

APPENDIX A: CALIFORNIA HIGH-SPEED RAIL IMPACT AVOIDANCE AND MINIMIZATION FEATURES FOR HYDROLOGY AND WATER RESOURCES

Definitions

The California High-Speed Rail Authority (Authority) has developed impact avoidance and minimization features (IAMF) that would avoid or minimize potential impacts and mitigation measures that would avoid or reduce significant impacts that exist after application of all appropriate IAMFs. IAMFs are standard practices, actions, and design features that are incorporated into the proposed design of the Merced to Fresno Section: Central Valley Wye alternatives (Central Valley Wye alternatives). Mitigation measures consist of practices, actions, and design features that the Authority will apply to the Central Valley Wye after an impact is identified. Mitigation measures reduce or avoid the environmental effects of the Central Valley Wye alternatives, but are not part of the Central Valley Wye itself. Mitigation measures will be adopted as part of the approval process for the Central Valley Wye and certification of the *California High-Speed Rail Merced to Fresno Section: Central Valley Wye Supplemental Environmental Impact Report (EIR)/ Supplemental Environmental Impact Statement (EIS)* (Supplemental EIR/EIS); their implementation will be monitored by the Authority during construction and operation of the Central Valley Wye. This appendix describes IAMFs that are specific to hydrology and water resources and IAMFs for other resources (biology, geology, and hazardous materials and waste) that are also related to effects on hydrology and water resources, and the environmental effects that the measures avoid or reduce. There would be no significant impacts as a result of Central Valley Wye construction or operations; therefore, no mitigation measures are required.

Impact Avoidance and Minimization Features

The Authority and Federal Railroad Administration (FRA) have committed to integrate programmatic IAMFs consistent with the Program EIR/EIS documents¹ into the high-speed rail (HSR) project. In addition to the programmatic IAMFs from the Program EIR/EIS documents, the Authority and FRA have also committed to IAMFs from the Merced to Fresno Final EIR/EIS and developed new IAMFs specific to this Supplemental EIR/EIS. The Authority and FRA will implement these features during design and construction, as relevant to the Central Valley Wye, to avoid or reduce environmental and community impacts. The description of each IAMF in this appendix details the means and effectiveness of the IAMF in avoiding or minimizing impacts, as well as the environmental benefits it would achieve. This appendix includes those IAMFs applicable to the Central Valley Wye alternatives for hydrology and water resources and for other resources related to effects on hydrology and water resources.

Descriptions of Impact Avoidance and Minimization Features

Hydrology and Water Resources

HYD-IAMF#1: Storm Water Management. Prior to construction, the contractor shall prepare a storm water management and treatment plan for review and approval by the Authority. During the detailed design phase, each receiving stormwater system's capacity to accommodate project runoff will be evaluated. As necessary, onsite stormwater management measures, such as detention or selected upgrades to the receiving system, will be designed to provide adequate capacity and to comply with the design standards in the latest version of Authority Technical Memorandum 2.6.5 *Hydraulics and Hydrology Guidelines*. Onsite stormwater management facilities will be designed and constructed to capture runoff and provide treatment prior to discharge of pollutant-generating surfaces, including station parking areas, access roads, new

¹ The Program EIR/EIS documents are: *Final Program EIR/EIS for the Proposed California High-Speed Train System* (Authority and FRA 2005) (Statewide Program EIR/EIS), *San Francisco Bay Area to Central Valley High-Speed Train Final Program EIR/EIS* (Authority and FRA 2008) (Bay Area to Central Valley Program EIR/EIS), *2010 Bay Area to Central Valley High-Speed Train Revised Final Program EIR* (Authority 2010) (Bay Area to Central Valley Revised Program EIR), and *2012 Bay Area to Central Valley High-Speed Train Partially Revised Final Program EIR* (Authority and FRA, 2012) (Bay Area to Central Valley Partially Revised Final Program EIR).

road over- and underpasses, reconstructed interchanges, and new or relocated roads and highways. Low-impact development techniques will be used to detain runoff onsite and to reduce offsite runoff such as constructed wetland systems, biofiltration and bioretention systems, wet ponds, organic mulch layers, planting soil beds, and vegetated systems (biofilters), such as vegetated swales and grass filter strips, will be used where appropriate.

