3.7 Biological and Aquatic Resources

This Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (Revised/Supplemental Draft EIR/EIS), Biological Resources Analysis, provides updates addressing the California Fish and Game Commission's designation of the southern California/Central Coast population of mountain lion under the California Endangered Species Act (CESA) and the monarch butterfly's status as a candidate for listing under the federal Endangered Species Act (FESA). This document provides information on the biology and ecology of mountain lion and monarch butterfly as well as data sources used to determine the extent of potential habitat within the resource study areas (RSA) for both new species. Changes made in response to the new species designations are being made in the Revised/Supplemental Draft EIR/EIS and the following appendices: Appendix 3.7-A, Special-Status Species Subject to Project Impacts, and a new Appendix 3.7-D, Supplemental Species Habitat Model Descriptions. Two additional new appendices, Appendix 3.7-E, Supplemental Noise Analysis on Terrestrial Wildlife Species, and Appendix 3.7-F, Supplemental Artificial Light Analysis on Terrestrial Wildlife Species, were added to the Revised/Supplemental Draft EIR/EIS to support the analysis of noise and artificial light effects on mountain lion. All other appendices to Section 3.7, including all technical reports supporting Section 3.7 of the Draft EIR/EIS, remain unchanged.

This Revised/Supplemental Draft EIR/EIS reflects the following changes:

- Inclusion of mountain lion and monarch butterfly.
- Additional information and assessment regarding operational noise and lighting impacts on wildlife.
- Clarifications and additional mitigation addressing impacts on wildlife.
- Clarifications and additions regarding design, monitoring, and adaptive management of wildlife crossings.

3.7.4 Consultation with Regulatory Agencies for Federal Endangered Species Act Compliance

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3.7.4.1 Consultation History with the U.S. Fish and Wildlife Service: Wildlife

The Authority submitted a biological assessment (BA) and requested initiation of formal Section 7 consultation on June 22, 2020.[1] The BA evaluates the potential adverse effects of the project (i.e., proposed action) on species listed as endangered or threatened under FESA, as well as effects on designated or proposed critical habitat. Potential effects on federally listed species will be evaluated in accordance with the legal requirements set forth in Section 7 of FESA (16 U.S.C. § 1531 et seq.). A preliminary effects evaluation is provided in Section 3.7.11, Preliminary FESA Findings.

3.7.4.2 Consultation History with the National Marine Fisheries Service: Fish

The Authority submitted a BA to the NMFS and requested initiation of formal Section 7 consultation on June 22, 2020. The BA evaluates the potential adverse effects of the project (i.e., proposed action) on fish species identified as endangered or threatened under FESA, as well as effects on designated or proposed critical habitat and EFH. A preliminary effects evaluation is provided in Section 3.7.11. NMFS responded to the request to initiate formal consultation on July 7, 2020, and requested additional information. The Authority met with representatives from NMFS several times to discuss information needs and subsequently submitted a revised BA on October

[1] Pursuant to 23 U.S.C. Section 327, under the National Environmental Policy Act (NEPA) Assignment Memorandum of Understanding between the FRA and the State of California, effective July 23, 2019 (FRA and State of California 2019), the Authority has been assigned FRA's FESA Section 7 (16 U.S.C. § 1536) responsibilities for consultations (formal and informal) with respect to the project extent and other projects described in subpart 3.3 of the Memorandum of Understanding.

14, 2020. On October 20, 2020, NMFS found the supplementary information and revisions to be sufficient and initiated formal consultation.

3.7.5 Methods for Evaluating Impacts

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3.7.5.3 Methods for Impact Analysis

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Special-Status Species

Biologists consulted the following sources to identify special-status plant and wildlife species that could potentially be affected by the project:

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- California Fish and Game Commission findings regarding petitions to list species under the CESA (California Fish and Game Commission 2020).

The official USFWS and NMFS species lists, CNDDB list, and CNPS lists used to inform this effort are provided in Appendix A, Official Species Lists, of the *Biological and Aquatic Resources Technical Report* (Authority 2020a). Complete lists of special-status plants (Table B-1) and wildlife (Table B-2) considered for the impacts analysis are provided in Appendix B, Special-Status Species Considered, of the technical report. Appendix 3.7-A in this Revised/Supplemental Draft EIR/EIS, Special-Status Species Subject to Project Impacts, has been updated to address mountain lion and monarch butterfly.

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Wildlife Exposure to Train Noise

Potential wildlife exposure to train noise was identified by determining the maximum noise levels that would be produced by operational trains and the frequency with which trains would operate. Noise levels at various distances from the train were determined by use of an acoustic model. Existing noise levels at various locations on the landscape were determined with reference to noise monitoring data presented in Appendix B of the *Noise and Vibration Technical Report* (Volume 2, Appendix 3.4-A). Potential presence of wildlife in different portions of the alignment was determined with reference to species models discussed in the above section *Special-Status Species*, and effects of train noise on wildlife movement were assessed using sources cited in the following section *Wildlife Movement*. Effects of train noise on wildlife behavior were determined by reference to published literature. For further detail on methodology and citations to the relevant literature, see Appendix 3.7-E.

Wildlife Exposure to Artificial Lighting

Potential wildlife exposure to artificial light at night (ALAN) was evaluated in the context of baseline lighting conditions in the region, an evaluation of the construction and operations nighttime lighting sources, and a review of existing literature regarding the effects of ALAN on wildlife and wildlife movement. For further detail on the methodology, analysis, and citations relevant to ALAN, see Appendix 3.7-F.

Wildlife Movement

The Authority prepared a WCA of the Biological and Aquatic Resources Technical Report [Authority 2020a] to address impacts on wildlife movement and to support the EIR/EIS. Section 5.2 of the WCA summarizes the references used to identify regional and local wildlife movement corridors. Major references include the following:

- *Bay Area and Beyond Critical Linkages* report (Penrod et al. 2013)
- *Safe Passage for Coyote Valley* report (Phillips et al. 2012)
- *Coyote Valley Linkage Assessment Study* (Diamond and Snyder 2016)

- *The Nature Conservancy's Pajaro Study 2012–2013* (Diamond and Snyder 2013)
- *Wildlife Permeability and Hazards across Highway 152 Pacheco Pass: Establishing a Baseline to Inform Infrastructure and Restoration* (Pathways for Wildlife 2020)
- *The Effects of Spatial and Temporal Scale on Conservation Planning and Ecological Networks in the Central Valley, California*; Ph.D. dissertation by Patrick Huber (2008)
- Tule elk radio collar data from CDFW (Hobbs 2017)

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Special-Status Species Habitat Modeling

The Authority prepared GIS species habitat models for the regional RSA. The use of species habitat models was selected because access to the project extent is limited, and modeling allows the Authority to complete impact analyses and permitting efforts despite limited access to properties to conduct field-level biological surveys.

Species habitat models were developed to achieve the following:

- Assess impacts
- Analyze project alternatives
- Place avoidance and minimization features
- Determine mitigation requirements
- Prioritize mitigation opportunities
- Track and report impacts and mitigation

In summary, the models—and the maps generated from them—provide important support for compliance with CEQA, NEPA, Section 7 of the FESA, and Section 2081(b) of the CESA. Moreover, they inform compensatory mitigation planning associated with permitting under Sections 404 and 401 of the CWA and Cal. Fish and Game Code Section 1600. Additional details on species habitat modeling methodology and approach are provided in the technical memorandum prepared for and submitted to the USFWS and CDFW on December 19, 2016 (Appendix D, Species Habitat Modeling Methods Memo, of the *Biological and Aquatic Resources Technical Report* [Authority 2020a]). The California Fish and Game Commission published a notice of findings on May 1, 2020, to designate the southern California/Central Coast population (evolutionarily significant unit [ESU]) of mountain lion as a candidate species under the CESA. Additionally, the monarch butterfly became a candidate for listing under FESA on December 15, 2020. Information on the status, habitat requirements, and potential presence of both species have been added to Appendix 3.7-A and to a new Appendix 3.7-D.

Habitat Terminology

Habitat—The environmental conditions that support occupancy of a given organism in a specified area (Hall et al. 1997).

In scientific and lay publications, habitat is defined in many different ways and for many different purposes. For the purposes of this Revised/Supplemental Draft EIR/EIS, habitat is defined as the specific places where the physical and biological conditions are assumed present that are required to support occupancy by individuals or populations of a given species. Habitat may be occupied (i.e., species present or recently documented as present) or unoccupied.

The term *habitat* implies suitability because any areas with habitat for a given species are therefore *suitable* for that species. The use of this term in this Revised/Supplemental Draft EIR/EIS does not imply presence or absence of a given species, only that the environmental conditions known to support that species are known (through direct observation or expert opinion) or presumed (through habitat modeling) to be present in a specified area. *Occupied habitat* is used only when species occurrence has been verified in a specified area.

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Impact Types and Mechanisms

Project impacts may be direct (i.e., caused by the activity and occurring in the same time and place) or indirect (i.e., caused by the activity but removed in time or distance, but still reasonably foreseeable). Direct impacts would occur within the project footprint during construction and could be temporary (e.g., habitat loss or disturbance resulting from construction staging and activities but restored to pre-project conditions following construction) or permanent (e.g., removal and conversion of existing habitat to HSR facilities). Direct impacts would also occur during operations

and would be intermittent (i.e., not continuous but recurring during rail operations on an episodic or occasional basis throughout the life of the system). Indirect impacts could occur both within and adjacent to the project footprint.

Direct construction impacts on special-status species habitat (including monarch butterfly and mountain lion), special-status plant communities, aquatic resources, and conservation areas were quantified using GIS. Specifically, GIS analysts calculated areas of impact by intersecting biological and aquatic resource feature layers (e.g., special-status species habitat models) with feature layers in the project design drawings (i.e., project activities). Land cover (including special-status plant communities) and aquatic resource feature layers were generated in the land cover mapping and aquatic resource delineation efforts described earlier in this section. Feature layers for special-status species habitat are equivalent to the species habitat models developed specifically for the project as previously described in Species Modeling Methods. Prior to analysis, GIS analysts converted MicroStation DGN files provided by project engineers to ArcGIS geodatabases to facilitate intersects between design drawing and biological resource feature layers.

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3.7.6 Affected Environment

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3.7.6.2 Biological Conditions

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Special-Status Species

This section addresses special-status plant and wildlife species that have a potential to be affected by the project based on the methods and types of data described in Section 3.7.5.3, Methods for Impact Analysis. Information on the distribution, habitat requirements, threats, and occurrence of special-status species potentially affected by the project are listed in Volume 2, Appendix 3.7-A. As previously noted, the California Fish and Game Commission published a notice of findings on May 1, 2020, to designate the southern California/Central Coast population (ESU) of mountain lion as a candidate species under the CESA. As described in the petition to list the mountain lion, Gustafson et al. (2018) recently identified 10 genetically distinct mountain lion populations in California (with one centered in Nevada but extending into California). The project falls within the central coast north (CC-N) subpopulation (the most northern subpopulation in the ESU), and the project is adjacent to the central coast central (CC-C) subpopulation as described in the petition for listing (Center for Biological Diversity 2019). The petition describes that most of the populations comprising the ESU have low genetic diversity and effective population sizes,[2] and that the divergence of the genetic subpopulations in the ESU is likely the result of habitat fragmentation caused by roads and development. Gustafson et al. (2018) found that the CC-N subpopulation has low observed genetic diversity and resides in areas of significant isolation and habitat fragmentation. The petition describes one metric for minimum viable effective population size (noting that minimum viable effective population size has been found to vary depending on the species). The metric presented is referred to as the 50/500 rule, where an effective population size of 50 is assumed sufficient to prevent inbreeding depression in the short term and an effective population size of 500 is sufficient to retain evolutionary potential in perpetuity. Gustafson et al. (2018) estimated effective population size and total adult population size for each of the six subpopulations within the ESU. The CC-N subpopulation was found to have an effective population size of 17 (16.6) and an estimated total adult population of 33–66 individuals. The CC-C subpopulation has slightly higher estimates and was estimated to have an effective population size of 57 (56.6) and an estimated total adult population of 113–226; however, the petition notes this is still close to the lowest effective population size metric. The petition highlighted that

[2] Effective population size generally refers to the breeding adults in a population, recognizing that not all adult animals in a population may breed.

although low effective population size alone is cause for conservation concern, habitat loss and fragmentation due to roads and development have led to extreme levels of isolation and high mortality rates. Several other factors contributing to mountain lion survival and reproduction described in the petition include depredation take, illegal killings (many of which may go undocumented), intraspecific strife, the use of anticoagulant rodenticides, and the mortality of mountain lion cubs (if the mother is killed due to one of the factors listed above). Consequently, the petition notes that there is a high risk of inbreeding depression due to genetic isolation and high mortality rates, and habitat connectivity and habitat protection are needed to assure viable populations.

Additionally, as noted previously, the monarch butterfly became a candidate for listing under FESA on December 15, 2020. Monarch butterfly does not overwinter within the project area; however, it is known to migrate through and to breed within the area. The analysis of listed species (i.e., protected under FESA or CESA) is described in detail in the habitat model descriptions in Appendix E, Species Habitat Model Descriptions, of the *Biological and Aquatic Resources Technical Report* (Authority 2020a), and, for mountain lion and monarch butterfly, in Appendix 3.7-D to this Revised/Supplemental Draft EIR/EIS. Similar information for nonlisted special-status species (e.g., California species of special concern, CRPR 1B) is provided in Appendix B of the Biological and Aquatic Resources Technical Report (Authority 2020a). These tables also include listed and nonlisted species that were considered but determined unlikely to be affected by the project.

