proc. Equipment	750	0.222	1.061	0.955	0.005	0.030	0.030	568.299
Crushing/Proc. Equipment	9999	0.261	1.087	2.910	0.005	0.053	0.053	568.299

Dumpers/Tractors	25	0.685	2.339	4.332	0.007	0.161	0.161	568.299
Excavators	25	0.403	4.219	3.453	0.005	0.107	0.099	525.777
Excavators	50	0.403	4.219	3.453	0.005	0.107	0.099	525.777
Excavators	120	0.201	3.439	2.082	0.005	0.085	0.078	466.738
Excavators	175	0.158	3.078	1.154	0.005	0.057	0.052	472.496
Excavators	250	0.131	1.081	0.962	0.005	0.032	0.029	472.560
Excavators	500	0.115	1.051	0.726	0.005	0.026	0.024	470.292
Excavators	750	0.139	1.135	1.026	0.005	0.038	0.035	468.558
Forklifts	50	0.636	5.029	3.932	0.005	0.178	0.164	525.483
Forklifts	120	0.277	3.611	2.607	0.005	0.140	0.128	471.529
Forklifts	175	0.209	3.170	1.653	0.005	0.084	0.078	472.106
Forklifts	250	0.191	1.214	1.466	0.005	0.056	0.052	473.326
Forklifts	500	0.215	1.222	1.658	0.005	0.062	0.057	473.615
Generator Sets	15	0.607	3.491	4.269	0.008	0.178	0.178	568.299
Generator Sets	25	0.694	2.376	4.407	0.007	0.175	0.175	568.299
Generator Sets	50	0.440	3.758	3.481	0.007	0.093	0.093	568.300
Generator Sets	120	0.243	3.338	2.185	0.006	0.087	0.087	568.299
Generator Sets	175	0.184	2.930	1.297	0.006	0.053	0.053	568.299
Generator Sets	250	0.147	1.000	1.020	0.006	0.028	0.028	568.299
Generator Sets	500	0.144	0.981	0.945	0.005	0.027	0.027	568.300
Generator Sets	750	0.145	0.981	0.964	0.005	0.027	0.027	568.299
Generator Sets	9999	0.173	1.008	2.812	0.005	0.047	0.047	568.299
Graders	50	1.864	7.125	5.043	0.005	0.522	0.480	493.532
Graders	120	0.638	4.149	5.074	0.005	0.371	0.342	468.316
Graders	175	0.329	3.418	2.774	0.005	0.152	0.140	478.508
Graders	250	0.230	1.179	2.556	0.005	0.082	0.076	473.470
Graders	500	0.280	1.315	2.265	0.005	0.088	0.081	470.753
Graders	750	0.253	1.141	1.125	0.005	0.041	0.041	568.300
Off-Highway Tractors	120	0.276	3.669	2.707	0.005	0.144	0.132	476.921
Off-Highway Tractors	175	0.175	3.142	1.349	0.005	0.065	0.060	473.302
Off-Highway Tractors	250	0.155	1.130	1.116	0.005	0.040	0.037	470.861
Off-Highway Tractors	750	0.167	1.135	1.118	0.005	0.045	0.041	471.917
Off-Highway Tractors	1000	0.198	1.077	2.482	0.005	0.070	0.064	472.055
Off-Highway Trucks	175	0.214	3.328	1.335	0.005	0.065	0.060	470.004
Off-Highway Trucks	250	0.185	1.213	1.129	0.005	0.043	0.040	469.126

Off-Highway Trucks	500	0.177	1.182	1.064	0.005	0.038	0.035	474.970
Off-Highway Trucks	750	0.235	1.578	1.751	0.005	0.066	0.061	476.314
Off-Highway Trucks	1000	0.187	1.146	3.135	0.005	0.057	0.052	473.369
Other Construction Equipment	15	0.757	4.874	4.306	0.006	0.268	0.246	528.954
Other Construction Equipment	25	0.757	4.874	4.306	0.006	0.268	0.246	528.954
Other Construction Equipment	50	0.757	4.874	4.306	0.006	0.268	0.246	528.954
Other Construction Equipment	120	0.341	3.584	3.252	0.005	0.203	0.187	472.748
Other Construction Equipment	175	0.235	3.136	2.167	0.005	0.112	0.103	469.843
Other Construction Equipment	500	0.168	1.358	1.552	0.005	0.059	0.055	476.296
Other General Industrial Equipment	15	0.492	4.680	3.717	0.005	0.136	0.125	526.176
Other General Industrial Equipment	25	0.492	4.680	3.717	0.005	0.136	0.125	526.176
Other General Industrial Equipment	50	0.492	4.680	3.717	0.005	0.136	0.125	526.176
Other General Industrial Equipment	120	0.258	3.612	2.439	0.005	0.118	0.109	470.000
Other General Industrial Equipment	175	0.189	3.204	1.364	0.005	0.070	0.065	471.850
Other General Industrial Equipment	250	0.155	1.132	1.028	0.005	0.036	0.033	473.223
Other General Industrial Equipment	500	0.152	1.109	1.053	0.005	0.035	0.033	472.929

Other General Industrial Equipment	750	0.117	1.115	0.629	0.005	0.023	0.021	473.464
Other General Industrial Equipment	1000	0.203	1.067	3.985	0.005	0.081	0.074	472.055
Other Material Handling Equipment	50	0.744	5.248	4.233	0.005	0.239	0.219	523.709
Other Material Handling Equipment	120	0.203	3.497	2.055	0.005	0.081	0.074	473.588
Other Material Handling Equipment	175	0.189	3.168	1.396	0.005	0.072	0.067	472.219
Other Material Handling Equipment	250	0.200	1.197	1.774	0.005	0.060	0.055	471.482
Other Material Handling Equipment	500	0.204	1.260	1.601	0.005	0.067	0.061	470.297
Other Material Handling Equipment	9999	0.065	0.959	2.298	0.005	0.019	0.017	472.055
Pavers	25	0.918	4.945	4.131	0.005	0.265	0.243	526.853
Pavers	50	0.918	4.945	4.131	0.005	0.265	0.243	526.853
Pavers	120	0.314	3.493	3.068	0.005	0.191	0.175	469.899
Pavers	175	0.181	3.007	1.644	0.005	0.077	0.071	472.485
Pavers	250	0.107	1.004	1.035	0.005	0.034	0.031	473.483
Pavers	500	0.115	0.969	1.134	0.005	0.039	0.036	465.882
Paving Equipment	25	0.476	4.203	3.627	0.005	0.142	0.130	520.998
Paving Equipment	50	0.476	4.203	3.627	0.005	0.142	0.130	520.998
Paving Equipment	120	0.242	3.483	2.496	0.005	0.118	0.108	473.424
Paving Equipment	175	0.175	3.038	1.509	0.005	0.075	0.069	470.484
Paving Equipment	250	0.133	1.117	1.110	0.005	0.043	0.040	472.234
Plate Compactors	15	0.661	3.469	4.142	0.008	0.161	0.161	568.299
Pressure Washers	15	0.607	3.491	4.269	0.008	0.178	0.178	568.299
Pressure Washers	25	0.694	2.376	4.407	0.007	0.175	0.175	568.299
Pressure Washers	50	0.306	3.210	3.344	0.007	0.075	0.075	568.299
Pressure Washers	120	0.189	3.186	2.100	0.006	0.072	0.072	568.299
Pressure Washers	175	0.178	2.907	1.310	0.006	0.053	0.053	568.299

Pressure Washers	250	0.098	0.986	0.265	0.006	0.009	0.009	568.299
Pumps	15	0.683	3.491	4.278	0.008	0.183	0.183	568.299
Pumps	25	0.709	2.376	4.407	0.007	0.177	0.177	568.299
Pumps	50	0.485	3.943	3.528	0.007	0.099	0.099	568.299
Pumps	120	0.261	3.389	2.213	0.006	0.092	0.092	568.299
Pumps	175	0.199	2.974	1.318	0.006	0.056	0.056	568.300
Pumps	250	0.159	1.016	1.038	0.006	0.029	0.029	568.299
Pumps	500	0.156	0.992	0.958	0.005	0.028	0.028	568.300
Pumps	750	0.157	0.992	0.977	0.005	0.029	0.029	568.300
Pumps	9999	0.186	1.020	2.840	0.005	0.049	0.049	568.299
Rollers	15	0.569	4.125	3.689	0.005	0.167	0.154	526.141
Rollers	25	0.569	4.125	3.689	0.005	0.167	0.154	526.141
Rollers	50	0.569	4.125	3.689	0.005	0.167	0.154	526.141
Rollers	120	0.255	3.444	2.691	0.005	0.135	0.125	473.851
Rollers	175	0.127	2.909	1.101	0.005	0.049	0.046	471.970
Rollers	250	0.173	1.215	1.783	0.005	0.066	0.060	473.681
Rollers	500	0.212	1.968	2.200	0.005	0.091	0.083	477.573
Rough Terrain Forklifts	50	0.456	3.740	3.477	0.005	0.128	0.118	525.027
Rough Terrain Forklifts	120	0.137	3.240	1.821	0.005	0.051	0.047	473.037
Rough Terrain Forklifts	175	0.087	2.821	0.786	0.005	0.030	0.028	471.475
Rough Terrain Forklifts	250	0.123	1.001	1.489	0.005	0.035	0.033	472.927
Rough Terrain Forklifts	500	0.069	0.942	0.477	0.005	0.009	0.008	466.541
Rubber Tired Dozers	175	0.461	3.612	4.229	0.005	0.231	0.212	474.103
Rubber Tired Dozers	250	0.372	1.720	3.805	0.005	0.167	0.153	474.573
Rubber Tired Dozers	500	0.367	2.959	3.370	0.005	0.151	0.139	479.092
Rubber Tired Dozers	750	0.428	2.601	5.333	0.005	0.196	0.181	472.998
Rubber Tired Dozers	1000	0.414	1.725	4.365	0.005	0.115	0.115	568.299
Rubber Tired Loaders	25	0.960	5.941	4.348	0.005	0.259	0.238	523.908
Rubber Tired Loaders	50	0.960	5.941	4.348	0.005	0.259	0.238	523.908
Rubber Tired Loaders	120	0.352	3.791	2.970	0.005	0.179	0.165	466.898
Rubber Tired Loaders	175	0.224	3.281	1.590	0.005	0.084	0.077	470.459

Rubber Tired Loaders	250	0.177	1.142	1.442	0.005	0.048	0.045	469.871
Rubber Tired Loaders	500	0.193	1.276	1.433	0.005	0.053	0.048	469.143
Rubber Tired Loaders	750	0.212	1.333	1.654	0.005	0.064	0.059	465.052
Rubber Tired Loaders	1000	0.166	1.122	3.089	0.005	0.052	0.048	472.456
Scrapers	120	0.566	4.094	5.503	0.005	0.405	0.372	482.363
Scrapers	175	0.290	3.321	2.631	0.005	0.137	0.126	478.948
Scrapers	250	0.291	1.602	2.803	0.005	0.125	0.115	469.446
Scrapers	500	0.216	1.732	2.051	0.005	0.081	0.074	472.539
Scrapers	750	0.184	1.338	1.713	0.005	0.064	0.059	472.115
Signal Boards	15	0.661	3.469	4.142	0.008	0.161	0.161	568.299
Signal Boards	50	0.522	4.217	3.561	0.007	0.098	0.098	568.299
Signal Boards	120	0.278	3.470	2.179	0.006	0.089	0.089	568.299
Signal Boards	175	0.215	3.049	1.262	0.006	0.055	0.055	568.299
Signal Boards	250	0.213	1.257	1.192	0.007	0.035	0.035	686.695
Skid Steer Loaders	25	0.341	3.660	3.309	0.006	0.084	0.077	527.861
Skid Steer Loaders	50	0.341	3.660	3.309	0.006	0.084	0.077	527.861
Skid Steer Loaders	120	0.140	3.252	1.867	0.005	0.057	0.052	472.630
Surfacing Equipment	50	0.235	3.537	3.576	0.006	0.082	0.075	536.140
Surfacing Equipment	120	0.232	3.385	2.659	0.005	0.124	0.114	476.766
Surfacing Equipment	175	0.187	2.926	1.999	0.005	0.094	0.087	471.040
Surfacing Equipment	250	0.148	1.143	1.747	0.005	0.055	0.051	477.110
Surfacing Equipment	500	0.128	1.169	1.327	0.005	0.051	0.047	470.283
Surfacing Equipment	750	0.085	0.978	0.768	0.005	0.027	0.025	470.551
Sweepers/Scrubbers	15	0.622	4.768	3.856	0.005	0.191	0.176	525.328
Sweepers/Scrubbers	25	0.622	4.768	3.856	0.005	0.191	0.176	525.328
Sweepers/Scrubbers	50	0.622	4.768	3.856	0.005	0.191	0.176	525.328
Sweepers/Scrubbers	120	0.303	3.664	2.817	0.005	0.160	0.147	474.116
Sweepers/Scrubbers	175	0.213	3.201	1.638	0.005	0.072	0.066	473.122
Sweepers/Scrubbers	250	0.170	1.140	1.616	0.005	0.051	0.047	470.126
Tractors/Loaders/Backhoes	25	0.550	4.560	3.662	0.005	0.145	0.133	513.803

Tractors/Loaders/Backhoes	50	0.550	4.560	3.662	0.005	0.145	0.133	513.803
Tractors/Loaders/Backhoes	120	0.209	3.522	2.109	0.005	0.086	0.079	477.188
Tractors/Loaders/Backhoes	175	0.162	3.083	1.180	0.005	0.059	0.054	469.329
Tractors/Loaders/Backhoes	250	0.154	1.146	1.235	0.005	0.047	0.044	470.598
Tractors/Loaders/Backhoes	500	0.144	1.234	1.046	0.005	0.039	0.036	470.910
Tractors/Loaders/Backhoes	750	0.187	1.261	1.649	0.005	0.067	0.062	466.452
Trenchers	15	0.542	4.120	3.657	0.005	0.163	0.150	527.160
Trenchers	25	0.542	4.120	3.657	0.005	0.163	0.150	527.160
Trenchers	50	0.542	4.120	3.657	0.005	0.163	0.150	527.160
Trenchers	120	0.457	3.734	4.279	0.005	0.285	0.262	475.901
Trenchers	175	0.358	3.309	3.549	0.005	0.179	0.165	467.732
Trenchers	250	0.307	1.601	3.315	0.005	0.144	0.133	473.917
Trenchers	500	0.191	1.676	1.826	0.005	0.079	0.072	470.439
Trenchers	750	0.067	0.962	0.305	0.005	0.009	0.009	474.486
Welders	15	0.683	3.491	4.278	0.008	0.183	0.183	568.300
Welders	25	0.709	2.376	4.407	0.007	0.177	0.177	568.299
Welders	50	0.602	4.524	3.676	0.007	0.112	0.112	568.299
Welders	120	0.316	3.557	2.283	0.006	0.102	0.102	568.299
Welders	175	0.245	3.121	1.365	0.006	0.063	0.063	568.299
Welders	250	0.199	1.065	1.075	0.006	0.032	0.032	568.299
Welders	500	0.196	1.029	0.990	0.005	0.031	0.031	568.299
Water Trucks	175	0.214	3.328	1.335	0.005	0.065	0.060	470.004
Water Trucks	250	0.185	1.213	1.129	0.005	0.043	0.040	469.126
Water Trucks	500	0.177	1.182	1.064	0.005	0.038	0.035	474.970
Water Trucks	750	0.235	1.578	1.751	0.005	0.066	0.061	476.314
Water Trucks	1000	0.187	1.146	3.135	0.005	0.057	0.052	473.369

g/hp/hr	g/hp/hr
CH4	N2O
0.170	0.005
0.170	0.005
0.170	0.005
0.153	0.004
0.153	0.004
0.013	0.004
0.061	0.005
0.064	0.005
0.059	0.005
0.031	0.004
0.024	0.004
0.019	0.004
0.019	0.004
0.019	0.004
0.020	0.004
0.172	0.005
0.172	0.005
0.172	0.005
0.149	0.004
0.155	0.004
0.152	0.004
0.151	0.004
0.156	0.004
0.153	0.004

0.059	0.005
0.062	0.005
0.061	0.005
0.047	0.005
0.025	0.004
0.019	0.004
0.168	0.005
0.152	0.004
0.154	0.004
0.153	0.004
0.153	0.004
0.152	0.004
0.153	0.004
0.167	0.005
0.154	0.004
0.153	0.004
0.153	0.004
0.153	0.004
0.153	0.004
0.154	0.004
0.059	0.005
0.031	0.004
0.024	0.004
0.020	0.004
0.020	0.004
0.020	0.004
0.023	0.004

0.061	0.005
0.170	0.005
0.170	0.005
0.151	0.004
0.153	0.004
0.153	0.004
0.152	0.004
0.152	0.004
0.170	0.005
0.153	0.004
0.153	0.004
0.153	0.004
0.153	0.004
0.054	0.005
0.062	0.005
0.039	0.005
0.021	0.004
0.016	0.004
0.013	0.004
0.013	0.004
0.013	0.004
0.015	0.004
0.160	0.005
0.152	0.004
0.155	0.004
0.153	0.004
0.152	0.004
0.022	0.004
0.154	0.004
0.153	0.004
0.152	0.004
0.153	0.004
0.153	0.004
0.152	0.004
0.152	0.004

0.154	0.004
0.154	0.004
0.153	0.004
0.171	0.005
0.171	0.005
0.171	0.005
0.153	0.004
0.152	0.004
0.154	0.004
0.170	0.005
0.170	0.005
0.170	0.005
0.152	0.004
0.153	0.004
0.153	0.004
0.153	0.004

0.153	0.004
0.153	0.004
0.169	0.005
0.153	0.004
0.153	0.004
0.153	0.004
0.153	0.004
0.152	0.004
0.153	0.004
0.170	0.005
0.170	0.005
0.152	0.004
0.153	0.004
0.153	0.004
0.151	0.004
0.169	0.005
0.169	0.005
0.153	0.004
0.152	0.004
0.153	0.004
0.059	0.005
0.054	0.005
0.062	0.005
0.027	0.005
0.017	0.004
0.016	0.004

0.008	0.004
0.061	0.005
0.064	0.005
0.043	0.005
0.023	0.004
0.018	0.004
0.014	0.004
0.014	0.004
0.014	0.004
0.016	0.004
0.170	0.005
0.170	0.005
0.170	0.005
0.153	0.004
0.153	0.004
0.153	0.004
0.155	0.004
0.170	0.005
0.153	0.004
0.153	0.004
0.153	0.004
0.153	0.004
0.151	0.004
0.153	0.004
0.154	0.004
0.155	0.004
0.153	0.004
0.037	0.004
0.169	0.005
0.169	0.005
0.151	0.004
0.152	0.004

0.152	0.004
0.152	0.004
0.150	0.004
0.153	0.004
0.156	0.004
0.155	0.004
0.152	0.004
0.153	0.004
0.153	0.004
0.059	0.005
0.047	0.005
0.025	0.004
0.019	0.004
0.019	0.004
0.171	0.005
0.171	0.005
0.153	0.004
0.173	0.005
0.154	0.004
0.152	0.004
0.154	0.004
0.152	0.004
0.152	0.004
0.170	0.005
0.170	0.005
0.170	0.005
0.153	0.004
0.153	0.004
0.152	0.004
0.166	0.005

0.166	0.005
0.154	0.004
0.152	0.004
0.152	0.004
0.152	0.004
0.151	0.004
0.171	0.005
0.171	0.005
0.171	0.005
0.154	0.004
0.151	0.004
0.153	0.004
0.152	0.004
0.154	0.004
0.061	0.005
0.064	0.005
0.054	0.005
0.028	0.004
0.022	0.004
0.018	0.004
0.017	0.004
0.152	0.004
0.152	0.004
0.154	0.004
0.154	0.004
0.153	0.004

Basic Conversions

	<u>Factor</u>	<u>Value</u>	<u>Units</u>
	1 pound equals	453.592	grams
	1 MT equals	1.102	tons
	Total # of days in a week	7	days
	1 kg equals	1,000	grams
	1 Year equals	365	days
	1 ton equals	2,000	pounds
	Global Warming Potential of CH4	25	N/A
	Global Warming Potential of N2O	298	N/A

Source

<http://www.arb.ca.gov/cc/inventory/backgr>
<http://www.arb.ca.gov/cc/inventory/backgr>

Appendix B

**Special-Status Species
Potentially Occurring or Known
to Occur in the Project Area**

Special-Status Species Potentially Occurring or Known to Occur in the Project Area

Current agency status information was obtained from the USFWS (USFWS 2017) and CDFW (2017) for species that are listed, proposed for listing, or are candidates for listing as threatened or endangered under the FESA or the CESA, or are CDFW Species of Special Concern.” RareFind Reports (2017) from the CNDDDB were reviewed for special-status species occurrences in the United States Geological Survey (USGS) quadrangle containing the project area (Los Gatos quadrangle), and the eight surrounding quadrangles (Cupertino, San Jose West, San Jose East, Castle Rock Ridge, Santa Teresa Hills, Felton, Laurel, and Loma Prieta). The database query results are included in the species listed in the table below. Based on these lists the following table was created detailing special-status plant and wildlife species known to occur or with the potential to occur within the project vicinity, along with their legal status, habitat requirements, and potential to be affected by the project.

Species	Status (USFWS/ CDFW/CNPS)	Habitat	Potential Occurrence within Project Vicinity
MAMMALS			
<i>Antrozous pallidus</i> Pallid bat	- / CSC / -	Occurs in a wide variety of habitats including grasslands, shrublands, arid desert areas, oak savanna, coastal forested areas, and coniferous forests of the mountain regions of California. Most common in open, dry habitats with rocky areas for roosting. Day roosts include caves, crevices, mines, and occasionally hollow trees and buildings. Seems to prefer rocky outcrops, cliffs, and crevices with access to open habitats for foraging. Similar structures are used for night roosting and will also use more open sites such as eaves, awnings, and open areas under bridges for feeding roosts.	Could Occur: Suitable habitat is present within the project area.
<i>Corynorhinus townsendii</i> Townsend's big-eared bat	- / CSC / -	Found primarily in rural settings from inland deserts to coastal redwoods, oak woodland of the inner Coast Ranges and Sierra foothills, and low to mid-elevation mixed coniferous-deciduous forests. Typically roost during the day in limestone caves, lava tubes, and mines, but can roost in buildings that offer suitable conditions. Night roosts are in more open settings and include bridges, rock crevices, and trees.	Could Occur: Redwood habitat and trees with cavities providing suitable roosting habitat are present within the project area.
<i>Neotoma fuscipes annectens</i> San Francisco dusky-footed woodrat	- / CSC / -	Forest habitats of moderate canopy with moderate to dense understory. Also occurs in chaparral habitats.	Could Occur: Suitable habitat exists near the project area; however, no middens were observed during surveys of the project area.
<i>Taxidea taxus</i> American badger	- / CSC / -	Dry, open grasslands, fields, pastures savannas, and mountain meadows near timberline are preferred. The principal requirements seem to be sufficient food, friable soils, and relatively open, uncultivated grounds.	Unlikely: No suitable habitat is present within the project area.
BIRDS			
<i>Agelaius tricolor</i> Tricolored blackbird (nesting colony)	- / SC / -	Nest in colonies in dense riparian vegetation (such as cattails and blackberry patches), along rivers, lagoons, lakes, and ponds. Forages over grassland or aquatic habitats.	Unlikely: No suitable dense emergent vegetation is present within the project area.
<i>Aquila chrysaetos</i> Golden eagle (nesting & wintering)	- / CFP / -	Use rolling foothills, mountain terrain, wide arid plateaus deeply cut by streams and canyons, open mountain slopes, cliffs, and rocky outcrops. Nest in secluded cliffs with overhanging ledges as well as large trees.	Unlikely: No cliffs or rocky outcrops are present within the project area.

Species	Status (USFWS/ CDFW/CNPS)	Habitat	Potential Occurrence within Project Vicinity
<i>Athene cunicularia</i> Burrowing owl (burrow sites & some wintering sites)	- / CSC / -	Year-round resident of open, dry grassland and desert habitats, and in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats. Frequent open grasslands and shrublands with perches and burrows. Use rodent burrows (often California ground squirrel) for roosting and nesting cover. Pipes, culverts, and nest boxes may be substituted for burrows in areas where burrows are not available.	Unlikely: No suitable nesting or foraging habitat is present within the project area.
<i>Buteo swainsoni</i> Swainson's hawk (nesting)	- / ST / -	Forages in grasslands and agricultural lands; nests in riparian forests or woodlands and isolated trees in vicinity to foraging grounds.	Unlikely: Project site is outside of the current known breeding range of the species.
<i>Cypseloides niger</i> Black swift (nesting)	- / CSC / -	Regularly nests in moist crevice or cave on sea cliffs above the surf, or on cliffs behind, or adjacent to, waterfalls in deep canyons. Forages widely over many habitats.	Unlikely: No suitable nesting habitat is present within the project area.
<i>Elanus leucurus</i> White-tailed kite (nesting)	- / CFP / -	Open groves, river valleys, marshes, and grasslands. Prefer areas with low roost substrates (e.g., fences). Nest in shrubs and trees adjacent to grasslands.	Unlikely: No suitable habitat is present within the project area.
<i>Falco peregrinus anatum</i> American peregrine falcon (nesting)	- / CFP / -	Forages for other birds over a variety of habitats. Breeds primarily on rocky cliffs.	Unlikely: No rocky cliffs are present within the project area.
<i>Progne subis</i> Purple martin (nesting)	- / CSC / -	Valley foothill and montane hardwood, valley foothill conifer, riparian habitats, and coniferous habitats, including closed-cone pine-cypress, ponderosa pine, Douglas-fir, and redwood. Hawks insects on long, gliding flights above ground. Occasionally ground forages. Typically nest in woodpecker cavity, or other natural/human-made cavities including bridges that contain weep holes.	Unlikely: Although suitable nesting habitat (i.e., tree cavities) is present within the project area, most of the known occurrences of purple martin in California have been reported from weep holes in bridge structures.
REPTILES AND AMPHIBIANS			
<i>Aneides niger</i> Santa Cruz black salamander	- / CSC / -	This species is restricted to mesic forest in the fog belt of the outer Coast Range. While salamanders in the genus <i>Aneides</i> are sometimes quite arboreal, the Santa Cruz black salamander is a ground-dweller, occurring in moist streamside microhabitats and is frequently found in shallow standing water or seeps. In these moist microhabitats, the Santa Cruz black salamander has been found under stones along stream edges and underboards near creeks, talus formations, rock rubble, and leaf litter.	Could Occur: Suitable habitat is present within the project area. The nearest CNDDDB occurrence is approximately 1.1 miles northwest from the project area.
<i>Ambystoma californiense</i> California tiger salamander	FT / ST / -	Annual grassland and grassy understory of valley-foothill hardwood habitats in central and northern California. Need underground refuges and vernal pools or other seasonal water sources.	Unlikely: No suitable habitat is present within the project area.
<i>Dicamptodon ensatus</i> California giant salamander	- / CSC / -	Breeding and larval development occurs in cold permanent and semipermanent streams within oak woodland, coniferous forest and coastal chaparral habitat occurring from sea level to 900 meters.	Could Occur: Suitable habitat is present within the project area. The nearest CNDDDB occurrence is approximately 1.5 miles north of the project area.
<i>Emys marmorata</i> Western pond turtle (includes <i>E. m. pallida</i> and <i>E. m. marmorata</i> as recognized by CDFW)	- / CSC / -	Associated with permanent or nearly permanent water in a wide variety of habitats including streams, lakes, ponds, irrigation ditches. Require basking sites such as partially submerged logs, rocks, mats of vegetation, or open banks.	Could Occur: Suitable habitat is present within the project area. The nearest CNDDDB occurrence is approximately 2.5 miles from the project area.

Species	Status (USFWS/ CDFW/CNPS)	Habitat	Potential Occurrence within Project Vicinity
<i>Phrynosoma blainvillii</i> Coast horned lizard	- / CSC / -	Associated with open patches of sandy soils in washes, chaparral, scrub, and grasslands.	Unlikely: No suitable habitat is present within the project area.
<i>Rana boylei</i> Foothill yellow-legged frog	- / SC & CSC / -	Partly-shaded, shallow streams and riffles with a rocky substrate in a variety of habitats, including hardwood, pine, and riparian forests, scrub, chaparral, and wet meadows. Rarely encountered far from permanent water.	Unlikely: No suitable breeding or rearing habitat is present within the project area. The nearest CNDDDB occurrence is approximately 3.9 miles from the project area. Focused surveys for this species were conducted in the spring and summer of 2014 along Los Gatos Creek from the confluence of Hooker Gulch upstream to Austrian Dam, and no foothill yellow-legged frogs were detected (H. T. Harvey & Associates 2014). In addition, a foothill yellow-legged frog habitat assessment was conducted for the project area on September 21, 2017 to evaluate the suitability of habitat within the project area. No foothill yellow-legged frogs were detected, and the assessment concluded that the project area lacks connectivity to the nearest known localities and the species is not likely to successfully colonize the project area (Kupferberg 2017).
<i>Rana draytonii</i> California red-legged frog	FT / CSC / -	Lowlands and foothills in or near permanent or late-season sources of deep water with dense, shrubby, or emergent riparian vegetation. During late summer or fall adults are known to utilize a variety of upland habitats with leaf litter or mammal burrows.	Could Occur: Suitable habitat is present within the project area. There is a CNDDDB occurrence within the project area.
FISH			
<i>Oncorhynchus kisutch</i> Coho salmon (central California coast ESU)	FE / SE / -	All naturally spawned populations from Punta Gorda south to and including the San Lorenzo River; populations in tributaries to San Francisco Bay, excluding the Sacramento-San Joaquin River system; and four artificial propagation programs.	Not Present: Vasona Reservoir prevents this species from utilizing this portion of Los Gatos Creek.
<i>Oncorhynchus mykiss irideus</i> Steelhead (Central California Coast ESU)	FT / - / -	Coastal perennial and near perennial streams, with suitable spawning and rearing habitat and no major barriers.	Not Present: Vasona Reservoir prevents this species from using this portion of Los Gatos Creek.
<i>Oncorhynchus mykiss irideus</i> Steelhead (South/Central California Coast ESU)	FT / - / -	Coastal perennial and near perennial streams, with suitable spawning and rearing habitat and no major barriers.	Not Present: Vasona Reservoir prevents this species from using this portion of Los Gatos Creek.
INVERTEBRATES			
<i>Cicindela ohlone</i> Ohlone tiger beetle	FE / - / -	Coastal terraces with remnant stands of open native grassland with clay or sandy soils. Hunt, breed, and dig small vertical burrows along sunny single-track trails and dirt roads (maintained by	Unlikely: No suitable habitat is present within the project area.

Species	Status (USFWS/ CDFW/CNPS)	Habitat	Potential Occurrence within Project Vicinity
		cattle, hikers) in coast terrace meadows that still support native grasses. Current range from the City of Scotts Valley to the eastern edge of the City of Santa Cruz.	
<i>Euphyllotes enoptes smithi</i> Smith's blue butterfly	FE / - / -	Most commonly associated with coastal dunes and coastal sage scrub plant communities in Monterey and Santa Cruz Counties. Plant hosts are <i>Eriogonum latifolium</i> and <i>E. parvifolium</i> .	Unlikely: No suitable coastal dunes or coastal sage scrub habitat is present within the project area.
<i>Euphydryas editha bayensis</i> Bay checkerspot butterfly	FT / - / -	Restricted to native grasslands on outcrops of serpentine soil of the San Francisco Bay area. <i>Plantago erecta</i> is the primary host plant; <i>Orthocarpus densiflorus</i> and <i>O. purpurascens</i> are secondary host plants.	Unlikely: No suitable habitat is present within the project area.
<i>Polyphylla barbata</i> Mount Hermon (=barbata) June beetle	FE / - / -	Ponderosa pine-chaparral habitat with sandy soil and open, sparsely vegetated areas. May also occur in more vegetated areas of chaparral. While not always present, silver-leaved manzanita is often an indicator of suitable habitat. Restricted to the Zayante sandhills habitat of the Ben Lomond- Mount Harmon-Scotts Valley area.	Unlikely: No suitable habitat is present within the project area.
<i>Trimerotropis infantillis</i> Zayanteband-winged grasshopper	FE / - / -	Open sandy areas with sparse, low annual and perennial herbs on high ridges with sparse ponderosa pine. Often occurs with Ben Lomond wallflower. Restricted to sand parkland habitat found on ridges and hills within the Zayante sandhills habitat in Santa Cruz County. Flight season extends from late May through August.	Unlikely: No suitable habitat is present within the project area.
PLANTS			
<i>Amsinckia lunaris</i> Bent-flowered fiddleneck	- / - / 1B.2	Coastal bluff scrub, cismontane woodland, and valley and foothill grassland at elevations of 5 to 1,640 feet. Annual herb in the Boraginaceae family; blooms March-June.	Unlikely: No suitable habitat is present within the project area.
<i>Arctostaphylos andersonii</i> Anderson's manzanita	- / - / 1B.2	Openings and edges of broadleaved upland forest, chaparral, and north coast coniferous forest at elevations of 195 to 2,495 feet. Evergreen shrub in the Ericaceae family; blooms November-May.	Unlikely: No suitable habitat is present within the project area.
<i>Arctostaphylos silvicola</i> Bonny Doon manzanita	- / - / 1B.2	Chaparral, closed-cone coniferous forest, and lower montane coniferous forest on inland marine sands at elevations of 390 to 1,970 feet. Evergreen shrub in the Ericaceae family; blooms February- March.	Unlikely: No suitable habitat is present within the project area.
<i>Arenaria paludicola</i> Marsh sandwort	FE / SE / 1B.1	Known from only two natural occurrences in Black Lake Canyon and at Oso Flaco Lake. Sandy openings of freshwater of brackish marshes and swamps at elevations of 5 to 560 feet. Stoloniferous perennial herb in the Caryophyllaceae family; blooms May-August.	Unlikely: Project area is outside of the elevation range of this species.
<i>Balsamorhiza macrolepis</i> Big-scale balsamroot	- / - / 1B.2	Open, rocky slopes within chaparral, cismontane woodland, and valley and foothill grassland, sometimes on serpentine soils, at elevations of 295 to 5,100 feet. Perennial herb in the Asteraceae family; blooms March-June.	Unlikely: Most of the project area is within deeply shaded forest habitat and is not suitable for this species, which grows in sunny openings. The only open areas are disturbed and colonized by non-native species.
<i>California macrophylla</i> Round-leaved filaree	- / - / 1B.2	Open sites on grassland and scrub habitats on vertic clay soils at elevations of 45 to 3,935 feet. Annual herb in the Geraniaceae family; blooms March-May.	Unlikely: No suitable habitat is present within the project area.

