FLOODPLAINS TECHNICAL REPORT

Brightline West Cajon Pass High-Speed Rail Project

October 2022

Prepared for
Federal Railroad Administration

Prepared by
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Abbreviations and Acronyms

BFE	Base Flood Elevation
BMP	best management practice
Caltrans	California Department of Transportation
cfs	cubic feet per second
CGP	Construction General Permit
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FRA	Federal Railroad Administration
GHG	greenhouse gas
HEC-RAS	Hydraulic Engineering Centers-River Analysis System
I-15	Interstate 15
Project	Brightline West Cajon Pass High-Speed Rail Project
SBCTA	San Bernardino County Transportation Authority
SWMP	Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
VHT	vehicle hours traveled
VMT	vehicle miles traveled

1. Introduction

DesertXpress Enterprises, LLC (dba "Brightline West") proposes to construct and operate the Cajon Pass High-Speed Rail Project (Project), a 49 mile train system reaching a top speed of approximately 140 miles per hour (mph) between the Victor Valley and Rancho Cucamonga, California (Project). The Project includes two new railway stations—one in Hesperia, and one in Rancho Cucamonga. The connecting station in Victor Valley would be constructed as part of a separate project that was evaluated in the DesertXpress Final Environmental Impact Statement (Final EIS; FRA 2011).

The Project would be constructed within the Interstate 15 (I-15) right-of-way (ROW) for 48 miles and on existing transportation corridors for the last mile into the proposed Rancho Cucamonga station. The Project would be powered by overhead electric catenary and require construction of one new traction power substation (TPSS) in the Hesperia area. The maintenance facility that was evaluated with the Brightline West Victor Valley High-Speed Rail (HSR) Passenger Project would provide the primary maintenance functions, although layover tracks are anticipated at the Rancho Cucamonga station, which could include light maintenance capability, such as interior cleaning and daily inspection.

Trains are expected to operate daily on 45-minute headways between Victor Valley and Rancho Cucamonga. The trip between Victor Valley and Rancho Cucamonga would be approximately 35 minutes. Service would be coordinated with existing and planned Metrolink service at the Rancho Cucamonga station to provide a convenient connection between the high-speed rail (HSR) and commuter rail systems.

The Project would be constructed and operated under a lease agreement with the California Department of Transportation (Caltrans) for the use of the I-15 right-of-way and the station at Hesperia. Brightline West would secure additional agreements with Caltrans for Right-of-Way Use; Design & Construction Oversight and Reimbursement; and Operations & Maintenance, as necessary. For the last mile of the project from I-15 to the Rancho Cucamonga Station, there will be Agreements with the City of Rancho Cucamonga and the San Bernardino County Transportation Authority (SBCTA) for land rights, construction, operations and maintenance.

This report provides an overview of the floodplain effects associated with the construction and operation of the proposed Brightline West Cajon Pass High-Speed Rail Project (Project). The information provided in this report is preliminary and is intended to support the National Environmental Policy Act process for the Federal Railroad Administration (FRA). This information will form the basis of further analysis and field work, as needed. Forthcoming information related to construction methods, project design, and agency coordination will support confirmation of the potential for project effects and identification of measures that could be incorporated into the project design to minimize and/or avoid adverse effects.

2. Project Description

2.1. Background

Early project coordination for HSR service from Victor Valley to Rancho Cucamonga began in 2020, with Brightline West meeting with SBCTA to examine a connection between Victor Valley and Rancho Cucamonga. This meeting resulted in a memorandum of understanding (MOU) that was fully executed in July 2020 between Brightline West and SBCTA to study the potential of building HSR within the I-15 right-of-way between Victor Valley and Rancho Cucamonga. A separate MOU was executed in September 2020 between Brightline West and the Southern California Regional Rail Authority, which operates Metrolink, for connection to the existing Metrolink station in Rancho Cucamonga. Additionally, the California State Transportation Agency (CalSTA), Caltrans, the California High-Speed Rail Authority, and Brightline West have executed an MOU regarding the Project. The MOU reflects both the regional and statewide interest and value in the Project, including interconnectivity opportunities, and outlines how the parties will work together to advance their shared interest in the success of the Project.

2.2. Project Area

The Project would construct and operate a 48-mile train system capable of speeds up to approximately 140 mph between Victor Valley, California and Rancho Cucamonga, California (Project). The Project includes two new railway stations: one in Hesperia, and one in Rancho Cucamonga, and will connect to another Brightline West station in Victor Valley. The proposed rail alignment would be located within the median of the I-15 freeway between Victor Valley and Rancho Cucamonga except for the last mile approaching the proposed Rancho Cucamonga station. The Project area is depicted in Figure 1. The Project passes through the cities of Victorville, Hesperia, Rialto, and Fontana, and through unincorporated areas.

The project area is the same as the project footprint, and nearly all of it is within the I-15 right-of-way. It incorporates the limits of disturbance for construction of the proposed rail line and associated development, including power stations, bridge structures, and two rail stations. The Project area is approximately 49 miles long and ranges in width from approximately 22 feet to 71 feet.