Critical Habitat

Designated critical habitat for several listed species occurs in the habitat study area. The specific units for the relevant species are shown by alignment subsection in Table 3.7-6. Critical habitat designation for the monarch butterfly has not been proposed and will not be proposed unless it is listed under FESA in the future.

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Non-Special-Status Wildlife

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Mammals

A variety of terrestrial mammals occur in the habitat study area. Common burrowing or ground-dwelling rodents expected to occur in developed areas, woodland, scrub, and/or grassland include California ground squirrel, Botta's pocket gopher, western harvest mouse, house mouse, California deer mouse, and California vole). Small to large-sized generalist species adapted to both urban and natural areas include striped skunk, Virginia opossum, northern raccoon, and mule deer. Several carnivore species, including bobcat, coyote, and gray fox occasionally venture into and move through developed areas but spend most of their time in undeveloped areas away from human activity. Other species that primarily occur in natural woodland, scrub, or grassland include American badger, western gray squirrel, and Merriam's chipmunk.

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Wildlife Movement

The project extent crosses several wildlife corridors of regional importance. Although corridors occur in all subsections, those in the Santa Clara Valley (specifically, the Coyote Valley) and San Joaquin Valley (GEA) have been identified by the CDFW and local stakeholders as particularly important to wildlife movement and habitat connectivity at the regional and state scale. Further details on existing wildlife corridors within the regional RSA are provided in Chapter 5 of the WCA (Appendix C of the *Biological and Aquatic Resources Technical Report* [Authority 2020a]).

As described previously, the mountain lion was recently added as a candidate for listing under CESA, and the monarch butterfly became a candidate for listing under FESA in December 2020. Substantial impacts on monarch movement are unlikely to occur because of the species' large range, migration patterns, and density of occurrence in the project vicinity. However, movement

within the project area is very important to the mountain lion population in the region, and, although the mountain lion was not a candidate for listing under CESA at the time the WCA was prepared, the WCA included an analysis of movement effects on mountain lion as a focal species (the single member of the "high openness and high mobility species guild"). As described in detail in the WCA, existing information on mountain lion movement was considered and incorporated into the assessment. Extensive information was used in the development of the WCA; major sources of information included:

- *Coyote Valley Linkage Assessment Study* (Diamond and Snyder 2016)
- *The Nature Conservancy's Pajaro Study 2012–2013* (Diamond and Snyder 2013)
- *Wildlife Permeability and Hazards across Highway 152 Pacheco Pass: Establishing a Baseline to Inform Infrastructure and Restoration* (Pathways for Wildlife 2020)
- Mountain lion GPS collar tracking data (Wilmers 2017)
- Wildlife–vehicle collision records (CROS 2017; Road Ecology Center 2017; Diamond 2017; Hobbs 2017; Constable et al. 2009)

The WCA synthesized existing information, and quantitative GIS-based modeling methods were used to evaluate the changes in wildlife movement that would result from project construction. The methods used were adapted from similar analytic efforts conducted by other wildlife movement experts in the region (i.e., Penrod et al. 2013). The quantitative results of the analysis were evaluated using criteria to discern where permeability reductions would be likely to have an effect on the movement of focal species. Where moderate or high potential effects were identified, recommendations to facilitate wildlife movement were made in the WCA and were subsequently incorporated into the proposed project to the extent feasible.[3] Recommendations included minimum and recommended crossing dimensions for mountain lion (and other species), as well as recommended design features and other measures to facilitate use by focal species. In summary, although the mountain lion was not a candidate for listing at the time the WCA was prepared, the WCA specifically addressed it and assessed movement effects on mountain lion as a focal species, and that analysis remains relevant and sufficient now that the species is a state candidate for listing. However, additional analyses of noise and artificial lighting impacts on wildlife, including the mountain lion, was undertaken and has been added to this Revised/Supplemental Draft EIR/EIS as Appendix 3.7-E and Appendix 3.7-F (as it is relevant to the overall mountain lion analysis revision in response to its designation as a candidate species).

The additional noise analysis in Appendix 3.7-E indicates that along much of the alignment, noise exposures from the project would be reduced due to masking effects. Masking effects would occur in areas where a competing noise source (vehicular traffic, usually associated with a major highway or an urban core area) would mask the noise of the HSR trains. As noted in Appendix 3.7-E, the entire project extent located north of Station B665+00 is located in the San Jose urban area, with numerous arterial roads that support traffic much of the day, and the alignment is also collocated with Caltrain and freight rail traffic. Therefore, noise generated by HSR would be masked on both sides of the project alignment through much of the day. Southwards, to approximately Station B1025+00, the project is still collocated with Caltrain and freight rail. Immediately to the east is arterial traffic on Monterey Road, and approximately 1 mile farther east is U.S. Highway 101, a major freeway. Thus, noise impacts are partially masked between the alignment and Coyote Creek and are substantially masked east of U.S. Highway 101; however, there are few and minor masking features west of the alignment, except that some topographic masking would occur in areas west of the valley floor. Continuing south, urban area masking would occur through the cities of Morgan Hill and Gilroy, down to Station B1730+00 where the rail alignment intersects U.S. Highway 101. South of there, however, the line turns east and transits open agricultural lands across the valley floor to about Station B2250+00; throughout this area, there are no major

[3] The WCA, Section 7.2.2, noted that additional dedicated wildlife underpasses, not included in the project design, should be considered in the eastern Pacheco Pass area near Casa de Fruta.

sources of masking noise on the landscape. Eastward to Station B2350+00, the alignment crosses SR 152, then passes through a tunnel, and then crosses SR 152 again. The busy highway would provide some masking effect to reduce noise effects in the hills north of SR 152, while the tunnel would mask all train noise. From Station B2350+00 to B3330+00, the alignment would follow the valley of Pacheco Creek. Throughout this area, SR 152 is never more than 0.5 mile north of the alignment, and it would provide substantial masking in that direction. To the south, however, there are no sources of masking noise, except that some topographic masking would occur in areas on the slopes west of Pacheco Peak. From Station B3330+00 to Station B4030+00, the alignment is in a tunnel, and noise effects on wildlife would not be a concern. East from there to Volta, Station B4630+00, the alignment traverses rural and agricultural lands with little masking except locally where the alignment crosses I-5 at nearly a perpendicular angle. From Volta to the project's eastern limit at Station B5330+00, however, the alignment traverses agricultural and wildlife lands on the south side of Henry Miller Road, a moderately busy arterial, which provides some masking for lands north of the alignment but no masking for lands south of the alignment. Additional information regarding existing conditions and the noise analysis is located in Appendix 3.7-E.

The artificial lighting analysis in Appendix 3.7-F provides background on ALAN, which is defined for the proposed project as all exterior artificial light sources used during construction and operations to light the site, as well as vehicle-mounted lighting. The additional analysis of lighting impacts in Appendix 3.7-F indicates that the region generally has a high level of existing light exposure from San Jose to the southern outskirts of Gilroy (with appreciably lower levels in the Coyote Valley area). South and east of Gilroy, ALAN levels are generally low throughout most of the remaining alignment. The analysis focuses on three forms of project-related ALAN: continuous lighting directed onto the project site that is visible to wildlife located outside the project site, intermittent lighting from vehicle or train headlights that is directed toward wildlife habitat, and lighting from all project sources that contributes to skyglow. No research appears to have assessed the effects of light from high speed trains in other countries or locations.

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3.7.7 Environmental Consequences

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3.7.7.2 Special-Status Species

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Project Impacts

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Table 3.7-1 Direct Impacts on Special-Status Wildlife Species Habitat by Project Alternative (acres)

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
Monarch Butterfly												
Breeding/migration habitat	3,844.8	1,501.0	5,345.8	3,902.8	1,704.0	5,606.8	3,999.4	1,549.4	5,548.8	3,677.2	1,415.1	5,092.3
Mountain Lion (Southern California/Central Coast ESU)[1]												
Breeding and foraging habitat	709.3	123.9	833.2	709.4	124.6	834.0	710.2	118.3	828.5	709.8	122.9	832.7
High-priority foraging and dispersal habitat	1,491.3	563.3	2,054.6	1,500.2	589.9	2,090.1	1,506.5	568.0	2,074.5	1,440.1	533.7	1,973.8
Low-priority foraging and dispersal habitat	497.4	328.7	826.1	605.0	478.4	1,083.4	634.8	375.2	1,010.0	447.5	288.2	735.7
Total	2,698.0	1,015.9	**3,713.9**	2,814.6	1,192.9	**4,007.5**	2,851.5	1,061.5	**3,913.0**	2,597.4	944.8	**3,542.2**

Note: All tables in the Revised/Supplemental Draft EIR/EIS present only information related to the new or updated analysis.
Nonoverlapping acreage reflects the *aggregate* areal extent of all species taken together—in other words, the exterior perimeter of the overlapping model boundaries, so that land where modeled habitat for more than one species is present is only counted once.
Alt = alternative; CESA = California Endangered Species Act; DPS = distinct population segment; ESU = evolutionarily significant unit; Perm = permanent; Temp = temporary
[1] Note that mountain lion populations outside of the Southern California/Central Coast ESU are not candidates for state listing under CESA and have no special status.

Construction Impacts

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Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly

Construction of the HSR track and systems in all subsections would take place in suitable habitat (which could support breeding host plants [milkweed plants], or other nectar sources [a variety of flowering plants]) for monarch butterfly, a species that became a candidate for listing under FESA on December 15, 2020. Construction activities would convert and destroy suitable habitat and could result in individual fatalities of monarch butterflies if they are present at the time of construction. Additionally, fugitive dust during construction could affect monarch butterflies if they are near the construction area at the time construction occurs. Furthermore, fugitive dust could temporarily affect host or nectar plants by covering leaves and reducing the vigor of plants. The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (these measures and how they would avoid and minimize potential effects are described in Impact BIO#1) into the project design to avoid and minimize impacts on wildlife and plants from construction. As these IAMFs are widely applicable to all species, they would also avoid and minimize impacts on monarch butterfly.

Direct impacts could include mortality and injury of individual adults, eggs, and larvae, as well as the conversion and disturbance of suitable habitat. The areal extent of direct permanent and temporary habitat impacts for the species is shown in Table 3.7-1. All four project alternatives would have generally similar impacts on the monarch butterfly. While suitable habitat is present in all five subsections, the greatest amount is in the Pacheco Pass and San Joaquin Valley Subsections, where all four alternatives would be identical. The most extensive impacts on suitable habitat would result from work on the portals for Tunnel 1 in the Pacheco Pass Subsection, requiring large areas of grading and earthmoving for slope stabilization. The other differences between alternatives would be in the Monterey Corridor and Morgan Hill and Gilroy Subsections. Alternatives 2 and 3 would have the most extensive potential impacts because they would be largely on embankment in those subsections, resulting in a larger project footprint and more ground disturbance. Alternative 4 would have the least impact because of its reduced footprint associated with the existing at-grade Caltrain tracks. However, it should be noted that monarch butterflies depend solely on milkweed plants for completing their life cycle, and milkweed plants are not expected to be present in all suitable habitat. Milkweed plants are expected to be restricted to small patches or isolated individual plants in most locations, and thus the estimates of suitable habitat affected are likely overestimating potential impacts on suitable breeding/rearing habitat (Table 3.7-13). Monarchs have a very broad migratory range/distribution across western North America from their overwintering habitat on the coast toward the north and east. Because HSR trains would operate intermittently and because seasonal migration is so diffuse across western North America, trains are unlikely to introduce a substantial barrier to movement. While some impacts on individuals from train strike could occur, large groups of monarchs do not migrate together, and thus substantial mortality is not likely to occur. Consequently, impacts on movement are considered less than significant and will not be discussed further.

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface waters and associated vegetation types. Milkweed host plants are relatively shallow-rooted herbaceous perennials that commonly occur in upland habitats, are not likely to be dependent on groundwater, and thus are unlikely to be affected by dewatering. Monarch also uses a number of other herbaceous plants and several shrubs and trees as nectar sources (Xerces Society 2019). Similar to milkweeds, herbaceous nectar plants have relatively shallow root systems and are not likely to be dependent on groundwater. Shrubs and trees known to be used by monarch and that are likely to occur within the study area include coyotebrush (*Baccharis* spp.), goldenbush (*Ericameria* spp.), manzanita (*Arctostaphylos* spp.), willow (*Salix* spp.), and potentially other species. One or more of these

species (especially willow) may occur in areas affected by groundwater dewatering and may be affected, because they are dependent or partially dependent on groundwater.

The magnitude of permanent and temporary impacts on suitable habitat would be 3,844.8 acres and 1,501.0 acres, respectively, under Alternative 1; 3,902.8 acres and 1,704.0 acres under Alternative 2; 3,999.4 acres and 1,549.4 acres under Alternative 3; and 3,677.2 acres and 1,451.1 acres under Alternative 4. The magnitude of indirect impacts (habitat modification through introduction of invasive nonnative plants), while not quantified, would generally be proportional to the quantity of direct impacts. Invasion by nonnative plant species can affect and degrade numerous land cover types that support breeding host plants as well as nectar plants. While actions to minimize habitat disturbance are part of the project, construction would result in loss and disturbance of habitat for monarch butterfly. Construction activities could crush host plants supporting egg masses and larvae, and ground- and vegetation-disturbing activities conducted during the breeding or migratory season could kill adults feeding on nectar plants.