Species	Status (USFWS/ CDFW/CNPS)	Habitat	Potential Occurrence within Project Vicinity
<i>Calyptridium parryi</i> var. <i>hesseae</i> Santa Cruz Mountains pussypaws	- / - / 1B.1	Sandy or gravelly openings of chaparral and cismontane woodlands at elevations of 1,000 to 5,020 feet. Annual herb in the Montiaceae family; blooms May-August.	Unlikely: Project area is outside of the current known elevation range of this species.
<i>Campanula californica</i> Swamp harebell	- / - / 1B.2	Mesic areas of bogs and fens, closed-cone coniferous forest, coastal prairie, meadows and seeps, freshwater marshes and swamps, and North Coast coniferous forest at elevations of 0 to 1,330 feet. Perennial rhizomatous herb in the Campanulaceae family; blooms June-October.	Unlikely: No suitable habitat is present within the project area.
<i>Carex comosa</i> Bristly sedge	- / - / 2B.1	Coastal prairie, marshes and swamps on lake margins, and valley and foothill grassland at elevations of 0 to 2,050 feet. Perennial rhizomatous herb in the Cyperaceae family; blooms May-September.	Unlikely: No suitable habitat is present within the project area.
<i>Carex saliniformis</i> Deceiving sedge	- / - / 1B.2	Mesic areas of coastal prairie, coastal scrub, meadows and seeps, and coastal salt marshes and swamps at elevations of 5 to 755 feet.	Unlikely: No suitable habitat is present within the project area.
<i>Ceanothus ferrisiae</i> Coyote ceanothus	FE / - / 1B.1	Chaparral, coastal scrub, and valley and foothill grassland on serpentinite soils, at elevations of 390 to 1,510 feet. Perennial evergreen shrub in the Rhamnaceae family; blooms January-May.	Unlikely: No suitable habitat is present within the project area.
<i>Centromadia parryi</i> ssp. <i>congdonii</i> Congdon's tarplant	- / - / 1B.1	Valley and foothill grassland on alkaline soils at elevations of 0 to 755 feet. Annual herb in the Asteraceae family; blooms May-October sometimes into November.	Unlikely: No suitable habitat is present within the project area, and the project area is outside of the known elevation range for this species.
<i>Chorizanthe pungens</i> var. <i>hartwegiana</i> Ben Lomond spineflower	FE / - / 1B.1	Lower montane coniferous forest (maritime ponderosa pine sandhills) at elevations of 295 to 2,000 feet. Annual herb in the Polygonaceae family; blooms April-July.	Unlikely: No suitable habitat is present within the project area.
<i>Chorizanthe pungens</i> var. <i>pungens</i> Monterey spineflower	FT / - / 1B.2	Coastal dunes and open sand within maritime chaparral, coastal scrub, and grasslands at elevations of 5 to 1,475 feet. Annual herb in the Polygonaceae family; blooms April-June, sometimes into July or August.	Unlikely: No open sand habitat is present within the project area.
<i>Chorizanthe robusta</i> var. <i>hartwegii</i> Scott's Valley spineflower	FE / - / 1B.1	Meadows and seeps on sandy soils and valley and foothill grassland on mudstone and Purisima outcrops at elevations of 750 to 805 feet. Annual herb in the Polygonaceae family; blooms April-July.	Unlikely: No suitable habitat is present within the project area.
<i>Chorizanthe robusta</i> var. <i>robusta</i> Robust spineflower	FE / - / 1B.1	Coastal dunes and other exposed sand or gravel sites in coastal habitats at elevations of 5 to 985 feet. Annual herb in the Polygonaceae family; blooms April-September.	Unlikely: No suitable open sand or gravel habitat is present within the project area.
<i>Cirsium fontinale</i> var. <i>campylon</i> Mount Hamilton fountain thistle	- / - / 1B.2	Chaparral, cismontane woodland, and valley and foothill grassland on serpentine seeps, at elevations of 325 to 2,920 feet. Perennial herb in the Asteraceae family; blooms February-October.	Unlikely: No suitable habitat is present within the project area.
<i>Collinsia multicolor</i> San Francisco collinsia	- / - / 1B.2	Closed-cone coniferous forest and coastal scrub, on serpentine soils, at elevations of 95 to 820. Annual herb in the Plantaginaceae family; blooms March-May.	Unlikely: No suitable habitat is present within the project area.
<i>Dacryophyllum falcifolium</i> Tear drop moss	- / - / 1B.3	North coast coniferous forests on carbonate soils at elevations of 160 to 900 feet. Known only in Monterey and Santa Cruz Counties.	Unlikely: No suitable habitat is present within the project area.

Species	Status (USFWS/ CDFW/CNPS)	Habitat	Potential Occurrence within Project Vicinity
<i>Dirca occidentalis</i> Western leatherwood	- / - / 1B.2	Mesic areas of broadleaved upland forest, closed- cone coniferous forest, chaparral, cismontane woodland, North Coast coniferous forest, riparian forest, and riparian woodland at elevations of 80 to 1,395 feet. Perennial shrub in the Thymelaeaceae family; blooms January-April.	Could Occur: Suitable habitat is present within the project area.
<i>Dudleya abramsii</i> ssp. <i>setchellii</i> Santa Clara Valley dudleya	FE / - / 1B.1	Cismontane woodland and valley and foothill grasslands on rocky serpentine soils, at elevations of 195 to 1,495 feet. Perennial herb in the Crassulaceae family; blooms April-October.	Unlikely: No suitable habitat is present within the project area.
<i>Eriogonum nudum</i> var. <i>decurrens</i> Ben Lomond buckwheat	- / - / 1B.1	Chaparral, cismontane woodland, and lower montane coniferous forest (maritime ponderosa pine sandhills) on sandy soils, at elevations of 160 to 2,625 feet. Perennial herb in the Polygonaceae family; blooms June-October.	Unlikely: No suitable habitat is present within the project area.
<i>Erysimum teretifolium</i> Santa Cruz wallflower	FE / SE / 1B.1	Chaparral and lower montane coniferous forest on inland marine sands, at elevations of 390 to 2,000 feet. Perennial herb in the Brassicaceae family; blooms March-July.	Unlikely: No suitable habitat is present within the project area.
<i>Fissidens pauperculus</i> Minute pocket moss	- / - / 1B.2	North coast coniferous forest on damp coastal soil at elevations of 30 to 3,360 feet. Moss in the Fissidentaceae family.	Unlikely: No suitable habitat is present within the project area.
<i>Fritillaria liliacea</i> Fragrant fritillaria	- / - / 1B.2	Grows in heavy clay soils on open hillslopes or fields in coastal prairie, coastal scrub, and valley and foothill grassland, often serpentine, at elevations of 5 to 1,345 feet. Bulbiferous perennial herb in the Liliaceae family; blooms February-April.	Unlikely: No suitable habitat is present within the project area.
<i>Hesperocyparis abramsiana</i> var. <i>abramsiana</i> Santa Cruz cypress	FE / SE / 1B.2	Closed-cone coniferous forest, chaparral, and lower montane coniferous forest on sandstone or granitic soils at elevations of 950 to 2,625 feet Evergreen tree in the Cupressaceae family.	Not Present: Large perennial that was not observed during reconnaissance-level survey.
<i>Hoita strobilina</i> Loma Prieta hoita	- / - / 1B.1	Mesic areas of chaparral and oak woodland usually on serpentine soils, at elevations of 95 to 2820 feet. Perennial herb in the Fabaceae family; blooms May-October.	Unlikely: No suitable habitat is present within the project area.
<i>Holocarpha macradenia</i> Santa Cruz tarplant	FT / SE / 1B.1	Coastal prairies and valley foothill grasslands, often clay or sandy soils, at elevations of 30 to 720 feet. Annual herb in the Asteraceae family; blooms June-October.	Unlikely: No suitable habitat is present within the project area.
<i>Horkelia cuneata</i> ssp. <i>sericea</i> Kellogg's horkelia	- / - / 1B.1	Openings of closed-cone coniferous forests, maritime chaparral, coastal dunes, and coastal scrub on sandy or gravelly soils at elevations of 30 to 655 feet. Perennial herb in the Rosaceae family; blooms April-September.	Unlikely: No suitable habitat is present within the project area. Project area is outside of the elevation range of this species.
<i>Horkelia marinensis</i> Point Reyes horkelia	- / - / 1B.2	Coastal dunes, coastal prairie, and coastal scrub on sandy soils at elevations of 15 to 2,475 feet. Perennial herb in the Rosaceae family; blooms May-September.	Unlikely: No suitable habitat is present within the project area.
<i>Lasthenia conjugens</i> Contra Costa goldfields	FE / - / 1B.1	Mesic areas of valley and foothill grassland, alkaline playas, cismontane woodland, and vernal pools at elevations of 0 to 1,540 feet. Annual herb in the Asteraceae family; blooms March-June.	Unlikely: No suitable grassland habitat is present within the project area.
<i>Lessingia micradenia</i> var. <i>glabrata</i> Smooth lessingia	- / - / 1B.2	Chaparral and cismontane woodlands on serpentine soils, often on roadsides, at elevations of 390 to 1,380 feet. Annual herb in the Asteraceae family; blooms July-November.	Unlikely: No suitable habitat is present within the project area. No serpentine soils present.
<i>Malacothamnus aboriginum</i> Indian Valley bush-mallow	- / - / 1B.2	Chaparral and cismontane woodland on rocky or granitic soils, often in burned areas, at elevations of 492 to 5,577 feet. Deciduous shrub in the Malvaceae family; blooms April-October.	Unlikely: No suitable habitat is present within the project area.

Species	Status (USFWS/ CDFW/CNPS)	Habitat	Potential Occurrence within Project Vicinity
<i>Malacothamnus arcuatus</i> Arcuate bush-mallow	- / - / 1B.2	Chaparral and woodland openings at elevations of 45 to 1,165 feet. Perennial evergreen shrub in the Malvaceae family; blooms April-September.	Unlikely: No suitable habitat is present within the project area.
<i>Malacothamnus hallii</i> Hall's bush mallow	- / - / 1B.2	Chaparral and coastal scrub at elevations of 30 to 2,495 feet. Perennial evergreen shrub in the Malvaceae family; blooms May-October.	Unlikely: No suitable habitat is present within the project area.
<i>Microseris paludosa</i> Marsh microseris	- / - / 1B.2	Closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland at elevations of 15 to 1,165 feet. Perennial herb in the Asteraceae family; blooms April-July.	Could Occur: Suitable habitat for this species does exist within the project area.
<i>Monardella sinuata</i> ssp. <i>nigrescens</i> Northern curly-leaved monardella	- / - / 1B.2	Chaparral, coastal dunes, coastal scrub, and lower montane coniferous forest (ponderosa pine sandhills) on sandy soils at elevations of 0 to 985 feet. Annual herb in the Lamiaceae family; blooms April-September.	Unlikely: No suitable habitat is present within the project area. No sandy soils present.
<i>Monolopia gracilens</i> Woodland woollythreads	- / - / 1B.2	Openings of broadleaved upland forest, chaparral, cismontane woodland, North Coast coniferous forest, and valley and foothill grassland on serpentine soils at elevations of 325 to 3,935 feet. Annual herb in the Asteraceae family; blooms February-July.	Unlikely: No suitable habitat is present within the project area. No serpentine soils present.
<i>Penstemon rattanii</i> var. <i>kleei</i> Santa Cruz Mountains beardtongue	- / - / 1B	Chaparral and lower montane and North Coast coniferous forests at elevations of 1,310 to 3,610 feet. Perennial herb in the Plantaginaceae family; blooms May-June.	Unlikely: Project area is outside of the elevation range of this species.
<i>Pentachaeta bellidiflora</i> White-rayed pentachaeta	FE / SE / 1B	Cismontane woodland and valley and foothill grasslands, often on serpentine soils, at elevations of 110 to 2,035 feet. Annual herb in the Asteraceae family; blooms March-May.	Unlikely: No suitable habitat is present within the project area.
<i>Piperia candida</i> White-flowered rein orchid	- / - / 1B.2	Broadleaved upland forest, lower montane coniferous forest, and North Coast coniferous forest, sometimes on serpentine soils, at elevations of 95 to 4,300 feet. Perennial herb in the Orchidaceae family; blooms May-September.	Unlikely: No suitable habitat present in the project area, including no serpentine soils.
<i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i> Choris' popcorn-flower	- / - / 1B.2	Mesic areas of chaparral, coastal prairie, and coastal scrub at elevations of 5 to 525 feet. Annual herb in the Boraginaceae family; blooms March-June.	Unlikely: No suitable habitat is present within the project area. Project area is outside of the elevation range of this species.
<i>Plagiobothrys diffuses</i> San Francisco popcorn-flower	- / SE / 1B.2	Coastal prairie and valley and foothill grassland at elevations of 195 to 1,180 feet. Annual herb in the Boraginaceae family; blooms March-June.	Unlikely: No suitable habitat is present within the project area.
<i>Plagiobothrys glaber</i> Hairless popcorn-flower	- / - / 1A	Alkaline meadows and seeps, and coastal salt marshes and swamps at elevations of 45 to 590 feet. Annual herb in the Boraginaceae family; blooms March-May.	Unlikely: No suitable habitat is present within the project area. Project area is outside of the elevation range of this species and species is presumed extinct in California.
<i>Polygonum hickmanii</i> Scotts Valley polygonum	FE / SE / 1B.1	Valley and foothill grassland on mudstone and sandstone at elevations of 685 to 820 feet. Annual herb in the Polygonaceae family; blooms May-August.	Unlikely: No suitable habitat is present within the project area.
<i>Senecio aphanactis</i> Chaparral ragwort	- / - / 2	Chaparral, cismontane woodland, and coastal scrub, on alkaline soils, at elevations of 45 to 2,625 feet. Annual herb in the Asteraceae family; blooms January-April.	Unlikely: No suitable habitat is present within the project area.

Species	Status (USFWS/ CDFW/CNPS)	Habitat	Potential Occurrence within Project Vicinity
<i>Silene verecunda</i> ssp. <i>verecunda</i> San Francisco campion	- / - / 1B.2	Coastal bluff scrub, chaparral, coastal prairie, coastal scrub, valley and foothill grassland, at elevation of 95 to 2,115 feet. Annual herb in Asteraceae family; blooms March to June, sometimes as early as March and as late as August.	Unlikely: No suitable habitat is present within the project area.
<i>Stebbinsoseris decipiens</i> Santa Cruz microseris	- / - / 1B.2	Broadleaved upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, valley and foothill grassland at elevations between 30 to 1,640 feet. Annual herb in Asteraceae family, blooms April-May.	Could Occur: Suitable habitat for this species present within the project area.
<i>Streptanthus albidus</i> ssp. <i>albidus</i> Metcalf Canyon jewel-flower	FE / - / 1B.1	Valley grasslands and barren slopes on serpentine soils at elevations of 145 to 2,625 feet. Annual herb in the Brassicaceae family; blooms April- July.	Unlikely: No suitable habitat is present within the project area. No serpentine soils present.
<i>Streptanthus albidus</i> ssp. <i>peramoenus</i> Most beautiful jewel-flower	- / - / 1B.2	Chaparral, cismontane woodlands, and valley and foothill grasslands on serpentine soils at elevations of 310 to 3,280 feet. Annual herb in the Brassicaceae family; blooms March-October.	Unlikely: No suitable habitat is present within the project area. No serpentine soils present.
<i>Trifolium buckwestiorum</i> Santa Cruz clover	- / - / 1B.1	Gravelly margins/edges, grassy or disturbed areas of broadleaved upland forest, cismontane woodland, and coastal prairie at elevations of 340 to 2,000 feet. Annual herb in the Fabaceae family; blooms April-October.	Unlikely: No suitable habitat is present within the project area; this species grows in openings at forest edges and not in deep shade, and all open areas in the project area are disturbed and colonized by non-native species.
<i>Trifolium hydrophilum</i> Saline clover	- / - / 1B.2	Marshes and swamps, mesic and alkaline valley and foothill grassland, and vernal pools at elevations of 0 to 985 feet. Annual herb in the Fabaceae family; blooms April-June.	Unlikely: No suitable habitat is present within the project area.
<i>Tropidocarpum capparideum</i> Caper-fruited tropidocarpum	- / - / 1B.1	Valley and foothill grassland (alkaline hills) at elevations between 0 to 1,495 feet. Annual herb in Brassicaceae family; blooms March-June.	Unlikely: No suitable habitat is present within the project area.

STATUS DEFINITIONS

USFWS (Federal)

FE listed as Endangered under the federal Endangered Species Act
 FT listed as Threatened under the federal Endangered Species Act
 -- No listing

CDFW (State)

SE listed as Endangered under the California Endangered Species Act
 ST listed as Threatened under the California Endangered Species Act
 SC Candidate for listing under the California Endangered Species Act
 CSC California Department of Fish and Wildlife Species of Special Concern
 CFP California Fully Protected Animal
 -- No listing

CNPS (California Rare Plant Rank)

1A Presumed extinct in California
 1B List 1B species: rare, threatened, or endangered in California and elsewhere.
 2 List 2 species: rare, threatened, or endangered in California but more common elsewhere.
 .1 seriously endangered in California
 .2 fairly endangered in California
 .3 not very endangered in California
 - no listing.
 * known populations believed extirpated from that County

Sources: SJWC 2015; CNDDB 2017; USFWS 2017; CNPS 2017 data compiled by Ascent in 2017

Appendix C

CWA Section 404 Permit



DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET, 16TH FLOOR
SAN FRANCISCO, CALIFORNIA 94103-1398

APR 06 2017

Regulatory Division

Subject: File Number 2015-00452S

Mr. Matthew Johnson
Denise Duffy and Associates, Incorporated
947 Cass Street, Suite 5
Monterey, California 93940

Dear Mr. Johnson:

This correspondence is in reference to your submittal of November 19, 2015, on behalf of the San Jose Water Company, concerning Department of the Army (DA) authorization for the Ostwald Water Line Replacement project which would replace a water line in and adjacent to Los Gatos Creek for the purpose of improving the 55-year old water delivery system located along Los Gatos Creek adjacent to Aldercroft Heights Road, in the City of Los Gatos, Santa Clara County, California (APN: 58-25-013 and 558-25-016, Lat: 37.14956° N, Long: 121.9589° W).

Work within U.S. Army Corps of Engineers' (Corps) jurisdiction will include replacement of approximately 1,700 linear feet of raw water intake pipeline via open trenching. An existing 30-inch diameter wrapped steel pipeline extending from the Ostwald Dam impoundment along Los Gatos Creek to an existing pipeline to the north will be removed and replaced with a new 30-inch diameter ductile iron pipeline with polyethylene encasement. The replacement pipeline will be installed within the same alignment as the existing transmission line. Open trenching will require excavating a ditch approximately 52 inches wide, and depth will be determined by the grade of the existing pipe, but assumed to be to a depth of 5.5 feet. Temporary impacts will include 0.05 acre of wetlands and 0.82 acre (1,500 feet) of Los Gatos Creek, a perennial stream. All impacted areas will be restored to pre-project conditions. All work shall be completed in accordance with the plans and drawings titled "USACE File # 2015-00452S, Ostwald Water Line Replacement, April 4, 2017," Sheets 1 and 2, provided as Enclosure 1.

Section 404 of the Clean Water Act (CWA) generally regulates the discharge of dredged or fill material below the plane of ordinary high water in non-tidal waters of the United States, below the high tide line in tidal waters of the United States, and within the lateral extent of wetlands adjacent to these waters. Section 10 of the Rivers and Harbors Act generally regulates construction of structures and work, including excavation, dredging, and discharges of dredged or fill material, occurring below the plane of mean high water in tidal waters of the United States; in former diked baylands currently below mean high water; outside the limits of mean high water but affecting the navigable capacity of tidal waters; or below the plane of ordinary high water in non-tidal waters designated as navigable waters of the United States. Navigable

waters of the United States generally include all waters subject to the ebb and flow of the tide; and/or all waters presently used, or have been used in the past, or may be susceptible for future use to transport interstate or foreign commerce. A Preliminary Jurisdictional Determination (JD) has been completed for your site. Preliminary JDs are written indications that there may be waters of the U.S. on a parcel or indications of the approximate location(s) of waters of the U.S. on a parcel. Preliminary JDs are advisory in nature and may not be appealed. While this preliminary jurisdictional determination was conducted pursuant to Regulatory Guidance Letter No. 08-02, *Jurisdictional Determinations*, it may be subject to future revision if new information or a change in field conditions becomes subsequently apparent. The basis for this preliminary jurisdictional determination is fully explained in the enclosed *Preliminary Jurisdictional Determination Form*. You are requested to sign and date this form and return it to this office within two weeks of receipt. Please see the enclosed Preliminary JD map titled, "Preliminary Jurisdictional Determination, Ostwald Water Line Replacement, File 2015-00452S," dated April 4, 2017 (Enclosure 2).

Based on a review of the information in your submittal and the current condition of the site, as verified during a field investigation on March 16, 2017, the project qualifies for authorization under Department of the Army Nationwide Permit (NWP) 12 for Utility Line Activities, 82 Fed. Reg. 1860, January 6, 2017 (Enclosure 3), pursuant to Section 404 of the CWA of 1972, as amended (33 U.S.C. § 1344 *et seq.*). The project must be in compliance with the terms of the NWP, the general conditions of the Nationwide Permit Program (www.spn.usace.army.mil/Portals/68/docs/regulatory/NWP/NWP17_GC.pdf), and the San Francisco District regional conditions cited on our website (www.spn.usace.army.mil/Portals/68/docs/regulatory/NWP/NWP17_RC.pdf). You must also be in compliance with any special conditions specified in this letter for the NWP authorization to remain valid. Non-compliance with any term or condition could result in the revocation of the NWP authorization for your project, thereby requiring you to obtain an Individual Permit from the Corps. This NWP authorization does not obviate the need to obtain other State or local approvals required by law.

This verification will remain valid until March 18, 2022, unless the NWP authorization is modified, suspended, or revoked. Activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon a NWP will remain authorized provided the activity is completed within 12 months of the date of a NWP's expiration, modification, or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 C.F.R. § 330.4(e) and 33 C.F.R. § 330.5 (c) or (d). This verification will remain valid if, during the time period between now and March 18, 2022, the activity complies with any subsequent modification of the NWP authorization. The Chief of Engineers will periodically review NWPs and their conditions and will decide to modify, reissue, or revoke the permits. If a NWP is not modified or reissued within five years of its effective date, it automatically expires and becomes null and void. It is

incumbent upon you to remain informed of any changes to the NWP. Changes to the NWP would be announced by Public Notice posted on our website (<http://www.spn.usace.army.mil/Missions/Regulatory/Public-Notices.aspx>). Upon completion of the project and all associated mitigation requirements, you shall sign and return the Certification of Compliance, Enclosure 4, verifying that you have complied with the terms and conditions of the permit.

This authorization will not be effective until you have obtained a Section 401 water quality certification from the San Francisco Bay Regional Water Quality Control Board (RWQCB). If the RWQCB fails to act on a valid request for certification within two months after receipt of a complete application, the Corps will presume a waiver of water quality certification has been obtained. You shall submit a copy of the certification to the Corps prior to the commencement of work.

General Condition 18 stipulates that project authorization under a NWP does not allow for the incidental take of any federally-listed species in the absence of a biological opinion (BO) with incidental take provisions. As the principal federal lead agency for this project, the Corps initiated consultation with the United States Fish and Wildlife Service (US FWS) to address project related impacts to listed species, pursuant to Section 7(a) of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 *et seq.*). By letter of November 4, 2016, US FWS issued a BO (reference 2016-F-1522) cited in Enclosure 5, with an incidental take statement for California red-legged frog (CRLF).

In order to ensure compliance with this NWP authorization, the following special conditions shall be implemented:

1. To remain exempt from the prohibitions of Section 9 of the Endangered Species Act, the non-discretionary Terms and Conditions for incidental take of federally-listed Species shall be fully implemented as stipulated in the Biological Opinion entitled, "Formal Consultation on the Ostwald Water Line Replacement Project in Upper Los Gatos Creek, near the Town of Lost Gatos, Santa Clara County, California," (pages 3-8, 12-13) dated November 4, 2016 (Enclosure 5). Project authorization under the NWP is conditional upon compliance with the mandatory terms and conditions associated with incidental take. Failure to comply with the terms and conditions for incidental take, where a take of a federally-listed species occurs, would constitute an unauthorized take and non-compliance with the NWP authorization for your project. The US FWS is, however, the authoritative federal agency for determining compliance with the incidental take statement and for initiating appropriate enforcement actions or penalties under the Endangered Species Act.

2. A post construction report shall be submitted 45 days after the conclusion of construction activities. The report shall document construction activities and contain as-built drawings (if different from drawings submitted with application) and include before and after photos.
3. All temporary impacts shall be restored at least to preconstruction condition, and only native riparian species may be used for replanting.

You may refer any questions on this matter to Justin Yee of my Regulatory staff by telephone at (415) 503-6788 or by e-mail at Justin.J.Yee@usace.army.mil. All correspondence should be addressed to the Regulatory Division, South Branch, referencing the file number at the head of this letter.

The San Francisco District is committed to improving service to our customers. My Regulatory staff seeks to achieve the goals of the Regulatory Program in an efficient and cooperative manner, while preserving and protecting our nation's aquatic resources. If you would like to provide comments on our Regulatory Program, please complete the Customer Service Survey Form available on our website: <http://www.spn.usace.army.mil/Missions/Regulatory.aspx>

Sincerely,



For

Rick M. Bottoms, Ph.D.
Chief, Regulatory Division

Enclosures

Copy Furnished (w/ Encl 1):

San Jose Water Company, San Jose, CA (Attn: Scott Hoffman)
CA RWQCB, Oakland, CA
US FWS, Sacramento, CA (Attn: Joseph Terry)

Appendix D

USFWS Biological Opinion



United States Department of the Interior



In Reply Refer to:
08ESMF00-
2016-F-1522

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

NOV 04 2016

Holly N. Costa
Attn: Justin Yee
Department of the Army
San Francisco District, Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

Subject: Formal Consultation on the Ostwald Water Line Replacement Project in Upper Los Gatos Creek near the Town of Los Gatos, Santa Clara County, California (U.S. Army Corps of Engineers [Corps] file number 2015-00452S)

Dear Ms. Costa:

This letter is in response to the Corps' April 26, 2016, request for initiation of formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed Ostwald Water Line Replacement Project (proposed project) in and adjacent to upper Los Gatos Creek in the community of Aldercroft Heights south of the Town of Los Gatos, Santa Clara County, California (Corps file number 2015-00452S). Your request was received by the Service on April 28, 2016. At issue are the proposed project's effects on the federally threatened California red-legged frog (*Rana draytonii*). This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402). Critical habitat has been designated for the California red-legged frog but does not occur within the action area for the proposed project.

The Federal action we are consulting on is the Corps' issuance of a permit to the San Jose Water Company (SJWC) pursuant to Section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. § 1344 *et seq.*) to temporarily impact 0.03 acre of jurisdictional wetlands and 0.70 acre of waters of the United States in upper Los Gatos Creek to replace approximately 1,500 linear feet of the Ostwald raw water intake pipeline via open trenching. Pursuant to 50 CFR 402.12(j), you submitted a biological assessment for our review and requested concurrence with the findings presented therein. These findings conclude that the proposed project may affect, and is likely to adversely affect the California red-legged frog.

The Corps requested that the proposed project be appended to the June 18, 2014, *Programmatic Biological Opinion for Issuance of Permits under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, including Authorizations Under 22 Nationwide Permits, for Project that May Affect the Threatened California Red-Legged Frog in Nine San Francisco Bay Area Counties, California* (Programmatic Biological Opinion) (Service file number 08ESMF00-2014-F-0389, Service 2014). The Service has determined that the proposed project meets the suitability criteria of, and is within the geographic area analyzed in, the Programmatic Biological Opinion. Therefore, this letter is an agreement by the Service to append the proposed project to the Programmatic Biological Opinion and represents the Service's biological opinion on the effects of the proposed project on the California red-legged frog.

By appending the proposed project to the Programmatic Biological Opinion, SJWC acknowledges and accepts all of the conservation measures outlined within the Programmatic Biological Opinion, including, but not limited to, the measures to minimize adverse effects. SJWC will also follow all reasonable and prudent measures, and all terms and conditions as directed by the Programmatic Biological Opinion. The Corps will ensure that SJWC meets all of these obligations.

In considering your request, we based our evaluation on the following: (1) your letter requesting formal consultation dated April 26, 2016; (2) the November 2015 *Ostwald Pipeline Replacement Project Biological Assessment* (Biological Assessment) (Denise Duffy & Associates, Inc. 2015); (3) the August 5, 2016, memorandum “Ostwald Pipeline Replacement Project Adjustment of Impacts to Potentially Jurisdictional Wetlands and Other Waters of the U.S.” (M. Johnson, Denise Duffy & Associates, Inc., *in litt.* 2016a); (4) the September 15, 2016, memorandum “Ostwald Pipeline Replacement Project Determination of California Red-Legged Frog Habitat Impact Level (Permanent vs. Temporary)” (M. Johnson, Denise Duffy & Associates, Inc., *in litt.* 2016b); (5) the Programmatic Biological Opinion (Service file number 08ESMF00-F-2014-0389, Service 2014); (6) electronic mail and conversations among the Corps, SJWC, Denise Duffy & Associates, Inc., and the Service; and (7) other information available to the Service.

The remainder of this document provides our biological opinion on the effects of the proposed project on the California red-legged frog.

Consultation History

- March 23, 2016: The Service received from the Corps the Pre-Construction Notification for the proposed project.
- April 28, 2016: The Service received the letter from the Corps requesting the initiation of formal consultation on the proposed project.
- June 15, 2016: The Service sent an electronic mail message to the Corps and Denise Duffy & Associates, Inc. requesting revised estimates of temporary and permanent habitat disturbance based on the definitions of “temporary” and “permanent” effects in the Programmatic Biological Opinion. The Service stated that habitat compensation may be required.
- August 5, 2016: The Service received from Denise Duffy & Associates, Inc. a memorandum clarifying the estimates of wetlands and other waters of the United States that would be disturbed by the proposed project (M. Johnson, Denise Duffy & Associates, Inc., *in litt.* 2016a).
- September 19, 2016: The Service received a memorandum from Denise Duffy & Associates, Inc. responding to the Service’s request for information on estimates of habitat disturbance (M. Johnson, Denise Duffy & Associates, Inc., *in litt.* 2016b).
- September 20, 2016: The Service sent an electronic mail message to Denise Duffy & Associates, Inc. and the Corps stating that SJWC should propose suitable habitat compensation for the California red-legged frog based on the revised estimates of habitat disturbance.
- October 10, 2016: The Service received an electronic mail message from Denise Duffy & Associates, Inc. proposing to purchase 1.8 acres of California red-legged frog

credits at the Ohlone Conservation Bank or the proposed Ohlone West Conservation Bank in Alameda County.

BIOLOGICAL OPINION

Description of the Proposed Project

SJWC will replace approximately 1,500 linear feet of the existing 30-inch wrapped steel raw water intake pipeline, which extends from the Ostwald Dam impoundment along Los Gatos Creek to an existing pipeline approximately 1,500 feet to the north, with a new 30-inch ductile iron pipeline with polyethylene encasement (for corrosion protection) (Figure 1). The replacement pipeline will be installed within the same alignment as the existing transmission line. The dam and intake facility have been in operation since 1960. Ostwald Dam is an approximately 100-foot wide inflatable rubber tube that impounds water from Los Gatos Creek for diversion into the intake facility on the east bank of the creek. The water is conveyed from the intake facility via a 30-inch diameter pipeline to the Montevina Water Treatment Plant for treatment and distribution.

The estimated width of impact for pipeline removal, installation, and equipment is approximately 30 feet in width. Staging for the proposed project will be located adjacent to the access road on the east side. The staging area has been estimated at 0.9 acre. The contractor will employ an open trenching technique to extract and replace the existing pipeline. Typical trench width will be approximately 52 inches. The depth will be determined by the grade of the existing pipe but is assumed to be about 5.5 feet. Dewatering of Los Gatos Creek will be required, and bypass pumping will be employed to transport flows downstream.