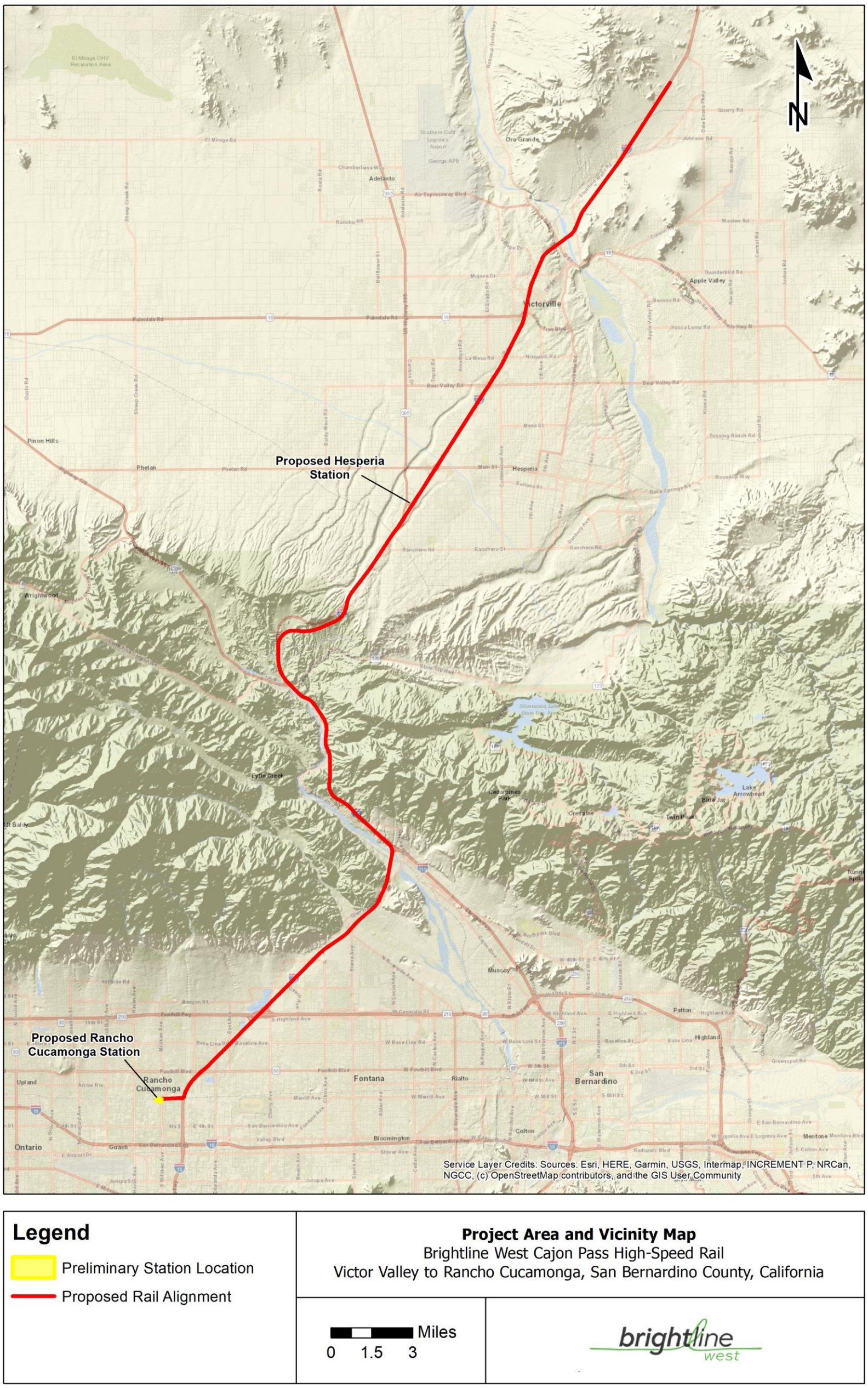

Figure 1. Project Area and Vicinity

2.3. Purpose of and Need for the Project

2.3.1. Purpose

The purpose of the Project is to provide reliable and safe passenger rail transportation between the Los Angeles metropolitan region and the High Desert of San Bernardino County. The Project would provide a convenient, efficient, and environmentally sustainable alternative to automobile travel on the highly congested I-15 freeway. The Project would add capacity to the overall transportation system by introducing a new HSR service from Victor Valley to Rancho Cucamonga. The Project would reduce travel time, improve reliability, and increase the mobility options for travel between metropolitan regions. Travel time from Victor Valley to Rancho Cucamonga for Project users would be approximately 30 percent faster during normal conditions and at least twice as fast during congestion peak periods. The Project would reduce automobile vehicle miles traveled (VMT), resulting in a corresponding reduction in greenhouse gas (GHG) and air quality emissions.

2.3.1.1. Multi-Modal Use of the I-15 Corridor

Operation of the Project would significantly increase the capacity of I-15 as a multi-modal corridor in Southern California. This increase in capacity would benefit freeway operations by providing an alternative to automobile travel that would reduce travel time. This shift of people from automobile to train travel along the I-15 corridor would reduce the need for programmed and/or planned freeway improvement and widening projects.