CEQA Conclusion

The impact under CEQA would be significant for all four project alternatives because construction activities would have a substantial adverse effect, through both direct mortality and habitat modification, on the monarch butterfly. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss of habitat for monarch butterfly and could cause direct impacts on individuals (injury and mortality) if any are present in affected habitat. In the absence of mitigation, such impacts would reduce the numbers and breeding habitat for the species, which although only constituting a small portion of the range, would contribute to the decline of this species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

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Impact BIO#26a: Loss of Breeding, Foraging, and Dispersal Habitat for and Direct Mortality or Disturbance of Mountain Lion

Construction of the HSR track and systems in all subsections would take place in suitable habitat for mountain lion, a population of which is a candidate for listing under CESA (potential habitat for the population that is a candidate for listing only extends into the San Joaquin Valley Subsection as far as the eastern slope of the Diablo Range and excludes most of the San Joaquin Valley Subsection within the Central Valley). Construction activities would convert and temporarily disturb habitat and could result in the disturbance, injury, and mortality of individual mountain lions.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on wildlife and plants from construction. As these IAMFs are widely applicable to all species, they would also avoid and minimize impacts on mountain lion. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat; disturbance, injury, and mortality of individuals) in habitat for mountain lion is shown in Table 3.7-1. In the Pacheco Pass and San Joaquin Valley Subsections, because the alternatives would be identical, the impacts would also be identical. In the Morgan Hill and Gilroy Subsection, there would be a minimal difference between Alternative 3 and Alternatives 1, 2, and 4 associated with the alignment of Alternative 3 through east Gilroy. While the project would result in the loss or disturbance of foraging and dispersal habitat, mountain lion is a highly mobile species, and abundant foraging and dispersal habitat is present in the region. The primary impact would be the loss or disturbance of breeding habitat, including the potential to kill cubs if they are present in the area at the time of construction. The impacts on breeding habitat are nearly identical among alternatives because the majority of breeding habitat occurs in the Pacheco Pass Subsection, and all alternatives are identical in this subsection. The magnitude of permanent impacts on breeding habitat, in descending order, would be 710.2 acres under Alternative 3, 709.8 acres under Alternative 4, 709.4 acres under Alternative 2, and 709.3 acres under

Alternative 1. The extent of temporary impacts, in descending order, would be 124.6 acres under Alternative 2, 123.9 acres under Alternative 1, 122.9 acres under Alternative 4, and 118.3 acres under Alternative 3. The magnitude of indirect impacts (introduction of invasive nonnative plants), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts (Table 3.7-13).

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface waters and associated vegetation types. Potentially affected surface waters could serve as water sources for mountain lions, potentially temporarily reducing the availability of water.

While pre-construction and construction actions (IAMFs) that avoid and minimize impacts on plants and wildlife, including the mountain lion, are part of the project, these actions would not prevent the conversion and temporary disturbance of habitat in the project footprint, nor would they necessarily eliminate the risk of disturbance, injury, or mortality of individual mountain lions. Construction-related ground disturbance (e.g., grading, excavation) and vehicle traffic may injure or kill mountain lions, including cubs, by crushing occupied dens or colliding with moving lions. Although unlikely, mountain lions may become entrapped in excavated areas, pipes, or other equipment used for construction. Noise and vibration generated by construction activities may impair mountain lions' feeding, breeding, and sheltering behaviors. Potential hazardous material and pollutant releases and maintenance activities that involve pesticides or herbicides could degrade habitat or reduce prey species composition over the long term. Introduction of invasive nonnative vegetation could alter the structure of the vegetation community, making it less suitable to support mountain lions and could adversely affect the productivity of the prey base.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could result in a substantial adverse effect, through both direct mortality or disturbance of individuals and habitat modification, on mountain lion. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in a considerable loss and degradation of breeding and foraging and high-priority foraging and dispersal habitat; could result in injury or mortality of individuals in the construction footprint; and could cause noise- and vibration-related disturbance beyond the project footprint. These impacts could reduce the viability of local populations and contribute to the rangewide decline of this species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Operations Impacts

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Impact BIO#32: Intermittent Disturbance or Degradation of Habitat for Special-Status Wildlife during Operations

HSR operations would include inspection and maintenance activities along the HSR right-of-way. The Authority has incorporated BIO-IAMF#4 into project specifications to address disturbance or degradation of habitat for special-status wildlife associated with such activities.

Right-of-way maintenance activities would include minor grading, clearing, and excavation needed to maintain adequate drainage or repair infrastructure; vegetation management, including application of herbicide to invasive weeds growing within the right-of-way; and vehicle traffic along maintenance roads. Because much of the right-of-way would already have been subjected to extensive ground disturbance and construction activities and converted to HSR track and systems, the areas within the right-of-way would provide limited habitat for most special-status wildlife. Nevertheless, these activities may further degrade habitat areas inside the right-of-way that were avoided during construction, as well as habitat outside of but within 250 feet of the right-of-way (i.e., core habitat study area). Minor ground disturbance within the right-of-way may result in minor direct (filling, sedimentation, inadvertent release of oils and chemicals from parked vehicles or equipment) or indirect (hydrological interruption, introduction of invasive species) impacts on special-status

wildlife habitat (including host and nectar plants for invertebrates such as the monarch butterfly) in and adjacent to the right-of-way. If applied during high winds, herbicides could drift into and contaminate aquatic habitat features (e.g., ponds and wetlands) or affect other upland plants that may be host plants or nectar sources for invertebrates. Such direct and indirect impacts would degrade special-status wildlife habitat in the habitat study area. Some habitat areas may be degraded to the extent that they no longer support the resources necessary for species survival and reproduction, and therefore cease to function as habitat for those species. Wind caused by train operations could occur, potentially affecting special-status insects flights, foraging, or dispersal. However, effects of induced wind during operations will be a matter of the wind speed generated. The Authority studied induced wind speed from train operations, and potential effects on pollination, in whitepapers in 2012 (Authority 2012b and 2012c), and found that wind speed is not likely to be excessive at the edge of the right-of-way, predicted to be less than 5 miles per hour (mph) at a distance of 30 feet from a train going 220 mph. Consequently, wind speeds within proximity to trains are unlikely to substantially exceed normal wind speeds and are unlikely to affect flights, foraging, or dispersal.

Some special-status wildlife species, including pollinators such as monarch butterfly, may be able to access the right-of-way during operations, where they would be subject to train strike. Individual birds could be injured or killed through collision with HSR infrastructure such as traction power transmission facilities. Moreover, disturbance impacts (e.g., noise, visual stimuli) can alter movement patterns and degrade conditions that support special-status wildlife species. Because operations would potentially affect a wide array of wildlife taxa and because such impacts are primarily associated with wildlife moving across or near the project footprint, these impacts are collectively addressed in Section 3.7.7.7, Wildlife Movement.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because inspection and maintenance activities could have a substantial adverse effect, through habitat modification, on special-status wildlife species. While actions would be implemented before operations to reduce the potential for impacts on special-status wildlife and their habitat, inspection and maintenance activities would entail disturbance and potential degradation of special-status wildlife habitat, potentially resulting in some areas becoming inhospitable for special-status wildlife. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

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3.7.7.7 Wildlife Movement

In addition to addressing impacts on known or mapped wildlife corridors, this analysis more broadly addresses impacts on wildlife movement throughout the project extent. Similarly, although the primary focus of the analysis concerns wildlife movement, some of the nonphysical impact mechanisms that can interfere with movement (e.g., noise, visual disturbance, lighting) pertain equally to disturbance of resident individuals or populations (e.g., breeding, nesting, and foraging waterbirds). Because mapped corridors and other undeveloped areas are more hospitable to wildlife, such areas are likelier than more developed areas to support wildlife movement as well as resident individuals and species. Accordingly, this analysis addresses these impacts for both resident and transient wildlife.

As noted throughout this Revised/Supplemental Draft EIR/EIS, mountain lion is currently considered a candidate for listing under CESA. Impacts on mountain lion were assessed in the WCA and considered in the Draft EIR/EIS; however, considering its change in status, additional information on subpopulations within the ESU and additional information on specific mountain lion impacts related to movement are provided where appropriate below. Unlike the mountain lion, barriers to movement are not an identified threat to monarch butterflies in the listing petition (Center for Biological Diversity et al. 2014) nor is the project area near important and limiting overwintering habitat (which occurs on the coast) where disruptions to migratory or daily movement patterns could significantly affect the species. As a result, movement impacts on the monarch butterfly are not further evaluated.

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Project Impacts

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Construction Impacts

Impact BIO#42: Temporary Disruption of Wildlife and Wildlife Movement

Construction of the HSR track and systems in all subsections would temporarily affect wildlife movement of a variety of species, including mountain lion, a candidate for listing under CESA, in several ways. Construction fencing and dewatering would create temporary barriers to movement, precluding the normal movement of animals. Noise, vibration and visual disturbance from construction vehicles and pile driving may alter or delay movement of individuals as they attempt to avoid the construction area. Nighttime construction or security lighting producing ALAN could cause animals to delay or alter movement patterns because they may avoid lit areas.

ALAN during construction could potentially occur throughout the hours of darkness but would only occur in Coyote Valley and at tunnel portals, locations with low levels of existing ALAN. Lighting during construction would be relatively low intensity and would be designed to meet Occupational Safety and Health Administration (OSHA) standards for general construction, 5 foot-candles (54 lux; 29 C.F.R. § 1926.56), at the limits of the construction area. Light would be directed on site but would be visible to wildlife outside the project footprint. Construction vehicle lighting (i.e., vehicles going to and coming from the project site or vehicles operating within the project footprint) may briefly direct headlights toward areas outside the project footprint. Though of short duration and limited spatial scope, lights of this intensity could influence wildlife behavior or physiology (see Section 1.3.2 in Appendix 3.7-F for additional information and discussion of intermittent lighting effects).

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, and BIO-IAMF#8 (described in Impact BIO#1) into project design to avoid and minimize impacts on wildlife movement. In addition, during construction, the contractor would minimize noise disturbance of wildlife by implementing such measures as construction of noise barriers, careful routing of truck traffic, construction of walled enclosures, scheduling noisy operations into the same period, and phased construction (NV-IAMF#1). Although the extent and location of construction activities would be broadly similar among the project alternatives, the severity of impacts of the alternatives would be, in descending order, Alternative 3, Alternative 1, Alternative 2, and Alternative 4 for the following reasons:

- Alternatives 1, 2, and 4 would cross less land that is protected to conserve wildlife movement in the Soap Lake floodplain than Alternative 3.
- Alternatives 1, 2, and 4 would cross less of the Santa Cruz Mountains to Diablo Range modeled linkage (Penrod et al. 2013than Alternative 3. than Alternative 3.
- Alternatives 1, 2, and 4 would follow a highly developed transportation corridor in downtown Gilroy rather than crossing the undeveloped agricultural areas east of Gilroy where Alternative 3 would be constructed. These agricultural areas support wildlife movement.
- Alternatives 1 and 3 would bypass downtown Morgan Hill, fragmenting agricultural lands and requiring construction and infrastructure closer to Coyote Creek, a known wildlife movement corridor.
- Alternative 4 would be make use of the existing Union Pacific Railroad (UPRR)-of-way and would require less area for construction on undeveloped land.

While pre-construction and construction actions to minimize impacts on wildlife movement are part of the project, these actions would not entirely preclude impediments to wildlife movement through and across the project extent. Temporary construction fencing and dewatering activities would impede terrestrial and aquatic wildlife movement. Construction noise, vibration, visual disturbance, and ALAN could discourage individuals from following normal movement pathways.

With respect to mountain lion, recently considered a candidate for listing under CESA, project construction would occur generally at the boundary between the CC-C and CC-N subpopulations. As described in the affected environment in Section 3.7.6.2, Biological Conditions, gene flow between subpopulations has been identified as a major factor affecting the long-term persistence of mountain lion populations. Although the extent of active gene flow between the subpopulations (i.e., number of breeding mountain lions moving between subpopulations) is not known, movement of mountain lions across Highway 152 in the Pacheco Pass region, as well as within Coyote Valley, has been documented both by camera stations and as evidenced through mountain lions killed by vehicle collisions in the region, and thus at least some gene flow is likely occurring. Mountain lions are sensitive to human activity, and they would be likely to avoid active construction areas. Consequently, construction activities are likely to temporarily limit the movement of mountain lions during the construction period or cause them to alter their behavior, including taking longer routes to avoid active construction areas. Such avoidance behaviors can be expected to result in additional stressors, including changes in breeding activity.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because project construction would interfere substantially with established native wildlife corridors. While actions would be implemented before and during construction to reduce such interference, project construction would impede wildlife movement through and across the project footprint. With respect to mountain lion, impacts on movement during construction are expected to be significant, with potential temporary disruptions to genetic flow between subpopulations. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#43: Permanent Impacts on Wildlife Movement

Construction of the project would permanently affect regional and local wildlife movement patterns by creating new barriers to local and regional wildlife movement and fragmenting habitat. As described in the WCA (Appendix C of the *Biological and Aquatic Resources Technical Report* [Authority 2020a]), wildlife movement impacts on a variety of species movement guilds (represented by focal species) were assessed and form the basis for the summary of impacts described here. In general, terrestrial species are more vulnerable to permanent movement impacts. The WCA included an assessment of impacts on movement of mountain lion, a species recently considered as a candidate for listing under CESA, as a focal species representing a “high openness/high mobility movement guild”. Consequently, potential impacts on mountain lion were considered along with all other focal species. Changes to the project design (primarily the placement of viaduct sections and dedicated wildlife crossings) would provide for wildlife movement across the alignment in Coyote Valley, the Soap Lake floodplain, most of Pacheco Pass, and the Central Valley; barriers to movement would remain on the west slope of Pacheco Pass where the rail alignment parallel to Pacheco Creek would be placed on a series of continuous cut-and-fill slopes. Barriers to movement and habitat fragmentation reduce resource availability and isolate breeding groups; both conditions can ultimately lead to reduced reproductive success and inbreeding depression. This can be particularly true for mountain lion, as isolation of populations due to habitat loss and fragmentation of habitat has been identified as a significant threat to genetic health (Center for Biological Diversity 2019). The project would occur generally at the boundary between the mountain lion CC-C and CC-N subpopulations, and gene flow between these subpopulations has been identified as a significant issue to the long-term persistence of mountain lion populations in the region. Birds and bats are able to move over patches of unsuitable habitat and are thus not likely to be vulnerable to movement impacts.