The existing maintenance road onsite consists of compacted dirt and gravel. SJWC will access the creek channel on the south end of the proposed project via the existing maintenance road. On the north end, SJWC will access the creek channel at the bridge where the pipe comes above ground. The creek channel is near the road, and access is possible with little grade change. Filter fabric will be placed over the access route and local import rock placed over the fabric. The filter fabric and imported rock will be removed after construction. SJWC also has an existing access route cut down the slope off their access road to the Ostwald Intake Facility. The proposed project will extend the access route to the creek with minimal grading.

Extraction and replacement of the existing pipeline will require heavy machinery including, but not limited to, a front loader, small crane, and an excavator. The machinery will be used to access the site and work within the stream channel. An existing ramp provides access from the intake facility access road to the east bank of Los Gatos Creek, below the dam.

Conservation Measures

SJWC and their contractors will implement the measures in the Programmatic Biological Opinion including the following measures to avoid and minimize effects on the California red-legged frog and its habitats during construction of the proposed project. These conservation measures are further described below.

1. SJWC will designate a point of contact for the project. Their name and telephone number will be provided to the Service no more than thirty (30) calendar days prior to the date of initial ground disturbance.

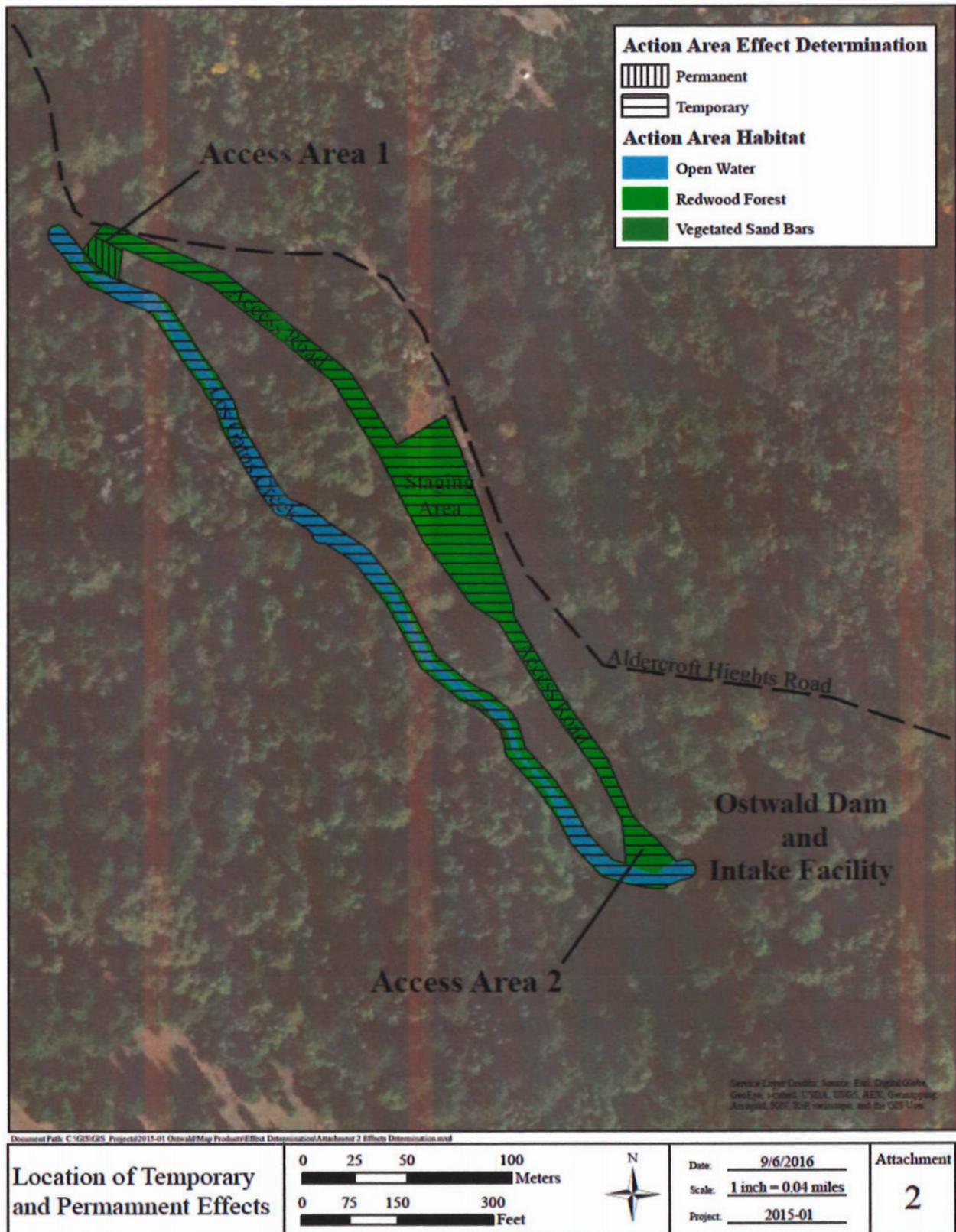


Figure 1. Map of proposed project area and habitats (copied from Attachment 2 in M. Johnson, Denise Duffy & Associates, Inc., *in litt.* 2016b).

2. A Service-approved biologist(s) will be onsite during all activities that may result in take of the California red-legged frog. The qualifications of the biologist(s) will be submitted to the Service for review and written approval at least thirty (30) calendar days prior to the date earthmoving is initiated at the project site.
3. No more than twenty-four (24) hours prior to the date of initial ground disturbance, a pre-construction survey for the California red-legged frog will be conducted by a Service-approved biologist at the project site. The survey will consist of walking the project limits and within the project site to ascertain the possible presence of the species. The Service-approved biologist will investigate all potential areas that could be used by the California red-legged frog for feeding, breeding, sheltering, movement, and other essential behaviors. This includes an adequate examination of mammal burrows, such as California ground squirrels or gophers. If any adults, subadults, juveniles, tadpoles, or eggs are found, the Service-approved biologist will contact the Service to determine if moving any of the individuals is appropriate. In making this determination the Service will consider if an appropriate relocation site exists. If the Service approves moving animals, SJWC will ensure the Service-approved biologist is given sufficient time to move the animals from the work site before ground disturbance is initiated. Only Service-approved biologists will capture, handle, and monitor the California red-legged frog.
4. The Service-approved biologist will implement the measures in the “Declining Amphibian Task Force Fieldwork Code of Practice” to avoid the introduction and spread of amphibian diseases (<http://www.fws.gov/ventura/docs/species/protocols/DAFTA.pdf>).
5. The Service-approved biologist(s) will be given the authority to freely communicate verbally, by telephone, electronic mail, or in writing at any time with construction personnel, any other person(s) at the project site, otherwise associated with the proposed project, the Service, the California Department of Fish and Wildlife (CDFW), or their designated agents. The Service-approved biologist will have oversight over implementation of all the avoidance and minimization measures, and will have the authority and responsibility to stop project activities if they determine any of the associated requirements are not being fulfilled. If the Service-approved biologist(s) exercises this authority, the Service will be notified by telephone and electronic mail within twenty-four (24) hours. The Service contact is the Coast/Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at telephone (916) 414-6623.
6. The Service-approved biologist will conduct employee education training for employees working on earthmoving and/or construction activities. Personnel will be required to attend the presentation which will describe the California red-legged frog, avoidance, minimization, and conservation measures, legal protection of the animal, and other related issues. All attendees will sign an attendance sheet along with their printed name, company or agency, email address, and telephone number. The original sign-in sheet will be sent to the Service within seven (7) calendar days of the completion of the training.
7. SJWC will minimize adverse effects to the California red-legged frog by limiting, to the maximum extent possible, the number of access routes, construction areas, equipment staging, storage, parking, and stockpile areas. Prior to the date of initial ground disturbance at the project site, equipment staging areas, site access routes, construction equipment and personnel parking areas, debris storage areas, and any other areas that may be disturbed will be identified, surveyed by the Service-approved biologist, and clearly identified with 5-foot tall bright orange plastic fencing. The fencing will be inspected by the Service-approved

biologist and maintained daily by the applicant until the last day that construction equipment is at the project.

8. To the extent practicable, initial ground-disturbing activities will be avoided between November 1 and March 31 because that is the time period when the California red-legged frog is most likely to be moving through upland areas. When ground-disturbing activities must take place between November 1 and March 31, the Corps through the applicant will ensure that daily monitoring by the Service-approved biologist is completed for the California red-legged frog.
9. To minimize harassment, injury, death, and harm in the form of temporary habitat disturbances, all project-related vehicle traffic will be restricted to established roads, construction areas, equipment staging, storage, parking, and stockpile areas. These areas will be included in pre-construction surveys and, to the maximum extent possible, established in locations disturbed by previous activities to prevent further adverse effects. Project-related vehicles will observe a 20-mile per hour speed limit within construction areas, except on County roads, and State and Federal highways. Off-road traffic outside of designated and fenced project work areas will be prohibited.
10. If a work site is to be temporarily dewatered by pumping, intakes shall be completely screened with wire mesh not larger than 5 millimeters to prevent California red-legged frogs from entering the pump system. Water shall be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow shall be removed in a manner that would allow flow to resume with the least disturbance to the substrate.
11. SJWC will maintain all construction equipment to prevent leaks of fuels, lubricants, or other fluids.
12. Each encounter with the California red-legged frog will be treated on a case-by-case basis in coordination with the Service, but the general procedure is as follows: (1) the animal will not be disturbed if it is not in danger; or (2) the animal will be moved to a secure location if it is in any danger. These procedures are further described below:
 - a. When a California red-legged frog is encountered in the action area, all activities which have the potential to result in the harassment, injury, or death of the individual will be immediately halted. The Service-approved biologist will then assess the situation in order to select a course of action that will avoid or minimize adverse effects to the animal. To the maximum extent possible, contact with the California red-legged frog will be avoided, and the applicant will allow it to move out of the potentially hazardous situation to a secure location on its own volition. This procedure applies to situations where a California red-legged frog is encountered while it is moving to another location. It does not apply to animals that are uncovered or otherwise exposed or in areas where there is not sufficient adjacent habitat to support the species should the individual move away from the hazardous location.
 - b. Any California red-legged frog that is in danger will be relocated and released by the Service-approved biologist outside the construction area within the same riparian area or watershed. If relocation of the California red-legged frog outside the fence is not feasible (*i.e.*, there are too many individuals observed per day), the biologist will relocate the animals to a Service pre-approved location. Prior to the initial ground disturbance, the

applicant will obtain approval of the relocation protocol from the Service in the event that a California red-legged frog is encountered and needs to be moved away from the project site. Under no circumstances will a California red-legged frog be released on a site unless the written permission of the landowner has been obtained by SJWC.

- c. The Service-approved biologist will limit the duration of the handling and captivity of the California red-legged frog to the minimum amount of time necessary to complete the task. If the animal must be held in captivity, it will be kept in a cool, dark, moist, aerated environment, such as a clean and disinfected bucket or plastic container with a damp sponge. The container used for holding or transporting the individual will not contain any standing water.
 - d. SJWC will immediately notify the Service once the California red-legged frog and the site is secure. The contact for this situation is the Coast/Bay Division Chief of the Endangered Species Program by email and at telephone (916) 414-6623.
13. Uneaten human food and trash attracts crows, ravens, coyotes, and other predators of the California red-legged frog. A litter control program will be instituted at each project site. All workers will ensure their food scraps, paper wrappers, food containers, cans, bottles, and other trash are deposited in covered or closed trash containers. The trash containers will be removed from the project site at the end of each working day.
 14. Restoration and re-vegetation work for temporary effects will be implemented using native California plant species collected on-site or from local sources (*i.e.*, local ecotype). Native or non-native plant species and material from non-local sources will be utilized only with prior written authorization from the Service. All topsoil from natural lands will be removed, cached, and returned to the site according to Service-approved restoration protocols.
 15. Loss of soil from run-off or erosion will be prevented with straw bales, straw wattles, or similar means provided they do not entangle or block escape or dispersal routes of the California red-legged frog.
 16. SJWC will not apply insecticides or herbicides at the project site during construction or long-term operational maintenance where there is the potential for these chemical agents to enter creeks, streams, waterbodies, or uplands that contain potential habitat for the California red-legged frog.
 17. No pets will be permitted at the project site, to avoid and minimize the potential for harassment, injury, and death of the California red-legged frog.
 18. No firearms will be allowed at the project site except for those carried by authorized security personnel, or local, State, or Federal law enforcement officials to avoid and minimize the potential for harassment, injury, and death of the California red-legged frog.
 19. For onsite storage of pipes, conduits and other materials that could provide shelter for the California red-legged frog, an open-top trailer will be used to elevate the materials above ground. This is intended to reduce the potential for animals to climb into the conduits and other materials.
 20. To the maximum extent practicable, no construction activities will occur during rain events or within 24 hours following a rain event. Prior to construction activities resuming, a

Service-approved biologist will inspect the action area and all equipment/materials for the presence of California red-legged frogs. The animals will be allowed to move away from the project site of their own volition or moved by the Service-approved biologist.

21. To the maximum extent practicable, night-time construction will be minimized or avoided by the applicant. Because dusk and dawn are often the times when the California red-legged frog is most actively moving and foraging, to the maximum extent practicable, earthmoving and construction activities will cease no less than 30 minutes before sunset and will not begin again prior to no less than 30 minutes after sunrise. Except when necessary for driver or pedestrian safety, to the maximum extent practicable, artificial lighting at a project site will be prohibited during the hours of darkness.
22. Trenches or pits one (1) foot or deeper that are going to be left unfilled for more than forty-eight (48) hours will be securely covered with boards or other material to prevent the California red-legged frog from falling into them. If this is not possible, the applicant will ensure wooden ramps or other structures of suitable surface that provide adequate footing for the California red-legged frog are placed in the trench or pit to allow for their unaided escape. Auger holes or fence post holes that are greater than 1.0 inch in diameter will be immediately filled or securely covered so they do not become pitfall traps for the California red-legged frog. The Service-approved biologist will inspect the trenches, pits, or holes prior to their being filled to ensure there are no California red-legged frogs in them. The trench, pit, or hole also will be examined by the Service-approved biologist each workday morning at least one hour prior to initiation of work and in the late afternoon no more than one hour after work has ceased to ascertain whether any individuals have become trapped. If the escape ramps fail to allow the animal to escape, the Service-approved biologist will remove and transport it to a safe location, or contact the Service for guidance.
23. SJWC will compensate at a 1:1 ratio for temporary effects and a 3:1 ratio for permanent effects by purchasing 1.8 acres of California red-legged frog credits at the Ohlone Conservation Bank or the proposed Ohlone West Conservation Bank in Alameda County or other Service-approved location. SJWC will provide the funding for the California red-legged frog credits prior to the initiation of construction of the proposed project.

Action Area

The action area is defined in 50 CFR § 402.02, as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” For the proposed project, the approximately 2.5-acre action area encompasses the 1,500 linear feet of pipeline proposed for replacement, an associated 30-foot wide buffer of the pipeline included for construction equipment access, the 1,500 linear feet (0.73 acre) of Los Gatos Creek within the proposed project footprint, the existing access road, and the 0.9-acre staging area on the eastern side of the existing access road.

Analytical Framework for the Jeopardy Determination

In accordance with policy and regulation, the jeopardy analyses in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the California red-legged frog’s and range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the California red-legged frog in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the California red-legged frog; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any

interrelated or interdependent activities on the California red-legged frog; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the California red-legged frog.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the California red-legged frog's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of this species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the California red-legged frog and the role of the action area in the survival and recovery of the California red-legged frog as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

California Red-Legged Frog

Refer to pages 13 through 19 of the Programmatic Biological Opinion (Service 2014) for the current status of the California red-legged frog.

Environmental Baseline

The proposed project is located approximately 4.5 miles south of the Town of Los Gatos within the main stem of upper Los Gatos Creek, approximately 2 miles upstream from Lexington Reservoir and 2 miles downstream of Lake Elsmar in Santa Clara County, California. Hydrologic input for upper Los Gatos Creek is dominated by releases from the upstream reservoirs and surface runoff. The action area encompasses approximately 1,500 linear feet of upper Los Gatos Creek (Figure 1). The habitats within the action area are mapped in Figure 1 and described below.

Approximately 1.7 acres of redwood forest occur within the action area (Figure 1). Redwood forest is the dominant habitat and is located throughout the action area. Ground cover also includes an organic layer consisting mainly of redwood needles in various stages of decomposition. The redwood forest provides suitable upland dispersal habitat for the California red-legged frog within the action area. The understory of the majority of the redwood forest within the action area has been previously disturbed from the construction and on-going maintenance of the existing access roads and staging area.

Los Gatos Creek is a perennial stream. Approximately 0.7 acre of open water habitat occurs within the action area in Los Gatos Creek (Figure 1). A number of non-native fish species have been detected in Los Gatos Creek. They include bluegill, brown bullhead, carp, green sunfish, goldfish, largemouth bass, mosquito fish, pumpkinseed, and red shiner. The open water habitat within the action area provides suitable non-breeding aquatic foraging and dispersal habitat for the California red-legged frog. The presence of non-native fish degrades the quality of the open water habitat for the California red-legged frog.

Approximately 0.03 acre of vegetated sand and gravel bar habitat occurs within the action area (Figure 1). This habitat type is located as isolated wetlands associated with sediment deposition in Los Gatos Creek. The vegetated sand and gravel bar wetlands within the survey area are sparsely

vegetated with willow and sedge as dominant plants. Other wetland plants observed within this habitat type included western coltsfoot and common rush. The vegetated sand and gravel bar habitat provides suitable non-breeding aquatic foraging and dispersal habitat for the California red-legged frog.

Large pools with slow-moving water, capable of providing suitable California red-legged frog breeding habitat, are not present within the section of Los Gatos Creek within the action area. However, the nearby impoundment, constructed for the Ostwald Intake Facility, could provide suitable breeding habitat for the California red-legged frog. Therefore, Los Gatos Creek and the vegetated sand bar within the action area provide suitable non-breeding aquatic foraging and dispersal habitat for the California red-legged frog and the adjacent redwood forest provides suitable upland dispersal habitat for the California red-legged frog.

The action area occurs within the Central Coast recovery unit for the California red-legged frog (Service 2002). The recovery status for this unit is high, with many existing populations and many areas of high habitat suitability. The action area does not occur within a core area for the California red-legged frog. The nearest core area is the Watsonville Slough-Elkhorn Slough core area located about 0.9 mile to the southwest of the action area (Service 2002).

The California Natural Diversity Database (CNDDDB) reports the California red-legged frog as occurring within the action area in Los Gatos Creek where more than 20 California red-legged frogs were found chorusing in a small pond next to the Ostwald Dam in 1989 (CNDDDB occurrence number 17; CDFW 2016). The CNDDDB also reports the California red-legged frog as occurring about 0.7 mile south (upstream) of the action area where one adult California red-legged frog was found dead on a road next to Los Gatos Creek in 1989 (CNDDDB occurrence number 18; CDFW 2016). Based on the known occurrence of the California red-legged frog within and near the action area and the availability of suitable aquatic and upland habitat within the action area, the Service believes the California red-legged frog is likely to occur within the action area for the proposed project.

Effects of the Proposed Project

California Red-legged Frog

The proposed project will result in the temporary disturbance of about 0.73 acre of non-breeding aquatic habitat for the California red-legged frog along about 1,500 linear feet of Los Gatos Creek (0.70 acre of open water habitat and 0.03 acre of vegetated sand and gravel bar habitat) and 1.65 acres of previously disturbed redwood forest understory (Figure 1). The proposed project will also result in the permanent loss of about 0.05 acre of undisturbed redwood forest understory (Figure 1). Temporarily disturbed habitats will be revegetated and restored using native California plant species collected on-site or from local sources (*i.e.*, local ecotype). All topsoil from natural lands will be removed, cached, and returned to the site according to Service-approved restoration protocols. The Service considers the removal of 0.05 acre of undisturbed redwood forest understory as a permanent effect because the redwood forest understory would not be restored to pre-project conditions within one calendar year of the initial disturbance. The disturbance of open water and vegetated sand and gravel bar habitat within Los Gatos Creek will temporarily remove non-breeding aquatic foraging and dispersal habitat for the California red-legged frog. The disturbance of redwood forest understory habitat will remove upland habitat the California red-legged frog utilizes for foraging, sheltering, and dispersing. No redwood trees will be removed by the proposed project.

As noted previously in the Description of the Proposed Project section, SJWC has also proposed a set of conservation measures, including the commitment to provide compensatory habitat as a condition of the action. This compensatory habitat is intended to minimize the effect on the species of the proposed project's anticipated incidental take, resulting from the permanent loss of 0.05 acre and temporary disturbance of 1.65 acres of habitat described above. The compensatory habitat proposed will be in the form of the purchase of 1.80 acres of California red-legged frog credits at the Ohlone Conservation Bank or the proposed Ohlone West Conservation Bank in Alameda County or other Service-approved location. This component of the action will have the effect of protecting and managing lands for the species' conservation in perpetuity. The compensatory lands will provide suitable habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. Providing this compensatory habitat as part of a relatively large, contiguous block of conserved land may contribute to other recovery efforts for the species.

Any California red-legged frogs dispersing, foraging, or sheltering within the action area during construction could be injured or killed. California red-legged frogs could also be injured or killed if they were run over by heavy equipment or construction-related traffic. Dewatering activities could result in injury or mortality of California red-legged frogs if the frogs were entrained or trapped in the pumps. SJWC will minimize the potential for injury and mortality of California red-legged frogs during construction by: having a Service-approved biologist conduct pre-construction surveys of the work site to look for any signs of California red-legged frogs; requiring all construction employees be trained in the identification of the California red-legged frog and its habitats and the implementation of the avoidance and minimization measures; relocation of any California red-legged frogs from the action area by a Service-approved biologist; screening the pumps used for dewatering of the creek; and covering all open trenches or providing escape ramps.

Aquatic habitat for the California red-legged frog could be degraded if the proposed project resulted in a spill of fuel or other hazardous materials or increased sedimentation in Los Gatos Creek. SJWC and its contractors will minimize the potential for the degradation of aquatic habitat from a spill by implementing water quality best management practices, a Storm Water Pollution Prevention Plan, fueling equipment away from suitable aquatic habitat, implementing a spill prevention plan, and limiting work to the dry season.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. During this consultation, the Service did not identify any future non-federal actions that are reasonably certain to occur in the action area of the proposed project.

Conclusion

After reviewing the current status of the California red-legged frog, the environmental baseline for the action area, the effects of the proposed Ostwald Water Line Replacement Project, and the cumulative effects, it is the Service's biological opinion that the Ostwald Water Line Replacement Project, as proposed, fits within the parameters of the level of effects analyzed in the Programmatic Biological Opinion and is therefore not likely to jeopardize the continued existence of the California red-legged frog. We based this determination on the following: (1) successful implementation of the conservation measures described in this biological opinion will minimize the adverse effects on individual California red-legged frogs; (2) no suitable breeding habitat and only 0.73 acre of non-

breeding aquatic habitat for the California red-legged frog would be disturbed; (3) suitable non-breeding aquatic habitat and upland dispersal habitat will remain onsite; and (4) the purchase of 1.80 acres of California red-legged frog credits at the Ohlone Conservation Bank or proposed Ohlone West Conservation Bank in Alameda County or other Service-approved location.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or SJWC must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

California Red-legged Frog

The Service anticipates incidental take of individual California red-legged frogs will be difficult to detect or quantify because of the variable, unknown size of any resident population over time, their elusive and cryptic behavior, and the difficulty of finding killed or injured animals. Due to the difficulty in quantifying the number of California red-legged frogs that will be taken as a result of the proposed project, the Service is quantifying take incidental to the proposed project as the following:

1. The harassment, capture, and non-lethal harm of all adult, sub-adult, and juvenile California red-legged frogs within the 0.73 acre of non-breeding aquatic habitat and 1.65 acres of redwood forest understory temporarily disturbed and 0.05 acre of redwood forest understory permanently removed during construction of the proposed project.

2. The injury or mortality of one adult, sub-adult, or juvenile California red-legged frog.

Upon implementation of the following *Reasonable and Prudent Measures*, incidental take of California red-legged frog associated with the Ostwald Water Line Replacement Project will become exempt from the prohibitions described in section 9 of the Act. No other forms of take are exempted under this opinion.

Effect of the Take

The proposed project, as described, fits within the parameters of the level of take analyzed in the Programmatic Biological Opinion, and the Service has determined that this level of take is not likely to result in jeopardy to the California red-legged frog.

Reasonable and Prudent Measures

All necessary and appropriate measures to avoid or minimize effects on the California red-legged frog resulting from implementation of this project have been incorporated into the project's proposed conservation measures. Therefore, the Service believes the following Reasonable and Prudent Measure is necessary and appropriate to minimize incidental take of the California red-legged frog:

1. All conservation measures, as described in the biological assessment and restated here in the Description of the Proposed Project section of this biological opinion, shall be fully implemented and adhered to. Further, this Reasonable and Prudent Measure shall be supplemented by the Terms and Conditions below.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. The Corps shall include full implementation and adherence to the conservation measures as a condition of any permit or contract issued for the proposed project.

Monitoring

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the proposed project is approached or exceeded, the Corps or SJWC shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, the Corps must immediately reinitiate formal consultation as per 50 CFR 402.16.

- a. For those components of the action that may result in direct encounters between listed species and project workers and their equipment whereby incidental take in the form of harassment, harm, injury, or death is anticipated, the Corps shall immediately contact the Service's Sacramento Fish and Wildlife Office (SFWO) at (916) 414-6623 to report the encounter. If encounter occurs after normal working hours, the Corps shall contact the SFWO at the earliest possible opportunity the next working day. When injured or killed individuals of the listed species are found, the Corps shall follow the steps outlined in the Salvage and Disposition of Individuals section below.

Disposition of Individuals Taken

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact person is the Coast/Bay Division Chief of the Endangered Species Program at the SFWO at (916) 414-6623.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. Control bullfrogs, non-native tiger salamanders, and other invasive species and predators within suitable breeding habitat for the California red-legged frog.
2. Restore, preserve, and management in perpetuity under a Service-approved long-term management plan suitable aquatic breeding habitat and surrounding upland habitat for the California red-legged frog.
3. Construct wildlife crossings for California red-legged frogs and other special-status species in areas with high potential for vehicle strikes.
4. Report sightings of any listed or sensitive animal species to the CNDDDB of the CDFW. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on the Ostwald Water Line Replacement Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and:

- (a) If the amount or extent of taking specified in the incidental take statement is exceeded;
- (b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;

- (c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or
- (d) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this biological opinion, please contact Joseph Terry, Senior Biologist (Joseph_Terry@fws.gov), or Ryan Olah, Coast/Bay Division Chief (Ryan_Olah@fws.gov), at the letterhead address or at telephone (916) 943-6721 or (916) 414-6623.

Sincerely,



Jennifer M. Norris
Field Supervisor

Enclosure

LITERATURE CITED

California Department of Fish and Wildlife (CDFW). 2016. California Natural Diversity Database. RareFind version 5. Natural Heritage Division. Sacramento, California.

Denise Duffy & Associates, Inc. 2015. Ostwald Pipeline Replacement Project Biological Assessment. November. Prepared by Denise Duffy & Associates, Inc., Monterey, California, for the San Jose Water Company, San Jose, California. 33 pp. plus appendices.

U.S. Fish and Wildlife Service (Service). 2002. Recovery plan for the California red-legged frog (*Rana aurora draytonii*). Portland, Oregon. 173 pages.

_____. 2014. Programmatic Biological Opinion for Issuance of Permits under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, including Authorizations Under 22 Nationwide Permits, for Project that May Affect the Threatened California Red-Legged Frog in Nine San Francisco Bay Area Counties, California. U.S. Fish and Wildlife Service file number 08ESMF00-2014-F-0389. Sacramento Fish and Wildlife Office, Sacramento, California. 31 pp.

***In Litt.* References**

Johnson, Matthew. 2016a. Memorandum from Senior Environmental Scientist/GIS Manager, Denise Duffy & Associates, Inc., Monterey, California, to Justin Yee, U.S. Army Corps of Engineers, San Francisco, California, and Joseph Terry, Senior Biologist, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California, dated August 5, 2016. Subject: Ostwald Pipeline Replacement Project Adjustment of Impacts to Potentially Jurisdictional Wetlands and Other Waters of the U.S.

Johnson, Matthew. 2016b. Memorandum from Senior Environmental Scientist/GIS Manager, Denise Duffy & Associates, Inc., Monterey, California, to Justin Yee, U.S. Army Corps of Engineers, San Francisco, California, and Joseph Terry, Senior Biologist, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California, dated September 15, 2016. Subject: Ostwald Pipeline Replacement Project Determination of California Red-Legged Frog Habitat Impact Level (Permanent vs. Temporary).

Enclosure:

California Red-legged Frog Programmatic Biological Opinion



United States Department of the Interior
FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846



In Reply Refer To:
FF08ESMF00-2014-F-0389

JUN 18 2014

Ms. Jane M. Hicks
Regulatory Division
U.S. Army Corps of Engineers
1455 Market Street 16th Floor
San Francisco, California 94103-1398

Subject: Programmatic Biological Opinion for Issuance of Permits under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, including Authorizations Under 22 Nationwide Permits, for Projects that May Affect the Threatened California Red-Legged Frog in Nine San Francisco Bay Area Counties, California

Dear Ms. Hicks:

This is the U.S. Fish and Wildlife Service's (Service) programmatic biological opinion for issuance of permits under Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act (RHA), including 22 Nationwide Permits, in Marin, Napa, Solano, Sonoma, Contra Costa, Alameda, San Francisco, San Mateo, and Santa Clara counties, California. Nationwide Permits are authorized by the U.S. Army Corps of Engineers (Corps) under the Clean Water Act (33 U.S.C. 1251 *et seq.*). At issue are the adverse effects on the threatened California red-legged frog (*Rana draytonii*) and its designated critical habitat. This programmatic biological opinion was prepared under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*)(Act).

The Corps may append activities authorized under CWA and RHA permits in the nine San Francisco Bay Area counties (Bay Area counties) to this programmatic biological opinion with the concurrence of the Service provided the activities meet the suitability criteria for the threatened amphibian and its critical habitat, or the Service determines that implementation of appropriate additional conservation measures sufficiently reduces the effects of the action consistent with the intent of this programmatic biological opinion.

This programmatic biological opinion is based on: (1) recovery plan for the California red-legged frog (Service 2002); (2) designated critical habitat for the California red-legged frog (Service 2010); and (3) other information available to the Service.

ADMINISTRATION OF THE PROGRAMMATIC BIOLOGICAL OPINION

This programmatic consultation will be implemented when the Corps makes a determination that a proposed project that qualifies for authorization under one of the 22 Nationwide Permits described in the Project Description, or otherwise meets the suitability criteria set forth in this document, may affect the California red-legged frog and/or its critical habitat, as required by the implementing

regulations for section 7 of the Act. The Corps will then provide the Service with all of the written documentation utilized to formulate its determination. Upon receipt of the appropriate information, the Service will review the material and append the project to this programmatic biological opinion, or we will issue a letter stating the project is not likely to affect the California red-legged frog. At the Service's discretion, an individual biological opinion will be completed for the Nationwide or other Corps permit action; or if, in addition to the California red-legged frog, other listed species also will be adversely affected, the proposed action will be appended to this programmatic biological opinion and a biological opinion completed for the additional listed species. Both the appendage and the biological opinion will then be combined into a single document by the Service that will be issued to the Corps.

A key element of this programmatic biological opinion is that each separate permit action appended will have minimal effects and low levels of incidental take of the California red-legged frog. Projects not appropriate to be appended to this biological opinion are those that exceed minimal effects to this species, including direct, indirect, and cumulative effects and these would require separate consultation. At the Service's discretion, proposed actions that do not meet the suitability criteria may still be appended, if the complete implementation of appropriate additional conservation measures sufficiently reduces the effects of the action or that the project has minimal effects that are consistent with the intent of this programmatic biological opinion.

This programmatic biological opinion is effective for a period of five (5) calendar years from the date of its issuance and can be extended if deemed appropriate by both agencies. The Service will review this programmatic consultation, as appropriate, to ensure that its application is consistent with the intended criteria.

BIOLOGICAL OPINION

Description of the Proposed Action

Project Description

For this programmatic biological opinion, actions authorized by the Corps that may be appended consist of a variety of activities that may result in the incidental take of the California red-legged frog on 1.0 acre or less per project of suitable upland red-legged frog habitat, including areas within 300 feet of the top of bank of a creek, stream, waterbody, or wetland, or up to 1.0 acre of aquatic habitat/waters of the United States, or a combination of uplands and wetlands that is not larger than 1.0 acre in size. The Corps and the Service may determine on a case by case basis that projects larger than one acre can be appended to this programmatic biological opinion. Based on the following criteria: the action has minimal effects to the frog, the action is consistent with the intent of the biological opinion and appropriate conservation measures are included. Each project appended to this programmatic biological opinion may result in temporary effects and/or permanent effects. For the purposes of this biological opinion, temporary effects and permanent effects are defined as:

1. Temporary effects: The effects resulting from a Nationwide or other Corps permit-authorized activity are short term and do not result in effects to California red-legged frog habitat that are longer than one year; all habitats will be restored to better or equal to before the impact within one calendar year following disturbance. Disturbance may include alteration or reduction in vegetative cover or suitable aestivation sites, such as root wads, rodent burrows, or other forms

of cover. An elevation in ambient noise level, for example, also may be considered a disturbance. Temporary effects are those that denude, manipulate, or otherwise modify habitats from their existing, pre-project conditions as a result of project activities that include, but are not limited to, construction, staging, storage, lay down, vehicle access, borrow sites, disposal areas, vehicle parking, dredging, and vegetation removal. In order to be considered a temporary effect, the affected site must be restored to baseline habitat values or higher within one calendar year following the date of initial disturbance.

