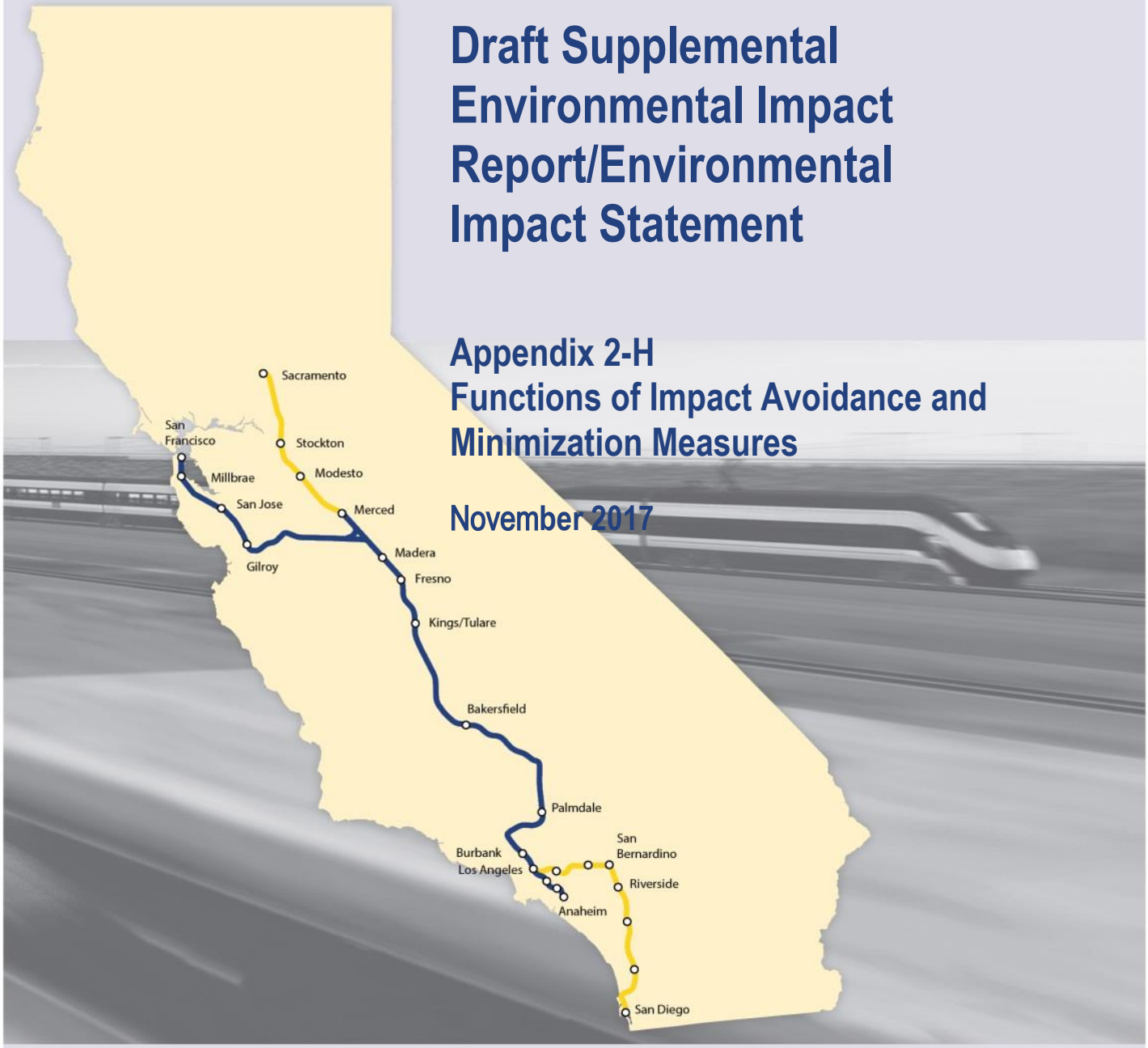
California High-Speed Rail Authority

Fresno to Bakersfield Section

Draft Supplemental Environmental Impact Report/Environmental Impact Statement



Appendix 2-H
Functions of Impact Avoidance and Minimization Measures

November 2017

CALIFORNIA High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

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ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
AG	agricultural
AQ	air quality
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
Authority	California High-Speed Rail Authority
AVR	aesthetics and visual quality
BIO	biological resources
BMP	best management practice
Caltrans	California Department of Transportation
CCR	California Code of Regulations
CDSM	cement deep soil mixing
CFR	Code of Federal Regulations
CHA	collision hazard analysis
CIDH	cast-in-drilled hole
CMP	compensatory mitigation plan or Construction Management Plan
CMS	Changeable message signs
CTP	Construction Transportation Plan
CUL	cultural resources
CVFPB	Central Valley Flood Protection Board
EMCPP	Electromagnetic Compatibility Program Plan
EMF	electromagnetic field
EMI	electromagnetic interference
EQ	earthquake
FPP	Flood Protection Plan
FRA	Federal Railroad Administration
GEO	geologic resources
HMW	hazardous materials and waste
HSR	high-speed rail
HST	high-speed train
HYD	hydrology and water resources
IAMM	impact avoidance and minimization measures
IBC	International Building Code