The relative permanent impacts of the project alternatives on overall wildlife movement would result from the following characteristics:

- Alternatives 1 and 3 would be on viaduct through the Monterey Corridor and Morgan Hill and Gilroy Subsections, posing a relatively small contribution to the cumulative barriers to movement already existing in the region because the elevated guideway on viaduct would leave the landscape below permeable for movement.

- Alternatives 1, 2, and 4 would cross through downtown Gilroy, focusing construction and other local development in the downtown region, where development (rather than agriculture) is already the primary land cover type. Therefore, the addition of new developed surfaces would constitute a negligible change to the existing condition.
- Alternatives 1, 2, and 4 would minimize impacts on protected lands in the Soap Lake floodplain, which would leave this area open for movement.
- Alternatives 1, 2, and 4 would minimize impacts on the Santa Cruz to Gabilan Range modeled wildlife corridor (Penrod et al. 2013), which would leave this area open for movement.
- Alternative 3 would cross undeveloped agricultural lands and protected lands east of downtown Gilroy, resulting in more severe impacts on wildlife movement than Alternatives 1, 2, and 4 in the Morgan Hill and Gilroy Subsection because the addition of a transportation corridor would add a barrier to movement in a relatively permeable landscape.

Alternative 2 would have the greatest impact on overall terrestrial wildlife movement because the alignment profile would be at grade or on embankment and fenced continuously through Coyote Valley, an important wildlife linkage mapped by Penrod et al. (2013). Alternative 4 would also be at grade through Coyote Valley; however, breaks in the fencing to allow traffic to cross the alignment would also maintain wildlife permeability of existing railroad grade crossings. Alternative 3 would result in more extensive in-water impacts on aquatic species movement than Alternatives 1, 2, and 4 because of more extensive impacts in Llagas Creek.

With respect to mountain lion movement impacts, the overall Draft EIR/EIS description of permanent impacts on wildlife movement described above are applicable. However, additional information is provided in this Revised/Supplemental Draft EIR/EIS regarding impacts on mountain lion movement considering its recent change in status and information regarding subpopulations. All alternatives would have identical impacts on mountain lion movement within the Pacheco Pass Subsection because all alternatives are identical there. Alternative 2 would have greater potential to affect mountain lion movement overall, primarily because of the long portions of at-grade and on-embankment (rather than viaduct) profile in the Monterey Corridor and Morgan Hill and Gilroy Subsections. Alternative 4 would have slightly less potential for impacts compared to Alternative 2 because it includes at-grade fence breaks where traffic, and wildlife including mountain lions, can cross the rail. Alternatives 1 and 3 would cross Coyote Valley and the Soap Lake area with similar profiles (primarily viaduct with some at-grade portions). However, to avoid downtown Gilroy, Alternative 3 would traverse more undeveloped lands (primarily agricultural lands) than Alternative 1. Additionally, more of the Alternative 3 alignment would traverse the regional wildlife linkage modeled by Penrod et al. (2013) as that alternative bisects more parcels that are protected (either through conservation easement or ownership) to conserve this linkage (in part). For these reasons, Alternative 1 would likely have a lesser impact on the mountain lion.

While all alternatives would include wildlife undercrossings in locations known to be important for wildlife movement in Coyote Valley, eastern Pacheco Pass, and the Central Valley (as included in Chapter 2, Alternatives, and shown and identified in Volume 3, Preliminary Engineering for Project Design Record, of the Draft EIR/EIS), these project design features would not entirely preclude interference with existing wildlife movement across the alignment. This is particularly true in the locations between wildlife undercrossings of fenced at-grade and embankment portions of the rail where permeability would be further reduced below existing constrained conditions.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would interfere substantially with established and potential wildlife corridors. While actions would be implemented before construction to reduce such interference (i.e., the inclusion of dedicated wildlife crossings in the project design), the presence of HSR facilities would impede wildlife movement through and across the project footprint. With respect to mountain lion, the inclusion of dedicated crossings and viaducts in the project design are expected to facilitate the continued

gene flow between subpopulations; however, some uncertainty exists around this conclusion, because the movement of mountain lions and thresholds for movement are not well understood. Consequently, impacts causing disruptions to genetic flow between subpopulations are possible and are considered potentially significant. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Operations Impacts

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Impact BIO#44: Intermittent Noise Disturbance of Wildlife Using Corridors during Operations

All four project alternatives would result in noise from train operations. Because of the frequency and speed of trains, noise created by train operations has the potential to affect wildlife movement and use of habitat. Maintenance activities are expected to be dispersed over time and location and are not expected to be of an intensity or duration to result in substantial impacts on wildlife movement or habitat use.

Impacts of operational noise are considered permanent and direct, though intermittent. As outlined in *San Jose to Merced Project Section: Noise and Vibration Technical Report* (Authority 2019c), noise generated by train operation falls into three distinct sound categories:

- Propulsion or machinery noise
- Mechanical noise resulting from wheel-rail interactions or guideway vibrations
- Aerodynamic noise resulting from airflow moving past the train, including the pantograph (FRA 2012).

Noise levels from train operations are further based on source location, strength, frequency content, directivity, and speed. The following analysis considers noise impacts on mammals and on birds. Although reptiles and amphibians are also subject to noise impacts, they have substantially greater vulnerability to vibration impacts, which are discussed in Impact BIO#45.

Mammalian Species

Mammalian wildlife use sound mainly to forage, to evade predators, and for communication. Mammalian wildlife responses to noise depend on the timing, intensity, and frequency of the sound, as well as the species' tolerance to noise. The project alternatives would not create noise at magnitudes that could cause traumatic effects such as temporary or permanent loss of hearing. Exposure to noise may result in behavioral changes (e.g., fleeing or hiding), interference with auditory cues (e.g., interference with mate attraction), or physiological responses (e.g., stress or impaired bioenergetics), each of which can result in broader impacts on movement, foraging efficiency, reproductive success, and survival (Francis and Barber 2013). Among wildlife, hearing is very important for mammals. Hearing enables predators to be effective in situations where vision has limited usefulness, such as dense vegetation or darkness. Some animals such as mountain lions likely locate each other with auditory (as well as olfactory) signals (Center for Biological Diversity 2019). The primary impact of noise on mammalian wildlife, then, is the masking of acoustic information. Masking effects are only present for the duration of the noise exposure. If the noise is brief, normal behaviors return immediately upon cessation of the noise.

Masking also occurs in another form: the noise of the train is masked by other noisy features of the landscape. These mainly consist of urban areas and major highways, chiefly U.S. Highway 101, SR 152, and I-5. These features produce noise of a magnitude comparable to that of the HSR line, and they produce that noise more continuously. Thus, for instance, the noise of the train would be masked from wildlife located east of U.S. Highway 101 in Coyote Valley, whereas there is no comparable masking from any feature located west of the rail line in Coyote Valley. Due to masking by urban areas, noise impacts would mainly occur in the Soap Lake region, in the area from south of Gilroy to the west portal of the Pacheco Pass tunnel, and in the area from the

east portal of that tunnel to the eastern limit of the project. In each of these areas, mammalian wildlife would be affected.

Mountain lions may occur in Coyote Valley and in the upper Pacheco Creek area west of the west portal of the Pacheco Pass tunnel. Mountain lions are sensitive to human noise sources, and train noise could deter them from crossing the rail alignment or from foraging in the vicinity of the alignment. These effects are moderated by the presence of an extended quiet period between the hours of midnight and 6 a.m., which is the period when mountain lions are most active, when the alignment would experience only infrequent maintenance traffic.

San Joaquin kit fox may occur in the area east of the east portal of the Pacheco Pass tunnel and are especially known to use grassland habitat in the vicinity of the California Aqueduct. San Joaquin kit fox may be sensitive to human noise sources, and noise could interfere with their hunting behavior, as well as with their normal movements across the rail alignment. These effects are moderated because the fox is most active between midnight and 6 a.m., when operations on the HSR alignment would be limited to intermittent, slower-speed maintenance vehicles.

Fresno kangaroo rats may occur in the San Joaquin Valley portion of the alignment. Fresno kangaroo rats may be sensitive to human noise sources, and noise could interfere with their foraging behavior, as well as with movements across the rail alignment. Normally a burrowing animal, the kangaroo rat is most active aboveground shortly after sunset, and trains are sufficiently frequent at that time to preclude or reduce kangaroo rat activities near the alignment, although kangaroo rat movement would be relatively unimpeded later in the night—for example, between midnight and 6 a.m.—when operations on the HSR alignment would be limited to intermittent, slower-speed maintenance vehicles.

Other mammalian wildlife potentially affected by noise include the special-status species tule elk, badger, dusky-footed woodrat, ringtail, Townsend's big-eared bat, western mastiff bat, pallid bat, and western red bat, as well as a wide variety of non-special-status mammals. Of these special-status species, the tule elk, badger, dusky-footed woodrat, ringtail, and bats are nocturnal, with peak activities during times of low or no train activity. Tule elk, additionally, do not occupy habitat close to the rail alignment. Bats are unlikely to be substantially affected by HSR train noise because they primarily hear at frequencies higher than those dominating the acoustic spectrum of HSR train noise, and the HSR train noise would be present only briefly and intermittently.

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CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would interfere substantially with established wildlife movement corridors and with special-status species use of foraging habitat. Specifically, noise created by train operations would adversely affect foraging and predator evasion by mammalian wildlife, including mountain lions and Fresno kangaroo rats, and could deter them from crossing the rail alignment. Such deterrence could also reduce movement of mountain lions between the CC-C and CC-N subpopulations, which has been identified as a significant issue for the long-term persistence of mountain lion populations in the region. Noise would also cause direct intermittent impacts on large congregations of wintering waterbirds in the GEA IBA and on birds in the UPR IBA by interrupting normal movement patterns associated with foraging and causing birds to fly away from approaching trains or avoid habitat along the railway The loss in food energy gain from these disturbances could have population-level impacts for birds because food availability for wintering birds is a key factor limiting their size (CVJV 2006). Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#45: Intermittent Vibration Disturbance of Wildlife Using Corridors during Operations

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Amphibians are also highly sensitive to vibration, using ground vibration for communication, especially in the process of mate selection; thus, vibration generated by project operations at the time of amphibian breeding has the potential to affect the success of amphibian breeding activities and thereby to affect their population status. Burrowing rodents, notably kangaroo rats, are potentially sensitive to vibration influences on behavior and on the risk of vibration-caused burrow collapse. Studies involving intensive seismic exploration (Cypher et al. 2016), which generates extensive ground vibrations, did not find evidence of burrow collapse; however, minimization measures, including avoiding kangaroo rat burrows by a buffer distance of at least 10 meters (33 feet), may have avoided such effects. Exclusion fencing would limit impacts on kangaroo rats by excluding species' use of habitat within a distance of up to 13 meters (42 feet) from the tracks. While some larger mammals can detect seismic waves (vibrations) over long distances, using them to communicate, larger mammals (such as mountain lion and San Joaquin kit fox) occurring in the project area are not known to use vibration to communicate or otherwise facilitate their normal behavior. Considering the limited area affected by vibration and the highly mobile nature of these species, impacts from vibration are not likely to be substantial.

Because vibration is likely to have greater impacts on affected species when the alignment profile is at grade, Alternatives 2 and 4 are more likely to result in an impact on wildlife movement than Alternatives 1 and 3. Alternative 3 is likely to cause a greater impact on wildlife movement than Alternative 1 because a longer portion of Alternative 3 overlaps with the Santa Cruz Mountains to Diablo Range wildlife linkage as mapped by Penrod et al. (2013). More of Alternative 3 also overlaps with lands conserved to protect movement corridors.

CEQA Conclusion

The impact under CEQA would be less than significant for all four alternatives. While reptiles, amphibians, and burrowing rodents may perceive ground vibrations caused by passing trains, such vibrations have low potential to affect wildlife movement because they would be of short duration and would occur primarily during the day when most vibration-sensitive wildlife species are inactive. Therefore, CEQA does not require mitigation.

Impact BIO#46: Intermittent Visual Disturbance of Wildlife Using Corridors during Operations

Mammalian Species

Movement patterns of mammalian species may be altered by visual stimuli associated with passing trains or maintenance activities at rail facilities. Mammals such as mountain lions are known to avoid human-occupied locations (Center for Biological Diversity 2019), and therefore the presence of humans during maintenance activities could be expected to potentially change movement patterns, including avoidance of an area. Moving trains may also cause visual cues, which cause animals to temporarily or permanently avoid an area.

