

Memorandum

Date: November 12, 2019

To: Ms. Sabrina Dunn
California Department of Transportation
District 4
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Governor's Office of Planning & Research

NOV 12 2019

STATE CLEARINGHOUSE

From:  Mr. Gregg Erickson, Regional Manager
California Department of Fish and Wildlife-Bay Delta Region, 2825 Cordelia Road, Suite 100, Fairfield, CA 94534

Subject: Interstate 580 Safety Lighting and Power Supply Installation Project, Mitigated Negative Declaration, SCH #2019109033, County of Alameda

The California Department of Fish and Wildlife (CDFW) has reviewed the above Interstate 580 Safety Lighting and Power Supply Installation Project (Project) Mitigated Negative Declaration (MND) as proposed by the lead agency, the California Department of Transportation (Caltrans) pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines.¹ Pursuant to our jurisdiction, CDFW is submitting comments on the MND as a means to inform Caltrans as the Lead Agency, of our concerns regarding potentially significant impacts to sensitive resources associated with the proposed Project.

CDFW ROLE

CDFW is a Trustee Agency with responsibility under CEQA §15386 for commenting on projects that could impact fish, plant and wildlife resources. CDFW is also considered a Responsible Agency if a project would require discretionary approval, such as the California Endangered Species Act (CESA) Permit, the Native Plant Protection Act, the Lake and Streambed Alteration (LSA) Agreement and other provisions of the Fish and Game Code that afford protection to the State's fish and wildlife trust resources.

Pursuant to our jurisdiction, CDFW is concerned the Project will have a significant impact on nocturnal wildlife species such as the American badger (*Taxidea taxus*), a California species of special concern (SSC), pallid bat (*Antrozous pallidus*), a California SSC, Townsend's big-eared bat (*Corynorhinus townsendii*), a California SSC, California tiger salamander (*Ambystoma californiense*) a species listed as threatened under CESA and Federal Endangered Species Act (ESA), and California red-legged frog (*Rana draytonii*), a species listed as threatened under ESA and listed as a California SSC. The Project proposes to install 120 light emitting diode (LED) lighting fixtures along a 4.7-mile segment of Interstate 580 (I-580) in the Altamont Pass that currently does not have overhead lighting. The new light fixtures will likely cause disruptions to species nocturnal behavior. The Project location consists of grass covered hills with a lack of development and no residential homes. CDFW is providing comments and recommendations on the MND regarding those activities involved in the Project that are within

¹ CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

Additional Fish and Game Code Regulations

CDFW also has jurisdiction over actions that may result in the disturbance or destruction of active nest sites or the unauthorized take of birds. Fish and Game Code sections protecting birds, their eggs, and nests include 3503 (regarding unlawful take, possession or needless destruction of the nests or eggs of any bird), 3503.5 (regarding the take, possession or destruction of any birds-of-prey or their nests or eggs), and 3513 (regarding unlawful take of any migratory nongame bird). Fully protected species may not be taken or possessed at any time (Fish and Game Code Section 3511). Migratory birds are also protected under the federal Migratory Bird Treaty Act.

IMPACTS SUMMARY

The current MND does not adequately address significant impacts that will be created by artificial lighting and light pollution, and does not provide suitable avoidance and minimization measures that would reduce impacts below a level of significance as required by CEQA. The negative impacts to fish and wildlife resources created by artificial lighting and light pollution has been well documented and studied on nocturnal wildlife and migratory bird species and the MND should be updated to discuss these findings as a significant impact and not as an indirect impact as noted in the Biological Resources section. Animals can experience increased orientation or disorientation from additional illumination and are attracted to or repulsed by glare, which affects foraging, reproduction, communication, and other critical behaviors (Longcore & Rich, 2004). Artificial light disrupts interspecific interactions evolved in natural patterns of light and dark, with serious implications for community ecology (Longcore & Rich, 2004).