This IAMF will minimize the potential of the Central Valley Wye to result in unmanaged stormwater runoff. These measures will avoid water running off the site that carries sediment or creates erosion from water flow.

HYD-IAMF#2: Flood Protection. Prior to construction, the contractor shall prepare a flood protection plan for Authority review and approval. The project will be designed to both remain operational during flood events and to minimize increases in 100-year or 200-year flood elevations, as applicable to locale. Design standards will include the following:

- Establish track elevation to prevent saturation and infiltration of stormwater into the sub-ballast.
- Minimize development within the floodplain, to such an extent that water surface elevation in the floodplain would not increase by more than 1 foot, or as required by state or local agencies, during the 100-year or 200-year flood flow [as applicable to locale]. Avoid placement of facilities in the floodplain or raise the ground with fill above the base-flood elevation.
- Design the floodplain crossings to maintain a 100-year floodwater surface elevation of no greater than 1 foot above current levels, or as required by state or local agencies, and project features within the floodway itself will not increase existing 100-year floodwater surface elevations in Federal Emergency Management Agency-designated floodways, or as otherwise agreed upon with the county floodplains manager.

The following design standards would minimize the effects of pier placement on floodplains and floodways:

- Design site crossings to be as nearly perpendicular to the channel as feasible to minimize bridge length.
- Orient piers to be parallel to the expected high-water flow direction to minimize flow disturbance.
- Elevate bridge crossings at least 3 feet above the high-water surface elevation to provide adequate clearance for floating debris, or as required by local agencies.
- Conduct engineering analyses of channel scour depths at each crossing to evaluate the depth for burying the bridge piers and abutments. Implement scour-control measures to reduce erosion potential.
- Use quarry stone, cobblestone, or their equivalent for erosion control along rivers and streams, complemented with native riparian plantings or other natural stabilization alternatives that would restore and maintain a natural riparian corridor.
- Place bedding materials under the stone protection at locations where the underlying soils require stabilization as a result of stream-flow velocity.

This IAMF provides specific requirements avoid increasing flood depths and erosive power. This IAMF includes flood protection measures during maintenance activities, such as conducting in-water work during the dry season when channel flows are low or absent. This will effectively minimize the potential for flood damage to the Central Valley Wye and the potential for the Central Valley Wye to increase flood hazards in the surrounding area.

HYD-IAMF#3: Prepare and Implement a Construction Stormwater Pollution Prevention Plan. Prior to Construction (any ground disturbing activities) the contractor shall comply with the State Water Resources Control Board (SWRCB) Construction General Permit requiring preparation and

implementation of a SWPPP. The Construction SWPPP will propose BMPs to minimize potential short-term increases in sediment transport caused by construction, including erosion control requirements, stormwater management, and channel dewatering for affected stream crossings. These BMPs will include measures to incorporate permeable surfaces into facility design plans where feasible, and how treated stormwater will be retained or detained onsite. Other BMPs shall include strategies to manage the amount and quality of overall stormwater runoff. The Construction SWPPP will include measures to address, but are not limited to, the following:

- Hydromodification management to verify maintenance of pre-project hydrology by emphasizing onsite retention of stormwater runoff using measures such as flow dispersion, infiltration, and evaporation (supplemented by detention where required). Additional flow control measures will be implemented where local regulations or drainage requirements dictate.
- Implementing practices to minimize the contact of construction materials, equipment, and maintenance supplies with stormwater.
- Limiting fueling and other activities using hazardous materials to areas distant from surface water, providing drip pans under equipment, and daily checks for vehicle condition.
- Implementing practices to reduce erosion of exposed soil, including soil stabilization, regular watering for dust control, perimeter siltation fences, and sediment catchment basins.
- Implementing practices to maintain current water quality, including: siltation fencing, wattle barriers, stabilized construction entrances, grass buffer strips, ponding areas, organic mulch layers, inlet protection, storage tanks and sediment traps to arrest and settle sediment.
- Where feasible, avoiding areas that may have substantial erosion risk, including areas with erosive soils and steep slopes.
- Using diversion ditches to intercept offsite surface runoff.
- Where feasible, limiting construction to dry periods when flows in water bodies are low or absent.
- Implementing practices to capture and provide proper offsite disposal of concrete wash water, including isolation of runoff from fresh concrete during curing to prevent it from reaching the local drainage system, and possible treatments (e.g., dry ice).
- Developing and implementing a spill prevention and emergency response plan to handle potential fuel and/or hazardous material spills.