Bird Species

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CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would interfere substantially with established wildlife movement corridors. Specifically, visual disturbance created by train operations would cause direct intermittent impacts on large congregations of wintering waterbirds (e.g., sandhill crane) in the GEA and UPR IBAs by interrupting normal movement patterns associated with foraging and causing birds to fly away from approaching trains or avoid habitat along the railway. The loss in food energy gain from these disturbances could have population-level impacts because food availability for wintering birds is a key factor limiting their size (CVJV 2006). Passing trains could also cause raptors nesting within 269 feet of the alignment to abandon their nests, reducing reproductive success of affected pairs and viability of local populations. Visual disturbance created by train operations or by maintenance activities, including human presence, could also cause direct intermittent impacts on mammals, including mountain lion. Activities associated with operations could cause animals to change behaviors or to avoid an area. Mitigation measures to address this impact are identified

in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail., Mitigation Measures, describes these measures in detail.

Impact BIO#47: Intermittent and Permanent Lighting Disturbance of Wildlife and Wildlife Using Corridors during Operations

Terrestrial Species

ALAN has the potential to affect wildlife movement for most terrestrial species, including the mountain lion, a recent candidate for listing under CESA, in large part because a preponderance of wildlife movement occurs at night (Beier 2006; FHWA 2011). Operational light sources include passing trains and associated rail infrastructure, such as the MOWF and stations. Nighttime lighting is not expected to affect wildlife movement in urban or developed settings (such as near San Jose and Gilroy) where train and facility lighting would not significantly increase baseline light levels, particularly where these locations do not overlap with known movement corridors. Conversely, nighttime lighting impacts from trains are expected to be greatest where the rail is at grade and where there are low existing levels of ALAN. However, the impacts on movement from train light are likely to be less than those from noise and vibration because noise and vibration travel farther from the centerline than light (which is directed in front of the train). Lighting impacts from trains are expected to be greatest where the rail is at grade. The Authority has incorporated BIO-IAMF#12 into project design to avoid and minimize impacts from operational lighting sources by several methods, including using appropriate shielding to reduce horizontal or skyward illumination and avoiding the use of high-intensity lights (e.g., sodium vapor, quartz, and halogen). Additionally, BIO-IAMF#12 specifies that no lighting be installed under viaduct and bridge structures in riparian habitat areas.

Continuous sources of operations lighting would have little potential to affect wildlife, including mountain lion, because lighting would be directed toward the site and is predominantly of a fairly low intensity (approximately 5 lux for security lighting and approximately 20 to 50 lux at stations and the MOWF). Intermittent sources of operations lighting would at times be directed toward wildlife habitat; however, operations lighting from train headlights would mostly be directed ahead and within the fenced area along the alignment. Exposures would be brief but could potentially last for periods of minutes in the case of operations lighting from maintenance activities and up to 10 seconds in the case of operational train lighting. Exposure to intermittent light has been found to potentially affect melatonin metabolism and to elicit avoidance responses. Although no literature addresses intermittent light effects on mountain lion, or any large mammals, there is a potential for adverse behavioral and physiological effects on terrestrial wildlife resulting from intermittent light exposure from operations sources.

Because the project alignment and profile are the same for the Pacheco Pass and San Joaquin Valley Subsections, differences between alternatives would be confined to the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections. All of these subsections have high levels of existing ALAN, and therefore substantial impacts from lighting are not expected within these subsections. Consequently, all alternatives are similar with respect to impacts from operational lighting on terrestrial wildlife species and wildlife corridors.

Aerial Species

Operations activities have the potential to generate light. HSR facilities with security lighting and train headlights produce light that could result in altered movement or foraging patterns in aerial species, including both birds and bats. As discussed in the WCA (Authority 2020a: Appendix C), few quantitative studies are available to determine the distance over which this impact may occur; however, published analyses confirm some potential for impact. For example, hunting owls may perch on OCS structures and become disoriented by the headlight of the approaching train, resulting in train strike (Santos et al. 2017). Longcore and Rich (2004) note that birds may become “trapped” by a cone of light, unwilling to exit into darkness. This behavior may elevate train strike risk for birds lit by the headlight of an approaching train. ALAN has also been observed to cause altered melatonin metabolism in a wide variety of species, including birds and bats; such changes can affect circadian rhythms, reproductive timing, and many other aspects of physiology and behavior (Gaston and Holt 2018). Although these effects would be minimized as

described above for terrestrial species, substantial exposure may occur for both bats and birds if they forage on insects attracted to ALAN sources; this is a particularly common behavior in bats and in the aerialist songbirds, such as swallows and swifts. Although improved access to this food source (flying insects) would be beneficial to many birds and bats, it could confer a competitive benefit on those animals relative to other birds and bats that actively avoid ALAN sources. Overall, headlight effects are brief and facility lighting effects are localized; thus, these ALAN sources are not expected to result in a substantial impact on birds or bats, and moreover most bird species are diurnal and would not be exposed to ALAN.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would interfere substantially with established native wildlife movement corridors used by terrestrial species. Intermittent light could cause an avoidance response in wildlife, and exposure to intermittent light sources has been found to potentially affect melatonin metabolism, both creating temporary habitat quality reductions. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#48: Mortality Resulting from Train Strike during Operations

Terrestrial Species

Although the entire track alignment would be fenced with an 8-foot chain-link fence, except under Alternative 4 where there are breaks in the fencing for road crossings, it is possible that terrestrial species could enter the alignment and be struck by a moving train. The terrestrial wildlife species most likely to enter the alignment are small species such as mice and ground squirrels. Digging species (e.g., ground squirrels) are of particular concern because once a hole is dug under the fence, other species (e.g., badger, San Joaquin kit fox) may take advantage of it and enter the right-of-way. Also, animals are known to jump (e.g., deer, elk), climb (e.g., mountain lion), or push fences (e.g., elk).

Because terrestrial species are not expected to gain access to elevated sections, it is only at-grade sections that present risk of train strike. Alternatives 2 and 4 would be at grade through most of the Monterey Corridor and Morgan Hill and Gilroy Subsections, but because Alternative 4 has fence breaks at road crossings in this region it presents a greater potential for train strike than Alternatives 1, 2, and 3. Following Alternative 4, Alternative 1 is likely to have the least potential for train strike. Alternative 2 has a long at-grade segment in the Morgan Hill and Gilroy Subsection and Alternative 3 includes a relatively long at-grade segment through the agricultural lands east of Gilroy, which result in an elevated risk of train strike.

Aerial Species

Train operations pose the risk of injury and mortality to aerial species by striking birds or bats flying in the path of passing trains. See Impact BIO#2a for a discussion of Bay checkerspot butterfly and potential impacts on movement; monarch movement is not expected to be affected by the rail per discussions in Impact BIO#2b. The WCA (Authority 2020a) determined that all aerial species, including bats, would be vulnerable to train strike. Raptors and carrion feeders are vulnerable because of their potential to forage on carrion on or near the tracks. Blackbirds and other perching birds are vulnerable because they may perch on train infrastructure and be struck when attempting to fly away from passing trains. Aerial foragers and raptors are vulnerable while foraging close to the ground. Waterfowl, shorebirds, and wading birds are vulnerable to strike where their primary habitat is close to the rail because of their long, low take-off trajectories. Finally, bats may roost in train infrastructure such as viaducts or tunnel entrances, increasing the potential for train strike. and be struck when attempting to fly away from passing trains. Aerial foragers and raptors are vulnerable while foraging close to the ground. Waterfowl, shorebirds, and wading birds are vulnerable to strike where their primary habitat is close to the rail because of their long, low take-off trajectories. Finally, bats may roost in train infrastructure such as viaducts or tunnel entrances, increasing the potential for train strike.

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CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would interfere substantially with established native wildlife movement corridors. Project operations could cause direct mortality and injury of terrestrial and aerial wildlife trying to cross the alignment during operations. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

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3.7.8 Mitigation Measures

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Table 3.7-2 Mitigation Measures for Impacts on Biological and Aquatic Resources by Alternative

Mitigation Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan	X	X	X	X
BIO-MM#14: Avoid Direct Impacts on Bay Checkerspot and Monarch Butterfly Host Plants	X	X	X	X
BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan	X	X	X	X
BIO-MM#76: Minimize Impacts on Wildlife Movement during Construction	X	X	X	X
BIO-MM#77a: Design Wildlife Crossings to Facilitate Wildlife Movement	X	X	X	X
BIO -MM#77b: Monitoring and Adaptive Management of Wildlife Crossings	X	X	X	X
BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement	X	X	X	X
BIO-MM#81: Minimize Permanent Intermittent Impacts on Terrestrial Species Wildlife Movement	X	X	X	X
BIO-MM#86: Provide Compensatory Mitigation for Impacts on Monarch Butterfly Habitat	X	X	X	X
BIO-MM#87: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measure for Mountain Lion Dens	X	X	X	X
BIO-MM#88: Provide Compensatory Mitigation for Impacts on Mountain Lion Habitat	X	X	X	X
BIO-MM#89: Minimize the Impacts of Operational Lighting on Wildlife Species	X	X	X	X

Note: All tables in the Revised/Supplemental Draft EIR/EIS present only information related to the new or updated analysis.

BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan

Prior to any ground-disturbing activity, the Project Biologist would prepare a restoration and revegetation plan (RRP) to address temporary impacts resulting from ground-disturbing activities within areas that potentially support special-status species, wetlands, and/or other aquatic resources. Restoration activities may include, but not be limited to: grading landform contours to

approximate pre-disturbance conditions, stockpiling and spreading topsoil, removing invasive plant species, revegetating disturbed areas with native plant species (including host plants for butterflies), and using certified weed-free straw and mulch. The Authority would implement the RRP in all temporarily disturbed areas outside of the permanent right-of-way that potentially support special-status species, wetlands, and/or other aquatic resources. and/or other aquatic resources.

…

BIO-MM#14: Avoid Direct Impacts on Bay Checkerspot and Monarch Butterfly Host Plants
Prior to construction, the Project Biologist would survey for Bay checkerspot and monarch butterfly larval host plants—dwarf plantain and purple owl's-clover for Bay checkerspot and native milkweed species for monarch—within suitable habitat. If host plants are found, the Project Biologist would conduct surveys for adult butterflies during the peak of the flight period to determine presence/absence, or presence may be assumed. Where adult butterflies are present, or assumed to be present, construction personnel would avoid host plants outside permanent impact areas.

BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan
Prior to O&M of the HSR, the Authority would prepare an annual vegetation control plan (VCP) would generally follow the procedures established in Chapter C2 of the California Department of Transportation (Caltrans) Maintenance Manual to manage vegetation on Authority property (Caltrans 2014). Vegetation would be controlled by chemical, thermal, biological, cultural, mechanical, structural, and manual methods. The VCP would be updated each winter and completed in time to be implemented no later than April 1 of each year. The annual update to the VCP would include a section addressing issues encountered during the prior year and changes to be incorporated into the VCP. The plan would describe site-specific vegetation control methods, as outlined below:

- Chemical vegetation control methods
- Mowing program consistent with Section 1415 of the FAST Act
- Other nonchemical vegetation control
- Other chemical pest control methods (e.g., insects, snail, rodent)

Only Caltrans-approved herbicides may be used in the vegetation control program. Pesticide application would be conducted by certified pesticide applicators in accordance with all requirements of the California Department of Pesticide Regulation and County Agricultural Commissioners. Noxious/invasive weeds would be treated where requested by County Agricultural Commissioners. The Authority would cooperate in area-wide efforts to control noxious/invasive weeds if such programs have been established by local agencies.

To the extent feasible and consistent with the Caltrans (2014) Maintenance Manual requirements, the Authority would also include pollinator conservation measures in the VCP from the Xerces Society *Best Management Practices for Pollinators on Western Rangelands* (Xerces Society 2018), conservation measures in the *Nationwide Candidate Conservation Agreement for Monarch Butterfly on Energy and Transportation Lands* (Cardno 2020), or other applicable sources.

BIO-MM#76: Minimize Impacts on Wildlife Movement during Construction
During construction, all known wildlife crossing structures, such as underpasses and culverts, would be maintained unobstructed; no equipment storage, staging, or unnecessary operations would be conducted in such areas. Where an existing underpass or culvert must be closed or obstructed, a temporary crossing structure or an alternative movement corridor would be created. Construction would be timed to minimize impacts on movement by providing at least one crossing feature in a region. For example, to minimize impacts on wildlife using the Fisher Creek culvert, construction at Fisher Creek would not commence until the construction of the Tulare Swale undercrossing is complete. Fencing would be placed to funnel individuals to temporary or alternative crossing structures or movement corridors. The Authority would avoid placing fencing, either temporarily or permanently, within known movement routes for wildlife (e.g., the Fisher Creek underpass) in those portions of the alignment where the tracks are elevated (e.g., viaducts or bridges).

The Authority would also avoid conducting ground-disturbing activities within known wildlife movement routes during nighttime hours, to the extent feasible. If nighttime work is necessary, the Authority would minimize impacts on adjacent lands by preparing a site-specific lighting information plan. The plan will provide the number of lights to be utilized, the type of lights to be used (i.e., LED, incandescent, or halide), the lumens of the lights, how the lights will be shielded and directed downward, as well as a map that shows the work area, lighting locations, and the orientation of how lighting will be directed. Lighting will use the minimum levels approved by OSHA (29 C.F.R. § 1926.56) for general construction (i.e., 5 foot-candles or 54 lux). Additionally, the plan will include instructions to minimize the direction of construction vehicle headlights toward off-site locations and using low beams or turning off headlights when safety considerations permit. To the extent feasible, the plan will require minimizing the duration of lighting by using methods other than lighting to ensure security of the construction site during hours it is not in use.