IMPACTS

Light Pollution Impacts on Nocturnal Species

The CEQA document does not adequately analyze Project related impacts on nocturnal wildlife species or migratory birds regarding the potential significant impacts of artificial lighting and light pollution. Artificial lighting and light pollution are potential significant impacts to nocturnal wildlife because the impact types can degrade the quality of the environment and substantially reduce the number of individuals. Species including but not limited to, American badger, pallid bat and Townsend's big-eared bat, as well as migratory birds should be analyzed and discussed with additional mitigation incorporated to reduce the impacts to less-than-significant.

According to page 7 of the MND, the 120 LED lighting fixtures would increase the lighting in the Altamont Pass areas outside the roadway to a level of 0.5 lux, which is equivalent to the brightness of a full moon (Kyba et. al., 2017). Unlike the brightness of a full moon which occurs roughly once per month, the permanent and continuously powered lighting fixtures would create an unnatural light regime equivalent to a full moon 365 days a year, creating an unnatural, well lit environment in an area with no previous overhead lighting. The MND discusses indirect impacts to sensitive amphibian species but does not adequately address the direct impacts that would occur as a result of light fixture installation to other nocturnal species and migratory birds.

American Badger

The negative impacts to nocturnal species and migratory birds should be identified in the updated MND as significant based on the following evidence. The Durham County Badger Group states that artificial light impacts reproduction in badgers and has been shown to cause a reduction in the population size, as well as problems in foraging (Natural England, 2002).

American badgers are known to inhabit the area and are noted as a species present within the Project vicinity on page 12 of the MND. Additional light pollution equivalent to that of a full moon, every night of the year would therefore have a significant impact on reproduction and population. Caltrans proposes to install the fixtures with a reduced mounting height, short mast arm length, lower bulb wattage, and front side shielding in order to reduce illumination of areas outside of the roadway by approximately 79 percent compared to standard Caltrans roadway lighting fixtures. These avoidance and minimization measures alone would not reduce impacts below a level of significant.

Bat Species

Many bat species are attracted to insects that congregate around light sources (Frank, 1988). Although it may seem that this is a positive effect, the increased food concentration benefits only those species that exploit light sources and could therefore result in altered community structure. Faster-flying species of bats congregate around lights to feed on insects, but other, slower-flying species avoid lights (Blake *et al.* 1994; Rydell and Baagøe, 1996). Studies have also found that the presence of light pollution in a habitat interferes with the roosting and foraging behavior of bats. As a result of such pollution, species do not forage during dusk when their food preference is at its highest supply (Jones *et al.* 1994, Downs *et al.* 2003). Pallid bat and Townsend's big-eared bat are known to inhabit the area and are noted as a species present within the vicinity of the Project on page 12 of the MND. Additional light pollution equivalent to that of a full moon would therefore have a significant direct impact on the foraging and roosting behavior of bats known to occur within the vicinity of the Project.

Migratory Birds

Migratory birds also have the potential to be significantly and directly impacted by the completion of this Project. The majority of land birds migrate at night (Wilson, 2011). One method of migrant navigation is by reference to stars (Emlen, 1975). Light pollution from all sources reduces the visibility of stars and may entrap migrating birds in dangerous environments especially during inclement weather, causing collision, apparent confusion and mortality (Ogden, 1996). Increased and focused light pollution in this section of the Altamont Pass has the potential to confuse migratory birds and increase bird strikes with man-made structures such as wind turbines due to attraction to the illuminated objects (Poot *et al.* 2008). Therefore, the appropriate avoidance and minimization measures to reduce the output of artificial lighting and focus it towards the road should be incorporated as specified in the avoidance and minimization section of this memorandum.

Furthermore, song is normally heard during hours of brightness, sunrise and sunset; however, when artificial light extends the hours of brightness the birds continue to sing. This can result in sleep loss for the birds (Kempenaers *et al.* 2010, Dominoni *et al.* 2013a, Dominoni *et al.* 2013b, Schlicht *et al.* 2014, Da Silva *et al.* 2014) as well as an increased potential for predation. The migration direction of the European robin (*Erithacus rubecula*) is known to be determined by the use of blue and green photoreceptors. The altering of the natural light in the atmosphere may hinder the migration path of this species (Wiltschko *et al.* 2007). Therefore, bird species with similar photoreceptors have the potential to have their migration direction become disrupted. In order to reduce this impact below a level of significance, the installation and use of the proper lights that emit appropriate wavelengths and spectrums of lighting during the appropriate times of the night should be incorporated into the Project as specified in the avoidance and minimization section of this memorandum. Due to the constant illumination created by the Project, mitigation for the area of permanent illumination may be the only appropriate measure to reduce impacts below a level of significant.