2. Permanent effects: The effects resulting from project activities which remove existing habitat or essential habitat components that cannot be restored to pre-project conditions of equal or greater value within one calendar year of the date of initial disturbance.

Projects that meet the suitability criteria and may involve some or all of the preceding activities are often authorized under the Corps' Nationwide Permit program. To guide the Corps during project evaluation, the Service has reviewed the Nationwide Permits the Corps has issued under 33 CFR 330.3 and has determined that projects typically authorized under the Nationwide Permits listed below may be appropriate for appendage to this programmatic biological opinion:

- (#3) Maintenance.
- (#5) Scientific Measuring Devices.
- (#6) Survey Activities.
- (#7) Outfall Structures.
- (#12) Utility Line Discharges.
- (#13) Bank Stabilization, provided that activity is less than fifty (50) feet in length.
- (#14) Road Crossings.
- (#15) U.S. Coast Guard Approved Bridges.
- (#17) Hydropower Projects.
- (#18) Minor Discharges.
- (#19) Minor Dredging.
- (#23) Approved Categorical Exclusions.
- (#25) Structural Discharges.
- (#27) Wetland and Riparian Restoration and Creation Activities.
- (#31) Maintenance of Existing Flood Control Facilities.
- (#32) Completed Enforcement Actions.
- (#33) Temporary Construction, Access and Dewatering.
- (#37) Emergency Watershed Protection and Rehabilitation.
- (#38) Cleanup of Hazardous and Toxic Waste.
- (#44) Mining Activities.
- (#45) Repair of Uplands Damaged by Discrete Events.
- (#46) Discharges in Ditches.

Suitability Criteria

To make use of this programmatic biological opinion, the Corps will ensure that each Nationwide or other permit activity that is proposed for appendage satisfies the following criteria:

1. The California red-legged frog has been found to inhabit or utilize the action area through the result of a Service-approved protocol survey; or, the action area contains suitable habitat for breeding, foraging, aestivation, movement, or other essential behaviors; or the Corps is assuming

the species will be affected by the proposed action.

2. Each Nationwide or other permit activity appended to this programmatic biological opinion adversely affects no more than 1.0 acre of suitable California red-legged frog upland habitat and no more than 1.0 acre of aquatic habitat. This includes equipment staging areas, site access routes, laydown areas, construction, equipment storage, vehicle parking areas; and stockpile and debris storage areas.
3. Activities authorized under Nationwide and other Corps permits may adversely affect the California red-legged frog through mortality, injury, harassment, capture, trap or harm, or temporary disturbance or permanent loss of the species' aquatic and upland habitats. This includes areas with suitable habitat for California red-legged frog movement. The projects will not occur in locations where the populations are so small and/or isolated that even the minor effects described in the programmatic biological opinion may have substantial adverse effects to the long-term survival and viability of the species within the recovery unit.
4. The measures to reduce and/or avoid adverse effects to the California red-legged frog described in the Conservation Measures of this programmatic biological opinion will be fully implemented by the Corps through the applicant. The measures may be modified on a project-specific basis upon written concurrence by the Service.
5. The Corps through the applicant will include enhancement, creation, or construction of habitat connectivity and safe wildlife passage across roads, whenever possible, as a conservation measure for Nationwide and other permit activities submitted for appendage to this programmatic biological opinion.
6. Nationwide and other permits appended to this programmatic biological opinion are not interdependent or interrelated with other projects being proposed or implemented by the Corps through the applicant, other government agencies, or other parties. This includes actions which have been separated from each other as a result of funding, authorizations, or other constraints.
7. The Corps through the applicant will provide the following information to the Service with their request for appending each Nationwide or other permit action to this programmatic biological opinion:
 - a. Corps Permit Application including Assessor's Parcel Number(s), Universal Transverse Mercator (UTM) coordinates, and street address of the project;
 - b. Corps-verified jurisdictional determination;
 - c. Written description of the project, including but not limited to, construction methods, types and numbers of equipment, specific dates the work will occur, habitat restoration, conservation measures that will be fully implemented, and a monitoring plan for the California red-legged frog. The description will include the location and size of construction areas, borrow sites, laydown areas, parking areas, disposal sites, and other associated activities;
 - d. A 7.5 minute U.S. Geological Survey topographic map or similar high-quality color topographic map clearly marked with the precise location of the project, construction areas,

borrow sites, laydown areas, parking areas, disposal sites, restoration sites, California red-legged frog relocation sites, and other associated activities;

- e. A map showing known listed plant populations and listed animal sightings, from the California Department of Fish and Wildlife's Natural Diversity Data Base, and other sources, recorded within the action area and within a 10-mile radius of the project site;
- f. A map (scale 1" =100') delineating the major vegetation communities present on and adjacent to the project site. Color photographs of the major vegetation communities present on the project site will be included with the document, with the locations of where they were taken indicated on the vegetation map;
- g. One plan view and a minimum of one typical cross section indicating water bodies, vegetation types, work areas, roads, restoration sites, refueling, storage, parking, and staging areas;
- h. The names and complete curriculum vitae of the biologist(s) who are being proposed to conduct pre-construction surveys, and monitor and handle California red-legged frog;

Conservation Measures

The Project Description includes the Conservation Measures that the Corps through the applicant will fully implement to avoid, minimize, and compensate for the direct effects, indirect effects, both temporary and permanent, and cumulative effects to the California red-legged frog from Nationwide and other Corps permits expected to occur in the nine San Francisco Bay Area counties.

1. For any project with greater than 0.5 acre of permanent impacts to suitable aquatic California red-legged frog habitat, and for any project with greater than 0.5 acre of suitable upland California red-legged frog habitat, the Corps will ensure harm to the California red-legged frog Nationwide or other permit action is minimized by the submittal of an appropriate habitat compensation proposal and, if appropriate, a restoration, monitoring, and management plan, at least thirty (30) calendar days prior to the date of initial ground disturbance (described in Compensation Section below).
2. When constructing a road improvement, wherever possible, the Corps through the applicant will enhance or construct wildlife passage for the California red-legged frog across roads, highways, or other anthropogenic barriers. This includes upland culverts, tunnels, or overcrossings designed specifically for wildlife movement, as well as making accommodations for terrestrial wildlife movement through culverts that convey hydrology.
3. The Corps will ensure the applicant implements the conservation measures of this programmatic biological opinion, and the appendage. The Corps will ensure the applicant designates a point of contact for the project. The point of contact will maintain a copy of this biological opinion and the appendage onsite for the duration of the construction period. Their name and telephone number will be provided to the Service no more than thirty (30) calendar days prior to the date of initial ground disturbance. At least fourteen (14) calendar days prior to the date of initial ground disturbance, the Corps will ensure the applicant submits a signed letter to the Service verifying that they possess a copy of this programmatic biological opinion and the appendage, and have read and fully understand their responsibilities.

4. If verbally requested before, during, or upon completion of ground disturbance and construction activities, the applicant will ensure the Service, California Department of Fish and Wildlife, and/or their designated agents can immediately and without delay, access and inspect the project site for compliance with the project description, conservation measures, and reasonable and prudent measures of this programmatic biological opinion and appendage, and to evaluate project effects to the California red-legged frog and its habitat.
5. A Service-approved biologist(s) will be onsite during all activities that may result in take of the California red-legged frog. The qualifications of the biologist(s) will be submitted to the Service for review and written approval at least thirty (30) calendar days prior to the date earthmoving is initiated at the project site. The Service-approved biologist(s) will keep a copy of this programmatic biological opinion and the appendage in their possession when onsite.
6. No more than twenty-four (24) hours prior to the date of initial ground disturbance, a pre-construction survey for the California red-legged frog will be conducted by a Service-approved biologist at the project site. The survey will consist of walking the project limits and within the project site to ascertain the possible presence of the species. The Service-approved biologist will investigate all potential areas that could be used by the California red-legged frog for feeding, breeding, sheltering, movement, and other essential behaviors. This includes an adequate examination of mammal burrows, such as California ground squirrels or gophers. If any adults, subadults, juveniles, tadpoles, or eggs are found, the Service-approved biologist will contact the Service to determine if moving any of the individuals is appropriate. In making this determination the Service will consider if an appropriate relocation site exists. If the Service approves moving animals, the Corps through the applicant will ensure the Service-approved biologist is given sufficient time to move the animals from the work site before ground disturbance is initiated. Only Service-approved biologists will capture, handle, and monitor the California red-legged frog.
7. The Service-approved biologist(s) will be given the authority to freely communicate verbally, by telephone, electronic mail, or in writing at any time with construction personnel, any other person(s) at the project site, otherwise associated with the project, the Service, the Department, or their designated agents. The Service-approved biologist will have oversight over implementation of all the conservation measures in this programmatic biological opinion, and, through the applicant, will have the authority and responsibility to stop project activities if they determine any of the associated requirements are not being fulfilled. If the Service-approved biologist(s) exercises this authority, the Service will be notified by telephone and electronic mail within twenty-four (24) hours. The Service contact is the Coast Bay Foothills Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at telephone (916) 414-6600.
8. The Service-approved biologist will conduct employee education training for employees working on earthmoving and/or construction activities. Personnel will be required to attend the presentation which will describe the California red-legged-frog, avoidance, minimization, and conservation measures, legal protection of the animal, and other related issues. All attendees will sign an attendance sheet along with their printed name, company or agency, email address, and telephone number. The original sign-in sheet will be sent to the Service within seven (7) calendar days of the completion of the training.

9. The Corps through the applicant will minimize adverse effects to the California red-legged frog by limiting, to the maximum extent possible, the number of access routes, construction areas, equipment staging, storage, parking, and stockpile areas. Prior to the date of initial ground disturbance at the project site, equipment staging areas, site access routes, construction equipment and personnel parking areas, debris storage areas, and any other areas that may be disturbed will be identified, surveyed by the Service-approved biologist, and clearly identified with 5-foot tall bright orange plastic fencing. The fencing will be inspected by the Service-approved biologist and maintained daily by the applicant until the last day that construction equipment are at the project.
11. To the extent practicable, initial ground-disturbing activities will be avoided between November 1 and March 31 because that is the time period when California red-legged frogs are most likely to be moving through upland areas. When ground-disturbing activities must take place between November 1 and March 31, the Corps through the applicant will ensure that daily monitoring by the Service-approved biologist is completed for the California red-legged frog.
12. To minimize harassment, injury death, and harm in the form of temporary habitat disturbances, all project-related vehicle traffic will be restricted to established roads, construction areas, equipment staging, storage, parking, and stockpile areas. These areas will be included in pre-construction surveys and, to the maximum extent possible, established in locations disturbed by previous activities to prevent further adverse effects. Project-related vehicles will observe a 20-mile per hour speed limit within construction areas, except on County roads, and State and Federal highways. Off-road traffic outside of designated and fenced project work areas will be prohibited.
13. The Corps through the applicant will ensure bio-swales and bio-filtration are installed at the project site adjacent to roadways to avoid and minimize sediment loading and point source pollutants.
14. Stormwater pollution prevention plans (SWPPPs) and erosion control BMPs will be developed and implemented to minimize any wind- or water-related erosion and will be in compliance with the requirements of the Corps. The applicant will include provisions in construction contracts for measures to protect sensitive areas and prevent and minimize stormwater and non-stormwater discharges. Protective measures will include, at a minimum, those listed below.
 - a. No discharge of pollutants from vehicle or equipment cleaning will be allowed into any storm drains or water courses.
 - b. Vehicle and equipment fueling and maintenance operations will be at least 50 feet away from water courses, except at established commercial gas stations or established vehicle maintenance facilities.
 - c. Concrete waste and water from curing operations will be collected in washouts and will be disposed of and not allowed into water courses.

- d. Spill containment kits will be maintained onsite at all times during construction operations and/or staging or fueling of equipment.
 - e. Dust control measures will include use of water trucks and organic tackifiers to control dust in excavation-and-fill areas, covering temporary access road entrances and exits with rock (rocking), and covering of temporary stockpiles when weather conditions require.
15. If a work site is to be temporarily dewatered by pumping, intakes shall be completely screened with wire mesh not larger than five millimeters to prevent California red-legged frogs from entering the pump system. Water shall be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow shall be removed in a manner that would allow flow to resume with the least disturbance to the substrate.
 16. The Corps through the applicant will maintain all construction equipment to prevent leaks of fuels, lubricants, or other fluids.
 17. Each encounter with the California red-legged frog will be treated on a case-by-case basis in coordination with the Service, but the general procedure is as follows: (1) the animal will not be disturbed if it is not in danger; or (2) the animal will be moved to a secure location if it is in any danger. These procedures are further described below:
 - a. When a California red-legged frog is encountered in the action area, all activities which have the potential to result in the harassment, injury, or death of the individual will be immediately halted. The Service-approved biologist will then assess the situation in order to select a course of action that will avoid or minimize adverse effects to the animal. To the maximum extent possible, contact with the frog will be avoided and the applicant will allow it to move out of the potentially hazardous situation to a secure location on its own volition. This procedure applies to situations where a California red-legged frog is encountered while it is moving to another location. It does not apply to animals that are uncovered or otherwise exposed or in areas where there is not sufficient adjacent habitat to support the species should the individual move away from the hazardous location.
 - b. California red-legged frogs that are in danger will be relocated and released by the Service-approved biologist outside the construction area within the same riparian area or watershed. If relocation of the frog outside the fence is not feasible (i.e., there are too many individuals observed per day), the biologist will relocate the animals to a Service pre-approved location. Prior to the initial ground disturbance, the applicant will obtain approval of the relocation protocol from the Service in the event that a California red-legged frog is encountered and needs to be moved away from the project site. Under no circumstances will a California red-legged frog be released on a site unless the written permission of the landowner has been obtained by the applicant.

The Service-approved biologist will limit the duration of the handling and captivity of the California red-legged frog to the minimum amount of time necessary to complete the task. If the animal must be held in captivity, it will be kept in a cool, dark, moist, aerated environment, such as a clean and disinfected bucket or plastic container with a damp sponge. The container used for holding or transporting the individual will not contain any standing water.

- c. The applicant will immediately notify the Service once the California red-legged frog and the site is secure. The contact for this situation is the Coast Bay Foothills Division Chief of the Endangered Species Program by email and at telephone (916) 414-6600.
18. Uneaten human food and trash attracts crows, ravens, coyotes, and other predators of the California red-legged frog. A litter control program will be instituted at each project site. All workers will ensure their food scraps, paper wrappers, food containers, cans, bottles, and other trash are deposited in covered or closed trash containers. The trash containers will be removed from the project site at the end of each working day.
19. All grindings and asphaltic-concrete waste may be temporarily stored within previously disturbed areas absent of habitat and at a minimum of 150 feet from any culvert, pond, creek, stream crossing, or other waterbody. On or before the date of project completion, the waste will be transported to an approved disposal site.
20. Restoration and re-vegetation work for temporary effects will be implemented using native California plant species collected on-site or from local sources (i.e., local ecotype). Native or non-native plant species and material from non-local sources will be utilized only with prior written authorization from the Service. All topsoil from natural lands will be removed, cached, and returned to the site according to Service-approved restoration protocols.
21. Loss of soil from run-off or erosion will be prevented with straw bales, straw wattles, or similar means provided they do not entangle, block escape or dispersal routes of the California red-legged frog.
22. The Corps through the applicant will not apply insecticides or herbicides at the project site during construction or long-term operational maintenance where there is the potential for these chemical agents to enter creeks, streams, waterbodies, or uplands that contain potential habitat for the California red-legged frog.
23. No pets will be permitted at the project site, to avoid and minimize the potential for harassment, injury and death of the California red-legged frog.
24. No firearms will be allowed at the project site except for those carried by authorized security personnel, or local, State, or Federal law enforcement officials to avoid and minimize the potential for harassment, injury and death of the California red-legged frog.
25. For onsite storage of pipes, conduits and other materials that could provide shelter for California red-legged frogs, an open-top trailer will be used to elevate the materials above ground. This is intended to reduce the potential for animals to climb into the conduits and other materials.
26. To the maximum extent practicable, no construction activities will occur during rain events or within 24-hours following a rain event. Prior to construction activities resuming, a Service-approved biologist will inspect the action area and all equipment/materials for the presence of California red-legged frogs. The animals will be allowed to move away from the project site of their own volition or moved by the Service-approved biologist.

27. To the maximum extent practicable, night-time construction will be minimized or avoided by the applicant. Because dusk and dawn are often the times when the California red-legged frog is most actively moving and foraging, to the maximum extent practicable, earthmoving and construction activities will cease no less than 30 minutes before sunset and will not begin again prior to no less than 30 minutes after sunrise. Except when necessary for driver or pedestrian safety, to the maximum extent practicable, artificial lighting at a project site will be prohibited during the hours of darkness.
28. Plastic monofilament netting (erosion control matting), loosely woven netting, or similar material in any form will not be used at the project site because California red-legged frogs can become entangled and trapped in them. Any such material found on site will be immediately removed by the Service-approved biologist, construction personnel, or the applicant. Materials utilizing fixed weaves (strands cannot move), polypropylene, polymer or other synthetic materials will not be used.
29. Dust control measures will be implemented during construction, or when necessary in the opinion of the Service-approved biologist, Service, California Department of Fish and Wildlife, or their authorized agent. These measures will consist of regular truck watering of construction access areas and disturbed soil areas with water or organic soil stabilizers to minimize airborne dust and soil particles generated from graded areas. Regular truck watering will be a requirement of the construction contract. Watering guidelines for truck watering will be established to avoid any excessive run-off that may flow into contiguous or adjacent areas containing potential habitat for the California red-legged frog.
30. Trenches or pits one (1) foot or deeper that are going to be left unfilled for more than forty-eight (48) hours will be securely covered with boards or other material to prevent the California red-legged frog from falling into them. If this is not possible, the applicant will ensure wooden ramps or other structures of suitable surface that provide adequate footing for the California red-legged frog are placed in the trench or pit to allow for their unaided escape. Auger holes or fence post holes that are greater than 0.10 inch in diameter will be immediately filled or securely covered so they do not become pitfall traps for the California red-legged frog. The Service-approved biologist will inspect the trenches, pits, or holes prior to their being filled to ensure there are no California red-legged frogs in them. The trench, pit, or hole also will be examined by the Service-approved biologist each workday morning at least one hour prior to initiation of work and in the late afternoon no more than one hour after work has ceased to ascertain whether any individuals have become trapped. If the escape ramps fail to allow the animal to escape, the Service-approved biologist will remove and transport it to a safe location, or contact the Service for guidance.
31. The Service-approved biologist(s) will permanently remove any aquatic exotic wildlife species, such as bullfrogs and crayfish from the project site, to the maximum extent possible.
32. The Corps will ensure the applicant reports any information to the Service about take or suspected take of listed wildlife species not exempted by this programmatic biological opinion. The Service will be notified via electronic mail and telephone within twenty-four (24) hours from the time the information is received by the applicant. Notification will include the species, number of individuals, sex (if known), date, time, location of the incident or of the finding of a dead or injured animal, how the individual was taken, photographs of the specific animal, and names of the persons who observe the take and/or found the animal. The

individual animal will be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contacts are the Chief of the Coast Foothill Division, Endangered Species Program, Sacramento Fish and Wildlife Office at (916) 414-6600, and Resident Agent-in-Charge of the Service's Law Enforcement Division at (916) 569-8444.

Compensation

Compensation measures include protecting and managing habitat at a secure location to minimize the harm of the California red-legged frog caused by alteration, disturbance, or destruction of its habitat. The Corps through the applicant will provide compensation in the form of in-perpetuity habitat protection for any project appended to this BO with greater than 0.5 acre of permanent impacts to suitable California red-legged frog habitat. An area of non-habitat is not necessarily an area absent of vegetation. Shoulder areas or right-of-way that lack vegetative cover may function in a landscape highly fragmented by linear structures, such as roads, railways, and canals, as a corridor for dispersal, or potential refugia areas despite the appearance of degradation. The compensation ratios for adverse effects are as follows:

California Red-legged Frog Habitat Compensation

Level of Effect	Compensation Ratio
Permanent	3:1
Temporary	1:1*

* this often is in the form of on-site restoration in Waters of the United States.

The Corps will ensure the applicant provides in-kind habitat as part of the compensation for projects appended to this programmatic biological opinion. Aquatic habitat will be provided for adverse effects to aquatic habitat, and upland habitat will be protected for damage or loss of upland habitat. The applicant will compensate for adverse effects for temporary or permanent effects to the California red-legged frog by one of the following options: 1) acquire land, by itself, or possibly in conjunction with a conservation organization, State park, State Wildlife Area, National Wildlife Refuge, or local regional park that provides occupied habitat; 2) purchase the appropriate credit units at a Service-approved conservation bank; or 3) by restoration of Waters of the US of an area suitable to support the frog. The Service and the Corps will have to approve the applicability of restoration of a proposed site on a case-by-case basis.

Conservation credits or appropriate habitat obtained by the applicant will consist of the following measures:

1. At least thirty (30) calendar days prior to the date of initial ground disturbance, the applicant will acquire habitat occupied by the California red-legged frog or habitat that is important to this threatened animal, such as movement corridors, that the Service has concurred is appropriate in writing. The property will have a conservation easement or other appropriate entitlement; management plan, and endowment to manage the habitat in perpetuity. All of these documents will be reviewed and approved by the Service. The conservation easement will name the Service

as third-party beneficiaries and it will be held by an entity qualified to hold conservation easements subject to approval by the Service. An in-perpetuity endowment to manage the land and monitor the conservation easement will be secured using an escrow account or other funding assurance acceptable to and approved by the Service. The endowment will be held by a Service-approved entity in an amount agreed to by the Service. A Service-approved management plan will be developed prior to acquisition of land and it will include, but not limited to; a description of existing habitats and planned habitat creation, restoration and/or enhancement; monitoring criteria for the California red-legged frog; an integrated pest management and monitoring plan to control invasive species; habitat creation, restoration and/or enhancement success criteria; and adaptive management strategies if success criteria are not met or to incorporate new scientific data.

OR

2. The applicant will purchase an appropriate number of credits at a Service-approved conservation bank whose service area includes the action area for the proposed appendage to this programmatic biological opinion. Conservation credits will be purchased and documentation provided to the Service comprising the Agreement for Sale of Conservation Credits, Bill of Sale, Payment Receipt and Updated Credit Ledger at least fourteen (14) calendar days prior to the date of initial ground disturbance at the project.

OR

3. The applicant will provide a restoration, monitoring and management plan to the Service and the Corps at least 30 calendar days prior to ground disturbance for review and approval. The plan will include at a minimum success criteria and information regarding site preservation. The plan may also include the removal of invasive species. Because not in all cases will restoration benefit, the species this will be reviewed on a case-by-case basis.

Action Area

The action area is defined in 50 CFR 402.02 as “all areas to be affected directly or indirectly by the Federal action, and not merely the immediate area involved in the action.” This programmatic consultation addresses minor projects within the following California counties: Napa, Solano, Contra Costa, Alameda, San Francisco, San Mateo, Santa Clara, Sonoma and Marin. Areas within 1,000 feet of the project footprint, parking, equipment storage, stockpile, access, and borrow site locations for each Nationwide or other permit are included within the action area.

Analytical Framework for the Jeopardy and Adverse Modification Analysis

Jeopardy Determination

The following analysis relies on four components to support the jeopardy determination for the California red-legged frog: (1) the **Status of the Species**, which evaluates the species’ range wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the **Environmental Baseline**, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the role of the action area in the species’ survival and recovery; (3) the **Effects of the Action**, which determines the direct and indirect effects of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) **Cumulative Effects**, which evaluates the effects of future, non-Federal activities in

the action area on the species.

In accordance with the implementing regulations for section 7 and Service policy, the jeopardy determination is made in the following manner: the effects of the proposed Federal action are evaluated in the context of the aggregate effects of all factors that have contributed to the current status of the California red-legged frog and, for non-Federal activities in the action area, those actions likely to affect the species in the future, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The following analysis places an emphasis on using the range-wide survival and recovery needs of the California red-legged frog and the role of the action area in providing for those needs as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Adverse Modification Determination

This programmatic biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of critical habitat at 50 CFR §402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this programmatic biological opinion relies on four components: (1) *Status of Critical Habitat*, which evaluates the range wide condition of designated critical habitat for the California red-legged frog in terms of PCEs, the factors responsible for that condition, and the intended recovery function of the critical habitat at the provincial and range-wide scale; (2) *Environmental Baseline*, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) *Effects of the Action*, which determines the direct and indirect effects of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs and how that will influence the recovery role of affected critical habitat units; and (4) *Cumulative Effects* which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units. For purposes of the adverse modification determination, the effects of the proposed Federal action on the California red-legged frog critical habitats are evaluated in the context of the range-wide condition of the critical habitat at the provincial and range-wide scales, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the California red-legged frog.

The analysis in this biological opinion places an emphasis on using the intended range-wide recovery function of the California red-legged frog critical habitat and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

Status and Environmental Baseline of the California Red-Legged Frog

Listing Status: The California red-legged frog was listed as a threatened species on May 23, 1996 (61 FR 25813) (Service 1996). Critical habitat was designated for this species on April 13, 2006 (71 FR 19244) (Service 2006) and revisions to the critical habitat designation were published on March 17, 2010 (75 FR 12816) (Service 2010). At this time, the Service recognized the taxonomic

change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer *et al.* 2010). A Recovery Plan was published for the California red-legged frog on September 12, 2002 (Service 2002).

Description: The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers (Stebbins 2003), and dorsolateral folds are prominent on the back. Larvae (tadpoles) range from 0.6 to 3.1 inches in length, and the background color of the body is dark brown and yellow with darker spots (Storer 1925).

Distribution: The historic range of the California red-legged frog extended from the vicinity of Elk Creek in Mendocino County, California, along the coast inland to the vicinity of Redding in Shasta County, California, and southward to northwestern Baja California, Mexico (Fellers 2005; Jennings and Hayes 1985; Hayes and Krempels 1986). The species was historically documented in 46 counties but the taxa now remains in 238 streams or drainages within 23 counties, representing a loss of 70 percent of its former range (Service 2002). California red-legged frogs are still locally abundant within portions of the San Francisco Bay Area and the Central California Coast. Isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse Ranges. The species is believed to be extirpated from the southern Transverse and Peninsular ranges, but is still present in Baja California, Mexico (CDFG 2013a).

Status and Natural History: California red-legged frogs predominately inhabit permanent water sources such as streams, lakes, marshes, natural and manmade ponds, and ephemeral drainages in valley bottoms and foothills up to 4,921 feet in elevation (Jennings and Hayes 1994, Bulger *et al.* 2003, Stebbins 2003). However, they also inhabit ephemeral creeks, drainages and ponds with minimal riparian and emergent vegetation. California red-legged frogs breed from November to April, although earlier breeding records have been reported in southern localities. Breeding generally occurs in still or slow-moving water often associated with emergent vegetation, such as cattails, tules or overhanging willows (Storer 1925, Hayes and Jennings 1988). Female frogs deposit egg masses on emergent vegetation so that the egg mass floats on or near the surface of the water (Hayes and Miyamoto 1984).

Habitat includes nearly any area within 1-2 miles of a breeding site that stays moist and cool through the summer including vegetated areas with coyote brush, California blackberry thickets, and root masses associated with willow and California bay trees (Fellers 2005). Sheltering habitat for California red-legged frogs potentially includes all aquatic, riparian, and upland areas within the range of the species and includes any landscape feature that provides cover, such as animal burrows, boulders or rocks, organic debris such as downed trees or logs, and industrial debris. Agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or hay stacks may also be used. Incised stream channels with portions narrower and depths greater than 18 inches also may provide important summer sheltering habitat. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting frog population numbers and survival.

California red-legged frogs do not have a distinct breeding migration (Fellers 2005). Adults are often associated with permanent bodies of water. Some individuals remain at breeding sites year-round, while others disperse to neighboring water features. Dispersal distances are typically less than 0.5-mile, with a few individuals moving up to 1-2 miles (Fellers 2005). Movements are typically

along riparian corridors, but some individuals, especially on rainy nights, move directly from one site to another through normally inhospitable habitats, such as heavily grazed pastures or oak-grassland savannas (Fellers 2005).

In a study of California red-legged frog terrestrial activity in a mesic area of the Santa Cruz Mountains, Bulger *et al.* (2003) categorized terrestrial use as migratory and non-migratory. The latter occurred from one to several days and was associated with precipitation events. Migratory movements were characterized as the movement between aquatic sites and were most often associated with breeding activities. Bulger *et al.* (2003) reported that non-migrating frogs typically stayed within 200 feet of aquatic habitat 90 percent of the time and were most often associated with dense vegetative cover, i.e., California blackberry, poison oak and coyote brush. Dispersing frogs in northern Santa Cruz County traveled distances from 0.25-mile to more than 2 miles without apparent regard to topography, vegetation type, or riparian corridors (Bulger *et al.* 2003).

In a study of California red-legged frog terrestrial activity in a xeric environment in eastern Contra Costa County, Tatarian (2008) noted that a 57 percent majority of frogs fitted with radio transmitters in the Round Valley study area stayed at their breeding pools, whereas 43 percent moved into adjacent upland habitat or to other aquatic sites. This study reported a peak seasonal terrestrial movement occurring in the fall months associated with the first 0.2-inch of precipitation and tapering off into spring. Upland movement activities ranged from 3 to 233 feet, averaging 80 feet, and were associated with a variety of refugia including grass thatch, crevices, cow hoof prints, ground squirrel burrows at the base of trees or rocks, logs, and under man-made structures; others were associated with upland sites lacking refugia (Tatarian 2008). The majority of terrestrial movements lasted from 1 to 4 days; however, one adult female was reported to remain in upland habitat for 50 days (Tatarian 2008). Upland refugia closer to aquatic sites were used more often and were more commonly associated with areas exhibiting higher object cover, e.g., woody debris, rocks, and vegetative cover. Subterranean cover was not significantly different between occupied upland habitat and non-occupied upland habitat.

California red-legged frogs are often prolific breeders, laying their eggs during or shortly after large rainfall events in late winter and early spring (Hayes and Miyamoto 1984). Egg masses containing 2,000 to 5,000 eggs are attached to vegetation below the surface and hatch after 6 to 14 days (Storer 1925, Jennings and Hayes 1994). In coastal lagoons, the most significant mortality factor in the pre-hatching stage is water salinity (Jennings *et al.* 1992). Eggs exposed to salinity levels greater than 4.5 parts per thousand resulted in 100 percent mortality (Jennings and Hayes 1990). Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae undergo metamorphosis 3½ to 7 months following hatching and reach sexual maturity 2 to 3 years of age (Storer 1925; Wright and Wright 1949; Jennings and Hayes 1985, 1990, 1994). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings *et al.* 1992). California red-legged frogs may live 8 to 10 years (Jennings *et al.* 1992). Populations can fluctuate from year to year; favorable conditions allow the species to have extremely high rates of reproduction and thus produce large numbers of dispersing young and a concomitant increase in the number of occupied sites. In contrast, the animal may temporarily disappear from an area when conditions are stressful (e.g., during periods of drought, disease, etc.).

The diet of California red-legged frogs is highly variable; changing with the life history stage. The diet of the larval stage has been the least studied and is thought to be similar to that of other ranid frogs, which feed on algae, diatoms, and detritus (Fellers 2005; Kupferberg 1996a, 1996b, 1997).

Hayes and Tennant (1985) analyzed the diets of California red-legged frogs from Cañada de la Gaviota in Santa Barbara County during the winter of 1981 and found invertebrates (comprising 42 taxa) to be the most common prey item consumed; however, they speculated that this was opportunistic and varied based on prey availability. They ascertained that larger frogs consumed larger prey and were recorded to have preyed on Pacific chorus frog, three-spined stickleback and, to a limited extent, California mice, which were abundant at the study site (Hayes and Tennant 1985, Fellers 2005). Although larger vertebrate prey was consumed less frequently, it represented over half of the prey mass eaten by larger frogs suggesting that such prey may play an energetically important role in their diets (Hayes and Tennant 1985). Juvenile and subadult/adult frogs varied in their feeding activity periods; juveniles fed for longer periods throughout the day and night, while subadult/adults fed nocturnally (Hayes and Tennant 1985). Juveniles were significantly less successful at capturing prey and all life history stages exhibited poor prey discrimination, feeding on several inanimate objects that moved through their field of view (Hayes and Tennant 1985).

Recovery Plan: The Recovery Plan for the California red-legged frog identifies eight recovery units (Service 2002). The establishment of these recovery units is based on the determination that various regional areas of the species' range are essential to its survival and recovery. These recovery units are delineated by major watershed boundaries as defined by U.S. Geological Survey hydrologic units and the limits of its range. The goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit. Within each recovery unit, core areas have been delineated and represent contiguous areas of moderate to high California red-legged frog densities that are relatively free of exotic species such as bullfrogs. The goal of designating core areas is to protect metapopulations. Thus when combined with suitable dispersal habitat, will allow for the long term viability within existing populations. This management strategy identified within the Recovery Plan will allow for the recolonization of habitats within and adjacent to core areas that are naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of California red-legged frogs.