Implementation of a SWPPP is the responsibility of the construction contractor's Qualified SWPPP Practitioner or designee. As part of that responsibility, the effectiveness of construction BMPs must be monitored before and after storm events. Records of these inspections and monitoring results are submitted to the local regional water quality control board (SWRCB/Regional Water Quality Control Board (RWQCB)) as part of the annual report required by the Statewide Construction General Permit. The reports are available to the public online. The SWRCB and RWQCB have the opportunity to review these documents.

This standard requirement will minimize the potential for erosion and the related release of sediments from the construction site. This will avoid water running off the site carrying sediment or creating erosion from water flow.

HYD-IAMF#4: Prepare and Implement an Industrial Stormwater Pollution Prevention Plan. Prior to construction of any facility classified as an industrial facility, the contractor shall comply with existing water quality regulations. The stormwater general permit requires preparation of a SWPPP and a monitoring plan for industrial facilities that discharge stormwater from the site, including vehicle maintenance facilities associated with transportation operations. The permit includes performance standards for pollution control.

This standard requirement will minimize the potential for erosion and the related release of sediments from maintenance facilities associated with transportation operations that discharge stormwater. This will avoid water running off the site carrying sediment or creating erosion from water flow.

Biological Resources

BIO-IAMF#18: Construction Utility Requirements and Waste Disposal. During construction (any ground disturbing activities), the contractors may temporarily store excavated materials produced by construction activities in areas at or near the construction site within the Environmental Footprint. Wherever possible, they will return excavated soil to its original location to be used as backfill. Any excavated waste materials unsuitable for treatment and reuse will be disposed of by hauling it offsite to a permitted location in conformance with applicable state and federal laws. The Contractor shall provide the Authority with documentation that waste has been properly disposed.

Returning excavated soil improves the chances of native plant species re-establishing themselves on portions of the Central Valley Wye. This feature also minimizes construction waste and make certain there will be no construction waste left on site to attract animals and put them at risk of harm.

BIO-IAMF#20: Dewatering and Water Diversion. Prior to construction activities (any ground-disturbing activities) within open or flowing water, the contractor shall prepare a dewatering plan, which will be prepared by the contractor for review and approval by the resource agencies (e.g., National Marine Fisheries Services, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, SWRCB, and California Department of Fish and Wildlife), prior to any work in that area. The plan will incorporate appropriate construction measures that minimize turbidity and siltation as determined through review and approval by the designated resource agencies. The Project Biologist and/or Biological Monitor will provide regular monitoring of dewatering and diversion sites and water quality data will be collected (if applicable). Prior to dewatering or water diversion, pre-activity surveys would establish the presence or absence of special status wildlife species within the affected waterbody. If special status species were detected during pre-activity surveys, an agency approved biologist would relocate the species to an approved location offsite.

The feature will reduce the potential for work to disrupt water flows in a manner that would be detrimental to special status species. Stopping flows necessary to fish movement and reproduction, and allowing sediment from construction to enter the water are two examples of detrimental outcomes that will be avoided by this feature.

Geology and Soils

GEO-IAMF#1: Geologic Resources. Prior to Construction the Contractor shall prepare a Construction Management Plan (CMP) addressing how the Contractor will address geologic constraints and minimize or avoid impacts to geologic resources during construction. The plan will be submitted to the Authority for review and approval. At a minimum, the plan will address the following geotechnical constraints/resources:

- a. Groundwater Withdrawal. Controlling the amount of groundwater withdrawal from the project, by re-inject groundwater at specific locations if necessary, or use alternate foundation designs to offset the potential for settlement. This control is important for locations with retained cuts in areas where high groundwater exists, and where existing buildings are located near the depressed track section.