California Tiger Salamander (CTS)

The MND does not adequately discuss or address if the Project has the potential to 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, or substantially reduce the number or restrict range of CTS as a result of installation of artificial lighting and the creation of additional light pollution. The updated MND should adequately analyze direct impacts on CTS regarding the potential significant impacts of artificial lighting and light pollution. Artificial lighting and light pollution are potential significant impacts to CTS because the impact types have the potential to degrade the quality of the environment and substantially reduce the number of individuals. Furthermore, the MND does not mitigate biological impacts on CTS to a level of less-than-significant as required by CEQA using adequate avoidance and minimization measures.

The negative impacts to CTS should be identified in the updated MND as significant based on the following evidence. Artificial lighting has been proven to disrupt the production of melatonin in *Ambystoma* salamanders if they are exposed to it, altering metabolic rates and reducing tolerance to high temperatures (Perry et al. 2008). Additionally, *Ambystoma* salamanders could miss the cue to migrate if there is artificial light, which could affect breeding. *Ambystoma tigrinum*, was one species of focus in the study, which is a sister clade to *Ambystoma californiense*, meaning the two clades are the result of splitting from a single genetic lineage. The two species also share the same life cycle type and have been proven to hybridize in the field. CDFW disagrees with the conclusion made on page 17 of the MND; "Additionally, there may be indirect impacts related to the addition of artificial light from installing the light fixtures. Artificial light introduced by the project might have the potential to alter dispersal and breeding behaviors for CTS. Though no research has been done on the effects of light on these specific species, studies on similar species show altered behavioral and physiological traits that could imply similar effects for these species."

A field study was conducted to examine the effects of artificial night lighting on the foraging activity of the redback salamander, *Plethodon cinereus*, (Rohacek, et. al., 2010) a fossorial species with similar life cycle traits to CTS. *Plethodon cinereus* emergence from subterranean dens or leaf litter during nocturnal rain events is similar to the behavior of CTS. The *Plethodon* study yielded results concluding the redback salamander displayed an aversion to light level increases of only 0.01 lux and foraged less in illuminated habitats compared to darker ones. The proposed Project has a net increase of 0.5 lux to areas outside the roadway, and therefore has the potential to negatively impact the nocturnal habitats of CTS and would likely create a significant impact on the nocturnal activity of *Ambystoma californiense*. This has direct implications for the Project because numerous CTS incidents of take in the roadway of I-580 have been documented in this part of the Altamont Pass (Caltrans E-Mail to CDFW on December 20, 2018; ITP 2081-2015-039-03); therefore, CTS are getting close enough to the road to be significantly impacted by the proposed change in artificial lighting.

Another study examined the effects of LED illumination on habitat preference and aversion behavior to artificial light in the blue-spotted salamander (BSS; *Ambystoma laterale x jeffersonium*) (Fueka, 2017). Findings showed BSS had a preference for deciduous litter in dark trials and coniferous litter in illuminated trials. Coniferous litter is determined to be less than preferred habitat type because of the decreased levels of moisture retention. The findings discuss that the altered preference in the presence of artificial lighting could result in BSS seeking out sub-par habitat in areas far from their natal ponds with drier moisture levels and different invertebrate regimes that could further negatively impact the salamander. BSS shares

a similar life cycle and genetic relatedness as CTS and BSS belong to the *Ambystomatidae* family. Therefore, it could be inferred artificial lighting and light pollution impacts has the potential to alter habitat preferences and lead CTS away from breeding ponds and preferred habitat types which could result in a loss of individuals.