Threats: Habitat loss, non-native species introduction, and urban encroachment are the primary factors that have adversely affected the California red-legged frog throughout its range. Several researchers in central California have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (Jennings and Hayes 1990; Twedt 1993), red swamp crayfish, signal crayfish, and several species of warm water fish including sunfish, goldfish, common carp, and mosquitofish (Moyle 1976; Barry 1992; Hunt 1993; Fisher and Schaffer 1996). This has been attributed to predation, competition, and reproduction interference. Twedt (1993) documented bullfrog predation of juvenile northern red-legged frogs, and suggested that bullfrogs could prey on subadult California red-legged frogs as well. Bullfrogs may also have a competitive advantage over California red-legged frogs. For instance, bullfrogs are larger and possess more generalized food habits (Bury and Whelan 1984). In addition, bullfrogs have an extended breeding season (Storer 1933) during which an individual female can produce as many as 20,000 eggs (Emlen 1977). Furthermore, bullfrog larvae are unpalatable to predatory fish (Kruse and Francis 1977). Bullfrogs also interfere with California red-legged frog reproduction by eating adult male California red-legged frogs. Both California and northern red-legged frogs have been observed in amplexus (mounted on) with both male and female bullfrogs (Jennings and Hayes 1990; Twedt 1993; Jennings 1993). Thus bullfrogs are able to prey upon and out-compete California red-legged frogs, especially in sub-optimal habitat.

The urbanization of land within and adjacent to California red-legged frog habitat has also affected the threatened amphibian. These declines are attributed to channelization of riparian areas,

enclosure of the channels by urban development that blocks dispersal, and the introduction of predatory fishes and bullfrogs. Diseases may also pose a significant threat, although the specific effects of disease on the California red-legged frog are not known. Pathogens are suspected of causing global amphibian declines (Davidson et al. 2003). Chytridiomycosis and ranaviruses are a potential threat because these diseases have been found to adversely affect other amphibians, including the listed species (Davidson et al. 2003; Lips et al. 2006). Mao *et al.* (1999 cited in Fellers 2005) reported northern red-legged frogs infected with an iridovirus, which was also presented in sympatric threespine sticklebacks in northwestern California. Non-native species, such as bullfrogs and non-native tiger salamanders that live within the range of the California red-legged frog have been identified as potential carriers of these diseases (Garner *et al.* 2006). Humans can facilitate the spread of disease by encouraging the further introduction of non-native carriers and by acting as carriers themselves (i.e., contaminated boots, waders or fishing equipment). Human activities can also introduce stress by other means, such as habitat fragmentation, that results in the listed species being more susceptible to the effects of disease.

The action area for the 22 Nationwide and other Corps permits in the nine Bay Area counties contains three recovery units that were designated in the recovery plan for the California red-legged frog (Service 2002). They are the North Coast and North San Francisco Bay Unit; South and East San Francisco Bay Unit; and the Central Coast Recovery Unit (Service 2002). Recovery Units are based on the identification of various regional areas of the species' range that are essential to its survival and recovery.

The entirety of the proposed project is located within the range and current distribution of the California red-legged frog. Ensure its survival and recovery in the action area is important because most of the known populations of this species are found in the San Francisco Bay region and the central coast range (Service 2002; Fellers 2005). The action area contains a mosaic of industrial, residential, agricultural, fallow, and open space land uses, although the majority of lands do not contain suitable habitat for the animal. The lands containing suitable habitat range from highly modified and degraded to high quality. The Point Reyes peninsula and associated areas in Marin County are known to contain large populations of the California red-legged frog, however, the majority of populations within the action area consist of a small number of individuals.

The California red-legged frog occurs within the action area as demonstrated by: (1) historic and recent observation of the species at numerous locations in all nine San Francisco Bay Area counties (Service 2002; California Department of Fish and Wildlife 2013a, 2013b); (2) the biology and ecology of the animal, especially the ability of individuals to move considerable distances and their ability to spend the dry months of the year in habitats with suitable environmental conditions; (3) the action area contains numerous creeks, streams, constructed drainage features, perennial and seasonal ponds, including stock ponds, and marshes that provide breeding and non-breeding aquatic habitat for the California red-legged frog. Riparian vegetation along creeks and drainages and landscape vegetation in the action area provide valuable refuge, forage, and dispersal habitat for red-legged frogs; (4) the action area contains upland habitat with rodent burrows and other cover sites; (5) the action area contains upland habitat that provides refuge, forage, and dispersal habitat for the species; and (6) the numerous locations and movement corridors where the species can move within the action area and vicinity.

Status and Environmental Baseline of California Red-Legged Frog Critical Habitat

The Service designated critical habitat for the California red-legged frog on April 13, 2006 (71 FR 19244) (Service 2006) and a revised designation to the critical habitat was published on March 17, 2010 (75 FR 12816) (Service 2010). At this time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer et al. 2010). Critical habitat is defined in Section 3 of the Act as: (1) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. In determining which areas to designate as critical habitat, the Service considers those physical and biological features that are essential to a species' conservation and that may require special management considerations or protection (50 CFR 424.12(b)). The Service is required to list the known Primary Constituent Elements (PCE's) together with the critical habitat description. Such physical and biological features include, but are not limited to, the following:

1. Space for individual and population growth, and for normal behavior;
2. Food, water, air, light, minerals, or other nutritional or physiological requirements;
3. Cover or shelter;
4. Sites for breeding, reproduction, rearing of offspring, or dispersal; and
5. Generally, habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

The PCE's defined for the California red-legged frog was derived from its biological needs. The area designated as revised critical habitat provides aquatic habitat for breeding and non-breeding activities and upland habitat for shelter, foraging, predator avoidance, and dispersal across its range. The PCE's and, therefore, the resulting physical and biological features essential for the conservation of the species were determined from studies of California red-legged frog ecology. Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the PCE's essential to the conservation of the California red-legged frog are:

1. Aquatic Breeding Habitat. Standing bodies of fresh water (with salinities less than 7.0 parts per thousand), including: natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.
2. Non-Breeding Aquatic Habitat. Freshwater and wetted riparian habitats, as described above, that may not hold water long enough for the subspecies to hatch and complete its aquatic life cycle but that do provide for shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frogs. Other wetland habitats that would be considered to meet these elements include, but are not limited to: plunge pools within intermittent creeks; seeps; quiet water refugia during high water flows; and springs of sufficient flow to withstand the summer dry period.

3. Upland Habitat. Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat up to a distance of 1 mile in most cases and comprised of various vegetational series such as grasslands, woodlands, wetland, or riparian plant species that provide the frog shelter, forage, and predator avoidance. Upland features are also essential in that they are needed to maintain the hydrologic, geographic, topographic, ecological, and edaphic features that support and surround the wetland or riparian habitat. These upland features contribute to the filling and drying of the wetland or riparian habitat and are responsible for maintaining suitable periods of pool inundation for larval frogs and their food sources, and provide breeding, non-breeding, feeding, and sheltering habitat for juvenile and adult frogs (e.g., shelter, shade, moisture, cooler temperatures, a prey base, foraging opportunities, and areas for predator avoidance). Upland habitat should include structural features such as boulders, rocks and organic debris (e.g., downed trees, logs), as well as small mammal burrows and moist leaf litter.
4. Dispersal Habitat. Accessible upland or riparian dispersal habitat within designated units and between occupied locations within a minimum of 1 mile of each other that allow for movement between such sites. Dispersal habitat includes various natural habitats and altered habitats such as agricultural fields, which do not contain barriers (e.g., heavily traveled road without bridges or culverts) to dispersal. Dispersal habitat does not include moderate- to high-density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large reservoirs over 50 acres in size, or other areas that do not contain those features identified in PCE's 1, 2, or 3 as essential to the conservation of the subspecies.

With the revised designation of critical habitat, the Service intends to conserve the geographic areas containing the physical and biological features that are essential to the conservation of the species, through the identification of the appropriate quantity and spatial arrangement of the PCE's sufficient to support the life-history functions of the species. Because not all life-history functions require all the PCE's, not all areas designated as critical habitat will contain all the PCE's. Please refer to the final designation of critical habitat for California red-legged frog for additional information (75 FR 12816).

There are 20 critical habitat units of the California red-legged frog located within the action area for the 22 Nationwide and other Corps permits in the nine San Francisco Bay Area counties. The critical habitat units range in size from 1,564 acres to 204,718 acres totaling 692,945 acres in eight counties. There is no designated critical habitat for the California red-legged frog in San Francisco County.

Effects of the Proposed Action

California Red-legged Frog

Projects authorized by the Corps under the 22 Nationwide and other permits in the nine San Francisco Bay Area counties covered by this PBO could have adverse effects on the threatened California red-legged frog through mortality, capture, injury, harassment, and harm of individual subadults and adults.

Ground disturbance and construction activities associated with projects authorized under the Nationwide and other Corps permits may remove vegetation and other materials utilized for cover and aestivation, fill or crush burrows or crevices, and reduce the prey base for the California red-

legged frog. Because this listed amphibian uses small mammal burrows and soil crevices for shelter, individuals may be crushed, buried, or otherwise injured during construction activities. Disturbance caused by construction activities may cause individuals to disperse into areas containing unsuitable habitat, increase the risk of predation or other sources of mortality. Direct injury or mortality to the animal may result from poisoning by pesticides, or harassment from night-lighting, noise, and vibration.

The Corps will ensure the permittees compensate for permanent and, in some cases, temporal habitat loss with in-perpetuity preservation and or restoration of appropriate amounts of California red-legged frog habitat. Preservation of high value habitat at a Conservation Bank will allow for the permanent protection, long-term management, and enhancement of the habitat for the California red-legged frog which will contribute to the recovery of this species. In some cases, the permittee may choose to use a site they acquire which would need to be protected in perpetuity and be managed for the benefit of the frog. In addition, for small in-stream impacts revegetation/restoration of the site may be appropriate and this may benefit the species by improving the functions. This compensation, combined with the implementation of the other conservation measures described above, is anticipated to offset the adverse effects of harm resulting from project-related habitat modification or loss.

Preconstruction surveys and the relocation of the California red-legged frog may reduce injury or mortality. However, death and injury of individual red-legged frogs could occur at the time of relocation or later in time subsequent to their release. Although survivorship for translocated members of this species has not been determined, survivorship of translocated wildlife, in general, is lower because of intraspecific competition, lack of familiarity with the location of potential breeding, feeding, and sheltering habitats, increased risk of contracting disease in a foreign environment, and the risk of predation. Improper handling, containment, or transport of individuals will be reduced or prevented by use of a Service-approved biologist, limiting the duration of handling, limiting the distance of translocation, and requiring the proper transport and release of the animals.

Unless rescued by the Service-approved biologist, individual California red-legged frogs could be harassed, injured, or and killed by ground disturbing and construction-related activities. Even with a Service-approved biologist present at the project site, worker awareness, and escape ramps, animals may fall into the trenches, pits, or other excavations, and then risk being directly injured, killed, or be unable to escape and die as a result of desiccation, entombment, or starvation.

Plastic netting and similar materials that are used for erosion control and other reasons could result in the entanglement and death of California red-legged frogs, as well as birds and wildlife, due to exposure, starvation, strangulation, or predation (Stuart *et al.* 2001). However, the Corps has committed, through implementation of the Conservation Measures, to ensuring the permittees do not utilize these materials which reduces these adverse effects.

Habitat Loss and Fragmentation

The primary factor leading to the listing of this animal is the result of habitat loss and fragmentation in the form of roadway construction, and urban encroachment. Activities associated with urban development, including roadway projects, removal of vegetation and other materials utilized as cover and aestivation, damage or destruction of water bodies utilized by all life history stages, reduction or elimination of movement corridors and upland habitat, filling or collapsing rodent burrows or crevices, and potentially reduce the prey base for the California red-legged frog. Construction activities are likely to result in the direct disturbance, displacement, injury, and/or mortality of

California red-legged frogs. Individuals likely are to be killed or injured by construction equipment or other vehicles accessing the construction site. Disturbance from human activities, including roadway activities may also cause individuals to move into or across areas of unsuitable habitat where they may be prone to higher rates of mortality from vehicles and predation.

Summer cover and foraging habitat within the action area may be temporarily and permanently eliminated by the proposed projects. Individual red-legged frogs occupying the affected habitat run the risk of being crushed or buried by earth moving activities. Those that do survive will suffer permanent and temporary loss of habitat and harassment from increased human activity. Loss or reduction of dispersal habitat increases intra- and inter-specific competition for food and living space for the red-legged frog in the action area. Removal of native vegetation, such as willow and coyote brush, may increase exposure of the California red-legged frog to predators due to the permanent loss of cover. Measures to minimize habitat destruction and alteration such as reducing the project footprint, restoration and re-vegetation of disturbed sites with locally collected native plant species can potentially provide refuge, food and shelter for the listed amphibian, while also limiting the establishment of invasive and non-local native plants.

Fragmentation of habitat isolates populations of the California red-legged frog such that breeding between populations becomes impossible or extremely limited. Fragmentation also limits dispersal resulting in a reduced chance of repopulation to locations where it has been extirpated. Isolation due to fragmentation can result in the ultimate decline of populations because of the lack of genetic variability. Van Gelder (1973) and Cooke (1995) have examined the effect of roads on amphibians, such as the California red-legged frog, and found that because of their activity patterns, population structure, and preferred habitats, aquatic breeding amphibians are especially vulnerable to traffic induced mortality.

Road Kills

Roadways, bridges, and other associated structures or facilities may result in adverse effects to the California red-legged frog. Aside from direct construction related-effects, the threats are the result of the slow movements of this animal, inability to notice the approach of cars in time to avoid them, their tendency to become immobilized when in danger which leaves them on roads for longer periods of time, their life cycles that involve periodic long distance dispersal. Traffic volume influences the permeability (e.g., the likelihood of crossings) of roads and the probability for mortality due to vehicle strikes. Factors such as the width of the road, the presence of a median with or without Jersey or "K" rail concrete barriers, the velocity of the traffic, the physical nature of the approach and shoulder of the road, and the behavior of the animals attempting to cross determine probabilities for mortality. Clevenger *et al.* (2003) found that studying roads in Canada found that a low volume road (1,068 to 3,231 vehicles per day) in Canada resulted in higher mortalities of small vertebrate fauna than high volume roads (14,000 to 35,000 vehicles per day).

Contaminants

The presence of roads, ground disturbance and construction or repair of roadways can result in the introduction of chemical contaminants to the site. Contaminants can be introduced in several ways. Substances used in road building materials or to recondition roads can leach out or wash off roads adjacent to habitat. Vehicle exhaust emissions can include hazardous substances which may concentrate in soils along roads. Heavy metals such as lead, aluminum, iron, cadmium, copper, manganese, titanium, nickel, zinc, and boron are all emitted in vehicle exhaust (Trombulak and Frissell 2000). Concentrations of organic pollutants (i.e. dioxins, polychlorinated biphenyls) are higher in soils along roads (Benfenati *et al.* 1992). Ozone levels are higher in the air near roads

(Trombulak and Frissell 2000). Vehicles may leak hazardous substances such as motor oil and antifreeze. A variety of substances could be introduced during accidental spills of materials. Spills can result from leaks in vehicles, small containers falling off vehicles, or from accidents resulting in whole loads being spilled. Large spills may be partially or completely mitigated by clean-up efforts, depending on the substance. Although the quantity leaked by a single vehicle may be small, the substances can accumulate on roads and may be washed into the adjacent environment by runoff during rain storms.

The California red-legged frog could be exposed to contaminants if it inhabits or utilizes areas adjacent to the project site. Exposure pathways could include inhalation, dermal contact and absorption, direct ingestion of contaminated soil or plants, or consumption of contaminated prey. Exposure to contaminants may cause short- or long-term morbidity. Carcinogenic substances could cause genetic damage resulting in sterility, reduced productivity, or reduced fitness among progeny. Contaminants may also have a negative effect on the prey of the California red-legged frog. This could result in reduced prey diversity and abundance, and diminished local carrying capacity for the animal.

Disease

Biologists and construction personnel working in different geographic locations inhabited by different amphibian species may transmit diseases to the California red-legged frog through contaminated equipment and other materials. The chance of a disease, such as chytrid fungus, being introduced into a new area is greater today than in the past due to the increasing occurrences of disease throughout amphibian populations, as well as Global Climate Change in California and the United States. Chytrid fungus may exacerbate the effects of other diseases on amphibians or increase the sensitivity of the amphibian to environmental changes that reduce normal immune response capabilities (Bosch *et al.* 2001).

Invasive Species

Construction of roads can facilitate the invasion and establishment by species not native to the area. Disturbance and alteration of habitat adjacent to roads may create favorable conditions for non-native plants and animals. Non-native plants can spread along roadsides and then into adjacent habitat (Gelbard and Harrison 2003). American bullfrogs and other non-native animals may use modified habitats adjacent to road to disperse into California red-legged frog habitat. These exotic animals could compete for resources such as food or refugia, or directly injure or kill them. Non-native plants and animals may reduce habitat quality for the California red-legged frog or its prey, and reduce the local carrying capacity. Introductions of non-native species could cause them to alter behavioral patterns by avoiding or abandoning areas near roads.

Disturbed areas adjacent to roads provide favorable habitat conditions for a number of non-native plant species. Some of these taxa are aggressively invasive and they can alter natural communities and potentially affect habitat quality. A problematic species within the range of the red-legged frog is yellow star thistle. Dense stands of this plant can form along roadsides and then spread into adjacent habitat. This plant displaces native vegetation and competes with native plants for resources.

Road Effect Zone

In addition to the adverse effects occurring during ground disturbance and construction, roadways are a major source of injury and mortality for amphibians. Ehmann and Cogger (1985) estimated that five million reptiles and frogs are killed annually on Australian roads. Vos and Chardon (1998)

found that road density within 750 feet of a pond was negatively associated with the size of moor frog populations. The density of roads within 2250 feet of a pond was negatively associated with the probability that species would occupy the pond at all. Van Gelder (1973) estimated that 30% of the females from a local breeding population of the common toad succumbed to road kill and reported that an equivalent percentage for males was likely. In a study of frogs and toads, Fahrig *et al.* (1995) found the proportion of dead-to-live animals increased and the total density of animals decreased with increasing traffic intensity.

Roads act as barriers to California red-legged frogs attempting to cross fragmented habitats. As barriers, roads restrict gene flow leading to negative, demographic consequences that can cause extinction (Shepard *et al.* 2008). Roads were found to be significant barriers to gene flow among common frogs in Germany resulting in genetic differentiation among populations separated by roads (Reh and Seitz 1990). Failure to cross roads by the California red-legged frog may disconnect fragmented populations from mating resulting in population declines over time. Isolated populations have a greater chance of extinction when new immigrants are not contributing to the gene pool and are less likely to be re-colonized after extinction. The installation of culverts, tunnels, bridges, and overcrossings, to facilitate safe wildlife passage under or across roads can minimize the reduction of population isolation or loss.

Adverse effects to the California red-legged frog from roads may extend some distance from the actual road. The phenomenon can result from any of the effects already described in this programmatic biological opinion (e.g. vehicle-related mortality, habitat degradation, invasive exotic species, etc.). Forman and Deblinger (2000) and Forman (2000) described the effect as the “road effect” zone. Along a 4-lane road in Massachusetts, they determined that this zone extend for an average of approximately 980 feet to either side of the road for an average total zone width of approximately 1970 feet. However, in places they detected an effect > 0.6 mile from the road. Trombulak and Frissell (2000) described how heavy metal concentrations from vehicle exhaust were greatest within 66 feet of roads, but elevated levels of metals in both soil and plants were detected at 660 feet of roads. The road effect zone apparently varies with habitat type and traffic volume. The road effect zone and the California red-legged frog have not been adequately investigated; however, it is possible it exists given the effects of roads on the animal.

Effects to Critical Habitat

The Service anticipates that the activities associated with the Project could negatively affect some of the PCEs of California red-legged frog critical habitat within the action area. However, these activities will only result in minor effects to habitat and these activities (implemented with the conservation measures) will not prevent critical habitat from providing essential conservation values for the California red-legged frog. While disturbance within critical habitat may prevent some California red-legged frogs from using portions of the critical habitat for essential life functions whether temporarily (e.g., disturbance that can be restored to pre-project conditions within one calendar year from the date of initial ground disturbance) or permanently (e.g., disturbance that cannot be restored to pre-project condition within one calendar year), they will still be able to complete their essential ecological and biological functions in the remaining areas of critical habitat. All critical habitat units will retain their PCEs and the PCEs within each critical habitat unit will still remain functional. Therefore, the designated critical habitat for the California red-legged frog will still be able to perform its intended functions and conservation role.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this programmatic biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Numerous non-Federal activities continue to adversely affect, primarily through the damage or destruction of habitat, the California red-legged frog in the action area. In addition, the same activities affect this threatened species also affect its critical habitat. Loss and degradation of habitat affecting this listed species with or without Service authorization continues as a result of urbanization; road construction and maintenance, utility right-of-way management; flood control and water banking projects that may not be funded, permitted, or constructed by a Federal agency; inappropriate levels of grazing by livestock; and continuing agricultural expansion. This threatened amphibian also is adversely affected by ground squirrel reduction, mosquito control, including the planting of exotic mosquito fish, and reduction of food sources. Unauthorized take is occurring, and the Service continues to request re-initiation of projects when project descriptions have changed markedly since our biological opinions were issued.

The Association of Bay Area Governments 2007 Projection forecasts the San Francisco Bay Area nine-county population will increase by 2.2 million residents from 2000-2035 (ABAG 2007). The human population is projected to increase by 18 percent for the San Francisco Bay hydrologic region from 1995 to 2020 with agricultural crop land use in the region projected to remain around 65,000 acres (California Department of Water Resources 1998). Development projects that occur during this timeframe due to increases in human population growth will continue to imperil the California red-legged frog.

Conclusion

After reviewing the current status of the California red-legged frog, the environmental baseline for the action area; the effects of projects potentially authorized under the 22 Nationwide and other Corps permits in the nine San Francisco Bay Area counties, and the cumulative effects; it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of this threatened species. We based this determination on the following conservation measures that will be fully implemented by the Corps: (1) habitat loss will be compensated with in-perpetuity preservation of occupied California red-legged frog habitat in the action area; (2) the Corps will incorporate construction or enhancement of culverts or other structures to ensure safe passage of California red-legged frogs across the roadways where appropriate; (3) pre-construction surveys will be conducted for listed species; (4) a Service-approved biologist will monitor all activities for compliance with this programmatic biological opinion; (5) California red-legged frogs found in the project work area will be relocated to nearby suitable habitat; and (6) other conservation measures, as described in the Conservation Measures of this programmatic biological opinion.

After reviewing the current status of the California red-legged frog, the environmental baseline for the action area, the effects of projects potentially authorized under Nationwide or other Corps permits in the nine San Francisco Bay Area counties, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to destroy or adversely modify California red-legged frog critical habitat. The proposed action is not likely to result in the destruction or

adverse modification of critical habitat for this threatened species because although the project may adversely affect primary constituent elements within a portion of some of the critical habitat units in the action area, these activities will be limited to a small proportion of the critical habitat and will not affect the ability of the remaining critical habitat to conserve the California red-legged frog.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement. The Incidental Take Statement accompanying this biological opinion does not address the restrictions or requirements of other applicable laws.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service anticipates that incidental take of the California red-legged frog will be difficult to detect because when individuals are not in their breeding ponds, they inhabit the burrows of ground squirrels or other rodents, root wads or other objects; they may be difficult to locate due to their cryptic appearance and behavior; subadults and adults may be located a distance from the breeding ponds; their distance movements occur on a limited period during rainy nights in the fall, winter, or spring; and the finding of an injured or dead individual is unlikely because of their relatively small body size. Adverse effects to this animal also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in water regime at their breeding ponds, or additional environmental disturbances. Due to the difficulty in quantifying the number of the California red-legged frog that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the harm and harassment, capture, injury and mortality of all eggs, egg masses, tadpoles, subadults, and/or adults inhabiting or utilizing a total of seventy-five (75) acres for the five (5) year duration of this programmatic biological opinion. Reinitiation will be triggered if the amount of incidental take is exceeded by the Corps.

Effect of the Take

The Service has determined that this level of anticipated take for projects potentially authorized under the 22 Nationwide and other Corps permits in the nine San Francisco Bay Area counties, as appended to this biological opinion, is not likely to result in jeopardy to the California red-legged frog, or adverse modification or destruction of its designated critical habitat.

Reasonable and Prudent Measure

1. The Corps shall minimize adverse effects to the California red-legged frog by fully implementing terms and conditions

Terms and Condition

In order to be exempt from the prohibitions of section 9 of the Act, the Corps shall comply with the following Term and Condition that implements the reasonable and prudent measure described above. This Term and Condition is nondiscretionary.

The following Term and Condition implements the Reasonable and Prudent Measure:

1. The Corps shall implement the conservation measure described within the project description of this programmatic biological opinion.

Reporting Requirements

For each Nationwide or other Corps permit appended to this programmatic biological opinion, the Service-approved biologist will maintain a written record that will include, but is not limited to: (1) beginning and ending time of each day's construction activity and monitoring effort; (2) California red-legged frogs, and wildlife species, that were observed, including the specific time and location; and (3) description of any actions taken to protect the California red-legged frog or its habitat. The biological monitor will submit the original written record to the Service within fourteen (14) calendar days of the completion of their monitoring, or immediately upon verbal, email, or written request from the Service, California Department of Fish and Wildlife, or their authorized agent.

Injured California red-legged frogs must be cared for by a licensed veterinarian or other qualified person such as the Service-approved biologist; dead individuals shall be placed in a zip-lock® plastic bag containing a piece of paper with the date, time, and location where the animal was found, and who found it legibly written in permanent ink, and then placed in a freezer located in a secure location. The Service must be notified within twenty-four (24) hours via telephone and electronic mail of the discovery of death or injury to any listed species that occurs or is suspected to have occurred as a result of project related activities, or is observed in or near the action area.

Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal clearly indicated on a USGS 7.5 minute quadrangle and other maps at a finer scale, as requested by the Service, and any other pertinent information. The Service contacts are the Coast Bay Foothills Division Chief at telephone (916) 414-6600, and the Resident Agent-in-Charge of the Service's Law Enforcement Division at telephone (916) 569-8444.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service has developed the following conservation recommendations based, in part, on the Recovery Plan for the California Red-legged Frog (Service 2002).

1. Implement actions within the 2002 Recovery Plan for the California Red-legged Frog.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed and/or proposed species or their habitats, the Service requests notification of the implementation of this recommendation.

REINITIATION NOTICE

This concludes formal consultation on the 22 Nationwide and other Corps permits in the nine San Francisco Bay Area counties. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species that was not considered in this opinion; or (4) a new species is listed that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions concerning this biological opinion on projects authorized under the 22 Nationwide and other Corps permits in the nine San Francisco Bay Area counties, please contact Ryan Olah (Ryan_Olah@fws.gov) at the Sacramento Fish and Wildlife Office at the letterhead address or at telephone (916)414-6623.

Sincerely,



Jennifer M. Norris
Field Supervisor

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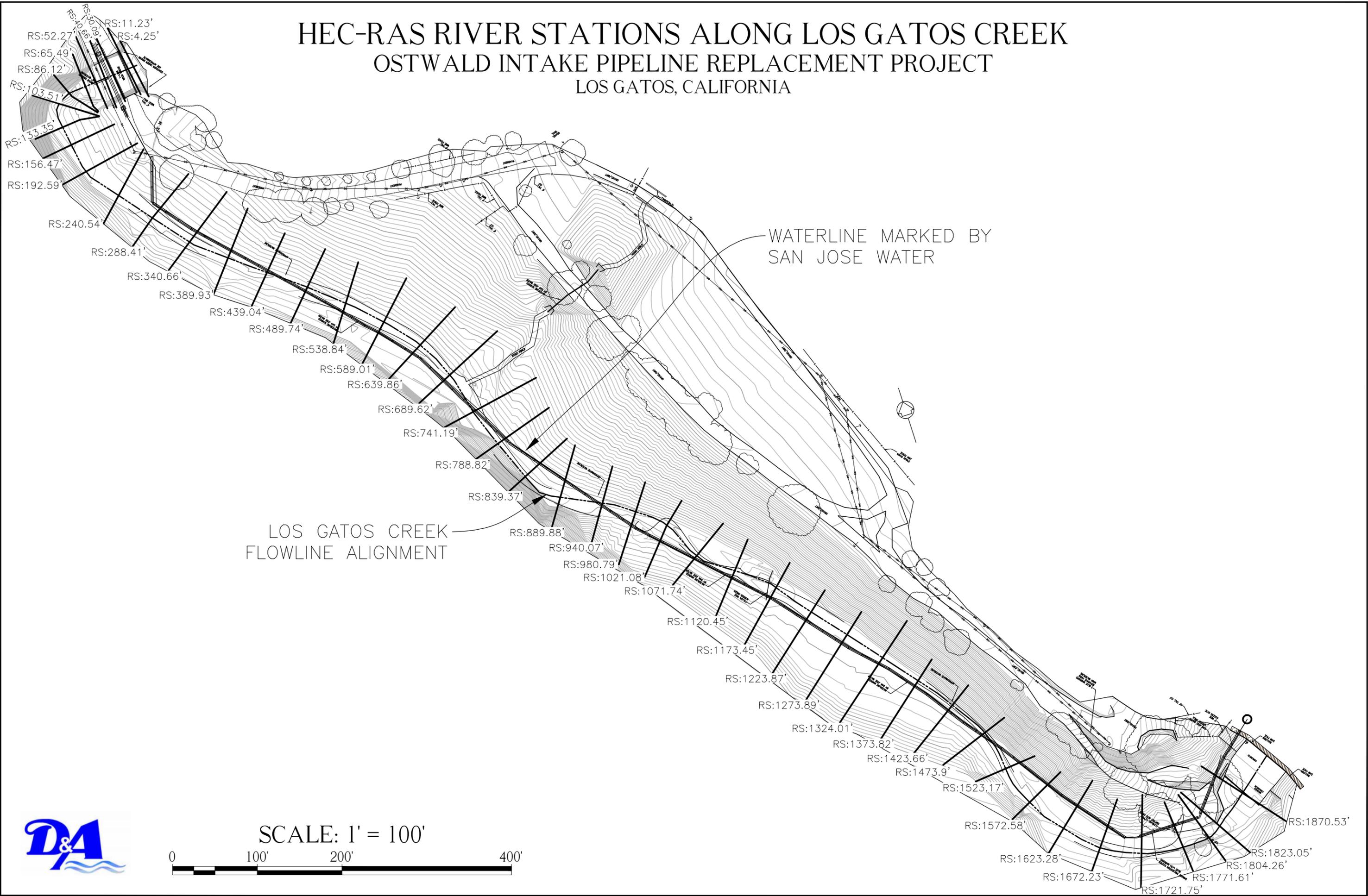
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Appendix E