Ground settlement resulting from groundwater pumping is a problem in portions of the San Joaquin Valley. This feature makes certain that HSR infrastructure will be designed to accommodate settlement and that the Central Valley Wye itself will not contribute to additional settlement.

- b. Unstable Soils. Employing various methods to mitigate for the risk of ground failure from unstable soils. If soft or loose soils are encountered at shallow depths, they can be excavated

and replaced with competent soils. To limit the excavation depth, replacement materials can also be strengthened using geosynthetics. Where unsuitable soils are deeper, ground improvement methods, such as stone columns, cement deep-soil-mixing (CDSM), or jet-grouting, can be used. Alternatively, if sufficient construction time is available, preloading—in combination with prefabricated vertical drains (wicks) and staged construction—can be used to gradually improve the strength of the soil without causing bearing-capacity failures.

This feature will address the risk of ground failure from settlement in the Central Valley Wye's engineering design. The design will include remediation for settlement-prone soils during construction. These activities will avoid the risk of settlement resulting from settlement-prone soils.

- d. **Water and Wind Erosion.** The Contractor will implement erosion control methods as appropriate from the various erosion control methods documented in the Construction Storm Water Pollution Prevention Plan (SWPPP) (See HYD-IAMF#3), the Caltrans Construction Manuals, and the construction technical memorandum (see GEO-IAMF#6), and in coordination with other erosion, sediment, stormwater management and fugitive dust control efforts. Water and wind erosion control methods may include, but are not limited to, use of revegetation, stabilizers, mulches, and biodegradable geotextiles.

Construction can contribute to air and water pollution if water and wind erosion occurs during construction. This measure will reduce the potential for erosion to occur by implementing specific actions to protect exposed soil, thereby reducing the potential for the Central Valley Wye to contribute to air (dust) and water (sediment) pollution. This IAMF will complement the required SWPPP.

GEO-IAMF#6: Geology and Soils. Prior to construction, the contractor shall document through issuance of a technical memorandum how the following guidelines and standards have been incorporated into facility design and construction:

- 2010 American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Bridge Design Specifications and the 2009 AASHTO Guide Specifications for Load and Resistance Factor Seismic Bridge Design, or their most recent versions. These documents provide guidance for characterization of soils, as well as methods to be used in the design of bridge foundations and structures, retaining walls, and buried structures. These design specifications will provide minimum specifications for evaluating the seismic response of the soil and structures.
- Federal Highway Administration (FHWA) Circulars and Reference Manuals: These documents provide detailed guidance on the characterization of geotechnical conditions at sites, methods for performing foundation design, and recommendations on foundation construction. These guidance documents include methods for designing retaining walls used for retained cuts and retained fills, foundations for elevated structures, and at-grade segments. Some of the documents include guidance on methods of mitigating geologic hazards that are encountered during design.
- American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual: These guidelines deal with rail systems. Although they cover many of the same general topics as AASHTO, they are more focused on best practices for rail systems. The manual includes principles, data, specifications, plans, and economics pertaining to the engineering, design, and construction of railways.
- California Building Code: The code is based on 2009 International Building Code (IBC). This code contains general building design and construction requirements relating to fire and life safety, structural safety, and access compliance.
- IBC and American Society of Civil Engineers (ASCE)-7: These codes and standards provide minimum design loads for buildings and other structures. They would be used for the design of the maintenance facilities and stations. Sections in IBC and ASCE-7 provide minimum

requirements for geotechnical investigations, levels of earthquake ground shaking, minimum standards for structural design, and inspection and testing requirements.