ISEP	Implementation Stage Electromagnetic Compatibility Program Plan
LU	land use and development, station planning
MOA	Memorandum of Agreement
NV	noise and vibration
OSHA	Occupational Safety and Health Administration
PHA	preliminary hazard analysis
PRO	parks, recreation and open space
PUE	public utilities and energy
RWQCB	Regional Water Quality Control Board
SHPO	State Historic Preservation Officer
SOCIO	socioeconomics and communities
SR	State Route
SS	safety and security
SSMP	Safety and Security Management Plan
SWMTP	Stormwater Management and Treatment Plan
SWPPP	Stormwater Pollution Prevention Plan
TR	transportation
TVA	threat and vulnerability assessment
Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended
UPRR	Union Pacific Railroad
U.S.	United States
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
VOC	volatile organic compound

APPENDIX 2-H: FUNCTIONS OF IMPACT AVOIDANCE AND MINIMIZATION MEASURES

2-H-1 Descriptions of How Impact Avoidance and Minimization Measures (IAMMs) Avoid or Minimize Effects

This table describes measures that would avoid or minimize potential impacts to construct and operate the Fresno to Bakersfield Locally Generated Alternative (F-B LGA) of the High Speed Rail (HSR) Project. These measures were developed by the Federal Railroad Administration (FRA) and the California High-Speed Rail Authority (Authority) in consultation with appropriate agencies, as well as with input from the public, to meet the requirements of National Environmental Policy Act and the California Environmental Quality Act.

The HSR project incorporates design features and Best Management Practices (BMPs) identified in this Supplemental Environmental Impact Report/Environmental Impact Statement (EIR/EIS) and described in detail in a series of technical reports that accompany preparation of the environmental document. As a result of applying these design features and BMPs, the F-B LGA will avoid potential adverse environmental impacts in several resource areas, including electromagnetic interference/electromagnetic fields (EMI/EMF), hydrology and water resources, geology and soils, and hazardous materials and wastes. In addition, the project's compliance with the regulatory requirements, including permitting and coordination with regulatory agencies for many project-related activities, provide additional assurance that potential adverse environmental impacts will not occur. Representative agencies include the United States (U.S.) Fish and Wildlife Service, the U.S. Army Corps of Engineers (USACE), and the U.S. Environmental Protection Agency with jurisdiction under the Federal Endangered Species Act and the Clean Water Act, respectively. Like the mitigation measures described in Technical Appendix 2-G of this Supplemental EIR/EIS, the project design features (below) and compliance with regulatory requirements are a condition of project approval and must be implemented by the Authority during design, construction, and operation of the HSR project.

These measures are listed by resource, and resources are listed alphabetically for ease of reference.

IAMM	Description
AGRICULTURAL FARMLAND AND FOREST LAND	
AG-IAMM#1: Restoration of Land Used for Temporary Staging Areas	This action reduces temporary impacts on Important Farmland by conserving agricultural land top soil through temporary stockpiling and then using that soil to restore agricultural lands to pre-project conditions after construction is completed. By stockpiling topsoil (the rich upper layer in which most plants have their roots) the agricultural productivity of the restored agricultural lands would be comparable to pre-project conditions.
AG-IAMM#2: Farmland Consolidation Program	This measure reduces impacts on agricultural farmland by administering a farmland consolidation program to sell remnant agricultural parcels to neighboring landowners for combining with adjacent farmland properties and continued agricultural productivity. Program implementation will reduce the amount of agricultural lands affected by HSR construction and operation.
AG-IAMM#3: Permit Assistance	This commitment reduces permanent impacts to agricultural operations (confined animal facility) by providing land use and regulatory agency permit assistance to landowners needing to obtain new or amended permits to continue operation of a confined animal facility whose operations would modified or facilities relocated resulting from high-speed rail (HSR) construction and operation. Obtaining land use and regulatory permits for modified or relocated confined animal facilities can be a lengthy and arduous process that can result in the inability to modify or relocate such facilities in a timely manner. By providing permitting assistance, the Authority can reduce potential impacts on agricultural operations.