Hydraulic Calculations

HEC-RAS RIVER STATIONS ALONG LOS GATOS CREEK OSTWALD INTAKE PIPELINE REPLACEMENT PROJECT LOS GATOS, CALIFORNIA



Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	100 cfs	100.00	788.00	789.92	789.92	790.31	0.021428	5.04	19.83	26.01	1.02
D&A - Los Gatos	1823.05	100 cfs	100.00	787.00	788.53		788.75	0.005761	3.79	26.35	19.40	0.57
D&A - Los Gatos	1804.26	100 cfs	100.00	786.00	788.28		788.60	0.009576	4.56	22.06	19.05	0.73
D&A - Los Gatos	1771.61	100 cfs	100.00	786.15	788.19		788.36	0.004284	3.33	30.24	23.77	0.51
D&A - Los Gatos	1721.75	100 cfs	100.00	786.69	787.92		788.09	0.006897	3.32	30.14	32.71	0.61
D&A - Los Gatos	1672.23	100 cfs	100.00	785.94	787.69		787.82	0.003977	2.99	34.79	33.97	0.48
D&A - Los Gatos	1623.28	100 cfs	100.00	785.78	787.09	787.09	787.46	0.016308	5.05	23.70	36.53	0.94
D&A - Los Gatos	1572.58	100 cfs	100.00	785.00	786.54		786.77	0.005492	3.98	30.15	32.13	0.59
D&A - Los Gatos	1523.17	100 cfs	100.00	785.00	786.28		786.48	0.005937	3.70	31.54	33.19	0.59
D&A - Los Gatos	1473.9	100 cfs	100.00	784.00	785.96		786.21	0.004863	4.20	29.40	24.02	0.56
D&A - Los Gatos	1423.66	100 cfs	100.00	784.00	785.67		785.93	0.006358	4.18	27.91	28.26	0.61
D&A - Los Gatos	1373.82	100 cfs	100.00	783.99	785.57		785.68	0.002842	2.75	40.24	38.83	0.42
D&A - Los Gatos	1324.01	100 cfs	100.00	783.99	785.43		785.53	0.003203	2.63	40.43	44.86	0.43
D&A - Los Gatos	1273.89	100 cfs	100.00	783.97	785.28		785.37	0.002981	2.38	44.06	51.81	0.41
D&A - Los Gatos	1223.87	100 cfs	100.00	783.84	784.70	784.70	785.04	0.019524	4.71	22.03	35.89	0.98
D&A - Los Gatos	1173.45	100 cfs	100.00	782.37	783.64	783.64	784.04	0.015087	5.16	22.77	35.49	0.91
D&A - Los Gatos	1120.45	100 cfs	100.00	781.89	782.69		782.92	0.013681	3.88	25.88	37.79	0.82
D&A - Los Gatos	1071.74	100 cfs	100.00	781.00	781.77	781.77	782.11	0.020208	4.68	21.63	32.71	1.00
D&A - Los Gatos	1021.08	100 cfs	100.00	779.79	781.65		781.76	0.002352	2.72	38.35	29.09	0.39
D&A - Los Gatos	980.79	100 cfs	100.00	779.00	781.30	780.73	781.61	0.004887	4.63	27.75	25.21	0.57
D&A - Los Gatos	940.07	100 cfs	100.00	779.00	780.73	780.70	781.28	0.012781	6.06	19.53	21.02	0.88
D&A - Los Gatos	889.88	100 cfs	100.00	778.93	780.85		780.95	0.001867	2.54	43.55	31.73	0.35
D&A - Los Gatos	839.37	100 cfs	100.00	778.03	780.71		780.84	0.002099	2.97	37.83	25.01	0.37
D&A - Los Gatos	788.82	100 cfs	100.00	778.87	780.24	780.13	780.61	0.012615	4.85	21.02	22.22	0.84
D&A - Los Gatos	741.19	100 cfs	100.00	778.46	779.51	779.51	779.88	0.018298	4.96	21.64	33.09	0.97
D&A - Los Gatos	689.62	100 cfs	100.00	777.00	778.68		778.84	0.006357	3.26	32.71	41.74	0.59
D&A - Los Gatos	639.86	100 cfs	100.00	776.90	778.47		778.61	0.003409	2.99	35.03	32.70	0.46
D&A - Los Gatos	589.01	100 cfs	100.00	776.00	778.39		778.48	0.001643	2.39	43.61	35.32	0.33
D&A - Los Gatos	538.84	100 cfs	100.00	776.96	778.02		778.29	0.010548	4.18	23.94	25.38	0.75
D&A - Los Gatos	489.74	100 cfs	100.00	775.90	777.19	777.19	777.59	0.018927	5.12	19.81	26.23	0.99
D&A - Los Gatos	439.04	100 cfs	100.00	774.99	776.82		777.00	0.004314	3.48	31.52	28.67	0.52
D&A - Los Gatos	389.93	100 cfs	100.00	774.95	776.63		776.80	0.003770	3.26	33.54	32.53	0.48
D&A - Los Gatos	340.66	100 cfs	100.00	774.90	776.38		776.57	0.005523	3.50	29.57	29.68	0.57
D&A - Los Gatos	288.41	100 cfs	100.00	774.80	775.90		776.15	0.011924	4.05	24.77	31.82	0.79
D&A - Los Gatos	240.54	100 cfs	100.00	774.12	775.55		775.72	0.006432	3.31	30.19	31.22	0.59
D&A - Los Gatos	192.59	100 cfs	100.00	773.68	774.83	774.83	775.19	0.020305	4.82	20.91	30.23	1.00
D&A - Los Gatos	156.47	100 cfs	100.00	772.88	774.29		774.59	0.013060	4.41	22.68	25.95	0.83
D&A - Los Gatos	133.35	100 cfs	100.00	772.37	773.82	773.82	774.21	0.020081	5.04	19.85	25.74	1.01
D&A - Los Gatos	103.51	100 cfs	100.00	769.99	773.68		773.78	0.001547	2.46	40.72	21.35	0.31
D&A - Los Gatos	86.12	100 cfs	100.00	768.63	773.64		773.75	0.001567	2.59	38.57	16.18	0.30
D&A - Los Gatos	65.49	100 cfs	100.00	771.74	773.55		773.70	0.003636	3.09	32.39	23.44	0.46
D&A - Los Gatos	52.27	100 cfs	100.00	771.71	773.50		773.64	0.004043	3.04	32.93	27.23	0.49
D&A - Los Gatos	40.66	100 cfs	100.00	771.64	773.37		773.58	0.007769	3.63	27.57	28.60	0.65
D&A - Los Gatos	30.09	100 cfs	100.00	771.42	773.16	773.03	773.46	0.013210	4.42	22.63	25.96	0.83
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	100 cfs	100.00	770.63	772.56	772.56	773.07	0.019852	5.76	17.36	17.40	1.02
D&A - Los Gatos	4.25	100 cfs	100.00	770.50	772.57	772.34	772.91	0.010405	4.68	21.35	18.19	0.76

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	200 cfs	200.00	788.00	790.45	790.45	790.90	0.019504	5.37	37.23	41.65	1.00
D&A - Los Gatos	1823.05	200 cfs	200.00	787.00	789.21		789.60	0.006221	5.01	40.27	22.77	0.63
D&A - Los Gatos	1804.26	200 cfs	200.00	786.00	788.76	788.62	789.41	0.012527	6.50	31.46	20.51	0.88
D&A - Los Gatos	1771.61	200 cfs	200.00	786.15	788.70		789.05	0.005745	4.78	43.29	26.59	0.62
D&A - Los Gatos	1721.75	200 cfs	200.00	786.69	788.47		788.73	0.006234	4.08	49.01	35.99	0.62
D&A - Los Gatos	1672.23	200 cfs	200.00	785.94	788.22		788.46	0.004440	4.04	54.39	39.87	0.54
D&A - Los Gatos	1623.28	200 cfs	200.00	785.78	787.53	787.53	788.07	0.014902	6.31	41.24	42.58	0.96
D&A - Los Gatos	1572.58	200 cfs	200.00	785.00	787.22		787.54	0.004945	4.89	56.13	40.39	0.59
D&A - Los Gatos	1523.17	200 cfs	200.00	785.00	787.05		787.30	0.004041	4.25	59.24	38.59	0.53
D&A - Los Gatos	1473.9	200 cfs	200.00	784.00	786.55		787.03	0.006498	5.91	44.80	27.49	0.68
D&A - Los Gatos	1423.66	200 cfs	200.00	784.00	786.15	785.94	786.65	0.008732	5.94	43.08	34.45	0.76
D&A - Los Gatos	1373.82	200 cfs	200.00	783.99	786.08		786.30	0.003600	3.84	62.40	47.26	0.50
D&A - Los Gatos	1324.01	200 cfs	200.00	783.99	785.93		786.11	0.003579	3.53	66.42	58.75	0.48
D&A - Los Gatos	1273.89	200 cfs	200.00	783.97	785.79		785.94	0.002972	3.10	73.62	63.85	0.44
D&A - Los Gatos	1223.87	200 cfs	200.00	783.84	785.11	785.11	785.61	0.016052	5.78	38.74	45.10	0.96
D&A - Los Gatos	1173.45	200 cfs	200.00	782.37	784.12	784.12	784.66	0.013704	6.40	41.15	40.98	0.93
D&A - Los Gatos	1120.45	200 cfs	200.00	781.89	782.96	782.96	783.44	0.018371	5.58	36.16	38.86	1.00
D&A - Los Gatos	1071.74	200 cfs	200.00	781.00	782.61		782.87	0.005410	4.13	51.34	38.15	0.59
D&A - Los Gatos	1021.08	200 cfs	200.00	779.79	782.52		782.69	0.001969	3.36	66.24	34.11	0.38
D&A - Los Gatos	980.79	200 cfs	200.00	779.00	782.04	781.62	782.53	0.005697	6.14	47.90	30.02	0.65
D&A - Los Gatos	940.07	200 cfs	200.00	779.00	781.43	781.42	782.19	0.011469	7.45	36.96	27.62	0.89
D&A - Los Gatos	889.88	200 cfs	200.00	778.93	781.66		781.82	0.001876	3.31	70.95	36.31	0.37
D&A - Los Gatos	839.37	200 cfs	200.00	778.03	781.44		781.69	0.002714	4.17	57.57	29.18	0.45
D&A - Los Gatos	788.82	200 cfs	200.00	778.87	780.69	780.69	781.38	0.015171	6.73	31.63	26.21	0.97
D&A - Los Gatos	741.19	200 cfs	200.00	778.46	779.96	779.96	780.51	0.015200	6.09	38.13	39.02	0.96
D&A - Los Gatos	689.62	200 cfs	200.00	777.00	779.37		779.54	0.003964	3.36	69.76	61.71	0.50
D&A - Los Gatos	639.86	200 cfs	200.00	776.90	779.13		779.35	0.003312	3.85	61.92	52.31	0.48
D&A - Los Gatos	589.01	200 cfs	200.00	776.00	779.04		779.20	0.002026	3.30	71.14	49.03	0.38
D&A - Los Gatos	538.84	200 cfs	200.00	776.96	778.46	778.32	778.96	0.012031	5.73	35.88	29.10	0.85
D&A - Los Gatos	489.74	200 cfs	200.00	775.90	777.67	777.67	778.28	0.015621	6.33	33.91	31.82	0.97
D&A - Los Gatos	439.04	200 cfs	200.00	774.99	777.41		777.73	0.004968	4.72	50.23	34.52	0.59
D&A - Los Gatos	389.93	200 cfs	200.00	774.95	777.20		777.49	0.004446	4.44	54.99	42.47	0.56
D&A - Los Gatos	340.66	200 cfs	200.00	774.90	776.84		777.21	0.007011	4.92	44.60	35.04	0.68
D&A - Los Gatos	288.41	200 cfs	200.00	774.80	776.35		776.76	0.010704	5.15	40.99	39.53	0.80
D&A - Los Gatos	240.54	200 cfs	200.00	774.12	776.01		776.32	0.007074	4.43	45.36	33.66	0.66
D&A - Los Gatos	192.59	200 cfs	200.00	773.68	775.29	775.26	775.81	0.015394	5.81	35.54	33.38	0.95
D&A - Los Gatos	156.47	200 cfs	200.00	772.88	774.66	774.64	775.25	0.015849	6.03	33.28	28.88	0.96
D&A - Los Gatos	133.35	200 cfs	200.00	772.37	774.30	774.30	774.85	0.018087	5.97	33.52	31.06	1.01
D&A - Los Gatos	103.51	200 cfs	200.00	769.99	774.34		774.54	0.002595	3.59	55.84	24.84	0.42
D&A - Los Gatos	86.12	200 cfs	200.00	768.63	774.21		774.48	0.003372	4.14	48.27	18.01	0.44
D&A - Los Gatos	65.49	200 cfs	200.00	771.74	774.09		774.39	0.005165	4.39	45.51	24.88	0.57
D&A - Los Gatos	52.27	200 cfs	200.00	771.71	774.05		774.31	0.005069	4.08	49.05	31.24	0.57
D&A - Los Gatos	40.66	200 cfs	200.00	771.64	773.94		774.24	0.007620	4.36	45.91	35.61	0.68
D&A - Los Gatos	30.09	200 cfs	200.00	771.42	773.73	773.53	774.13	0.011341	5.06	39.54	33.00	0.81
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	200 cfs	200.00	770.63	773.44	773.26	773.90	0.013276	5.46	36.63	29.52	0.86
D&A - Los Gatos	4.25	200 cfs	200.00	770.50	773.42	772.96	773.79	0.010417	4.90	40.80	32.75	0.77

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	400 cfs	400.00	788.00	791.05	791.05	791.55	0.018750	5.67	70.78	72.87	1.01
D&A - Los Gatos	1823.05	400 cfs	400.00	787.00	790.21	789.56	790.84	0.005997	6.45	73.78	61.52	0.66
D&A - Los Gatos	1804.26	400 cfs	400.00	786.00	789.63	789.63	790.64	0.011561	8.25	57.07	36.38	0.91
D&A - Los Gatos	1771.61	400 cfs	400.00	786.15	789.36		790.10	0.008110	6.95	62.09	30.48	0.77
D&A - Los Gatos	1721.75	400 cfs	400.00	786.69	789.25		789.65	0.005985	5.05	79.15	40.71	0.64
D&A - Los Gatos	1672.23	400 cfs	400.00	785.94	788.90		789.36	0.005449	5.60	84.20	47.55	0.64
D&A - Los Gatos	1623.28	400 cfs	400.00	785.78	788.50		789.03	0.007870	6.57	88.73	55.51	0.76
D&A - Los Gatos	1572.58	400 cfs	400.00	785.00	788.32		788.72	0.003916	5.75	102.07	43.35	0.57
D&A - Los Gatos	1523.17	400 cfs	400.00	785.00	788.20		788.53	0.003080	5.03	107.87	45.21	0.50
D&A - Los Gatos	1473.9	400 cfs	400.00	784.00	787.32	787.08	788.23	0.008958	8.39	67.57	31.95	0.84
D&A - Los Gatos	1423.66	400 cfs	400.00	784.00	786.77	786.77	787.71	0.012015	8.39	66.66	41.60	0.93
D&A - Los Gatos	1373.82	400 cfs	400.00	783.99	786.78		787.17	0.004473	5.29	99.44	58.71	0.58
D&A - Los Gatos	1324.01	400 cfs	400.00	783.99	786.64		786.94	0.003751	4.59	114.07	72.95	0.53
D&A - Los Gatos	1273.89	400 cfs	400.00	783.97	786.53		786.75	0.002911	3.97	125.71	76.31	0.46
D&A - Los Gatos	1223.87	400 cfs	400.00	783.84	785.73	785.73	786.43	0.013309	7.05	70.79	58.87	0.94
D&A - Los Gatos	1173.45	400 cfs	400.00	782.37	784.80	784.80	785.62	0.012915	8.01	71.41	47.95	0.96
D&A - Los Gatos	1120.45	400 cfs	400.00	781.89	783.90		784.37	0.007378	5.57	75.65	45.80	0.71
D&A - Los Gatos	1071.74	400 cfs	400.00	781.00	783.81		784.10	0.002950	4.48	101.91	46.57	0.48
D&A - Los Gatos	1021.08	400 cfs	400.00	779.79	783.70		783.98	0.001926	4.34	112.27	44.66	0.40
D&A - Los Gatos	980.79	400 cfs	400.00	779.00	783.01	782.63	783.79	0.006676	8.12	82.74	40.77	0.74
D&A - Los Gatos	940.07	400 cfs	400.00	779.00	782.47	782.36	783.44	0.009783	8.93	69.12	34.48	0.88
D&A - Los Gatos	889.88	400 cfs	400.00	778.93	782.77		783.04	0.001994	4.38	114.99	42.63	0.41
D&A - Los Gatos	839.37	400 cfs	400.00	778.03	782.41		782.89	0.003525	5.84	88.64	34.75	0.54
D&A - Los Gatos	788.82	400 cfs	400.00	778.87	781.53	781.53	782.53	0.012548	8.25	56.72	33.38	0.95
D&A - Los Gatos	741.19	400 cfs	400.00	778.46	780.61	780.61	781.42	0.013623	7.61	65.55	45.33	0.97
D&A - Los Gatos	689.62	400 cfs	400.00	777.00	780.34		780.53	0.002456	3.74	133.02	68.40	0.43
D&A - Los Gatos	639.86	400 cfs	400.00	776.90	780.12		780.40	0.002738	4.57	126.34	71.65	0.47
D&A - Los Gatos	589.01	400 cfs	400.00	776.00	780.02		780.27	0.002082	4.24	130.66	67.83	0.41
D&A - Los Gatos	538.84	400 cfs	400.00	776.96	779.12	779.12	779.99	0.012689	7.60	59.44	48.52	0.93
D&A - Los Gatos	489.74	400 cfs	400.00	775.90	778.42	778.41	779.30	0.012908	7.76	60.77	40.70	0.95
D&A - Los Gatos	439.04	400 cfs	400.00	774.99	778.22		778.79	0.005715	6.36	81.55	42.45	0.67
D&A - Los Gatos	389.93	400 cfs	400.00	774.95	778.05		778.50	0.004600	5.73	97.17	55.99	0.60
D&A - Los Gatos	340.66	400 cfs	400.00	774.90	777.46	777.25	778.16	0.009013	6.91	68.88	43.34	0.81
D&A - Los Gatos	288.41	400 cfs	400.00	774.80	777.05	776.85	777.66	0.009204	6.39	72.58	50.55	0.80
D&A - Los Gatos	240.54	400 cfs	400.00	774.12	776.74		777.25	0.006877	5.78	72.02	40.08	0.70
D&A - Los Gatos	192.59	400 cfs	400.00	773.68	775.93	775.92	776.76	0.014070	7.42	58.17	37.95	0.97
D&A - Los Gatos	156.47	400 cfs	400.00	772.88	775.37	775.37	776.25	0.013846	7.60	55.85	36.80	0.97
D&A - Los Gatos	133.35	400 cfs	400.00	772.37	775.28		775.84	0.008366	6.04	68.00	40.82	0.76
D&A - Los Gatos	103.51	400 cfs	400.00	769.99	775.24		775.64	0.003398	5.07	81.66	32.71	0.51
D&A - Los Gatos	86.12	400 cfs	400.00	768.63	774.83		775.53	0.006854	6.73	60.34	21.20	0.65
D&A - Los Gatos	65.49	400 cfs	400.00	771.74	774.69		775.36	0.008551	6.57	60.88	26.40	0.76
D&A - Los Gatos	52.27	400 cfs	400.00	771.71	774.70		775.22	0.006433	5.77	71.17	36.94	0.68
D&A - Los Gatos	40.66	400 cfs	400.00	771.64	774.66		775.12	0.007825	5.41	74.00	42.26	0.72
D&A - Los Gatos	30.09	400 cfs	400.00	771.42	774.42	774.23	775.01	0.011243	6.15	65.01	40.10	0.85
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	400 cfs	400.00	770.63	774.12	774.06	774.78	0.015186	6.49	61.73	43.43	0.96
D&A - Los Gatos	4.25	400 cfs	400.00	770.50	774.16	773.93	774.63	0.010404	5.49	72.95	50.35	0.80

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	50 cfs	50.00	788.00	789.54	789.54	789.84	0.022769	4.39	11.39	19.22	1.01
D&A - Los Gatos	1823.05	50 cfs	50.00	787.00	788.04		788.17	0.005492	2.91	17.15	18.41	0.53
D&A - Los Gatos	1804.26	50 cfs	50.00	786.00	787.88		788.06	0.006463	3.33	15.03	14.76	0.58
D&A - Los Gatos	1771.61	50 cfs	50.00	786.15	787.81		787.89	0.003080	2.31	21.66	21.81	0.41
D&A - Los Gatos	1721.75	50 cfs	50.00	786.69	787.54		787.65	0.007830	2.73	18.32	29.37	0.61
D&A - Los Gatos	1672.23	50 cfs	50.00	785.94	787.32		787.39	0.003528	2.19	22.99	29.72	0.43
D&A - Los Gatos	1623.28	50 cfs	50.00	785.78	786.75	786.75	787.02	0.020902	4.21	12.82	27.71	0.98
D&A - Los Gatos	1572.58	50 cfs	50.00	785.00	786.14		786.27	0.004354	2.86	18.89	24.41	0.49
D&A - Los Gatos	1523.17	50 cfs	50.00	785.00	785.75		785.93	0.011068	3.46	15.36	26.97	0.74
D&A - Los Gatos	1473.9	50 cfs	50.00	784.00	785.50		785.63	0.003610	2.96	19.44	19.94	0.46
D&A - Los Gatos	1423.66	50 cfs	50.00	784.00	785.29		785.43	0.004685	2.93	18.38	22.46	0.50
D&A - Los Gatos	1373.82	50 cfs	50.00	783.99	785.19		785.25	0.002234	1.95	26.66	32.59	0.35
D&A - Los Gatos	1324.01	50 cfs	50.00	783.99	785.07		785.13	0.002720	1.92	26.21	34.87	0.37
D&A - Los Gatos	1273.89	50 cfs	50.00	783.97	784.93		784.98	0.003005	1.82	27.54	41.27	0.38
D&A - Los Gatos	1223.87	50 cfs	50.00	783.84	784.43	784.42	784.65	0.021752	3.74	13.40	29.77	0.97
D&A - Los Gatos	1173.45	50 cfs	50.00	782.37	783.25	783.25	783.56	0.021403	4.43	11.37	20.19	1.00
D&A - Los Gatos	1120.45	50 cfs	50.00	781.89	782.45		782.59	0.013196	2.92	17.16	37.09	0.75
D&A - Los Gatos	1071.74	50 cfs	50.00	781.00	781.51	781.51	781.73	0.024135	3.74	13.39	31.64	1.01
D&A - Los Gatos	1021.08	50 cfs	50.00	779.79	780.97		781.06	0.004146	2.46	20.36	24.02	0.47
D&A - Los Gatos	980.79	50 cfs	50.00	779.00	780.71		780.88	0.004224	3.44	15.76	14.09	0.50
D&A - Los Gatos	940.07	50 cfs	50.00	779.00	780.33	780.15	780.62	0.010138	4.35	12.15	15.38	0.74
D&A - Los Gatos	889.88	50 cfs	50.00	778.93	780.31		780.37	0.001797	1.92	27.34	28.61	0.32
D&A - Los Gatos	839.37	50 cfs	50.00	778.03	780.23		780.29	0.001430	2.02	26.36	22.23	0.29
D&A - Los Gatos	788.82	50 cfs	50.00	778.87	779.95	779.76	780.13	0.009344	3.37	14.86	20.09	0.68
D&A - Los Gatos	741.19	50 cfs	50.00	778.46	779.21	779.21	779.46	0.021930	4.05	12.56	26.06	0.99
D&A - Los Gatos	689.62	50 cfs	50.00	777.00	778.22		778.35	0.007644	2.91	17.22	25.64	0.61
D&A - Los Gatos	639.86	50 cfs	50.00	776.90	778.01		778.09	0.003520	2.31	21.64	24.80	0.43
D&A - Los Gatos	589.01	50 cfs	50.00	776.00	777.94		777.98	0.001191	1.65	30.36	25.82	0.26
D&A - Los Gatos	538.84	50 cfs	50.00	776.96	777.68		777.84	0.009901	3.17	15.76	23.60	0.68
D&A - Los Gatos	489.74	50 cfs	50.00	775.90	776.85	776.85	777.13	0.022145	4.25	11.77	21.21	1.00
D&A - Los Gatos	439.04	50 cfs	50.00	774.99	776.38		776.48	0.003869	2.58	20.06	24.00	0.46
D&A - Los Gatos	389.93	50 cfs	50.00	774.95	776.23		776.31	0.003025	2.33	21.84	25.14	0.41
D&A - Los Gatos	340.66	50 cfs	50.00	774.90	776.03		776.13	0.004489	2.50	20.00	24.73	0.48
D&A - Los Gatos	288.41	50 cfs	50.00	774.80	775.54		775.73	0.014985	3.46	14.46	26.56	0.83
D&A - Los Gatos	240.54	50 cfs	50.00	774.12	775.18		775.28	0.005826	2.59	19.33	26.95	0.54
D&A - Los Gatos	192.59	50 cfs	50.00	773.68	774.50	774.50	774.79	0.021140	4.26	11.74	20.26	0.99
D&A - Los Gatos	156.47	50 cfs	50.00	772.88	773.94		774.13	0.012601	3.51	14.25	22.42	0.78
D&A - Los Gatos	133.35	50 cfs	50.00	772.37	773.45	773.45	773.75	0.022092	4.39	11.40	19.55	1.01
D&A - Los Gatos	103.51	50 cfs	50.00	769.99	773.20		773.24	0.000827	1.62	30.92	19.05	0.22
D&A - Los Gatos	86.12	50 cfs	50.00	768.63	773.18		773.22	0.000686	1.59	31.48	14.78	0.19
D&A - Los Gatos	65.49	50 cfs	50.00	771.74	773.12		773.20	0.002763	2.21	22.59	22.18	0.39
D&A - Los Gatos	52.27	50 cfs	50.00	771.71	773.07		773.15	0.003321	2.28	21.96	24.20	0.42
D&A - Los Gatos	40.66	50 cfs	50.00	771.64	772.95		773.09	0.007875	3.00	16.68	23.31	0.62
D&A - Los Gatos	30.09	50 cfs	50.00	771.42	772.76	772.64	772.97	0.013790	3.75	13.35	20.26	0.81
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	50 cfs	50.00	770.63	772.12	772.12	772.48	0.022250	4.85	10.32	14.74	1.02
D&A - Los Gatos	4.25	50 cfs	50.00	770.50	772.10	771.91	772.32	0.010401	3.74	13.36	16.06	0.72

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	800 cfs	800.00	788.00	792.20		792.62	0.005617	5.20	156.90	76.62	0.63
D&A - Los Gatos	1823.05	800 cfs	800.00	787.00	791.80		792.39	0.003823	6.85	191.66	87.25	0.56
D&A - Los Gatos	1804.26	800 cfs	800.00	786.00	790.97	790.97	792.21	0.008942	9.63	122.11	60.40	0.86
D&A - Los Gatos	1771.61	800 cfs	800.00	786.15	790.42	790.42	791.76	0.009510	9.51	102.38	49.78	0.89
D&A - Los Gatos	1721.75	800 cfs	800.00	786.69	790.60		791.13	0.004120	5.87	141.43	53.29	0.58
D&A - Los Gatos	1672.23	800 cfs	800.00	785.94	790.37		790.93	0.003768	6.41	166.14	61.74	0.57
D&A - Los Gatos	1623.28	800 cfs	800.00	785.78	790.28		790.72	0.003459	6.38	201.29	66.55	0.56
D&A - Los Gatos	1572.58	800 cfs	800.00	785.00	790.00		790.54	0.003224	6.90	178.67	47.89	0.55
D&A - Los Gatos	1523.17	800 cfs	800.00	785.00	789.92		790.37	0.002482	6.05	191.77	52.06	0.48
D&A - Los Gatos	1473.9	800 cfs	800.00	784.00	788.46	788.46	790.04	0.010880	11.39	108.16	39.06	0.97
D&A - Los Gatos	1423.66	800 cfs	800.00	784.00	787.95	787.95	789.19	0.010610	10.17	123.07	52.78	0.93
D&A - Los Gatos	1373.82	800 cfs	800.00	783.99	787.72		788.38	0.005399	7.15	159.21	67.24	0.67
D&A - Los Gatos	1324.01	800 cfs	800.00	783.99	787.64		788.09	0.003861	5.89	193.33	83.29	0.57
D&A - Los Gatos	1273.89	800 cfs	800.00	783.97	787.54		787.89	0.002988	5.13	208.86	86.36	0.50
D&A - Los Gatos	1223.87	800 cfs	800.00	783.84	786.63	786.56	787.57	0.010947	8.45	130.45	70.79	0.92
D&A - Los Gatos	1173.45	800 cfs	800.00	782.37	785.82	785.82	786.97	0.011762	9.89	125.93	59.02	0.98
D&A - Los Gatos	1120.45	800 cfs	800.00	781.89	785.49		785.99	0.003556	5.81	160.13	59.94	0.55
D&A - Los Gatos	1071.74	800 cfs	800.00	781.00	785.42		785.83	0.002261	5.35	186.46	58.00	0.45
D&A - Los Gatos	1021.08	800 cfs	800.00	779.79	785.28		785.72	0.001997	5.64	194.76	59.73	0.44
D&A - Los Gatos	980.79	800 cfs	800.00	779.00	784.58	784.01	785.54	0.005978	9.68	160.13	58.54	0.74
D&A - Los Gatos	940.07	800 cfs	800.00	779.00	783.92	783.71	785.21	0.008742	10.83	126.21	44.15	0.88
D&A - Los Gatos	889.88	800 cfs	800.00	778.93	784.31		784.76	0.002184	5.82	187.27	51.15	0.45
D&A - Los Gatos	839.37	800 cfs	800.00	778.03	783.67		784.56	0.004680	8.21	136.97	41.96	0.65
D&A - Los Gatos	788.82	800 cfs	800.00	778.87	782.77	782.77	784.17	0.010506	10.05	104.99	44.13	0.94
D&A - Los Gatos	741.19	800 cfs	800.00	778.46	781.58	781.58	782.76	0.012236	9.47	112.27	50.58	0.98
D&A - Los Gatos	689.62	800 cfs	800.00	777.00	781.57		781.86	0.002242	4.71	221.44	75.44	0.44
D&A - Los Gatos	639.86	800 cfs	800.00	776.90	781.34		781.73	0.002709	5.72	217.75	78.07	0.49
D&A - Los Gatos	589.01	800 cfs	800.00	776.00	781.21		781.60	0.002390	5.58	215.57	74.66	0.46
D&A - Los Gatos	538.84	800 cfs	800.00	776.96	780.21	780.21	781.31	0.010085	8.98	120.40	60.37	0.89
D&A - Los Gatos	489.74	800 cfs	800.00	775.90	779.61	779.52	780.74	0.009579	9.08	119.01	56.56	0.89
D&A - Los Gatos	439.04	800 cfs	800.00	774.99	779.37	778.87	780.29	0.006316	8.41	137.46	54.93	0.74
D&A - Los Gatos	389.93	800 cfs	800.00	774.95	779.35		779.94	0.004112	6.96	178.01	68.51	0.60
D&A - Los Gatos	340.66	800 cfs	800.00	774.90	778.34	778.34	779.57	0.010769	9.40	111.60	53.77	0.93
D&A - Los Gatos	288.41	800 cfs	800.00	774.80	778.19		778.97	0.007000	7.54	136.32	60.98	0.75
D&A - Los Gatos	240.54	800 cfs	800.00	774.12	777.73	777.30	778.62	0.007261	7.67	116.64	49.94	0.77
D&A - Los Gatos	192.59	800 cfs	800.00	773.68	777.15	776.94	778.21	0.009292	8.50	110.21	46.75	0.86
D&A - Los Gatos	156.47	800 cfs	800.00	772.88	777.11		777.87	0.005394	7.31	136.72	53.69	0.68
D&A - Los Gatos	133.35	800 cfs	800.00	772.37	777.22		777.69	0.002995	5.71	167.42	58.23	0.51
D&A - Los Gatos	103.51	800 cfs	800.00	769.99	777.10		777.61	0.002489	5.92	170.09	55.83	0.47
D&A - Los Gatos	86.12	800 cfs	800.00	768.63	775.55	775.55	777.39	0.013928	10.94	76.97	24.93	0.96
D&A - Los Gatos	65.49	800 cfs	800.00	771.74	775.44	775.44	776.96	0.013494	9.92	81.28	28.34	1.00
D&A - Los Gatos	52.27	800 cfs	800.00	771.71	775.46	775.25	776.56	0.009497	8.51	101.07	41.59	0.87
D&A - Los Gatos	40.66	800 cfs	800.00	771.64	775.61		776.34	0.007560	6.86	116.75	45.97	0.75
D&A - Los Gatos	30.09	800 cfs	800.00	771.42	775.32	775.13	776.24	0.010950	7.67	104.40	45.63	0.89
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	800 cfs	800.00	770.63	774.88	774.88	776.00	0.014830	8.50	94.70	44.10	1.01
D&A - Los Gatos	4.25	800 cfs	800.00	770.50	774.92	774.70	775.73	0.010407	7.24	111.37	51.69	0.86