To avoid impeding movement of aquatic species, the Authority would employ the use of vibratory (rather than impact) pile driving for work in or within 200 feet of waterbodies that provide habitat for steelhead or giant garter snake, where feasible. To allow for movement of steelhead and other fish species around dewatered sites, the capture and translocation of fish around the job site to a downstream location would be undertaken on consultation with the NMFS and CDFW.

Additionally, the Authority would establish wildlife-friendly fencing at soil stabilization areas and tunnel portals where a large right-of-way would be required. While access restriction fencing directly adjacent to the rail, tunnel portals, and HSR facilities would still be necessary for human safety and security, it would not be necessary around the larger construction footprints necessary for soil stabilization areas and tunnel portal work areas. Within these areas, a wildlife-friendly fence would be used with the following attributes (Paige 2012):

- Three- or four-strand wire design
- No more than 40 inches tall (to allow adult mammals to jump over)
- Bottom 18 inches off the ground (to allow animals to crawl under) (changes in topography such as gullies or dips can be used to provide this clearance distance)
- At least 12 inches between the top two wires
- Smooth top and bottom wires
- No vertical stays between posts; if stays are necessary, consider stiff plastic or composite stays
- Wood or steel posts at 16.5-foot intervals
- Gates, drop-downs, or other passage where wildlife can concentrate and cross
- Flagging or other measure to increase fence visibility (especially important for low-flying birds)

BIO-MM#77a: Design Wildlife Crossings to Facilitate Wildlife Movement

To the extent feasible, the Authority would design all wildlife crossings created specifically for terrestrial species consistent with the guidelines and recommendations in the WCA (Authority 2020a: Appendix C). The guidelines and recommendations include the following features:

- Under Alternatives 1 and 3 and for those wildlife crossing entrances on the east side of Monterey Road under Alternatives 2 and 4, install wildlife funnel fencing for the maximum feasible distance from each side of the crossing entrance/exit. Funnel fencing would be designed to benefit the greatest number of movement guilds feasible.
- Wildlife crossing width and height would be maximized and length minimized to the extent feasible
- Native earthen bottom

- Avoid metal walls
- Unobstructed entrances (e.g., no riprap, energy dissipaters, grates), although vegetative cover, adjacent to and near the entrances of crossings, is permissible
- Openness and a clear line of sight from end to end
- Design entrances to minimize light reflection from train lights
- Cover materials within the crossing such as rock or brush piles where smaller animals can take cover
- Year-round absence of water for a portion of the width of the crossing (i.e., no flowing water)
- Where water is likely to be present within a crossing as a result of a high groundwater table or proximity to an existing floodplain, wildlife crossing design would include features to minimize water entry into the crossing (e.g., impermeable groundwater barriers, berms) and to maximize drainage and drying time (e.g., slopes, sump pumps or permeable soils)
- Where hydrologic flow balancing features (culverts) provide wildlife connectivity, "shelves" would be constructed, where feasible, to allow small and medium animals to pass through the structure when it is flooded
- Slight grade at approaches to prevent flooding
- Hydrologic designs (ledges, cross slopes, water detention features, infiltration features, water proofing, or other features) to maintain crossing functionality (a dry crossing path) up to and including 100-year storm events for 95 percent of the year (347 days)
- Limited open space distance and absence of permanent physical obstacles between crossing and cover/habitat
- Separation from human use areas (e.g., trails, multiuse undercrossings, development)
- Avoidance of artificial light at approaches to wildlife crossings
- The addition of wildlife fencing to funnel wildlife to crossing structures
- Consideration of habitat modification and/or habitat restoration at crossings to facilitate cover for crossing animals
- To mitigate impenetrable barriers caused by construction of concrete vehicle barriers beneath viaducts in the Monterey Corridor and Morgan Hill and Gilroy Subsections (Alternatives 1 and 3), install Type L Concrete Barrier Wildlife Passageways at stations 718, 735, 755, 846, and 875

Because land use and other factors could change prior to construction of the project, the Authority would work with agency and stakeholder partners—CDFW, USFWS, NMFS, the SCVOSA, SCVHA, Peninsula Open Space Trust, and The Nature Conservancy—to validate and optimize wildlife crossing locations at the 75 to 90 percent design phase. The adjustment of some crossing locations, and the spacing of crossings, up to approximately 0.1 mile, may be necessary to orient crossings most advantageously to protected and natural lands, which is likely to improve the potential for use. In addition, the Authority would plan and prioritize species and wetland and natural community (e.g., sycamore alluvial wetland) mitigation land acquisition—in coordination with the agencies and stakeholders listed above—at or near wildlife crossing entrances to minimize future development and maintain the natural and rural land cover types surrounding wildlife crossing entrances and exits.

Further, the Authority would prepare a Wildlife Crossing Design, Inspection, and Maintenance Plan. The plan would include the following minimum components:

- A list of movement guild focal species for each wildlife crossing and hydrologic balancing features along the alignment
- Based on the focal species, identification of which of the above-listed design features (e.g., vegetation at the entrance, cover within the crossing, artificial dens for San Joaquin kit fox, critter shelves) will be included in each crossing's design
- A funnel fencing plan for wildlife crossing entrances/exits on the east side of Monterey Road in Coyote Valley
- Frequency of crossing design inspection
- A list of features to be inspected, criteria for passing inspection, and the response for failed inspection
- A description of how maintenance decisions will be informed by the wildlife crossing monitoring and adaptive management plan described in BIO-MM#77b

The Wildlife Crossing Design, Inspection, and Maintenance Plan would be developed in coordination with wildlife agencies—CDFW, USFWS, and NMFS—and local wildlife movement stakeholders (e.g., SCVOSA, SCVHA, Peninsula Open Space Trust, and The Nature Conservancy).

BIO-MM#77b: Monitoring and Adaptive Management of Wildlife Crossings

The Authority would develop a monitoring and adaptive management plan to monitor the effectiveness and use of crossing designs. The plan would include the following minimum components:

- **Monitoring methods**—Consistent with local monitoring efforts, which primarily use camera stations and other remote sensing equipment to document use. Monitoring would be focused on crossings within defined wildlife movement corridors. To the extent feasible, the Authority could also contribute funding to local organizations currently conducting wildlife movement monitoring to meet monitoring requirements outlined in the measure, provided the efforts are occurring within the same defined wildlife movement corridors.
- **Monitoring**—Monitoring start date to be no less than 2 years following construction (to allow time for habituation). Total initial monitoring period not to exceed 5 years following construction. Additional monitoring associated with adaptive management to be confined to the location triggering the adaptive management and not to exceed 5 years.
- **Success criteria**—Based on expected use by movement guild representatives known to be present in the region.
- **Adaptive management**—Including modifications to design features, if feasible, such as cover and substrate; use of new technologies to attract animals to the crossing; fencing; adjacent land management changes, if feasible; or other measures that may be determined to be feasible in the future.

The monitoring and adaptive management plan would be developed in coordination with wildlife agency staff and local wildlife movement stakeholders such as the SCVHA, the SCVOSA, The Nature Conservancy, and the Peninsula Open Space Trust.

BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement

To address the permanent intermittent impact of noise, visual disturbance, and train strike on movement by avian and mammalian wildlife, the Authority would build additional structures to minimize or avoid such impacts. Structures would be designed with the goal of reducing or eliminating the visual presence of the moving train and minimizing exposure to noise produced by HSR trains.

With regard to birds, the noise/visual barriers are designed to minimize exceedance of the following thresholds (as measured at the outer edges of the HSR right-of-way), as described in the WCA:

- Permanent hearing damage: 140 dBA or greater
- Temporary hearing damage: 93 dBA or greater but less than 140 dBA
- Masking: 84 dBA or greater but less than 93 dBA
- Arousal: 77 dBA or greater but less than 84 dBA

To this purpose, the Authority would build opaque noise/visual barriers to cover or obscure some or all of the train, including the OCS, if feasible, at the following locations:

- In the GEA IBA near Volta, between Stations B4550+00 and B4630+00 (all alternatives)
- In the UPR IBA (corresponding to the 10-year Pajaro River floodplain), between Stations B1932+00 and B2164+00 (Alternatives 1, 2, and 4)
- In the UPR IBA between Stations B1870+00 and B2097+00 (Alternative 3)

The noise/visual barriers would be a minimum height of 17 feet and would be designed to provide a minimum of 10 dBA attenuation of sound generated by HSR operations, as measured 50 feet from the noise/visual barrier. The noise/visual barriers would be constructed in conjunction with the installation of track and OCS and would be completed before HSR train operations begin.

Under all alternatives, for approximately 3.4 miles in the GEA IBA, centered approximately at Mud Slough between Stations B4914+00 and B5095+00, the rail design would be modified to enclose the train's operating envelope and OCS. The enclosure would be constructed using opaque, nonglare materials that provide a minimum of 10 dBA attenuation of sound generated by HSR operations, as measured 50 feet from the enclosure. The enclosure would also be designed to minimize sound generated by HSR train exit and entry. The Authority would design the guideway enclosure in compliance with all HSR design, operations, and maintenance requirements, including but not limited to:

- Train performance
- Passenger comfort
- Fire-life-safety readiness and response
- Loading to viaduct girder structure and embankment foundation
- 100-year service life under suitable, acceptable maintenance practices and costs

The guideway enclosure would be constructed in conjunction with the installation of track and OCS and would be completed before HSR train operations begin. A preliminary engineering feasibility analysis is provided in Appendix 3.7-C, HSR Guideway Enclosure for the Grasslands Ecological Area.

If structure designs in the UPR and GEA IBAs can be demonstrated through quantitative modeling to reduce sound levels outside the HSR right-of-way to less than 77 dBA, no additional measures would be necessary. If residual noise of 77 dBA or more (as measured outside the HSR right-of-way) is still demonstrated, and therefore would exceed one or more of the quantitative noise thresholds, HSR would implement the compensatory mitigation approach described in BIO-MM#58, which requires compensatory mitigation for lost habitat for waterbirds. The amount of compensatory mitigation required under BIO-MM#58, if implemented in concert with this mitigation measure, would depend on the extent of noise reduction that can be demonstrated using noise barriers or enclosures. Mitigation implemented under this measure would be consistent with and would help advance mitigation commitments at the program level, including mitigation intended to address impacts in the GEA.

With regard to mammals, potential noise and visual impacts include reduced habitat suitability if train noise or visual impacts impair an animal's ability to forage, evade predators, or conduct other essential behaviors and possible deterrence from crossing the rail alignment at locations intended by HSR design. As explained in Section 1.5 of Appendix 3.7-E, the noise/visual barriers

would be sited to minimize the risk of deterrence on movement corridors critical to the San Joaquin kit fox and the mountain lion. To this purpose, the Authority would build noise/visual barriers at the following locations:

- In Coyote Valley to protect the wildlife crossings sited between Stations B0648+80 and B0664+85 (Alternatives 1 and 3)
- In Coyote Valley to protect the wildlife crossings sited between Stations B0739+45 and B0754+80 (Alternative 2)
- In Coyote Valley to protect the wildlife crossings sited between Stations B0689+00 and B0704+00 (Alternative 4)
- In upper Pacheco Creek between Stations B3254+70 and B3303+00 (all alternatives)
- At the crossing of the California Aqueduct at Stations B4248+00 to B4249+00 (all alternatives)

The noise/visual barriers would be a minimum height of 17 feet and would be designed to provide a minimum of 10 dBA attenuation of sound generated by HSR operations, as measured 50 feet from the noise/visual barrier. Noise/visual barriers installed at the Tulare Swale and Fisher Creek wildlife crossing structures in Coyote Valley (under Alternatives 2 and 4) would extend no less than 720 feet beyond the stationing limits stated above. Noise/visual barriers installed on viaduct sections of the alignment (Coyote Valley, Alternatives 1 and 3; upper Pacheco Creek and California Aqueduct crossing, all alternatives) would extend no less than 555 feet beyond the stationing limits stated above. The noise/visual barriers would be constructed in conjunction with the installation of track and OCS and would be completed before HSR train operations begin. These length-of-barrier specifications are intended to ensure that the barrier creates a zone of minimized noise, extending several hundred feet from the alignment, that will serve as an attraction cue for animals using sound to locate the crossing locations.

The Authority would consult with CDFW, USFWS, Grasslands Water District, the owner(s) of properties where noise/visual barriers would be placed, and other stakeholders as part of final design of the guideway enclosure. The construction of noise/visual barriers could result in secondary impacts on visual resources. These secondary impacts are discussed in Section 3.4, Noise and Vibration, under mitigation measure NV-MM#3.

BIO-MM#81: Minimize Permanent Intermittent Impacts on Terrestrial Species Wildlife Movement

To address the permanent intermittent impact of operations on wildlife movement from train strike and entrapment, the Authority would implement an array of exclusion features for terrestrial species. These features include the following, which are specified in detail in the WCA (Authority 2020a: Appendix C):

…

- Jump out exit features that allow large mammals such as deer or mountain lion to exit the fenced right-of-way would be placed near at-grade road crossings in Coyote Valley at the following station numbers: B688, B691, B703, B730, B759, B761, B822, B823, B862, B863, B902, B935, B971, and B972

…

BIO-MM#86: Provide Compensatory Mitigation for Impacts on Monarch Butterfly Habitat

To compensate for permanent impacts on monarch butterfly habitat (breeding and foraging habitat for the monarch butterfly), the Authority would provide compensatory mitigation at a minimum 1:1 ratio for occupied breeding and foraging habitat, unless a higher ratio is required by the FESA. The Authority, in accordance with authorizations issued under the FESA, would determine the compensatory mitigation required to offset impacts on habitat for monarch butterfly. Compensatory mitigation could include one or more of the following:

- Purchase of credits from an agency-approved conservation bank

- Acquisition in fee title of USFWS-approved property
- Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values
- An in-lieu fee contribution determined through negotiation and consultation with the USFWS

Mitigation for monarch butterfly would prioritize areas with any future designated critical habitat (if the monarch is listed, and critical habitat is designated) and with existing monarch butterfly populations and suitable milkweed populations to support breeding. The secondary priority would be to create suitable habitat in other areas, if feasible (i.e., establish self-sustaining milkweed populations). The compensatory mitigation areas and methods selected would include appropriate measures to guide management of habitats (e.g., grazing, weed control), monitor populations, and identify methods to establish or reestablish populations, if necessary.