IAMM	Description
AIR QUALITY	
AQ-IAMM#1 Truck Equipment	This action reduces construction related air quality emissions by requiring the covering of all materials (truck beds) transported on public roads.
AQ-IAMM#2: Fugitive Dust Emissions	This action reduces construction related air quality emissions by requiring the preparation of a fugitive dust control plan. This plan identifies the minimum features that will be implemented during ground disturbing activities. Examples of these include covering all materials (truck beds) transported on public roads, watering exposed graded surfaces, limiting vehicle speed on the construction site, suspending operations during high wind events, stabilizing all disturbed graded areas, wetting of exterior surfaces of structures during demolition, and removing any accumulation of mud or dirt from adjacent public streets. These types of construction best management practices are proven methods of minimizing fugitive dust generation associated with ground disturbing and demolition construction activities. Each air district traversed by the HSR has adopted rules and/or regulations requiring dust control plans for construction activities. These dust control plans are a part of each district's overall strategy for compliance with federal and state air quality standards.
AQ-IAMM#3: Trackouts	This action reduces construction related air quality emissions by requiring the removal of any accumulation of mud or dirt from adjacent public streets.
AQ-IAMM#:4 Material Selection	This commitment reduces overall construction emissions by limiting the type of paint to those containing volatile organic compound (VOC) of less than 10 percent (low) to be used during construction. Using paint that releases fewer organic compounds into the air after application is an air quality management measure effective in reducing construction emissions and achieving federal and state air quality standards.
AESTHETICS AND VISUAL QUALITY	
AVR-IAMM#1: Design Standards	This measure reduces the aesthetic and visual impacts of the HSR infrastructure components, including stations and elevated guideways, by applying design approaches to integrate structures within a community and to reduce the intrusiveness of large, elevated structures. It will also provide some consistency in the HSR design throughout the program. This action reduces the aesthetic and visual impacts of the HSR by providing urban design guidelines to be evaluated and applied increasing the compatibility of the HSR infrastructure within an existing, specific local design context.
BIOLOGICAL RESOURCES	
BIO-IAMM #1 Environmental Design	At multiple locations, the route of the alternative alignments was altered to avoid impacts and effects to biological resources. During project design and construction, the Authority and FRA would implement measures to reduce impacts on air quality and hydrology based on applicable design standards. Implementation of these measures would also reduce impacts to biological resources. The design standards applicable to the project are listed in Appendix 2-D and the measures to be applied are summarized in Section 3.3, Air Quality and Global Climate Change and Section 3.8, Hydrology and Water Resources.

IAMM	Description
CULTURAL RESOURCES	
CUL-IAMM#1: Protective Measures	This measure reduces potential cultural resource impacts by providing training on measures to avoid or protect built historic resources, and to recognize archaeological resources that may be encountered, and mandatory procedures to follow should potential cultural resources be exposed during construction. The training also provides project avoidance and mitigation features to project construction crews. Regularly updated mandatory training reduces potential impacts on cultural resources by producing a well- informed construction crew versed in operational procedures that must be followed during construction activity. This reduces the potential for unplanned impacts to cultural resources during construction activities. This measure calling for a Pre-Construction Conditions Assessment, Plan for Protection of Historic Built Resources and Repair of Inadvertent Damage reduces potential impacts on historic cultural resources by identifying techniques to minimize inadvertent damage. If damage occurs, the plan calls for establishing standards of repair consistent with Secretary of the Interior's Standards for the Treatment of Historic Properties. This commitment to stabilize and protect historic buildings and structures susceptible to damage during construction reduces potential impacts on cultural resources. Temporary stabilization and protection measures will be removed after construction is completed. Properties will be restored to their pre-construction condition. Committing to prepare an archaeological sensitivity monitoring plan that identifies and maps areas of archaeological sensitivity reduces impacts on cultural resources by developing a systematic approach to cultural resource monitoring. The sensitivity of such areas is based on one or a combination of any of the following: known locations of archaeological sites, tribal consultation, landforms, depositional processes, distance to water, or historic mapping. This commitment to implement the plan by conducting archaeological and tribal monitoring during construction activities reduces impacts to cultural resources by providing assurances that construction activities will be conducted in a manner consistent with HSR cultural resource protocols procedures. Oversight by the Cultural Resource Compliance Manager and monitoring by qualified cultural resource and tribal monitors of construction activities near archaeologically sensitive areas reduces the potential for inadvertent construction impacts to cultural resources. This commitment to prepare and implement a built environment monitoring plan will reduce potential impacts on cultural resources by detailing an implementation strategy for monitoring historic structures and tying implementation of the measures to discrete steps in the construction process. The monitoring plan will define responsibilities and timing (spot check versus full time monitoring) to verify that monitoring occurs in an appropriate manner consistent with HSR cultural resource protocols and procedures.
CUL-IAMM#2: PA	The PA established the framework for the development and implementation of measures to avoid, minimize, and/or mitigate adverse effects on historic properties caused by the HSR System, in compliance with Section 106 and NEPA. As stipulated in the Section 106 programmatic agreement for the HSR program, implementation of a MOA is required for each project section, to be negotiated and agreed upon among the Authority, Federal Railroad Administration (FRA), and State Historic Preservation Officer (SHPO), and other signatories and consulting parties. The purpose is to reduce impacts on cultural resources by identifying agreed upon resources that will or may be adversely affected by the project. The MOA requires archaeological and built environment treatment plans to be prepared and include requirements that specify how commitments to the protection of