Based on the Perry 2008 study, it is assumed that the impacts which occur to a genetically related species with the exact same life cycle would cause similar significant impacts to the sister clade (i.e. *Ambystoma californiense*). Specifically, the current environmental setting of the Project site with no overhead lighting when compared to the future proposed condition of constant artificial lighting is a significant impact that should be avoided, minimized and mitigated as specified in the avoidance and minimization section of this letter to reduce impacts below a level of significance.

California Red-Legged Frog (CRLF)

The MND does not adequately discuss or address if the Project has the potential to 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, or substantially reduce the number or restrict range of CRLF as a result of installation of artificial lighting and the creation of additional light pollution.

The negative impacts to CRLF should be identified in the updated MND as significant based on the following evidence. Frogs and salamanders are particularly susceptible to artificial light pollution. Light pollution "may affect physiology, behavior, ecology, and evolution of frog and salamander populations" (Wise, 2007). For example, artificial light levels and timing influences melatonin production in salamanders. Melatonin regulates hormones, reproductive development and behavior, skin coloration, an animal's ability to regulate body temperature, and night vision (Gern, 1983).

Artificial lighting causes changes in individual frogs, such as timing delays in transitioning from tadpole to frog, can affect that individual's ability to survive. Remaining a tadpole longer may result in waterbodies becoming dry before metamorphosis can occur, increased predation, and reduced survival. Reduced survival at the population level can result in smaller populations or populations that disappear altogether. Ecological light pollution affects entire communities, not just individuals, and puts many species at risk (Gern, 1983). Therefore, any artificial light installation that causes additional light pollution from baseline conditions has the potential to create significant impacts to CRLF that should be avoided and minimized using the measures specified in the section of this memorandum below. Additionally, because baseline conditions have no artificial overhead lighting, the potentially significant impact can only be reduced below a level of significant using mitigation for the increased areas of light pollution.

Artificial Lighting and Light Pollution Mitigation Measures

To reduce impacts to less-than-significant: CDFW recommends that in addition to the avoidance and minimization measures provided in the Biological Resources Section of the MND that the following avoidance and minimization measures are included in the updated environmental document:

Light Intensity Limits

All LED's or bulbs installed as a result of the Project shall be rated to emit or produce light at or under 3,000 kelvin that results in the output of a warm white color spectrum.

Vehicle Light Barriers

Solid concrete barriers at a minimum height of 3.5 feet should be installed in areas where they have the potential to reduce illumination from overhead lights and from vehicle lights into areas outside of the roadway. Additional barrier types should be employed when feasible, such as plastic inserts (privacy slats) into the spacing of cyclone fencing to create light barriers into areas outside the roadway.

Reflective Signs and Road Striping

Retro-reflectivity of signs and road striping should be implemented throughout the Project to increase visibility of roads to drivers and reduce the need for electrical lighting. Reflective highway markers have also been proven effective to reduce raptor collisions on highways in California's central valley if installed along highway verges and medians.

Isolux Light Pollution Comparison

The lead agency should submit to natural resource agencies, 30 days prior to the initiation of construction Isolux Diagrams that note current light levels present during pre-Project conditions and the predicted Project light levels that will be created upon completion of the Project. Within 60 days of Project completion, the lead agency shall conduct a ground survey that compares predicated light levels with actual light levels achieved upon completion of the Project through comparison of Isolux diagrams. If an increase from the projected levels to the actual levels is discovered additional avoidance, minimization or mitigation measures may be required in coordination with the natural resource agencies.

California Tiger Salamander Light Pollution Impacts Avoidance and Minimization

Compensatory mitigation in areas that receive illumination increases of 0.01 lux or greater in areas of no previous impact from artificial lighting should be provided and the amount of compensation should be determined in consultation with the natural resource agencies.

CONCLUSION

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California's fish and wildlife. Likewise, we appreciate the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

Questions regarding this letter or further coordination should be directed to Mr. Robert Stanley, Senior Environmental Scientist (Specialist), at (707) 428-2093 or Robert.Stanley@wildlife.ca.gov; or Mr. Craig Weightman, Environmental Program Manager at (707) 944-5577 or Craig.Weightman@wildlife.ca.gov.

cc: State Clearinghouse #2019109033