- **Caltrans Design Standards:** Caltrans has specific minimum design and construction standards for all aspects of transportation system design, ranging from geotechnical explorations to construction practices. These amendments provide specific guidance for the design of deep foundations that are used to support elevated structures, for design of mechanically stabilized earth (MSE) walls used for retained fills, and for design of various types of cantilever (e.g., soldier pile, secant pile, and tangent pile) and tie-back walls used for retained cuts.
- **Caltrans Construction Manuals:** Caltrans has a number of manuals including Field Guide to Construction Dewatering, Caltrans Construction Site BMPs Manual and Construction Site BMP Field Manual and Troubleshooting Guide. These provide guidance and best management practices for dewatering options and management, erosion control and soil stabilization, non-storm water management, and waste management at construction sites.
- **American Society for Testing and Materials (ASTM):** ASTM has developed standards and guidelines for all types of material testing- from soil compaction testing to concrete-strength testing. The ASTM standards also include minimum performance requirements for materials.

This feature identifies many of the design standards that apply to the Central Valley Wye. These require construction to meet specific performance standards based on site conditions. The Central Valley Wye alternatives will be designed to be resistant to geologic hazards, including seismic damage and unstable soils.

Hazardous Materials and Waste

HMW- IAMF#1: Transport of Materials. During Construction the Contractor will comply with applicable state and federal regulations, such as the Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Hazardous Materials Release Response Plans and Inventory Law, and the Hazardous Waste Control Act. Prior to Construction the Contractor will provide the Authority with a hazardous materials and waste plan describing responsible parties and procedures for hazardous waste and hazardous materials transport.

These regulations specifically control the transport, use, and storage of hazardous materials. Compliance with these regulatory requirements will minimize the potential for an accidental release of hazardous materials during transport and during construction.

HMW-IAMF#3: Environmental Management System. To the extent feasible, the Authority is committed to identifying, avoiding, and minimizing hazardous substances in the material selection process for construction, operation, and maintenance of the HSR System. The Authority will use an Environmental Management System to describe the process that will be used to evaluate the full inventory of hazardous materials as defined by federal and state law employed on an annual basis and will replace hazardous substances with nonhazardous materials. The contractor shall implement the material substitution recommendation contained in the annual inventory.

These standards and material specifications would aid in promoting safety for passengers and employees by limiting their exposure to hazardous materials. In addition, because this feature reduces the potential for using hazardous materials during construction, operation, and maintenance, this feature will also reduce the potential for inadvertent releases of hazardous materials into the environment.

HMW-IAMF#4: Spill Prevention. Prior to Construction (any ground disturbing activities) the contractor shall prepare a Construction Management Plan addressing spill prevention. A Spill Prevention, Control, and Countermeasure (SPCC) plan or, for smaller quantities (if total aboveground oil storage capacity is less than 1,320 gallons in storage containers greater than or equal to 55-gallons), a spill prevention and response plan that prescribes BMPs to follow to

prevent hazardous material releases and clean-up of any hazardous material releases that may occur. The plans will be prepared and submitted to the PCM on behalf of the Authority.

This feature provides that measures are in place to avoid hazardous materials spills and, if they do occur, to respond quickly and effectively. This will reduce the risk to workers and the public from a hazardous materials spill.

HMW-IAMF#5: Undocumented Contamination. Prior to construction, the contractor shall prepare a Construction Management Plan addressing provisions for the disturbance of undocumented contamination. The plans will be submitted to the Authority for review and approval. Undocumented contamination could be encountered during construction activities and the contractor will work closely with local agencies to resolve any such encounters and address necessary clean-up or disposal. Copies of all required hazardous material documentation shall be provided within 30 days to the Authority.

This feature requires the Authority and their contractors to work with these agencies should they encounter undocumented contamination during construction. That will minimize the potential for hazardous materials to be released into the environment should undocumented contamination be encountered.

References

- California High-Speed Rail Authority (Authority). 2010. Bay Area to Central Valley High-Speed Train Revised Final Program EIR. August. Sacramento, CA.
- California High-Speed Rail Authority and Federal Railroad Administration (Authority and FRA). 2005. Statewide Final Program Environmental Impact Report (EIR)/Environmental Impact Statement (EIS) for the Proposed California High-Speed Train System. Vol. 1, Report. Sacramento and Washington, DC: California High-Speed Rail Authority and USDOT Federal Railroad Administration. August 2005.
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