IAMM	Description
	cultural resources will be implemented for each HSR construction segment.
EMI/EMF STANDARDS	
EMI/EMF-IAMM #1: EMCPP Design Features	This measure reduces potential exceedances to electromagnetic interference/ electromagnetic field (EMI/EMF) standards by requiring the Contractor to work with railroad engineering departments and apply standard design practices to prevent interference with the electronic equipment operated on parallel railroad facilities. This measure reduces potential exceedances to EMI/EMF standards by requiring the Contractor to design the HSR to international guidelines and comply with federal and state laws and regulations related to electromagnetic fields/electromagnetic interference. Prior to construction, the Contractor will prepare an electromagnetic field/electromagnetic interference technical memorandum for review and approval by the Authority. Project design will follow the Implementation Stage Electromagnetic Compatibility Program Plan (ISEP) to avoid EMI and to provide for HSR operational safety. Similarly, project design will follow the EMCPP to avoid EMI and to ensure HST operational safety. Some features of the EMCPP include: ▪ During the planning stage through system design, the Authority will perform EMC/EMI safety analyses, which will include identification of existing nearby radio systems, design of systems to prevent EMI with identified neighboring uses, and incorporation of these design requirements into bid specifications used to procure radio systems. ▪ Pipelines and other linear metallic objects that are not sufficiently grounded through the direct contact with earth would be separately grounded in coordination with the affected owner or utility to avoid possible shock hazards. For cases where metallic fences are purposely electrified to inhibit livestock or wildlife from traversing the barrier, specific insulation design measures would be implemented. ▪ HST standard corrosion protection measures would be implemented to eliminate risk of substantial corrosion of nearby metal objects.
GEOLOGIC RESOURCES	
GEO-IAMM #1: General Guidelines to be Followed	▪ 2010 American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design Bridge Design Specifications and the 2009 AASHTO Guide Specifications for Load and Resistance Factor Design Seismic Bridge Design: 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 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 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.

IAMM	Description
	▪ 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 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 Best Management Practices (BMPs) Manual and Construction Site Best Management Practice (BMP) Field Manual and Troubleshooting Guide that 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. Most of the guidelines and standards cited above use ASTM or a corresponding series of standards from AASHTO to assure that quality is achieved in the constructed project.
GEO-IAMM#2: Groundwater Withdrawal	This measure reduces potential impacts on geologic resources by requiring the Contractor to prepare a Construction Management Plan (CMP) which would address groundwater withdrawal. The CMP outlines how HSR engineering design appropriately addresses these geologic constraints.
GEO-IAMM#3: Monitor Slopes	The measure calls for slope monitoring that will reduce potential impacts from geologic conditions by establishing an operation and maintenance procedure for locations identified in the CMP where potential for long-term instability exists. Such instability could result in loss of track support or where slope failure could result in additional earth loading to foundations supporting elevated structures. The monitoring program will provide a mechanism supplying early detection of potential slope instability.
GEO-IAMM#4: Geotechnical Inspections	Prior to and throughout construction, conduct geotechnical inspections to verify that no new, unanticipated conditions are encountered, and to determine the locations of unstable soils in need of improvement.
GEO-IAMM#5: Improve Unstable Soils	The CMP would address unstable soils. The CMP outlines how HSR engineering design appropriately addresses these geologic constraints. This measure reduces impacts to geologic resources by requiring the Contractor to incorporate established engineering design guidelines and standards during the HSR design phase so HSR facilities are constructed to accepted engineering standards.

IAMM	Description
GEO-IAMM#6: Improve Settlement-Prone Soils	The CMP would address subsidence. The CMP outlines how HSR engineering design appropriately addresses these geologic constraints. This measure provides for subsidence monitoring as part of HSR design and will reduce potential impacts resulting from geologic conditions by providing a remote monitoring program. Trains with autonomous equipment for daily track surveys will monitor and detect reduced track tolerance resulting in changed operations until track tolerances are restored to design specifications.
GEO-IAMM#7: Prevent Water and Wind Erosion	The CMP would address water and wind. The CMP outlines how HSR engineering design appropriately addresses these geologic constraints.
GEO-IAMM#8: Modify or Remove and Replace Soils with Shrink-Swell Potential and Corrosion Characteristics	The CMP would address soils with shrink-swell potential. The CMP outlines how HSR engineering design appropriately addresses these geologic constraints.
GEO-IAMM#9: Evaluate and Design for Large Seismic Ground Shaking	This measure reduces impacts from geologic conditions by requiring evaluation and design for large seismic ground shaking in the engineering of all HSR components.
GEO-IAMM#10: Secondary Seismic Hazards	As discussed above, various ground improvement methods can be implemented to mitigate the potential for liquefaction, liquefaction-induced lateral spreading or flow of slopes, or post-earthquake settlement. Ground improvement around CIDH piles improves the lateral capacity of the CIDH during seismic loading. CDSM, stone columns, EQ drains or jet-grouting develop resistance to lateral flow or spreading of liquefied soils.
GEO-IAMM#11: Suspend Operations During or After an Earthquake	This commitment requires motion-sensing instruments be part of HSR design and will reduce potential impacts resulting from geologic conditions by providing a control system to shut down HSR operations temporarily during or after a potentially damaging earthquake.
HAZARDOUS MATERIALS AND WASTE	
HMW-IAMM#1: Transportation of Materials	This action reduces potential impacts because of hazardous materials and waste by requiring a written hazardous materials and waste plan describing responsible parties and procedures for hazard waste transport. This reduces the likelihood of hazardous waste spills.
HMW-IAMM#2: Property Acquisition	This action reduces potential impacts resulting from hazardous materials and waste by requiring completion of a Phase 1 environmental site assessment during the right-of-way acquisition phase. If documentation exists about potential hazardous waste on any parcel to be acquired, appropriate testing and remediation (if necessary) will be conducted in coordination with state and local agency officials.
HMW-IAMM#3: Landfill	This measure reduces potential impacts resulting from hazardous materials and waste by requiring additional methane protection construction procedures for work within 1,000 feet of a landfill including detection systems and personnel training.
HMW-IAMM#4: Work Barriers	This action reduces potential impacts resulting from hazardous materials and waste by requiring additional construction procedures that limit the potential release of subsurface containments during construction.
HMW-IAMM#5: Undocumented Contamination	This measure reduces potential impacts because of hazardous materials and waste by requiring preparation of a CMP addressing procedures for disturbing undocumented contaminated soil. The Contractor will work closely with state and local agencies to resolve any such encounters and address necessary clean-up or disposal.