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	100 cfs	100.00	788.00	789.92	789.92	790.31	0.021428	5.04	19.83	26.01	1.02
D&A - Los Gatos	1823.05	100 cfs	100.00	787.00	788.53		788.75	0.005761	3.79	26.35	19.40	0.57
D&A - Los Gatos	1804.26	100 cfs	100.00	786.00	788.28		788.60	0.009576	4.56	22.06	19.05	0.73
D&A - Los Gatos	1771.61	100 cfs	100.00	786.15	788.19		788.36	0.004284	3.33	30.24	23.77	0.51
D&A - Los Gatos	1721.75	100 cfs	100.00	786.69	787.92		788.09	0.006897	3.32	30.14	32.71	0.61
D&A - Los Gatos	1672.23	100 cfs	100.00	785.94	787.69		787.82	0.003977	2.99	34.79	33.97	0.48
D&A - Los Gatos	1623.28	100 cfs	100.00	785.78	787.09	787.09	787.46	0.016308	5.05	23.70	36.53	0.94
D&A - Los Gatos	1572.58	100 cfs	100.00	785.00	786.54		786.77	0.005492	3.98	30.15	32.13	0.59
D&A - Los Gatos	1523.17	100 cfs	100.00	785.00	786.28		786.48	0.005937	3.70	31.54	33.19	0.59
D&A - Los Gatos	1473.9	100 cfs	100.00	784.00	785.96		786.21	0.004863	4.20	29.40	24.02	0.56
D&A - Los Gatos	1423.66	100 cfs	100.00	784.00	785.67		785.93	0.006358	4.18	27.91	28.26	0.61
D&A - Los Gatos	1373.82	100 cfs	100.00	783.99	785.57		785.68	0.002842	2.75	40.24	38.83	0.42
D&A - Los Gatos	1324.01	100 cfs	100.00	783.99	785.43		785.53	0.003203	2.63	40.43	44.86	0.43
D&A - Los Gatos	1273.89	100 cfs	100.00	783.97	785.28		785.37	0.002981	2.38	44.06	51.81	0.41
D&A - Los Gatos	1223.87	100 cfs	100.00	783.84	784.70	784.70	785.04	0.019524	4.71	22.03	35.89	0.98
D&A - Los Gatos	1173.45	100 cfs	100.00	782.37	783.64	783.64	784.04	0.015087	5.16	22.77	35.49	0.91
D&A - Los Gatos	1120.45	100 cfs	100.00	781.89	782.69		782.92	0.013681	3.88	25.88	37.79	0.82
D&A - Los Gatos	1071.74	100 cfs	100.00	781.00	781.77	781.77	782.11	0.020208	4.68	21.63	32.71	1.00
D&A - Los Gatos	1021.08	100 cfs	100.00	779.79	781.65		781.76	0.002352	2.72	38.35	29.09	0.39
D&A - Los Gatos	980.79	100 cfs	100.00	779.00	781.30	780.73	781.61	0.004887	4.63	27.75	25.21	0.57
D&A - Los Gatos	940.07	100 cfs	100.00	779.00	780.73	780.70	781.28	0.012781	6.06	19.53	21.02	0.88
D&A - Los Gatos	889.88	100 cfs	100.00	778.93	780.85		780.95	0.001867	2.54	43.55	31.73	0.35
D&A - Los Gatos	839.37	100 cfs	100.00	778.03	780.71		780.84	0.002099	2.97	37.83	25.01	0.37
D&A - Los Gatos	788.82	100 cfs	100.00	778.87	780.24	780.13	780.61	0.012615	4.85	21.02	22.22	0.84
D&A - Los Gatos	741.19	100 cfs	100.00	778.46	779.51	779.51	779.88	0.018298	4.96	21.64	33.09	0.97
D&A - Los Gatos	689.62	100 cfs	100.00	777.00	778.68		778.84	0.006357	3.26	32.71	41.74	0.59
D&A - Los Gatos	639.86	100 cfs	100.00	776.90	778.47		778.61	0.003409	2.99	35.03	32.70	0.46
D&A - Los Gatos	589.01	100 cfs	100.00	776.00	778.39		778.48	0.001643	2.39	43.61	35.32	0.33
D&A - Los Gatos	538.84	100 cfs	100.00	776.96	778.02		778.29	0.010548	4.18	23.94	25.38	0.75
D&A - Los Gatos	489.74	100 cfs	100.00	775.90	777.19	777.19	777.59	0.018927	5.12	19.81	26.23	0.99
D&A - Los Gatos	439.04	100 cfs	100.00	774.99	776.82		777.00	0.004314	3.48	31.52	28.67	0.52
D&A - Los Gatos	389.93	100 cfs	100.00	774.95	776.63		776.80	0.003770	3.26	33.54	32.53	0.48
D&A - Los Gatos	340.66	100 cfs	100.00	774.90	776.38		776.57	0.005523	3.50	29.57	29.68	0.57
D&A - Los Gatos	288.41	100 cfs	100.00	774.80	775.90		776.15	0.011924	4.05	24.77	31.82	0.79
D&A - Los Gatos	240.54	100 cfs	100.00	774.12	775.55		775.72	0.006432	3.31	30.19	31.22	0.59
D&A - Los Gatos	192.59	100 cfs	100.00	773.68	774.83	774.83	775.19	0.020305	4.82	20.91	30.23	1.00
D&A - Los Gatos	156.47	100 cfs	100.00	772.88	774.29		774.59	0.013060	4.41	22.68	25.95	0.83
D&A - Los Gatos	133.35	100 cfs	100.00	772.37	773.82	773.82	774.21	0.020081	5.04	19.85	25.74	1.01
D&A - Los Gatos	103.51	100 cfs	100.00	769.99	773.68		773.78	0.001547	2.46	40.72	21.35	0.31
D&A - Los Gatos	86.12	100 cfs	100.00	768.63	773.64		773.75	0.001567	2.59	38.57	16.18	0.30
D&A - Los Gatos	65.49	100 cfs	100.00	771.74	773.55		773.70	0.003636	3.09	32.39	23.44	0.46
D&A - Los Gatos	52.27	100 cfs	100.00	771.71	773.50		773.64	0.004043	3.04	32.93	27.23	0.49
D&A - Los Gatos	40.66	100 cfs	100.00	771.64	773.37		773.58	0.007769	3.63	27.57	28.60	0.65
D&A - Los Gatos	30.09	100 cfs	100.00	771.42	773.16	773.03	773.46	0.013210	4.42	22.63	25.96	0.83
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	100 cfs	100.00	770.63	772.56	772.56	773.07	0.019852	5.76	17.36	17.40	1.02
D&A - Los Gatos	4.25	100 cfs	100.00	770.50	772.57	772.34	772.91	0.010405	4.68	21.35	18.19	0.76

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	200 cfs	200.00	788.00	790.45	790.45	790.90	0.019504	5.37	37.23	41.65	1.00
D&A - Los Gatos	1823.05	200 cfs	200.00	787.00	789.21		789.60	0.006221	5.01	40.27	22.77	0.63
D&A - Los Gatos	1804.26	200 cfs	200.00	786.00	788.76	788.62	789.41	0.012527	6.50	31.46	20.51	0.88
D&A - Los Gatos	1771.61	200 cfs	200.00	786.15	788.70		789.05	0.005745	4.78	43.29	26.59	0.62
D&A - Los Gatos	1721.75	200 cfs	200.00	786.69	788.47		788.73	0.006234	4.08	49.01	35.99	0.62
D&A - Los Gatos	1672.23	200 cfs	200.00	785.94	788.22		788.46	0.004440	4.04	54.39	39.87	0.54
D&A - Los Gatos	1623.28	200 cfs	200.00	785.78	787.53	787.53	788.07	0.014902	6.31	41.24	42.58	0.96
D&A - Los Gatos	1572.58	200 cfs	200.00	785.00	787.22		787.54	0.004945	4.89	56.13	40.39	0.59
D&A - Los Gatos	1523.17	200 cfs	200.00	785.00	787.05		787.30	0.004041	4.25	59.24	38.59	0.53
D&A - Los Gatos	1473.9	200 cfs	200.00	784.00	786.55		787.03	0.006498	5.91	44.80	27.49	0.68
D&A - Los Gatos	1423.66	200 cfs	200.00	784.00	786.15	785.94	786.65	0.008732	5.94	43.08	34.45	0.76
D&A - Los Gatos	1373.82	200 cfs	200.00	783.99	786.08		786.30	0.003600	3.84	62.40	47.26	0.50
D&A - Los Gatos	1324.01	200 cfs	200.00	783.99	785.93		786.11	0.003579	3.53	66.42	58.75	0.48
D&A - Los Gatos	1273.89	200 cfs	200.00	783.97	785.79		785.94	0.002972	3.10	73.62	63.85	0.44
D&A - Los Gatos	1223.87	200 cfs	200.00	783.84	785.11	785.11	785.61	0.016052	5.78	38.74	45.10	0.96
D&A - Los Gatos	1173.45	200 cfs	200.00	782.37	784.12	784.12	784.66	0.013704	6.40	41.15	40.98	0.93
D&A - Los Gatos	1120.45	200 cfs	200.00	781.89	782.96	782.96	783.44	0.018371	5.58	36.16	38.86	1.00
D&A - Los Gatos	1071.74	200 cfs	200.00	781.00	782.61		782.87	0.005410	4.13	51.34	38.15	0.59
D&A - Los Gatos	1021.08	200 cfs	200.00	779.79	782.52		782.69	0.001969	3.36	66.24	34.11	0.38
D&A - Los Gatos	980.79	200 cfs	200.00	779.00	782.04	781.62	782.53	0.005697	6.14	47.90	30.02	0.65
D&A - Los Gatos	940.07	200 cfs	200.00	779.00	781.43	781.42	782.19	0.011469	7.45	36.96	27.62	0.89
D&A - Los Gatos	889.88	200 cfs	200.00	778.93	781.66		781.82	0.001876	3.31	70.95	36.31	0.37
D&A - Los Gatos	839.37	200 cfs	200.00	778.03	781.44		781.69	0.002714	4.17	57.57	29.18	0.45
D&A - Los Gatos	788.82	200 cfs	200.00	778.87	780.69	780.69	781.38	0.015171	6.73	31.63	26.21	0.97
D&A - Los Gatos	741.19	200 cfs	200.00	778.46	779.96	779.96	780.51	0.015200	6.09	38.13	39.02	0.96
D&A - Los Gatos	689.62	200 cfs	200.00	777.00	779.37		779.54	0.003964	3.36	69.76	61.71	0.50
D&A - Los Gatos	639.86	200 cfs	200.00	776.90	779.13		779.35	0.003312	3.85	61.92	52.31	0.48
D&A - Los Gatos	589.01	200 cfs	200.00	776.00	779.04		779.20	0.002026	3.30	71.14	49.03	0.38
D&A - Los Gatos	538.84	200 cfs	200.00	776.96	778.46	778.32	778.96	0.012031	5.73	35.88	29.10	0.85
D&A - Los Gatos	489.74	200 cfs	200.00	775.90	777.67	777.67	778.28	0.015621	6.33	33.91	31.82	0.97
D&A - Los Gatos	439.04	200 cfs	200.00	774.99	777.41		777.73	0.004968	4.72	50.23	34.52	0.59
D&A - Los Gatos	389.93	200 cfs	200.00	774.95	777.20		777.49	0.004446	4.44	54.99	42.47	0.56
D&A - Los Gatos	340.66	200 cfs	200.00	774.90	776.84		777.21	0.007011	4.92	44.60	35.04	0.68
D&A - Los Gatos	288.41	200 cfs	200.00	774.80	776.35		776.76	0.010704	5.15	40.99	39.53	0.80
D&A - Los Gatos	240.54	200 cfs	200.00	774.12	776.01		776.32	0.007074	4.43	45.36	33.66	0.66
D&A - Los Gatos	192.59	200 cfs	200.00	773.68	775.29	775.26	775.81	0.015394	5.81	35.54	33.38	0.95
D&A - Los Gatos	156.47	200 cfs	200.00	772.88	774.66	774.64	775.25	0.015849	6.03	33.28	28.88	0.96
D&A - Los Gatos	133.35	200 cfs	200.00	772.37	774.30	774.30	774.85	0.018087	5.97	33.52	31.06	1.01
D&A - Los Gatos	103.51	200 cfs	200.00	769.99	774.34		774.54	0.002595	3.59	55.84	24.84	0.42
D&A - Los Gatos	86.12	200 cfs	200.00	768.63	774.21		774.48	0.003372	4.14	48.27	18.01	0.44
D&A - Los Gatos	65.49	200 cfs	200.00	771.74	774.09		774.39	0.005165	4.39	45.51	24.88	0.57
D&A - Los Gatos	52.27	200 cfs	200.00	771.71	774.05		774.31	0.005069	4.08	49.05	31.24	0.57
D&A - Los Gatos	40.66	200 cfs	200.00	771.64	773.94		774.24	0.007620	4.36	45.91	35.61	0.68
D&A - Los Gatos	30.09	200 cfs	200.00	771.42	773.73	773.53	774.13	0.011341	5.06	39.54	33.00	0.81
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	200 cfs	200.00	770.63	773.44	773.26	773.90	0.013276	5.46	36.63	29.52	0.86
D&A - Los Gatos	4.25	200 cfs	200.00	770.50	773.42	772.96	773.79	0.010417	4.90	40.80	32.75	0.77

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	400 cfs	400.00	788.00	791.05	791.05	791.55	0.018750	5.67	70.78	72.87	1.01
D&A - Los Gatos	1823.05	400 cfs	400.00	787.00	790.21	789.56	790.84	0.005997	6.45	73.78	61.52	0.66
D&A - Los Gatos	1804.26	400 cfs	400.00	786.00	789.63	789.63	790.64	0.011561	8.25	57.07	36.38	0.91
D&A - Los Gatos	1771.61	400 cfs	400.00	786.15	789.36		790.10	0.008110	6.95	62.09	30.48	0.77
D&A - Los Gatos	1721.75	400 cfs	400.00	786.69	789.25		789.65	0.005985	5.05	79.15	40.71	0.64
D&A - Los Gatos	1672.23	400 cfs	400.00	785.94	788.90		789.36	0.005449	5.60	84.20	47.55	0.64
D&A - Los Gatos	1623.28	400 cfs	400.00	785.78	788.50		789.03	0.007870	6.57	88.73	55.51	0.76
D&A - Los Gatos	1572.58	400 cfs	400.00	785.00	788.32		788.72	0.003916	5.75	102.07	43.35	0.57
D&A - Los Gatos	1523.17	400 cfs	400.00	785.00	788.20		788.53	0.003080	5.03	107.87	45.21	0.50
D&A - Los Gatos	1473.9	400 cfs	400.00	784.00	787.32	787.08	788.23	0.008958	8.39	67.57	31.95	0.84
D&A - Los Gatos	1423.66	400 cfs	400.00	784.00	786.77	786.77	787.71	0.012015	8.39	66.66	41.60	0.93
D&A - Los Gatos	1373.82	400 cfs	400.00	783.99	786.78		787.17	0.004473	5.29	99.44	58.71	0.58
D&A - Los Gatos	1324.01	400 cfs	400.00	783.99	786.64		786.94	0.003751	4.59	114.07	72.95	0.53
D&A - Los Gatos	1273.89	400 cfs	400.00	783.97	786.53		786.75	0.002911	3.97	125.71	76.31	0.46
D&A - Los Gatos	1223.87	400 cfs	400.00	783.84	785.73	785.73	786.43	0.013309	7.05	70.79	58.87	0.94
D&A - Los Gatos	1173.45	400 cfs	400.00	782.37	784.80	784.80	785.62	0.012915	8.01	71.41	47.95	0.96
D&A - Los Gatos	1120.45	400 cfs	400.00	781.89	783.90		784.37	0.007378	5.57	75.65	45.80	0.71
D&A - Los Gatos	1071.74	400 cfs	400.00	781.00	783.81		784.10	0.002950	4.48	101.91	46.57	0.48
D&A - Los Gatos	1021.08	400 cfs	400.00	779.79	783.70		783.98	0.001926	4.34	112.27	44.66	0.40
D&A - Los Gatos	980.79	400 cfs	400.00	779.00	783.01	782.63	783.79	0.006676	8.12	82.74	40.77	0.74
D&A - Los Gatos	940.07	400 cfs	400.00	779.00	782.47	782.36	783.44	0.009783	8.93	69.12	34.48	0.88
D&A - Los Gatos	889.88	400 cfs	400.00	778.93	782.77		783.04	0.001994	4.38	114.99	42.63	0.41
D&A - Los Gatos	839.37	400 cfs	400.00	778.03	782.41		782.89	0.003525	5.84	88.64	34.75	0.54
D&A - Los Gatos	788.82	400 cfs	400.00	778.87	781.53	781.53	782.53	0.012548	8.25	56.72	33.38	0.95
D&A - Los Gatos	741.19	400 cfs	400.00	778.46	780.61	780.61	781.42	0.013623	7.61	65.55	45.33	0.97
D&A - Los Gatos	689.62	400 cfs	400.00	777.00	780.34		780.53	0.002456	3.74	133.02	68.40	0.43
D&A - Los Gatos	639.86	400 cfs	400.00	776.90	780.12		780.40	0.002738	4.57	126.34	71.65	0.47
D&A - Los Gatos	589.01	400 cfs	400.00	776.00	780.02		780.27	0.002082	4.24	130.66	67.83	0.41
D&A - Los Gatos	538.84	400 cfs	400.00	776.96	779.12	779.12	779.99	0.012689	7.60	59.44	48.52	0.93
D&A - Los Gatos	489.74	400 cfs	400.00	775.90	778.42	778.41	779.30	0.012908	7.76	60.77	40.70	0.95
D&A - Los Gatos	439.04	400 cfs	400.00	774.99	778.22		778.79	0.005715	6.36	81.55	42.45	0.67
D&A - Los Gatos	389.93	400 cfs	400.00	774.95	778.05		778.50	0.004600	5.73	97.17	55.99	0.60
D&A - Los Gatos	340.66	400 cfs	400.00	774.90	777.46	777.25	778.16	0.009013	6.91	68.88	43.34	0.81
D&A - Los Gatos	288.41	400 cfs	400.00	774.80	777.05	776.85	777.66	0.009204	6.39	72.58	50.55	0.80
D&A - Los Gatos	240.54	400 cfs	400.00	774.12	776.74		777.25	0.006877	5.78	72.02	40.08	0.70
D&A - Los Gatos	192.59	400 cfs	400.00	773.68	775.93	775.92	776.76	0.014070	7.42	58.17	37.95	0.97
D&A - Los Gatos	156.47	400 cfs	400.00	772.88	775.37	775.37	776.25	0.013846	7.60	55.85	36.80	0.97
D&A - Los Gatos	133.35	400 cfs	400.00	772.37	775.28		775.84	0.008366	6.04	68.00	40.82	0.76
D&A - Los Gatos	103.51	400 cfs	400.00	769.99	775.24		775.64	0.003398	5.07	81.66	32.71	0.51
D&A - Los Gatos	86.12	400 cfs	400.00	768.63	774.83		775.53	0.006854	6.73	60.34	21.20	0.65
D&A - Los Gatos	65.49	400 cfs	400.00	771.74	774.69		775.36	0.008551	6.57	60.88	26.40	0.76
D&A - Los Gatos	52.27	400 cfs	400.00	771.71	774.70		775.22	0.006433	5.77	71.17	36.94	0.68
D&A - Los Gatos	40.66	400 cfs	400.00	771.64	774.66		775.12	0.007825	5.41	74.00	42.26	0.72
D&A - Los Gatos	30.09	400 cfs	400.00	771.42	774.42	774.23	775.01	0.011243	6.15	65.01	40.10	0.85
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	400 cfs	400.00	770.63	774.12	774.06	774.78	0.015186	6.49	61.73	43.43	0.96
D&A - Los Gatos	4.25	400 cfs	400.00	770.50	774.16	773.93	774.63	0.010404	5.49	72.95	50.35	0.80

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	50 cfs	50.00	788.00	789.54	789.54	789.84	0.022769	4.39	11.39	19.22	1.01
D&A - Los Gatos	1823.05	50 cfs	50.00	787.00	788.04		788.17	0.005492	2.91	17.15	18.41	0.53
D&A - Los Gatos	1804.26	50 cfs	50.00	786.00	787.88		788.06	0.006463	3.33	15.03	14.76	0.58
D&A - Los Gatos	1771.61	50 cfs	50.00	786.15	787.81		787.89	0.003080	2.31	21.66	21.81	0.41
D&A - Los Gatos	1721.75	50 cfs	50.00	786.69	787.54		787.65	0.007830	2.73	18.32	29.37	0.61
D&A - Los Gatos	1672.23	50 cfs	50.00	785.94	787.32		787.39	0.003528	2.19	22.99	29.72	0.43
D&A - Los Gatos	1623.28	50 cfs	50.00	785.78	786.75	786.75	787.02	0.020902	4.21	12.82	27.71	0.98
D&A - Los Gatos	1572.58	50 cfs	50.00	785.00	786.14		786.27	0.004354	2.86	18.89	24.41	0.49
D&A - Los Gatos	1523.17	50 cfs	50.00	785.00	785.75		785.93	0.011068	3.46	15.36	26.97	0.74
D&A - Los Gatos	1473.9	50 cfs	50.00	784.00	785.50		785.63	0.003610	2.96	19.44	19.94	0.46
D&A - Los Gatos	1423.66	50 cfs	50.00	784.00	785.29		785.43	0.004685	2.93	18.38	22.46	0.50
D&A - Los Gatos	1373.82	50 cfs	50.00	783.99	785.19		785.25	0.002234	1.95	26.66	32.59	0.35
D&A - Los Gatos	1324.01	50 cfs	50.00	783.99	785.07		785.13	0.002720	1.92	26.21	34.87	0.37
D&A - Los Gatos	1273.89	50 cfs	50.00	783.97	784.93		784.98	0.003005	1.82	27.54	41.27	0.38
D&A - Los Gatos	1223.87	50 cfs	50.00	783.84	784.43	784.42	784.65	0.021752	3.74	13.40	29.77	0.97
D&A - Los Gatos	1173.45	50 cfs	50.00	782.37	783.25	783.25	783.56	0.021403	4.43	11.37	20.19	1.00
D&A - Los Gatos	1120.45	50 cfs	50.00	781.89	782.45		782.59	0.013196	2.92	17.16	37.09	0.75
D&A - Los Gatos	1071.74	50 cfs	50.00	781.00	781.51	781.51	781.73	0.024135	3.74	13.39	31.64	1.01
D&A - Los Gatos	1021.08	50 cfs	50.00	779.79	780.97		781.06	0.004146	2.46	20.36	24.02	0.47
D&A - Los Gatos	980.79	50 cfs	50.00	779.00	780.71		780.88	0.004224	3.44	15.76	14.09	0.50
D&A - Los Gatos	940.07	50 cfs	50.00	779.00	780.33	780.15	780.62	0.010138	4.35	12.15	15.38	0.74
D&A - Los Gatos	889.88	50 cfs	50.00	778.93	780.31		780.37	0.001797	1.92	27.34	28.61	0.32
D&A - Los Gatos	839.37	50 cfs	50.00	778.03	780.23		780.29	0.001430	2.02	26.36	22.23	0.29
D&A - Los Gatos	788.82	50 cfs	50.00	778.87	779.95	779.76	780.13	0.009344	3.37	14.86	20.09	0.68
D&A - Los Gatos	741.19	50 cfs	50.00	778.46	779.21	779.21	779.46	0.021930	4.05	12.56	26.06	0.99
D&A - Los Gatos	689.62	50 cfs	50.00	777.00	778.22		778.35	0.007644	2.91	17.22	25.64	0.61
D&A - Los Gatos	639.86	50 cfs	50.00	776.90	778.01		778.09	0.003520	2.31	21.64	24.80	0.43
D&A - Los Gatos	589.01	50 cfs	50.00	776.00	777.94		777.98	0.001191	1.65	30.36	25.82	0.26
D&A - Los Gatos	538.84	50 cfs	50.00	776.96	777.68		777.84	0.009901	3.17	15.76	23.60	0.68
D&A - Los Gatos	489.74	50 cfs	50.00	775.90	776.85	776.85	777.13	0.022145	4.25	11.77	21.21	1.00
D&A - Los Gatos	439.04	50 cfs	50.00	774.99	776.38		776.48	0.003869	2.58	20.06	24.00	0.46
D&A - Los Gatos	389.93	50 cfs	50.00	774.95	776.23		776.31	0.003025	2.33	21.84	25.14	0.41
D&A - Los Gatos	340.66	50 cfs	50.00	774.90	776.03		776.13	0.004489	2.50	20.00	24.73	0.48
D&A - Los Gatos	288.41	50 cfs	50.00	774.80	775.54		775.73	0.014985	3.46	14.46	26.56	0.83
D&A - Los Gatos	240.54	50 cfs	50.00	774.12	775.18		775.28	0.005826	2.59	19.33	26.95	0.54
D&A - Los Gatos	192.59	50 cfs	50.00	773.68	774.50	774.50	774.79	0.021140	4.26	11.74	20.26	0.99
D&A - Los Gatos	156.47	50 cfs	50.00	772.88	773.94		774.13	0.012601	3.51	14.25	22.42	0.78
D&A - Los Gatos	133.35	50 cfs	50.00	772.37	773.45	773.45	773.75	0.022092	4.39	11.40	19.55	1.01
D&A - Los Gatos	103.51	50 cfs	50.00	769.99	773.20		773.24	0.000827	1.62	30.92	19.05	0.22
D&A - Los Gatos	86.12	50 cfs	50.00	768.63	773.18		773.22	0.000686	1.59	31.48	14.78	0.19
D&A - Los Gatos	65.49	50 cfs	50.00	771.74	773.12		773.20	0.002763	2.21	22.59	22.18	0.39
D&A - Los Gatos	52.27	50 cfs	50.00	771.71	773.07		773.15	0.003321	2.28	21.96	24.20	0.42
D&A - Los Gatos	40.66	50 cfs	50.00	771.64	772.95		773.09	0.007875	3.00	16.68	23.31	0.62
D&A - Los Gatos	30.09	50 cfs	50.00	771.42	772.76	772.64	772.97	0.013790	3.75	13.35	20.26	0.81
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	50 cfs	50.00	770.63	772.12	772.12	772.48	0.022250	4.85	10.32	14.74	1.02
D&A - Los Gatos	4.25	50 cfs	50.00	770.50	772.10	771.91	772.32	0.010401	3.74	13.36	16.06	0.72

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	800 cfs	800.00	788.00	792.20		792.62	0.005617	5.20	156.90	76.62	0.63
D&A - Los Gatos	1823.05	800 cfs	800.00	787.00	791.80		792.39	0.003823	6.85	191.66	87.25	0.56
D&A - Los Gatos	1804.26	800 cfs	800.00	786.00	790.97	790.97	792.21	0.008942	9.63	122.11	60.40	0.86
D&A - Los Gatos	1771.61	800 cfs	800.00	786.15	790.42	790.42	791.76	0.009510	9.51	102.38	49.78	0.89
D&A - Los Gatos	1721.75	800 cfs	800.00	786.69	790.60		791.13	0.004120	5.87	141.43	53.29	0.58
D&A - Los Gatos	1672.23	800 cfs	800.00	785.94	790.37		790.93	0.003768	6.41	166.14	61.74	0.57
D&A - Los Gatos	1623.28	800 cfs	800.00	785.78	790.28		790.72	0.003459	6.38	201.29	66.55	0.56
D&A - Los Gatos	1572.58	800 cfs	800.00	785.00	790.00		790.54	0.003224	6.90	178.67	47.89	0.55
D&A - Los Gatos	1523.17	800 cfs	800.00	785.00	789.92		790.37	0.002482	6.05	191.77	52.06	0.48
D&A - Los Gatos	1473.9	800 cfs	800.00	784.00	788.46	788.46	790.04	0.010880	11.39	108.16	39.06	0.97
D&A - Los Gatos	1423.66	800 cfs	800.00	784.00	787.95	787.95	789.19	0.010610	10.17	123.07	52.78	0.93
D&A - Los Gatos	1373.82	800 cfs	800.00	783.99	787.72		788.38	0.005399	7.15	159.21	67.24	0.67
D&A - Los Gatos	1324.01	800 cfs	800.00	783.99	787.64		788.09	0.003861	5.89	193.33	83.29	0.57
D&A - Los Gatos	1273.89	800 cfs	800.00	783.97	787.54		787.89	0.002988	5.13	208.86	86.36	0.50
D&A - Los Gatos	1223.87	800 cfs	800.00	783.84	786.63	786.56	787.57	0.010947	8.45	130.45	70.79	0.92
D&A - Los Gatos	1173.45	800 cfs	800.00	782.37	785.82	785.82	786.97	0.011762	9.89	125.93	59.02	0.98
D&A - Los Gatos	1120.45	800 cfs	800.00	781.89	785.49		785.99	0.003556	5.81	160.13	59.94	0.55
D&A - Los Gatos	1071.74	800 cfs	800.00	781.00	785.42		785.83	0.002261	5.35	186.46	58.00	0.45
D&A - Los Gatos	1021.08	800 cfs	800.00	779.79	785.28		785.72	0.001997	5.64	194.76	59.73	0.44
D&A - Los Gatos	980.79	800 cfs	800.00	779.00	784.58	784.01	785.54	0.005978	9.68	160.13	58.54	0.74
D&A - Los Gatos	940.07	800 cfs	800.00	779.00	783.92	783.71	785.21	0.008742	10.83	126.21	44.15	0.88
D&A - Los Gatos	889.88	800 cfs	800.00	778.93	784.31		784.76	0.002184	5.82	187.27	51.15	0.45
D&A - Los Gatos	839.37	800 cfs	800.00	778.03	783.67		784.56	0.004680	8.21	136.97	41.96	0.65
D&A - Los Gatos	788.82	800 cfs	800.00	778.87	782.77	782.77	784.17	0.010506	10.05	104.99	44.13	0.94
D&A - Los Gatos	741.19	800 cfs	800.00	778.46	781.58	781.58	782.76	0.012236	9.47	112.27	50.58	0.98
D&A - Los Gatos	689.62	800 cfs	800.00	777.00	781.57		781.86	0.002242	4.71	221.44	75.44	0.44
D&A - Los Gatos	639.86	800 cfs	800.00	776.90	781.34		781.73	0.002709	5.72	217.75	78.07	0.49
D&A - Los Gatos	589.01	800 cfs	800.00	776.00	781.21		781.60	0.002390	5.58	215.57	74.66	0.46
D&A - Los Gatos	538.84	800 cfs	800.00	776.96	780.21	780.21	781.31	0.010085	8.98	120.40	60.37	0.89
D&A - Los Gatos	489.74	800 cfs	800.00	775.90	779.61	779.52	780.74	0.009579	9.08	119.01	56.56	0.89
D&A - Los Gatos	439.04	800 cfs	800.00	774.99	779.37	778.87	780.29	0.006316	8.41	137.46	54.93	0.74
D&A - Los Gatos	389.93	800 cfs	800.00	774.95	779.35		779.94	0.004112	6.96	178.01	68.51	0.60
D&A - Los Gatos	340.66	800 cfs	800.00	774.90	778.34	778.34	779.57	0.010769	9.40	111.60	53.77	0.93
D&A - Los Gatos	288.41	800 cfs	800.00	774.80	778.19		778.97	0.007000	7.54	136.32	60.98	0.75
D&A - Los Gatos	240.54	800 cfs	800.00	774.12	777.73	777.30	778.62	0.007261	7.67	116.64	49.94	0.77
D&A - Los Gatos	192.59	800 cfs	800.00	773.68	777.15	776.94	778.21	0.009292	8.50	110.21	46.75	0.86
D&A - Los Gatos	156.47	800 cfs	800.00	772.88	777.11		777.87	0.005394	7.31	136.72	53.69	0.68
D&A - Los Gatos	133.35	800 cfs	800.00	772.37	777.22		777.69	0.002995	5.71	167.42	58.23	0.51
D&A - Los Gatos	103.51	800 cfs	800.00	769.99	777.10		777.61	0.002489	5.92	170.09	55.83	0.47
D&A - Los Gatos	86.12	800 cfs	800.00	768.63	775.55	775.55	777.39	0.013928	10.94	76.97	24.93	0.96
D&A - Los Gatos	65.49	800 cfs	800.00	771.74	775.44	775.44	776.96	0.013494	9.92	81.28	28.34	1.00
D&A - Los Gatos	52.27	800 cfs	800.00	771.71	775.46	775.25	776.56	0.009497	8.51	101.07	41.59	0.87
D&A - Los Gatos	40.66	800 cfs	800.00	771.64	775.61		776.34	0.007560	6.86	116.75	45.97	0.75
D&A - Los Gatos	30.09	800 cfs	800.00	771.42	775.32	775.13	776.24	0.010950	7.67	104.40	45.63	0.89
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	800 cfs	800.00	770.63	774.88	774.88	776.00	0.014830	8.50	94.70	44.10	1.01
D&A - Los Gatos	4.25	800 cfs	800.00	770.50	774.92	774.70	775.73	0.010407	7.24	111.37	51.69	0.86