As described under BIO-MM#10, the Authority would prepare and implement a compensatory mitigation plan that would include the considerations listed in this measure. The compensatory mitigation plan would also set success criteria and define monitoring requirements so that species habitat can be adaptively managed.

As addressed in the discussion of BIO-MM#10, compensatory mitigation could result in secondary impacts; however, these impacts would be beneficial, and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#87: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for Mountain Lion Dens

Prior to any ground-disturbing activity, regardless of the time of year, the Project Biologist would conduct pre-construction surveys for *known* or *potential* mountain lion dens within suitable habitat located within the work area and within 1,970 feet of the work area. These surveys would be conducted no less than 14 days and no more than 30 days prior to the start of ground-disturbing activities in a work area. *Known* and *potential* mountain lion den types will be defined as follows (terminology generally consistent with the USFWS (2011) guidance for another mammal in the region, San Joaquin kit fox).

- **Known den**—Any existing natural den or human-made structure that is used or has been used at any time in the past by a mountain lion. Evidence of use may include historical records; past or current radio telemetry or tracking study data; mountain lion sign, such as tracks, scat, and/or prey remains; or other reasonable proof that a given den is being or has been used by a mountain lion.
- **Potential den**—Any thick vegetation, boulder piles, rocky outcrops, or undercut cliffs within the species' range for which available evidence is insufficient to conclude that it is being used or has been used by a mountain lion. Potential dens will include the following characteristics: (1) refuge from predators (coyotes, golden eagles, other mountain lions) or (2) shielding of the litter from heavy rain and hot sun.

The Project Biologist will use location-specific survey methods to identify known and potential dens. The survey method will consider topography, vegetation density, safety, and other factors. Surveys will be conducted by a qualified biologist (i.e., a biologist with demonstrated experience in mountain lion biology, identification, and survey techniques) and may involve the establishment of camera stations, scent stations, pedestrian surveys (looking for tracks, caches, etc.), the use of scent detection dogs, or other appropriate methods. Survey methods used will be designed to avoid the disturbance of known or potential dens to the extent feasible.

If known or potential mountain lion dens are identified or observed during pre-construction surveys, mountain lion dens will be assumed to have kittens present until the Project Biologist can document that they are not present and/or that the den is not being used. A nondisturbance buffer of at least 1,970 feet will be established around the known or potential den until the Project Biologist can document and confirm that the den is not occupied. If the den is determined to be occupied, the 1,970 foot nondisturbance buffer will be maintained until the den is confirmed

abandoned by the Project Biologist. Construction may proceed if the Project Biologist determines that the den is not being used by mountain lions. However, to the extent feasible, ground disturbance would be limited to those days between October 1 and January 31 within 1,970 feet of known or potential dens to the extent feasible. Mountain lions can breed year-round, however, most breeding activity and births occur during the spring and summer months between February 1 and September 30.

BIO-MM#88: Provide Compensatory Mitigation for Impacts on Mountain Lion Habitat
The Authority would provide compensatory mitigation for impacts on mountain lion suitable habitat through the preservation of suitable habitat that is acceptable to CDFW. Habitat would be replaced at a minimum ratio of 2:1 for permanent impacts on breeding/foraging habitat and high-priority foraging and dispersal habitat, and at a ratio of 1:1 for low-priority foraging and dispersal habitat, unless a higher ratio is required by regulatory authorizations issued under CESA. Compensatory mitigation would be provided using one or more of the methods described in BIO-MM#10 and would, where feasible and acceptable to CDFW, contribute to preserving important movement lands across the HSR alignment.

As addressed in the discussion of BIO-MM#10, compensatory mitigation could result in secondary impacts; however, these impacts would be beneficial, and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#89: Minimize the Impacts of Operational Lighting on Wildlife Species
To address the permanent and intermittent impacts from ALAN, the Authority would implement measures to minimize the intensity and duration of operational lighting of permanent facilities (e.g., traction power facilities, radio sites, and maintenance facilities), as well as intermittent train lighting, and would install noise/visual barriers at essential wildlife crossings to shield views of the operational train and its headlights. Outdoor lighting at operational facilities would be consistent with minimum OSHA requirements established by 29 C.F.R. Section 1926.56 when the facilities are in use. To the extent feasible, the Authority would minimize the duration of lighting at operational facilities by using methods other than lighting (e.g., remote monitoring systems) to ensure security of facilities during nighttime hours when they are not in use. Train headlights would use the minimum standard allowed by the FRA under 49 C.F.R. Section 229.125 (a single headlight of at least 200,000 candelas) within the following stationing limits (areas with low existing ALAN exposure):

- Alternative 1: B680 to B1000 (Coyote Valley) and B1810 to B5335 (areas east of Gilroy)
- Alternative 2: B720 to B1070 (Coyote Valley) and B1810 to B5335 (areas east of Gilroy)
- Alternative 3: B630 to B1000 (Coyote Valley) and B1450 to B5335 (areas east of Gilroy)
- Alternative 4: B670 to B1020 (Coyote Valley) and B1750 to B5335 (areas east of Gilroy)

If feasible, as determined by the Authority, operational facilities, including trains, would use lighting that avoids shorter wavelengths of light (i.e., blue wavelengths). Lamps would have the lowest color temperature feasible for the desired application; green and red lighting appears to have the least wildlife impact and will be appropriate for some applications, such as security lighting (Longcore and Rich 2016; Kayumov et al. 2005).

3.7.9 Impact Summary for NEPA Comparison of Alternatives

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Table 3.7-3 Comparison of Project Alternative Impacts for Biological and Aquatic Resources (acres)

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Special-Status Species				
Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly	The project would disturb or convert habitat for monarch butterfly and could degrade suitable habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on monarch butterfly under Alternative 1.	Impacts under Alternative 2 would be the same as under Alternative 1.	Impacts under Alternative 3 would be the same as under Alternative 1.	Impacts under Alternative 4 would be the same as under Alternative 1.
Habitat for monarch butterfly	5,345.8	5,606.8	5,548.8	5,092.3
Impact BIO#26a: Loss of Breeding, Foraging, and Dispersal Habitat for and Direct Mortality or Disturbance of Mountain Lion	The project would remove or disturb habitat for mountain lion and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals by crushing occupied dens and preventing escape. Activities could also disturb individuals and impair breeding, feeding, or sheltering behavior. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on mountain lion under Alternative 1.	Impacts under Alternative 2 would be the same as under Alternative 1.	Impacts under Alternative 3 would be the same as under Alternative 1.	Impacts under Alternative 4 would be the same as under Alternative 1.
Habitat for mountain lion	3,713.9	4,007.5	3,913.0	3,542.2

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#32: Intermittent Disturbance or Degradation of Habitat for Special-Status Wildlife during Operations	O&M activities may occasionally remove or disturb habitat for special-status wildlife in and adjacent to the project footprint. Impacts would the same as during construction but would occur where activities were conducted in or adjacent to modeled habitat. Annual environmental awareness training for maintenance personnel would minimize intermittent direct and indirect impacts on special-status wildlife under Alternative 1. Operations effects on special-status wildlife individuals (i.e., injury or mortality) are addressed in the discussion of effects on wildlife movement.	Impacts under Alternative 2 would be the same as under Alternative 1. There are no special-status wildlife species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.	Impacts under Alternative 3 would be the same as under Alternative 1. There are no special-status wildlife species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.	Impacts under Alternative 4 would be the same as those under Alternative 2. There are no special-status wildlife species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.
Wildlife Movement				
Impact BIO#42: Temporary Disruption of Wildlife and Wildlife Movement	The project would temporarily affect wildlife and wildlife movement by creating temporary barriers to movement (e.g., construction fencing and dewatering), creating noise and vibration that alters or delays animal movements as they attempt to avoid the work area, and introducing ALAN during nighttime construction that alters or delays animal movements as they avoid lit areas. Wildlife exclusion fencing, and construction work windows would minimize temporary direct and indirect impacts on wildlife movement under all alternatives.	Impacts under Alternative 2 would be less than under Alternative 1 because Alternative 2 would stay within instead of circumvent downtown Morgan Hill, thus avoiding agricultural lands and staying farther from Coyote Creek, a known wildlife movement corridor. Alternative 2 would have the lowest temporary impact on wildlife movement of the four alternatives.	Impacts under Alternative 3 would be greater than those under Alternative 1 because Alternative 3 would cross more land protected to conserve wildlife movement and more of the Santa Cruz to Gabilan Range modeled wildlife corridor in the Soap Lake 10-year floodplain than the other alternatives. Alternative 3 would have the greatest temporary impact on wildlife movement of the four alternatives.	Impacts under Alternative 4 would be similar to those under Alternative 2.

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#43: Permanent Impacts on Wildlife Movement	The project would create a barrier to local and regional wildlife movement and fragment habitat. Dedicated wildlife crossings and modification of viaducts and drainage culverts to facilitate wildlife movement as proposed in the WCA would minimize permanent direct impacts on wildlife movement.	Impacts on terrestrial wildlife movement under Alternative 2 would be greater than under Alternative 1 because the alignment profile is at grade (rather than viaduct) through most portions of the Monterey Corridor and Morgan Hill and Gilroy Subsections, precluding the movement of several species.	Impacts under Alternative 3 would be greater than under Alternatives 1 and 2 because Alternative 3 would cross more of the Soap Lake floodplain and more undeveloped agricultural lands than these alternatives, and it would also result in more in-water impacts on aquatic species movement due to greater impacts on Llagas Creek.	Impacts under Alternative 4 would be similar to those under Alternative 2.
Impact BIO#44: Intermittent Nosie Disturbance of Wildlife Using Corridors during Operations	Noise from project operations could disturb and startle birds, particularly in the UPR and GEA IBAs, as well as cause varying degrees of hearing damage, leading to impacts on bioenergetic and reproductive success, as well as increasing the risk of train strike. Additionally, noise would contribute to masking of acoustic information for terrestrial wildlife species, including mountain lion, Fresno kangaroo rat, and San Joaquin kit fox, leading to reduced habitat suitability.	Impacts under Alternative 2 would be the same as under Alternative 1 because both would have the same alignment and profile in the IBAs and within areas where terrestrial wildlife habitat is the most suitable.	Impacts under Alternative 3 would be greater than under the other alternatives because Alternative 3 would traverse more of the Soap Lake 10-year floodplain.	Impacts under Alternative 4 would be similar to but slightly greater than those under Alternatives 1 and 2 because of the presence of the MOWF at the edge of the Soap Lake 10-year floodplain.
Impact BIO#45: Intermittent Vibration Disturbance of Wildlife Using Corridors during Operations	Vibration associated with project operations are likely to have the greatest impacts on reptiles and amphibians because of their sensitivity to ground movement; however, vibration is not anticipated to result in substantial or long-lasting impacts. The impact would be most pronounced in at-grade portions of the alignment.	Impacts under Alternative 2 would be greater than those under Alternatives 1 and 3 because more of the alignment would be at grade.	Impacts under Alternative 3 would be similar to but greater than those under Alternative 1 because, while Alternative 3 would be on aerial structure in many of the same areas as Alternative 1, it would also cross more land conserved to protect movement corridors, including the Santa Cruz Mountains to Diablo Range wildlife linkage.	Impacts under Alternative 4 would be similar to those under Alternative 2 because of their similar use of at-grade and embankment profiles.

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#46: Intermittent Visual Disturbance of Wildlife Using Corridors during Operations	Moving trains could alter movement patterns of mammalian species due to visual stimuli associated with passing trains or maintenance activities. Moving trains may also cause visual cues, which cause animals to temporarily or permanently avoid an area. Moving trains could also increase stress and provoke flight in birds using nearby habitat, resulting in altered behavior and physiological consequences, as well as possible nest abandonment. The GEA and the Soap Lake 10-year floodplain are the two areas most susceptible to these impacts.	Impacts under Alternative 2 would be the same as those under Alternative 1.	Impacts under Alternative 3 would be greater than those under the other three alternatives because it would traverse more of the Soap Lake 10-year floodplain.	Impacts under Alternative 4 would be the same as those under Alternatives 1 and 2.
Impact BIO#47: Intermittent and Permanent Lighting Disturbance of Wildlife and Wildlife Using Corridors during Operations	Nighttime lighting, including light from passing trains, could disturb wildlife attempting to move through or across the alignment. The impact would be most marked in areas with low existing light levels, especially where the alignment would be at grade.	Impacts under Alternative 2 would be similar to those under Alternative 1. Although more of Alternative 2 would be at grade, these portions would be in existing transportation corridors where light levels are already high.	Impacts under Alternative 3 would be greater than under the other three alternatives because it would cross agricultural areas east of Gilroy at grade, would cross more of the Santa Cruz Mountains to Diablo Range wildlife linkage, and would include the East Gilroy MOWF and Station in areas that currently experience low light levels.	Impacts under Alternative 4 would be the same as those under Alternative 2.