IAMM	Description
HMW-IAMM#6: Demolition Plans	This commitment reduces potential impacts resulting from hazardous materials and waste by requiring a demolition plan for the safe dismantling and removal of building components and debris including a plan for lead and asbestos abatement which can be prevalent in older structures. This measure reduces potential impacts resulting from hazardous materials and waste through preparation of a hazardous materials business plan addressing HSR operations.
HMW-IAMM#7: Spill Prevention	This measure reduces potential impacts because of hazardous materials and waste by requiring a written CMP including a construction period spill prevention plan. The plan will identify construction best management procedures designed to contain and prevent accidental spills, including procedures to clean up any accidental hazardous material release. This measure reduces potential impacts resulting from hazardous materials and waste through preparation of a spill prevention, control and countermeasure plan addressing HSR operations.
HMW-IAMM#8: Storage of Hazardous Materials	This measure reduces potential impacts resulting from hazardous materials and waste by requiring a written hazardous materials and waste plan describing responsible parties and procedures for hazard waste transport containment and storage best management practices. This reduces the likelihood of hazardous waste spills.
HMW-IAMM#9: Material Selection	This requirement reduces potential impacts resulting from hazardous materials and waste through implementation of an annual review of hazardous materials used during construction and operation, and determining if there are acceptable nonhazardous materials substitutes.
HYDROLOGY AND WATER RESOURCES	
HYD-IAMM#1: Storm Water Management and Treatment	This obligation reduces potential impacts to hydrology and water resources by requiring the preparation of a stormwater management and treatment plan (SWMTP). Implementation of the SWMTP reduces potential stormwater management impacts by evaluating each receiving storm water system's capacity to accommodate project runoff and identifying stormwater management designed to capture runoff and provide treatment prior to discharge of pollutant-generating surfaces. Such surfaces include station parking areas, access roads, new road over- and underpasses, reconstructed interchanges, and new or relocated roads and highways. Constructed wetland systems, biofiltration and bioretention systems, wet ponds, organic mulch layers, planting soil beds, and vegetated systems (biofilters), vegetated swales and grass filter strips, will be used where appropriate. If needed storm water infiltration or detention facilities will be built in compliance with the design standards.
HYD-IAMM#2: Flood Protection	This measure reduces potential impacts to hydrology and water resources by requiring the Contractor to prepare a Flood Protection Plan (FPP) for Authority review and approval. Through implementation of the FPP 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.
HYD-IAMM#3: Construction Stormwater Pollution Prevention Plan	This action reduces potential impacts to hydrology and water resources by requiring the Contractor to prepare a construction period Stormwater Pollution Prevention Plan (SWPPP). Implementation of the SWPPP will provide 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 provide permeable surfaces where feasible and to retain or detain and treat stormwater onsite.

IAMM	Description
HYD-IAMM #4: Regional Dewatering Permit	The Central Valley RWQCB, Order No. R5-2008-0081, Waste Discharge Requirements General Order for Dewatering and Other Low Threat Discharges to Surface Waters, is a permit that covers construction dewatering discharges and some other listed discharges that do not contain significant quantities of pollutants, and that either (1) are 4 months, or less, in duration, or (2) have an average dry-weather discharge that does not exceed 0.25 million gallons per day.
HYD-IAMM #5: Flood Protection	The CVFPB regulates specific river, creek, and slough crossings for flood protection. These crossings must meet the provisions of Title 23 of the CCR. Title 23 requires that new crossings maintain hydraulic capacity through such measures as in-line piers, adequate streambank height (freeboard), and measures to protect against streambank and channel erosion. Section 208.10 requires that improvements, including crossings, be constructed in a manner that does not reduce the channel's capacity or functionality, or that of any federal flood control project. The CVFPB reviews applications for encroachment permits for approval of a new channel crossing or other channel modification. For a proposed crossing or placement of a structure near a federal flood control project, the CVFPB coordinates review of the encroachment permit application with USACE pursuant to assurance agreements with USACE and the USACE Operation and Maintenance Manuals under Title 33 CFR, Section 208.10 and Title 33 U.S.C., Section 408. Under Section 408 of the Rivers and Harbors Act, the USACE must approve any proposed modification that involves a federal flood control project. A Section 408 permit would be required if construction modifies a federal levee. A Section 208.10 permit would be required where the project encroaches on a federal facility but does not modify it.
HYD-IAMM#6: Industrial Stormwater Pollution Prevention Plan	This commitment reduces potential impacts to hydrology and water resources by requiring the Contractor to prepare an industrial facility SWPPP. The industrial facility SWPPP will include best management practices to control stormwater runoff from HSR industrial facilities such as vehicle maintenance yards. The SWPPP will include a monitoring plan for stormwater discharged from industrial facilities.
STATION PLANNING, LAND USE, AND DEVELOPMENT	
LU-IAMM#1: Zone of Responsibility	This measure will reduce potential land use impacts by implementing sound design principles within the "zone of responsibility" around each HSR station. The Authority prepared Urban Design Guidelines (2011) to provide urban planning assistance to achieve great place making in the station areas. The application of sound urban design principles to the HSR system will help to maximize the performance of the transportation investment, enhance the livability of the communities it serves, create long-term value, and sensitively integrate the project into the communities along the HSR system corridor.
LU-IAMM #2: Construction Management Plan	Project design features would reduce some of the temporary land use impacts from project construction. These features are described in Section 3.12.6, Socioeconomics, Communities, and Environmental Justice, and in Section 3.3.8, Air Quality and Global Climate Change. They include implementation of a construction management plan to minimize temporary impacts on adjacent land uses and implementation of dust control measures during project construction.
NOISE AND VIBRATION	
NV-IAMM#1: General Construction Guidelines – Noise and Vibration	This measure will reduce potential noise and vibration impacts from construction by requiring the Contractor to document how federal guidelines for minimizing noise and vibration will be employed when construction is occurring near sensitive receptors (such as hospitals, residential neighborhoods and schools).