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	100 cfs	100.00	788.00	789.92	789.92	790.31	0.021428	5.04	19.83	26.01	1.02
D&A - Los Gatos	1823.05	100 cfs	100.00	787.00	788.53		788.75	0.005761	3.79	26.35	19.40	0.57
D&A - Los Gatos	1804.26	100 cfs	100.00	786.00	788.28		788.60	0.009576	4.56	22.06	19.05	0.73
D&A - Los Gatos	1771.61	100 cfs	100.00	786.15	788.19		788.36	0.004284	3.33	30.24	23.77	0.51
D&A - Los Gatos	1721.75	100 cfs	100.00	786.69	787.92		788.09	0.006897	3.32	30.14	32.71	0.61
D&A - Los Gatos	1672.23	100 cfs	100.00	785.94	787.69		787.82	0.003977	2.99	34.79	33.97	0.48
D&A - Los Gatos	1623.28	100 cfs	100.00	785.78	787.09	787.09	787.46	0.016308	5.05	23.70	36.53	0.94
D&A - Los Gatos	1572.58	100 cfs	100.00	785.00	786.54		786.77	0.005492	3.98	30.15	32.13	0.59
D&A - Los Gatos	1523.17	100 cfs	100.00	785.00	786.28		786.48	0.005937	3.70	31.54	33.19	0.59
D&A - Los Gatos	1473.9	100 cfs	100.00	784.00	785.96		786.21	0.004863	4.20	29.40	24.02	0.56
D&A - Los Gatos	1423.66	100 cfs	100.00	784.00	785.67		785.93	0.006358	4.18	27.91	28.26	0.61
D&A - Los Gatos	1373.82	100 cfs	100.00	783.99	785.57		785.68	0.002842	2.75	40.24	38.83	0.42
D&A - Los Gatos	1324.01	100 cfs	100.00	783.99	785.43		785.53	0.003203	2.63	40.43	44.86	0.43
D&A - Los Gatos	1273.89	100 cfs	100.00	783.97	785.28		785.37	0.002981	2.38	44.06	51.81	0.41
D&A - Los Gatos	1223.87	100 cfs	100.00	783.84	784.70	784.70	785.04	0.019524	4.71	22.03	35.89	0.98
D&A - Los Gatos	1173.45	100 cfs	100.00	782.37	783.64	783.64	784.04	0.015087	5.16	22.77	35.49	0.91
D&A - Los Gatos	1120.45	100 cfs	100.00	781.89	782.69		782.92	0.013681	3.88	25.88	37.79	0.82
D&A - Los Gatos	1071.74	100 cfs	100.00	781.00	781.77	781.77	782.11	0.020208	4.68	21.63	32.71	1.00
D&A - Los Gatos	1021.08	100 cfs	100.00	779.79	781.65		781.76	0.002352	2.72	38.35	29.09	0.39
D&A - Los Gatos	980.79	100 cfs	100.00	779.00	781.30	780.73	781.61	0.004887	4.63	27.75	25.21	0.57
D&A - Los Gatos	940.07	100 cfs	100.00	779.00	780.73	780.70	781.28	0.012781	6.06	19.53	21.02	0.88
D&A - Los Gatos	889.88	100 cfs	100.00	778.93	780.85		780.95	0.001867	2.54	43.55	31.73	0.35
D&A - Los Gatos	839.37	100 cfs	100.00	778.03	780.71		780.84	0.002099	2.97	37.83	25.01	0.37
D&A - Los Gatos	788.82	100 cfs	100.00	778.87	780.24	780.13	780.61	0.012615	4.85	21.02	22.22	0.84
D&A - Los Gatos	741.19	100 cfs	100.00	778.46	779.51	779.51	779.88	0.018298	4.96	21.64	33.09	0.97
D&A - Los Gatos	689.62	100 cfs	100.00	777.00	778.68		778.84	0.006357	3.26	32.71	41.74	0.59
D&A - Los Gatos	639.86	100 cfs	100.00	776.90	778.47		778.61	0.003409	2.99	35.03	32.70	0.46
D&A - Los Gatos	589.01	100 cfs	100.00	776.00	778.39		778.48	0.001643	2.39	43.61	35.32	0.33
D&A - Los Gatos	538.84	100 cfs	100.00	776.96	778.02		778.29	0.010548	4.18	23.94	25.38	0.75
D&A - Los Gatos	489.74	100 cfs	100.00	775.90	777.19	777.19	777.59	0.018927	5.12	19.81	26.23	0.99
D&A - Los Gatos	439.04	100 cfs	100.00	774.99	776.82		777.00	0.004314	3.48	31.52	28.67	0.52
D&A - Los Gatos	389.93	100 cfs	100.00	774.95	776.63		776.80	0.003770	3.26	33.54	32.53	0.48
D&A - Los Gatos	340.66	100 cfs	100.00	774.90	776.38		776.57	0.005523	3.50	29.57	29.68	0.57
D&A - Los Gatos	288.41	100 cfs	100.00	774.80	775.90		776.15	0.011924	4.05	24.77	31.82	0.79
D&A - Los Gatos	240.54	100 cfs	100.00	774.12	775.55		775.72	0.006435	3.31	30.18	31.22	0.59
D&A - Los Gatos	192.59	100 cfs	100.00	773.68	774.84	774.83	775.19	0.020283	4.81	20.92	30.24	1.00
D&A - Los Gatos	156.47	100 cfs	100.00	772.88	774.29		774.59	0.013078	4.41	22.67	25.94	0.83
D&A - Los Gatos	133.35	100 cfs	100.00	772.37	773.82	773.82	774.21	0.020052	5.03	19.86	25.75	1.01
D&A - Los Gatos	103.51	100 cfs	100.00	769.99	773.68		773.77	0.001553	2.46	40.66	21.33	0.31
D&A - Los Gatos	86.12	100 cfs	100.00	768.63	773.64		773.75	0.001572	2.60	38.53	16.17	0.30
D&A - Los Gatos	65.49	100 cfs	100.00	771.74	773.55		773.69	0.003663	3.09	32.31	23.43	0.46
D&A - Los Gatos	52.27	100 cfs	100.00	771.71	773.50		773.64	0.004082	3.05	32.82	27.20	0.49
D&A - Los Gatos	40.66	100 cfs	100.00	771.64	773.36	773.07	773.57	0.007984	3.66	27.30	28.48	0.66
D&A - Los Gatos	33.82		Bridge									
D&A - Los Gatos	30.09	100 cfs	100.00	771.42	773.16	773.03	773.46	0.013210	4.42	22.63	25.96	0.83
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	100 cfs	100.00	770.63	772.56	772.56	773.07	0.019852	5.76	17.36	17.40	1.02
D&A - Los Gatos	4.25	100 cfs	100.00	770.50	772.57	772.34	772.91	0.010405	4.68	21.35	18.19	0.76

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	200 cfs	200.00	788.00	790.45	790.45	790.90	0.019504	5.37	37.23	41.65	1.00
D&A - Los Gatos	1823.05	200 cfs	200.00	787.00	789.21		789.60	0.006221	5.01	40.27	22.77	0.63
D&A - Los Gatos	1804.26	200 cfs	200.00	786.00	788.76	788.62	789.41	0.012527	6.50	31.46	20.51	0.88
D&A - Los Gatos	1771.61	200 cfs	200.00	786.15	788.70		789.05	0.005745	4.78	43.29	26.59	0.62
D&A - Los Gatos	1721.75	200 cfs	200.00	786.69	788.47		788.73	0.006234	4.08	49.01	35.99	0.62
D&A - Los Gatos	1672.23	200 cfs	200.00	785.94	788.22		788.46	0.004440	4.04	54.39	39.87	0.54
D&A - Los Gatos	1623.28	200 cfs	200.00	785.78	787.53	787.53	788.07	0.014902	6.31	41.24	42.58	0.96
D&A - Los Gatos	1572.58	200 cfs	200.00	785.00	787.22		787.54	0.004945	4.89	56.13	40.39	0.59
D&A - Los Gatos	1523.17	200 cfs	200.00	785.00	787.05		787.30	0.004041	4.25	59.24	38.59	0.53
D&A - Los Gatos	1473.9	200 cfs	200.00	784.00	786.55		787.03	0.006498	5.91	44.80	27.49	0.68
D&A - Los Gatos	1423.66	200 cfs	200.00	784.00	786.15	785.94	786.65	0.008732	5.94	43.08	34.45	0.76
D&A - Los Gatos	1373.82	200 cfs	200.00	783.99	786.08		786.30	0.003600	3.84	62.40	47.26	0.50
D&A - Los Gatos	1324.01	200 cfs	200.00	783.99	785.93		786.11	0.003579	3.53	66.42	58.75	0.48
D&A - Los Gatos	1273.89	200 cfs	200.00	783.97	785.79		785.94	0.002972	3.10	73.62	63.85	0.44
D&A - Los Gatos	1223.87	200 cfs	200.00	783.84	785.11	785.11	785.61	0.016052	5.78	38.74	45.10	0.96
D&A - Los Gatos	1173.45	200 cfs	200.00	782.37	784.12	784.12	784.66	0.013704	6.40	41.15	40.98	0.93
D&A - Los Gatos	1120.45	200 cfs	200.00	781.89	782.96	782.96	783.44	0.018371	5.58	36.16	38.86	1.00
D&A - Los Gatos	1071.74	200 cfs	200.00	781.00	782.61		782.87	0.005410	4.13	51.34	38.15	0.59
D&A - Los Gatos	1021.08	200 cfs	200.00	779.79	782.52		782.69	0.001969	3.36	66.24	34.11	0.38
D&A - Los Gatos	980.79	200 cfs	200.00	779.00	782.04	781.62	782.53	0.005697	6.14	47.90	30.02	0.65
D&A - Los Gatos	940.07	200 cfs	200.00	779.00	781.43	781.42	782.19	0.011469	7.45	36.96	27.62	0.89
D&A - Los Gatos	889.88	200 cfs	200.00	778.93	781.66		781.82	0.001876	3.31	70.95	36.31	0.37
D&A - Los Gatos	839.37	200 cfs	200.00	778.03	781.44		781.69	0.002714	4.17	57.57	29.18	0.45
D&A - Los Gatos	788.82	200 cfs	200.00	778.87	780.69	780.69	781.38	0.015171	6.73	31.63	26.21	0.97
D&A - Los Gatos	741.19	200 cfs	200.00	778.46	779.96	779.96	780.51	0.015200	6.09	38.13	39.02	0.96
D&A - Los Gatos	689.62	200 cfs	200.00	777.00	779.37		779.54	0.003964	3.36	69.76	61.71	0.50
D&A - Los Gatos	639.86	200 cfs	200.00	776.90	779.13		779.35	0.003312	3.85	61.92	52.31	0.48
D&A - Los Gatos	589.01	200 cfs	200.00	776.00	779.04		779.20	0.002026	3.30	71.14	49.03	0.38
D&A - Los Gatos	538.84	200 cfs	200.00	776.96	778.46	778.32	778.96	0.012031	5.73	35.88	29.10	0.85
D&A - Los Gatos	489.74	200 cfs	200.00	775.90	777.67	777.67	778.28	0.015621	6.33	33.91	31.82	0.97
D&A - Los Gatos	439.04	200 cfs	200.00	774.99	777.41		777.73	0.004968	4.72	50.23	34.52	0.59
D&A - Los Gatos	389.93	200 cfs	200.00	774.95	777.20		777.49	0.004446	4.44	54.99	42.47	0.56
D&A - Los Gatos	340.66	200 cfs	200.00	774.90	776.84		777.21	0.007011	4.92	44.60	35.04	0.68
D&A - Los Gatos	288.41	200 cfs	200.00	774.80	776.35		776.76	0.010704	5.15	40.99	39.53	0.80
D&A - Los Gatos	240.54	200 cfs	200.00	774.12	776.01		776.32	0.007074	4.43	45.36	33.66	0.66
D&A - Los Gatos	192.59	200 cfs	200.00	773.68	775.29	775.26	775.81	0.015394	5.81	35.54	33.38	0.95
D&A - Los Gatos	156.47	200 cfs	200.00	772.88	774.66	774.64	775.25	0.015849	6.03	33.28	28.88	0.96
D&A - Los Gatos	133.35	200 cfs	200.00	772.37	774.30	774.30	774.85	0.018087	5.97	33.52	31.06	1.01
D&A - Los Gatos	103.51	200 cfs	200.00	769.99	774.33		774.53	0.002612	3.59	55.71	24.82	0.42
D&A - Los Gatos	86.12	200 cfs	200.00	768.63	774.21		774.47	0.003395	4.15	48.17	17.98	0.45
D&A - Los Gatos	65.49	200 cfs	200.00	771.74	774.08		774.39	0.005238	4.41	45.30	24.86	0.58
D&A - Los Gatos	52.27	200 cfs	200.00	771.71	774.04		774.30	0.005176	4.10	48.74	31.15	0.57
D&A - Los Gatos	40.66	200 cfs	200.00	771.64	773.93	773.57	774.23	0.007861	4.41	45.39	35.43	0.69
D&A - Los Gatos	33.82		Bridge									
D&A - Los Gatos	30.09	200 cfs	200.00	771.42	773.73	773.53	774.13	0.011341	5.06	39.54	33.00	0.81
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	200 cfs	200.00	770.63	773.44	773.26	773.90	0.013276	5.46	36.63	29.52	0.86
D&A - Los Gatos	4.25	200 cfs	200.00	770.50	773.42	772.96	773.79	0.010417	4.90	40.80	32.75	0.77

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	400 cfs	400.00	788.00	791.05	791.05	791.55	0.018750	5.67	70.78	72.87	1.01
D&A - Los Gatos	1823.05	400 cfs	400.00	787.00	790.21	789.56	790.84	0.005997	6.45	73.78	61.52	0.66
D&A - Los Gatos	1804.26	400 cfs	400.00	786.00	789.63	789.63	790.64	0.011561	8.25	57.07	36.38	0.91
D&A - Los Gatos	1771.61	400 cfs	400.00	786.15	789.36		790.10	0.008110	6.95	62.09	30.48	0.77
D&A - Los Gatos	1721.75	400 cfs	400.00	786.69	789.25		789.65	0.005985	5.05	79.15	40.71	0.64
D&A - Los Gatos	1672.23	400 cfs	400.00	785.94	788.90		789.36	0.005449	5.60	84.20	47.55	0.64
D&A - Los Gatos	1623.28	400 cfs	400.00	785.78	788.50		789.03	0.007870	6.57	88.73	55.51	0.76
D&A - Los Gatos	1572.58	400 cfs	400.00	785.00	788.32		788.72	0.003916	5.75	102.07	43.35	0.57
D&A - Los Gatos	1523.17	400 cfs	400.00	785.00	788.20		788.53	0.003080	5.03	107.87	45.21	0.50
D&A - Los Gatos	1473.9	400 cfs	400.00	784.00	787.32	787.08	788.23	0.008958	8.39	67.57	31.95	0.84
D&A - Los Gatos	1423.66	400 cfs	400.00	784.00	786.77	786.77	787.71	0.012015	8.39	66.66	41.60	0.93
D&A - Los Gatos	1373.82	400 cfs	400.00	783.99	786.78		787.17	0.004473	5.29	99.44	58.71	0.58
D&A - Los Gatos	1324.01	400 cfs	400.00	783.99	786.64		786.94	0.003751	4.59	114.07	72.95	0.53
D&A - Los Gatos	1273.89	400 cfs	400.00	783.97	786.53		786.75	0.002911	3.97	125.71	76.31	0.46
D&A - Los Gatos	1223.87	400 cfs	400.00	783.84	785.73	785.73	786.43	0.013309	7.05	70.79	58.87	0.94
D&A - Los Gatos	1173.45	400 cfs	400.00	782.37	784.80	784.80	785.62	0.012915	8.01	71.41	47.95	0.96
D&A - Los Gatos	1120.45	400 cfs	400.00	781.89	783.90		784.37	0.007378	5.57	75.65	45.80	0.71
D&A - Los Gatos	1071.74	400 cfs	400.00	781.00	783.81		784.10	0.002950	4.48	101.91	46.57	0.48
D&A - Los Gatos	1021.08	400 cfs	400.00	779.79	783.70		783.98	0.001926	4.34	112.27	44.66	0.40
D&A - Los Gatos	980.79	400 cfs	400.00	779.00	783.01	782.63	783.79	0.006676	8.12	82.74	40.77	0.74
D&A - Los Gatos	940.07	400 cfs	400.00	779.00	782.47	782.36	783.44	0.009783	8.93	69.12	34.48	0.88
D&A - Los Gatos	889.88	400 cfs	400.00	778.93	782.77		783.04	0.001994	4.38	114.99	42.63	0.41
D&A - Los Gatos	839.37	400 cfs	400.00	778.03	782.41		782.89	0.003525	5.84	88.64	34.75	0.54
D&A - Los Gatos	788.82	400 cfs	400.00	778.87	781.53	781.53	782.53	0.012548	8.25	56.72	33.38	0.95
D&A - Los Gatos	741.19	400 cfs	400.00	778.46	780.61	780.61	781.42	0.013623	7.61	65.55	45.33	0.97
D&A - Los Gatos	689.62	400 cfs	400.00	777.00	780.34		780.53	0.002456	3.74	133.02	68.40	0.43
D&A - Los Gatos	639.86	400 cfs	400.00	776.90	780.12		780.40	0.002738	4.57	126.34	71.65	0.47
D&A - Los Gatos	589.01	400 cfs	400.00	776.00	780.02		780.27	0.002082	4.24	130.66	67.83	0.41
D&A - Los Gatos	538.84	400 cfs	400.00	776.96	779.12	779.12	779.99	0.012689	7.60	59.44	48.52	0.93
D&A - Los Gatos	489.74	400 cfs	400.00	775.90	778.42	778.41	779.30	0.012908	7.76	60.77	40.70	0.95
D&A - Los Gatos	439.04	400 cfs	400.00	774.99	778.22		778.79	0.005715	6.36	81.55	42.45	0.67
D&A - Los Gatos	389.93	400 cfs	400.00	774.95	778.05		778.50	0.004600	5.73	97.17	55.99	0.60
D&A - Los Gatos	340.66	400 cfs	400.00	774.90	777.46	777.25	778.16	0.009013	6.91	68.88	43.34	0.81
D&A - Los Gatos	288.41	400 cfs	400.00	774.80	777.05	776.85	777.66	0.009204	6.39	72.58	50.55	0.80
D&A - Los Gatos	240.54	400 cfs	400.00	774.12	776.74		777.25	0.006877	5.78	72.02	40.08	0.70
D&A - Los Gatos	192.59	400 cfs	400.00	773.68	775.93	775.92	776.76	0.014070	7.42	58.17	37.95	0.97
D&A - Los Gatos	156.47	400 cfs	400.00	772.88	775.37	775.37	776.25	0.013846	7.60	55.85	36.80	0.97
D&A - Los Gatos	133.35	400 cfs	400.00	772.37	775.28		775.84	0.008391	6.05	67.92	40.79	0.76
D&A - Los Gatos	103.51	400 cfs	400.00	769.99	775.24		775.64	0.003404	5.07	81.60	32.69	0.51
D&A - Los Gatos	86.12	400 cfs	400.00	768.63	774.82		775.53	0.006874	6.73	60.28	21.18	0.65
D&A - Los Gatos	65.49	400 cfs	400.00	771.74	774.69		775.36	0.008601	6.58	60.77	26.39	0.76
D&A - Los Gatos	52.27	400 cfs	400.00	771.71	774.70		775.21	0.006482	5.78	70.98	36.89	0.68
D&A - Los Gatos	40.66	400 cfs	400.00	771.64	774.66	774.26	775.11	0.007905	5.43	73.73	42.20	0.72
D&A - Los Gatos	33.82		Bridge									
D&A - Los Gatos	30.09	400 cfs	400.00	771.42	774.42	774.23	775.01	0.011243	6.15	65.01	40.10	0.85
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	400 cfs	400.00	770.63	774.12	774.06	774.78	0.015186	6.49	61.73	43.43	0.96
D&A - Los Gatos	4.25	400 cfs	400.00	770.50	774.16	773.93	774.63	0.010404	5.49	72.95	50.35	0.80

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	50 cfs	50.00	788.00	789.54	789.54	789.84	0.022769	4.39	11.39	19.22	1.01
D&A - Los Gatos	1823.05	50 cfs	50.00	787.00	788.04		788.17	0.005492	2.91	17.15	18.41	0.53
D&A - Los Gatos	1804.26	50 cfs	50.00	786.00	787.88		788.06	0.006463	3.33	15.03	14.76	0.58
D&A - Los Gatos	1771.61	50 cfs	50.00	786.15	787.81		787.89	0.003080	2.31	21.66	21.81	0.41
D&A - Los Gatos	1721.75	50 cfs	50.00	786.69	787.54		787.65	0.007830	2.73	18.32	29.37	0.61
D&A - Los Gatos	1672.23	50 cfs	50.00	785.94	787.32		787.39	0.003528	2.19	22.99	29.72	0.43
D&A - Los Gatos	1623.28	50 cfs	50.00	785.78	786.75	786.75	787.02	0.020902	4.21	12.82	27.71	0.98
D&A - Los Gatos	1572.58	50 cfs	50.00	785.00	786.14		786.27	0.004354	2.86	18.89	24.41	0.49
D&A - Los Gatos	1523.17	50 cfs	50.00	785.00	785.75		785.93	0.011068	3.46	15.36	26.97	0.74
D&A - Los Gatos	1473.9	50 cfs	50.00	784.00	785.50		785.63	0.003610	2.96	19.44	19.94	0.46
D&A - Los Gatos	1423.66	50 cfs	50.00	784.00	785.29		785.43	0.004685	2.93	18.38	22.46	0.50
D&A - Los Gatos	1373.82	50 cfs	50.00	783.99	785.19		785.25	0.002234	1.95	26.66	32.59	0.35
D&A - Los Gatos	1324.01	50 cfs	50.00	783.99	785.07		785.13	0.002720	1.92	26.21	34.87	0.37
D&A - Los Gatos	1273.89	50 cfs	50.00	783.97	784.93		784.98	0.003005	1.82	27.54	41.27	0.38
D&A - Los Gatos	1223.87	50 cfs	50.00	783.84	784.43	784.42	784.65	0.021752	3.74	13.40	29.77	0.97
D&A - Los Gatos	1173.45	50 cfs	50.00	782.37	783.25	783.25	783.56	0.021403	4.43	11.37	20.19	1.00
D&A - Los Gatos	1120.45	50 cfs	50.00	781.89	782.45		782.59	0.013196	2.92	17.16	37.09	0.75
D&A - Los Gatos	1071.74	50 cfs	50.00	781.00	781.51	781.51	781.73	0.024135	3.74	13.39	31.64	1.01
D&A - Los Gatos	1021.08	50 cfs	50.00	779.79	780.97		781.06	0.004146	2.46	20.36	24.02	0.47
D&A - Los Gatos	980.79	50 cfs	50.00	779.00	780.71		780.88	0.004224	3.44	15.76	14.09	0.50
D&A - Los Gatos	940.07	50 cfs	50.00	779.00	780.33	780.15	780.62	0.010138	4.35	12.15	15.38	0.74
D&A - Los Gatos	889.88	50 cfs	50.00	778.93	780.31		780.37	0.001797	1.92	27.34	28.61	0.32
D&A - Los Gatos	839.37	50 cfs	50.00	778.03	780.23		780.29	0.001430	2.02	26.36	22.23	0.29
D&A - Los Gatos	788.82	50 cfs	50.00	778.87	779.95	779.76	780.13	0.009344	3.37	14.86	20.09	0.68
D&A - Los Gatos	741.19	50 cfs	50.00	778.46	779.21	779.21	779.46	0.021930	4.05	12.56	26.06	0.99
D&A - Los Gatos	689.62	50 cfs	50.00	777.00	778.22		778.35	0.007644	2.91	17.22	25.64	0.61
D&A - Los Gatos	639.86	50 cfs	50.00	776.90	778.01		778.09	0.003520	2.31	21.64	24.80	0.43
D&A - Los Gatos	589.01	50 cfs	50.00	776.00	777.94		777.98	0.001191	1.65	30.36	25.82	0.26
D&A - Los Gatos	538.84	50 cfs	50.00	776.96	777.68		777.84	0.009901	3.17	15.76	23.60	0.68
D&A - Los Gatos	489.74	50 cfs	50.00	775.90	776.85	776.85	777.13	0.022145	4.25	11.77	21.21	1.00
D&A - Los Gatos	439.04	50 cfs	50.00	774.99	776.38		776.48	0.003869	2.58	20.06	24.00	0.46
D&A - Los Gatos	389.93	50 cfs	50.00	774.95	776.23		776.31	0.003025	2.33	21.84	25.14	0.41
D&A - Los Gatos	340.66	50 cfs	50.00	774.90	776.03		776.13	0.004489	2.50	20.00	24.73	0.48
D&A - Los Gatos	288.41	50 cfs	50.00	774.80	775.54		775.73	0.014985	3.46	14.46	26.56	0.83
D&A - Los Gatos	240.54	50 cfs	50.00	774.12	775.18		775.28	0.005826	2.59	19.33	26.95	0.54
D&A - Los Gatos	192.59	50 cfs	50.00	773.68	774.50	774.50	774.79	0.021140	4.26	11.74	20.26	0.99
D&A - Los Gatos	156.47	50 cfs	50.00	772.88	773.94		774.13	0.012605	3.51	14.25	22.42	0.78
D&A - Los Gatos	133.35	50 cfs	50.00	772.37	773.45	773.45	773.75	0.022079	4.38	11.40	19.55	1.01
D&A - Los Gatos	103.51	50 cfs	50.00	769.99	773.19		773.24	0.000830	1.62	30.87	19.04	0.22
D&A - Los Gatos	86.12	50 cfs	50.00	768.63	773.18		773.22	0.000688	1.59	31.45	14.77	0.19
D&A - Los Gatos	65.49	50 cfs	50.00	771.74	773.12		773.19	0.002785	2.22	22.52	22.17	0.39
D&A - Los Gatos	52.27	50 cfs	50.00	771.71	773.07		773.15	0.003359	2.29	21.87	24.18	0.42
D&A - Los Gatos	40.66	50 cfs	50.00	771.64	772.95	772.70	773.09	0.008059	3.02	16.54	23.21	0.63
D&A - Los Gatos	33.82		Bridge									
D&A - Los Gatos	30.09	50 cfs	50.00	771.42	772.76	772.64	772.97	0.013790	3.75	13.35	20.26	0.81
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	50 cfs	50.00	770.63	772.12	772.12	772.48	0.022250	4.85	10.32	14.74	1.02
D&A - Los Gatos	4.25	50 cfs	50.00	770.50	772.10	771.91	772.32	0.010401	3.74	13.36	16.06	0.72

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
D&A - Los Gatos	1870.53	800 cfs	800.00	788.00	792.20		792.62	0.005617	5.20	156.90	76.62	0.63
D&A - Los Gatos	1823.05	800 cfs	800.00	787.00	791.80		792.39	0.003823	6.85	191.66	87.25	0.56
D&A - Los Gatos	1804.26	800 cfs	800.00	786.00	790.97	790.97	792.21	0.008942	9.63	122.11	60.40	0.86
D&A - Los Gatos	1771.61	800 cfs	800.00	786.15	790.42	790.42	791.76	0.009510	9.51	102.38	49.78	0.89
D&A - Los Gatos	1721.75	800 cfs	800.00	786.69	790.60		791.13	0.004120	5.87	141.43	53.29	0.58
D&A - Los Gatos	1672.23	800 cfs	800.00	785.94	790.37		790.93	0.003768	6.41	166.14	61.74	0.57
D&A - Los Gatos	1623.28	800 cfs	800.00	785.78	790.28		790.72	0.003459	6.38	201.29	66.55	0.56
D&A - Los Gatos	1572.58	800 cfs	800.00	785.00	790.00		790.54	0.003224	6.90	178.67	47.89	0.55
D&A - Los Gatos	1523.17	800 cfs	800.00	785.00	789.92		790.37	0.002482	6.05	191.77	52.06	0.48
D&A - Los Gatos	1473.9	800 cfs	800.00	784.00	788.46	788.46	790.04	0.010880	11.39	108.16	39.06	0.97
D&A - Los Gatos	1423.66	800 cfs	800.00	784.00	787.95	787.95	789.19	0.010610	10.17	123.07	52.78	0.93
D&A - Los Gatos	1373.82	800 cfs	800.00	783.99	787.72		788.38	0.005399	7.15	159.21	67.24	0.67
D&A - Los Gatos	1324.01	800 cfs	800.00	783.99	787.64		788.09	0.003861	5.89	193.33	83.29	0.57
D&A - Los Gatos	1273.89	800 cfs	800.00	783.97	787.54		787.89	0.002988	5.13	208.86	86.36	0.50
D&A - Los Gatos	1223.87	800 cfs	800.00	783.84	786.63	786.56	787.57	0.010947	8.45	130.45	70.79	0.92
D&A - Los Gatos	1173.45	800 cfs	800.00	782.37	785.82	785.82	786.97	0.011762	9.89	125.93	59.02	0.98
D&A - Los Gatos	1120.45	800 cfs	800.00	781.89	785.49		785.99	0.003556	5.81	160.13	59.94	0.55
D&A - Los Gatos	1071.74	800 cfs	800.00	781.00	785.42		785.83	0.002261	5.35	186.46	58.00	0.45
D&A - Los Gatos	1021.08	800 cfs	800.00	779.79	785.28		785.72	0.001997	5.64	194.76	59.73	0.44
D&A - Los Gatos	980.79	800 cfs	800.00	779.00	784.58	784.01	785.54	0.005978	9.68	160.13	58.54	0.74
D&A - Los Gatos	940.07	800 cfs	800.00	779.00	783.92	783.71	785.21	0.008742	10.83	126.21	44.15	0.88
D&A - Los Gatos	889.88	800 cfs	800.00	778.93	784.31		784.76	0.002184	5.82	187.27	51.15	0.45
D&A - Los Gatos	839.37	800 cfs	800.00	778.03	783.67		784.56	0.004680	8.21	136.97	41.96	0.65
D&A - Los Gatos	788.82	800 cfs	800.00	778.87	782.77	782.77	784.17	0.010506	10.05	104.99	44.13	0.94
D&A - Los Gatos	741.19	800 cfs	800.00	778.46	781.58	781.58	782.76	0.012236	9.47	112.27	50.58	0.98
D&A - Los Gatos	689.62	800 cfs	800.00	777.00	781.57		781.86	0.002242	4.71	221.44	75.44	0.44
D&A - Los Gatos	639.86	800 cfs	800.00	776.90	781.34		781.73	0.002709	5.72	217.75	78.07	0.49
D&A - Los Gatos	589.01	800 cfs	800.00	776.00	781.21		781.60	0.002390	5.58	215.57	74.66	0.46
D&A - Los Gatos	538.84	800 cfs	800.00	776.96	780.21	780.21	781.31	0.010085	8.98	120.40	60.37	0.89
D&A - Los Gatos	489.74	800 cfs	800.00	775.90	779.61	779.52	780.74	0.009579	9.08	119.01	56.56	0.89
D&A - Los Gatos	439.04	800 cfs	800.00	774.99	779.37	778.87	780.29	0.006316	8.41	137.46	54.93	0.74
D&A - Los Gatos	389.93	800 cfs	800.00	774.95	779.35		779.94	0.004112	6.96	178.01	68.51	0.60
D&A - Los Gatos	340.66	800 cfs	800.00	774.90	778.34	778.34	779.57	0.010769	9.40	111.60	53.77	0.93
D&A - Los Gatos	288.41	800 cfs	800.00	774.80	778.19		778.97	0.007000	7.54	136.32	60.98	0.75
D&A - Los Gatos	240.54	800 cfs	800.00	774.12	777.73	777.30	778.62	0.007261	7.67	116.64	49.94	0.77
D&A - Los Gatos	192.59	800 cfs	800.00	773.68	777.15	776.94	778.21	0.009292	8.50	110.21	46.75	0.86
D&A - Los Gatos	156.47	800 cfs	800.00	772.88	777.11		777.87	0.005394	7.31	136.72	53.69	0.68
D&A - Los Gatos	133.35	800 cfs	800.00	772.37	777.22		777.69	0.002995	5.71	167.42	58.23	0.51
D&A - Los Gatos	103.51	800 cfs	800.00	769.99	777.10		777.61	0.002489	5.92	170.09	55.83	0.47
D&A - Los Gatos	86.12	800 cfs	800.00	768.63	775.55	775.55	777.39	0.013928	10.94	76.97	24.93	0.96
D&A - Los Gatos	65.49	800 cfs	800.00	771.74	775.44	775.44	776.96	0.013494	9.92	81.28	28.34	1.00
D&A - Los Gatos	52.27	800 cfs	800.00	771.71	775.44	775.25	776.56	0.009624	8.54	100.59	41.54	0.87
D&A - Los Gatos	40.66	800 cfs	800.00	771.64	775.60	775.15	776.34	0.007660	6.89	116.28	45.96	0.76
D&A - Los Gatos	33.82		Bridge									
D&A - Los Gatos	30.09	800 cfs	800.00	771.42	775.32	775.13	776.24	0.010950	7.67	104.40	45.63	0.89
D&A - Los Gatos	13		Bridge									
D&A - Los Gatos	11.23	800 cfs	800.00	770.63	774.88	774.88	776.00	0.014830	8.50	94.70	44.10	1.01
D&A - Los Gatos	4.25	800 cfs	800.00	770.50	774.92	774.70	775.73	0.010407	7.24	111.37	51.69	0.86

Appendix F

Noise Calculations



Construction Source Noise Prediction Model

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L _{eq} dBA)	Equipment	Reference Emission Noise Levels (L _{max}) at 50 feet ¹	Usage Factor ¹
Threshold	1,080	50.0	Front End Loader	80	0.4
Residence 1	2000	41.7	Crane	85	0.16
Residence 2	2000	41.7	Excavator	85	0.4

Ground Type	SOFT
Source Height	12
Receiver Height	5
Ground Factor ²	0.60

Predicted Noise Level ³	L _{eq} dBA at 50 feet ³
Front End Loader	76.0
Crane	77.0
Excavator	81.0

Combined Predicted Noise Level (L _{eq} dBA at 50 feet)
83.4

Sources:

¹ Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

² Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

³ Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

$$L_{eq}(\text{equip}) = E.L. + 10 \cdot \log(U.F.) - 20 \cdot \log(D/50) - 10 \cdot G \cdot \log(D/50)$$

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.

Attenuation Calculations for Stationary Noise Sources

- KEY:** Orange cells are for input.
 Grey cells are intermediate calculations performed by the model.
 Green cells are data to present in a written analysis (output).

STEP 1: Identify the noise source and enter the reference noise level (dBA and distance).

STEP 2: Select the ground type (hard or soft), and enter the source and receiver heights.

STEP 3: Select the distance to the receiver.

Noise Source/ID	Reference Noise Level			Attenuation Characteristics				Attenuated Noise Level at Receptor		
	noise level (dBA)	@	distance (ft)	Ground Type (soft/hard)	Source Height (ft)	Receiver Height (ft)	Ground Factor	noise level (dBA)	@	distance (ft)
Construction Pipeline Activity Lmax	85.0	@	50	soft	12	5	0.60	43.4	@	2000
Construction Pipeline Activity Leq	83.4	@	50	soft	12	5	0.60	41.8	@	2000
							0.66			
							0.66			
							0.66			
							0.66			
							0.66			
							0.66			
							0.66			
							0.66			
							0.66			
							0.66			
							0.66			
							0.66			
							0.66			
							0.66			

Notes:
 Estimates of attenuated noise levels do not account for reductions from intervening barriers, including walls, trees, vegetation, or structures of any type.

Computation of the attenuated noise level is based on the equation presented on pg. 12-3 and 12-4 of FTA 2006.
 Computation of the ground factor is based on the equation presented in Figure 6-23 on pg. 6-23 of FTA 2006, where the distance of the reference noise level can be adjusted and the usage factor is not applied (i.e., the usage factor is equal to 1).

Sources:
 Federal Transit Association (FTA). 2006 (May). Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. Washington, D.C. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: September 24, 2010.