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#48: Mortality Resulting from Train Strike during Operations	Train strike is likeliest to cause mortality of terrestrial wildlife species along at-grade portions of the alignment. Alternative 1 would pose the lowest risk of train strike to terrestrial movement guilds because of the amount that would be on aerial structure. All profiles present risk of train strike to the aerial movement guild, although some focal groups are more susceptible to at-grade profiles, while others are more susceptible to elevated portions of the alignment.	Impacts under Alternative 2 would be greater than those under Alternative 1 because of the amount of the alignment at grade and on embankment.	Alternative 3 would present the greatest risk of train strike because, while much of it, like Alternative 1, would be on aerial structure, it would also cross through agricultural lands east of Gilroy at grade and would travel more closely to Coyote Creek than the other alternatives.	Impacts under Alternative 4 would be the same as those under Alternative 2.

Note: All tables in the Revised/Supplemental Draft EIR/EIS present only information related to the new or updated analysis.
ALAN = artificial light at night
BMP = best management practice
GEA = Grasslands Ecological Area
IBA = Important Bird Area
MOWF = maintenance-of-way facility
O&M = operations and maintenance
UPR = Upper Pajaro River
WCA = Wildlife Corridor Assessment
WEAP = worker environmental awareness program

3.7.9.1 Special-Status Species

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Monarch Butterfly

Construction of the project alternatives would cause direct (permanent and temporary) and indirect impacts on habitat for monarch butterfly and could cause direct impacts on individuals (i.e., injury, mortality, or disturbance), if any are present in affected habitat. Additional effects on monarch nectar plants (shrubs and trees only) may result from groundwater depletion during tunnel construction and the resultant disruption of hydrologic cycles of surface water resources. Impacts would occur where modeled suitable habitat is present in or adjacent to the project footprint. Impacts under all alternatives are generally similar because the species can occur in a wide variety of habitats and has a wide distribution. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#10, BIO-MM#13, BIO-MM#14, and BIO-MM#86 are available to reduce this impact.

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Mountain Lion

Construction of the project alternatives would have direct and indirect impacts on suitable habitat for mountain lion and on individuals, if any are present in affected habitat. The primary project activities affecting mountain lion habitat would be HSR right-of-way, TCE, and underground easement. All project alternatives would have nearly identical impacts on this species because the portions of the alternatives that overlap with suitable habitat in the Pacheco Pass and San Joaquin Valley Subsections have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#10, BIO-MM#13, BIO-MM#87, and BIO-MM#88 are available to reduce this impact.

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3.7.9.6 Wildlife Movement

Construction of the project alternatives would have temporary, permanent, and intermittent permanent impacts on wildlife corridors and movement from noise, visual changes, and ALAN. Impacts would occur where wildlife movement is known or likely to occur across or near the project footprint. Temporary impacts during construction (when all construction areas would be fenced) would be greatest under Alternative 3, which bisects agricultural lands east of Gilroy. Additional effects on fish movement may result from groundwater inflows into tunnels during construction and the associated disruption of hydrologic cycles of streams. Alternative 4 would have the least impact because it would make use of the existing UPRR right-of-way and would thus require a smaller project footprint. Alternative 1 would avoid impacts east of Gilroy, but it would have the same impacts as Alternative 3 in the area east of Morgan Hill. Permanent impacts would be greatest under Alternative 2, which would be primarily at grade or on embankment through the Morgan Hill and Gilroy Subsection, creating an almost complete barrier to east-west wildlife movement across the Santa Clara Valley, whereas Alternatives 1 and 3 would be on viaduct in this subsection. Alternative 3 would have greater impacts than Alternative 1 because it would be at grade or on embankment across agricultural areas east of Gilroy, it would bisect protected lands in the Soap Lake floodplain, and it would cross more of the Santa Cruz to Gabilan critical linkage. Intermittent permanent impacts (i.e., operations impacts—primarily train strike) would vary both by location and by species movement guild. Alternative 2 would have the greatest impacts on terrestrial species because of its at-grade or embankment profiles in the Morgan Hill and Gilroy Subsection. Alternative 1 would have the greatest impact on burrowing owls because it would be at grade near the San Jose International Airport, where a breeding colony of burrowing owls is known to be persist. Alternatives 1 and 3 would have the greatest impact on riparian birds because those alternatives would follow more of the Coyote Creek corridor than Alternative 2. Alternative 3 would pose the greatest hazard for waterfowl and shorebirds because it passes closer to the Soap Lake 10-year floodplain than the other three alternatives. Under all alternatives, carrion on or near the right-of-way could attract eagles and

California condors, resulting in a potential for train strike to occur. Under all alternatives, noise effects on wildlife would occur, resulting in potential behavioral changes, primarily to avian species but also to terrestrial wildlife species (primarily mammals). With respect to mountain lion, the inclusion of dedicated crossings and viaducts in the project design are expected to facilitate the continued gene flow between subpopulations; however, some uncertainty exists around this conclusion because the movement of mountain lions and thresholds for movement are not well understood. Consequently, impacts causing disruptions to genetic flow between subpopulations are possible. BIO-MM#3, BIO-MM#76, BIO-MM#77, BIO-MM#78, BIO-MM#79, BIO-MM#80, BIO-MM#81, BIO-MM#82, BIO-MM#83, BIO-MM#87, and BIO-MM#89 are available to reduce this impact.

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3.7.10 CEQA Significance Conclusions

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Table 3.7-4 CEQA Significance Conclusions and Mitigation Measures for Biological and Aquatic Resources

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Special-Status Species			
Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly	Significant for all alternatives: Construction of the project would remove or disturb habitat for monarch butterfly and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#14: Avoid Direct Impacts on Bay Checkerspot and Monarch Butterfly Host Plants BIO-MM#86: Provide Compensatory Mitigation for Impacts on Monarch Butterfly Habitat	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#26a: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of Mountain Lion	Significant for all alternatives: The project would remove or disturb habitat for mountain lion, potentially disrupting breeding, foraging, or dispersal and could degrade habitat outside of but adjacent to the work areas.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#87: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for Mountain Lion Dens BIO-MM#88: Provide Compensatory Mitigation for Impacts on Mountain Lion Habitat	Less than Significant
Impact BIO#32: Intermittent Disturbance of Habitat for and Direct Mortality of Special-Status Wildlife during Operations	Significant for all alternatives: O&M activities may occasionally remove or disturb and degrade habitat for special-status wildlife resulting in some areas becoming inhospitable for special-status wildlife.	BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan	Less than Significant
Wildlife Movement			
Impact BIO#42: Temporary Disruption of Wildlife and Wildlife Movement	Significant for all alternatives: The project would temporarily affect wildlife movement by creating temporary barriers to movement (e.g., construction fencing and dewatering), creating noise and vibration that alters or delays animal movements as they attempt to avoid the work area, and introducing artificial light during nighttime construction that alters or delays animal movements as they avoid lit areas.	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#25: Prepare Plan for Dewatering and Watering Diversions BIO-MM#76: Minimize Impacts on Wildlife Movement during Construction	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#43: Permanent Impacts on Wildlife Movement	Alternatives 1, 3, and 4 Significant: The project would create a barrier to local and regional wildlife movement and fragment habitat.	BIO-MM#77: Design Wildlife Crossings to Facilitate Wildlife Movement BIO-MM#78: Establish Wildlife Crossings at Embankment in West Slope of Pacheco Pass BIO-MM#79: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range	Less than Significant
	Alternative 2 Significant: The project would create a barrier to local and regional wildlife movement and fragment habitat in the same areas as Alts. 1, 3, and 4, and would also further degrade wildlife habitat connectivity across Coyote Valley.		Less than Significant
Impact BIO#44: Intermittent Noise Disturbance of Wildlife Using Corridors during Operations	Significant for all alternatives: noise of passing trains would cause direct impacts on large congregations of wintering waterbirds in the GEA IBA and impacts on mammalian wildlife.	BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement	Less than Significant
Impact BIO#45: Intermittent Vibration Disturbance of Wildlife Using Corridors during Operations	Less than significant for all alternatives: Although vibration of passing trains would be perceptible to reptiles, amphibians, and small mammals, the disturbances would be brief and more frequent during daylight hours when most sensitive species are inactive.	No mitigation measures are required.	N/A
Impact BIO#46: Intermittent Visual Disturbance of Wildlife Using Corridors during Operations	Significant for all alternatives: Visual disturbance caused by passing trains would cause direct impacts on large congregations of wintering waterbirds in the GEA IBA.	BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat BIO-MM#80: Minimize Permanent Intermittent Noise and Visual Impacts on Wildlife Movement	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#47: Intermittent and Permanent Lighting Disturbance of Wildlife and Wildlife Using Corridors during Operations	Significant for all alternatives: Intermittent light from passing trains and maintenance activities could alter wildlife behaviors and movement patterns.	BIO-MM#80: Minimize Permanent Intermittent Noise and Visual Impacts on Wildlife Movement BIO-MM#89: Minimize the Impacts of Operational Lighting on Wildlife Species	Less than Significant
Impact BIO#48: Mortality Resulting from Train Strike during Operations	Significant for all alternatives: Operations would cause direct mortality and injury of terrestrial and aerial wildlife trying to cross the alignment.	BIO-MM#77: Design Wildlife Crossings to Facilitate Wildlife Movement BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement BIO-MM#81: Minimize Permanent Intermittent Impacts on Terrestrial Species Wildlife Movement BIO-MM#82: Minimize Permanent Intermittent Impacts on Aerial Species Wildlife Movement BIO-MM#83: Implement Removal of Carrion that May Attract Condors and Eagles	Less than Significant

Note: All tables in the Revised/Supplemental Draft EIR/EIS present only information related to the new or updated analysis.
CEQA = California Environmental Quality Act
GEA = Grasslands Ecological Area
IBA = Important Bird Area
N/A = not applicable
O&M = operations and maintenance

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Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly

The Authority would implement mitigation measures to reduce the impacts on monarch butterfly. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#9 would involve preparation and implementation of a GAMMP that would require monitoring of groundwater-dependent surface water resources (including those providing nectar habitat for monarchs) within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to special-status species. BIO-MM#14 requires identification and avoidance of Bay checkerspot and monarch butterfly host plants prior to and during construction, helping to avoid impacts on individuals. BIO-MM#86 identifies minimum compensatory mitigation requirements for monarch butterfly that would be included in the CMP developed under BIO-MM#10. These measures are expected to minimize direct and indirect impacts on monarch butterfly habitat and individuals and would provide habitat of comparable quality to offset habitat loss. Therefore, the impact would be less than significant because mortality would be minimized, and habitat would be set aside to compensate for the temporary and permanent loss of habitat available to the species.

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Impact BIO#26a: Loss of Breeding, Foraging, and Dispersal Habitat for and Direct Mortality or Disturbance of Mountain Lion

The Authority would implement mitigation measures to reduce the impacts on mountain lion. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to special-status species. BIO-MM#87 would minimize direct impacts on individual mountain lions during construction by identifying and avoiding occupied mountain lion dens within the project footprint. BIO-MM#88 identifies minimum compensatory mitigation requirements for mountain lion that would be included in the CMP developed under

BIO-MM#10. These measures would minimize direct and indirect impacts on mountain lion suitable habitat and individuals and would compensate for habitat loss. Therefore, the impact would be less than significant because mortality would be minimized, and habitat would be set aside to compensate for the temporary and permanent loss of habitat available to the species.

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Impact BIO#44: Intermittent Noise Disturbance of Wildlife Using Corridors during Operations

The Authority would implement BIO-MM#58 to compensate for noise impacts on shorebirds and wintering waterbirds, and BIO-MM#80 to avoid and minimize impacts from noise, or some combination of the two measures if necessary. BIO-MM#58 would avoid or minimize noise impacts on habitat or provide for the preservation and enhancement of waterbird habitat in the GEA and UPR IBAs to compensate for the reduction in caloric uptake experienced in habitat close to the railroad. BIO-MM#80 is expected to reduce or eliminate noise effects on wildlife, including mountain lion and San Joaquin kit fox, by requiring sound walls within specific locations important for movement. This conclusion also considers the fact that there is less operational activity at night during periods of generally higher mammal activity. Therefore, the impact would be less than significant.

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Impact BIO#47: Intermittent and Permanent Lighting Disturbance of Wildlife and Wildlife Using Corridors during Operations

The Authority would implement mitigation to minimize ALAN impacts on wildlife from operations. Impacts from artificial lighting during operations are limited to areas with existing low levels of ALAN, primarily the Coyote Valley area, and areas east of Gilroy. BIO-MM#89 would help to minimize the impacts of ALAN within these areas by minimizing the intensity and duration of operational lighting of permanent facilities, thereby minimizing light spillover into adjacent wildlife habitat. BIO-MM#89 would also avoid shorter wavelengths of light on train headlights, which would reduce effects on melatonin metabolism and avoidance responses of wildlife. Lastly, BIO-MM#80, although primarily designed to reduce noise effects, would also help to minimize intermittent lighting of wildlife habitat from train headlights by requiring the construction of opaque noise/visual barriers, which would obscure headlights, at essential wildlife crossings in the Coyote Valley, in the upper Pacheco Creek area, and at the crossing of the California Aqueduct. Collectively, these measures would reduce or eliminate lighting effects on wildlife and wildlife using corridors during operations. Therefore, the impact would be less than significant.

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