IAMM	Description
PARKS, RECREATION AND OPEN SPACE	
PRO-IAMM#1: Design Standards	This measure will reduce potential impacts on parks, recreation and open space by requiring the Contractor to incorporate design features into HSR design that provide for safe and attractive access to present park and recreation facilities. It also requires the Contractor to provide sufficient separation of the HSR guideway system to maintain the intended user experience (passive or active recreation or wilderness experience) to the extent feasible.
PUBLIC UTILITIES AND ENERGY	
PUE-IAMM#1: Minimization of Utility Interruption	This measure requires that when relocating an irrigation facility is necessary, if feasible the Contractor will provide a new operational facility prior to disconnecting the original facility where feasible. Irrigation facility relocation preferences are included in the design-build contract and reduce unnecessary impacts to continued operation of irrigation facilities. This obligation reduces impacts to public utility interruptions by coordinating planned interruptions providing utility users an opportunity to plan appropriately for the service interruption. Prior to construction in areas where utility service interruptions are unavoidable, the Contractor will notify the public through a combination of communication media (e.g., by phone, email, mail, newspaper notices, or other means) within that jurisdiction and the affected service providers of the planned outage. The notification will specify the estimated duration of the planned outage and would be published no less than seven days prior to the outage. Construction will be coordinated to avoid interruptions of utility service to hospitals and other critical users. The Contractor will submit the public communication plan to the Authority in advance of the work for verification that appropriate notification was provided. This measure reduces impacts to public utility interruptions by coordinating planned interruptions providing utility providers an opportunity to plan appropriately for the service interruption. Prior to construction the Contractor shall prepare a technical memorandum documenting how construction activities will be coordinated with service providers to minimize or avoid interruptions, including upgrades of existing power lines to connect the HSR System to existing utility substations.
SAFETY AND SECURITY	
SS-IAMM#1: Emergency Vehicle Access	This action reduces potential safety and security impacts by requiring the Contractor to prepare a construction transportation plan that describes the Contractor's coordination efforts with local jurisdictions for maintaining emergency vehicle access during HSR construction.
SS-IAMM#2: Operation and Transportation Hazards	This action reduces potential safety and security impacts by requiring the Contractor to prepare a preliminary hazard analysis (PHA), collision hazard analysis (CHA), and threat and vulnerability assessment (TVA). The PHA follows the U.S. Department of Defense's System Safety Program Plan Requirements (MIL-STD-882) to identify and determine the facility hazards and vulnerabilities so that they can be addressed by and either eliminated or minimized through system design. CHAs follow the FRA's Collision Hazard Analysis Guide: Commuter and Intercity Passenger Service (FRA 2007) which provides a step-by-step procedure on how to perform a hazard analysis and how to develop effective mitigation strategies that will improve passenger rail safety. TVAs establish provisions for the deterrence and detection of, as well as the response to, criminal and terrorist acts for rail facilities and system operations.
SS-IAMM#3: Criminal and Terrorist Acts	TVAs establish provisions for the deterrence and detection of, as well as the response to, criminal and terrorist acts for rail facilities and system operations.

IAMM	Description
SS-IAMM#4: Construction Safety Plan	The SSMP will include construction safety and security plans to establish minimum safety and security guidelines during construction and security programs that address the safety of passengers and employees during emergency response.
SS-IAMM#5: Fire/Life Safety Programs	The SSMP will include construction safety and security plans to establish minimum safety and security guidelines during construction and fire/life safety and security programs that address the safety of passengers and employees during emergency response.
SS-IAMM#6: System Security Plans	The PHA follows the U.S. Department of Defense's System Safety Program Plan Requirements (MIL-STD-882) to identify and determine the facility hazards and vulnerabilities so that they can be addressed by and either eliminated or minimized through system design. CHAs follow the FRA's Collision Hazard Analysis Guide: Commuter and Intercity Passenger Service (FRA 2007) which provides a step-by-step procedure on how to perform a hazard analysis and how to develop effective mitigation strategies that will improve passenger rail safety.
SS-IAMM#7: Operating Procedure	The SSMP will reduce potential impacts on safety and security by requiring the Contractor to document how various federal (FRA), state Occupational Safety and Health Administration (OSHA) and Authority (design guidelines), plans, programs and guidelines were considered in HSR design, construction and eventual operation to protect the safety and security of construction workers and users of the HSR.
SS-IAMM#8: FRA Requirements	The SSMP will reduce potential impacts on safety and security by requiring the Contractor to document how various FRA plans, programs and guidelines were considered in HSR design, construction and eventual operation to protect the safety and security of construction workers and users of the HSR.
SS-IAMM#9: Worker Safety	This measure requires the Contractor to prepare a Safety and Security Management Plan (SSMP). It will reduce potential impacts on safety and security by requiring the Contractor to document how various federal (FRA), state Occupational Safety and Health Administration (OSHA) and Authority (design guidelines), plans, programs and guidelines were considered in HSR design, construction and eventual operation to protect the safety and security of construction workers and users of the HSR.
SS-IAMM#10: Environmental Design	PHAs identify and determine the facility hazards and vulnerabilities so that they can be addressed by and either eliminated or minimized through system design; CHAs follow the FRA's Collision Hazard Analysis Guide: Commuter and Intercity Passenger Service (FRA 2007) which provides a step-by-step procedure on how to perform a hazard analysis and how to develop effective mitigation strategies that will improve passenger rail safety. TVAs establish provisions for the deterrence and detection of, as well as the response to, criminal and terrorist acts for rail facilities and system operations.
SOCIOECONOMICS AND COMMUNITIES	
SOCIO-IAMM#1: Construction Management Plan	This measure will reduce potential impacts to neighborhoods and communities by requiring the Contractor to prepare a Construction Management Plan that includes measures that minimize impacts on community residents and businesses. The plan will include actions pertaining to communications, visual protection, air quality, safety controls, noise controls, and traffic controls.
SOCIO-IAMM#2: Uniform Relocation Assistance and Real Property Acquisition Policies Act. Compliance	This action identifies how compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended (Uniform Act) would reduce potential impacts to socioeconomics and communities. The provisions of the Uniform Act, a federally mandated program, would apply to all acquisitions of real property or displacements of persons resulting from this federally assisted project. The Uniform Act requires provision of relocation benefits to all eligible persons

IAMM	Description
	regardless of race, color, religion, sex, or national origin. Benefits to which eligible owners or tenants may be entitled are determined on an individual basis and explained in detail by an assigned right-of-way specialist. Implementation of the Uniform Act reduces potential socioeconomic impacts by providing relocation assistance for people displaced through right of way acquisition. This measure will reduce potential impacts to property owners by requiring the Authority to develop a relocation mitigation plan, specific to the issues of each project section, to minimize the economic disruption related to relocation.
TRANSPORTATION	
TR-IAMM#1: Off-Street Parking for Construction-Related Vehicles	This measure will reduce potential impacts to transportation by requiring the Contractor to identify adequate off-street parking for all construction-related vehicles and use these spaces throughout the construction period thereby reducing impacts to local on-street parking supply.
TR-IAMM#2: Maintenance of Pedestrian Access	This action will reduce potential impacts to transportation by requiring the Contractor to prepare and implement specific construction management plans to address maintenance of pedestrian access during the construction period.
TR-IAMM#3: Maintenance of Bicycle Access	This measure will reduce potential impacts to transportation by requiring the Contractor to prepare and implement specific construction management plans to address maintenance of bicycle access during the construction period.
TR–IAMM#4: Restriction on Construction Hours	This commitment will reduce potential impacts to transportation by limiting construction material deliveries and the number of construction employees arriving or departing the site during peak period travel resulting in reduced impacts on roadway performance levels.
TR-IAMM#5: Construction Truck Routes	This measure will reduce potential impacts to transportation by requiring the Contractor to deliver all construction-related equipment and materials on the appropriate truck routes avoiding impacts on streets not designed to accommodate truck traffic.
TR-IAMM#6: Protection of Public Roadways during Construction	This obligation will reduce potential impacts to transportation by requiring the Contractor to provide a photographic survey documenting the condition of the public roadways along truck routes providing access to the construction sites. The Contractor shall be responsible for the repair of any structural damage to public roadways caused by HSR construction or construction access, returning any damaged sections to their original pre HSR construction structural condition, or better.
TR-IAMM#7: Maintenance of Public Transit Access and Routes	This action will reduce potential impacts to transportation by requiring the Contractor to prepare and implement specific construction management plans to address maintenance of public transit access during the construction period, including bus and rail transit service, stops, stations, and layover facilities.
TR-IAMM#8: Construction Transportation Plan	This commitment will reduce potential impacts to transportation by requiring the Contractor to prepare a detailed Construction Transportation Plan (CTP) for minimizing the impact of construction and construction traffic on adjoining and nearby roadways. The CTP will address, in detail, the activities to be executed in each construction phase, with the requirement of maintaining traffic flow during peak travel periods. Such activities include, but are not limited to, the routing and scheduling of materials deliveries, materials staging and storage areas, construction employee arrival and departure schedules, employee parking locations, and temporary road closures, if any.

IAMM	Description
TR-IAMM#9: Construction during Special Events	This action will reduce potential impacts to transportation by requiring the Contractor provide a mechanism to prevent roadway construction activities from reducing roadway capacity during major athletic or other special events that substantially (10 percent or more) increase traffic on roadways affect by Project construction activities.
TR-IAMM#10: Protection of Freight and Passenger Rail during Construction.	This measure will reduce potential impacts to transportation by requiring the Contractor to repair any structural damage to freight or public railways, and return any damaged sections to their original structural condition. If necessary, during construction, a "shoofly" track would be constructed to allow existing train lines to bypass any areas closed for construction activities.
TR-IAMM #11: Additional Features in the Cities of Fresno and Bakersfield	In addition to the measures listed above, the Authority will also perform the following in the cities of Fresno and Bakersfield: ▪ Maintain detection at signalized intersections where alignment changes or widening is necessary, in order that the traffic signal does not need to be placed on recall (fixed timing). ▪ Changeable message signs (CMS) will be employed to advise motorists of lane closures or detours ahead. The CMSs will be deployed seven days before the start of construction at that location. ▪ Where project construction would cause delays on major roadways during the construction period, the project will provide for a network of CMS locations to provide adequate driver notification. For example, construction-related delays at the railroad grade separations that lead to SR 99 interchanges will require CMS placement to the east to allow drivers to make alternate route decisions. In the case of work on Shaw Avenue, recommended placement would be a CMS at Shaw Avenue just east of SR 41 and a CMS at Shaw Avenue just east of Palm Avenue. Similar CMS usage will be required along Ashlan Avenue, Clinton Avenue, McKinley Avenue, Olive Avenue, and Belmont Avenue. ▪ The Authority, in conjunction with the City of Fresno Public Works Department and City of Bakersfield Public Works Department, will develop a traffic management plan for the surface transportation network to minimize potential impacts on public safety services. ▪ During project construction, alignment of roadways to be grade-separated and freeway overpasses to be reconstructed will be offset from the existing alignment to facilitate staged construction, wherever possible. The Authority will also include the following measures specific to the city of Fresno: – Clinton Avenue over SR 99 and Ashlan Avenue over the Union Pacific Railroad (UPRR) will be offset from their existing alignments to allow the existing roadway to remain open while the new structure is being built. It is recognized by the city that this type of staging may necessitate temporary ramps to and from SR 99 during various phases of construction. Four travel lanes will be maintained from 7 a.m. to 9 a.m. and from 4 p.m. to 6 p.m. on Shaw Avenue from Cornelia to Blythe Avenue (at UPRR), on Ashlan Avenue from Parkway to Valentine Avenue (at UPRR), and on Clinton Avenue from Marks Avenue to Weber Avenue (at SR 99). – The Veterans Boulevard overpass and construction of new alignments of Golden State Boulevard and Bullard Avenue will be completed and open to traffic prior to the closure of the Carnegie Avenue at-grade railroad crossing. – One lane of traffic in each direction must be maintained at all times for Olive Avenue and McKinley Avenue for construction of the proposed grade separations. No full closures of these crossings will occur, with the

IAMM	Description
	exception of short duration closures of less than 72 hours not more than once per month. – During any Belmont Avenue closures that are determined to be necessary, the adjacent crossings of Olive Avenue and Divisadero Street will remain open with no lane closures at the two crossings. – Two of the three crossings will remain open at any given time at the existing railroad crossings at Divisadero, Tuolumne, and Stanislaus

AASHTO = American Association of State Highway and Transportation Officials
ASCE = American Society of Civil Engineers
ASTM = American Society for Testing and Materials
Authority = California High-Speed Rail Authority
BMP = Best Management Practices
Caltrans = California Department of Transportation
CCR = California Code of Regulations
CDSM = cement deep soil mixing
CFR = Code of Federal Regulations
CHA = collision hazard analysis
CIDH = cast-in-drilled hole
CMP = Construction Management Plan
CMS = Changeable message sign
CTP = Construction Transportation Plan
CVFPB = Central Valley Flood Protection Board
EMCPP = Electromagnetic Compatibility Program Plan
EMI = electromagnetic interference
EMF = electromagnetic fields
EQ = earthquake
FPP = Flood Protection Plan
FRA = Federal Railroad Administration
HSR = high-speed rail
HST = high-speed train
IBC = International Building Code
ISEP = Implementation Stage Electromagnetic Compatibility Program Plan
MOA = Memorandum of Agreement
OSHA = Occupational Safety and Health Administration
PHA = preliminary hazard analysis
RWQCB = Regional Water Quality Control Board
SHPO = State Historic Preservation Officer
SR = State Route
SSMP = Safety and Security Management Plan
SWMTP = stormwater management and treatment plan
SWPPP = Stormwater Pollution Prevention Plan
TVA = threat and vulnerability assessment
Uniform Act = Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended
UPRR = Union Pacific Railroad
U.S. = United States
USACE = United States Army Corps of Engineers
U.S.C. = United States Code
VOC = volatile organic compound

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