2.3.2. Need

The Project is needed to address transportation capacity deficiencies, major points of congestion, limited travel mode choices, safety deficiencies, and reduce GHG emissions.

Travel demand analysis completed on behalf of the project forecasts 49.1 million one-way trips between Southern California and Las Vegas in 2025, with approximately 85 percent of travelers making the trip by automobile. Most of these trips use the Cajon Pass segment of the I-15, which is capacity-constrained. Further, the freeway system leading into the I-15 from points west, east, and south, including I 10, State Route 210 (SR-210), I 215 and SR-60 have similar delays and capacity constraints. The Project would address this demand by providing a transportation alternative to vehicle travel, and it would allow access to the Brightline West service from the Greater Los Angeles and the Riverside-San Bernardino-Ontario Metropolitan areas, as well as points beyond, with a connection to the Metrolink system in Rancho Cucamonga.

The Project would also support federal and state policies focused on climate change and the need to reduce VMT and associated GHG emissions.

2.3.2.1. Capacity Constraints

I-15 through the Cajon Pass is one of the most congested segments of I-15, with no alternative routes that provide comparable direct road travel capability because of the mountainous topography. Through the Cajon Pass, I-15 supports daily workforce commuters, recreational travel, and regional and interstate freight and goods movement. According to the traffic study prepared for the I-15 Corridor Project Initial Study/Environmental Assessment (Caltrans and

SBCTA 2018), unreliability in travel time along segments of I-15 and surrounding roadways is caused by roadway capacity constraints, frequent accidents, and various factors that cause unanticipated congestion. Travelers using the Project would no longer need to drive through the most congested parts of the corridor in the Cajon Pass for interstate or commuter trips, thereby avoiding driving next to many large freight trucks, idling, and inefficient stop-and-go traffic conditions.

By 2045, travel speeds are expected to decrease on all but one segment of I-15 between the San Bernardino Valley and Apple Valley in the AM peak period, and travel speeds on most segments would also decrease—some by more than 10 mph—in the PM peak period (SCAG 2020). Based on the Project Report for the I-15 Corridor Study (addition of express lanes), traffic volumes on I-15 between I-10 and SR-210 are expected to increase in the range of 31 to 38 percent from 2014 to 2045. The Project Report states the existing level of service (LOS) is acceptable in most locations but that there are bottlenecks in each direction of travel that degrade traffic operation, especially between Baseline Road and SR-210. Because the express lane project is increasing capacity by adding express lanes, the traffic volumes are projected to increase by an additional 27 percent. The Project Report further mentions that, although the express lane project would improve conditions in the general-purpose lanes in many segments, it would cause the segment between the I-10 and Fourth Street to worsen in the PM peak hour (both directions). In the AM peak hour, the segment between Arrow Route and Fourth Street would worsen in the southbound direction. The segment between Baseline Road and SR-210 would continue to operate at over capacity conditions in all scenarios.

SCAG's Connect SoCal Goods Movement Technical Report identifies I-15 as part of the U.S. Department of Transportation's (USDOT) Primary Highway Freight Network and among the network segments that carry the highest volumes of truck traffic in the region. It also identifies the entirety of the Cajon Pass as a truck bottleneck, with over 15,000 annual vehicle hours of delay.

As documented above, given the attractiveness of the origins and destinations, the transportation capacity constraints on I-15 as described in current and predicted average daily traffic (ADT) and LOS limit reasonable highway access between Rancho Cucamonga, Hesperia, and Victor Valley.

2.3.2.2. Travel Demand

The anticipated substantial increases in population, housing, and employment in San Bernardino County will result in greater demand for transportation facilities and services, including increased travel demand that will result in congestion on roadways if capacity does not keep up with the demand. The proposed Hesperia Station would provide convenient connections between High Desert communities and the more urbanized San Bernardino Valley and Metropolitan Los Angeles. The High Desert provides lower cost housing options for Southern California residents, while the Rancho Cucamonga/Ontario area around Ontario International Airport has become a significant employment center.

SCAG forecasts, in its 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), that the population of San Bernardino County will grow to 2,815,000 by 2045, a 29 percent increase from the U.S. Census Bureau's 2018 population estimate of 2,180,085, and that the number of households will grow to 875,000, a 39 percent increase over

the 2018 household estimate of 630,633 (U.S. Census Bureau 2020). Additionally, the 2020-2045 RTP/SCS forecasts employment in San Bernardino County will increase to 1,064,000 by 2045, a 72 percent increase from the U.S. Census Bureau's estimate of 617,828 in 2018.

While the proposed Victor Valley station site would be located at the convergence of all the highways en route to Las Vegas for Southern California travelers, the Rancho Cucamonga station would be closer to major population centers in Southern California. Compared to the Victor Valley station, the proposed HSR station in Rancho Cucamonga, located about 45 miles east of Downtown Los Angeles, would provide more direct access to the densely populated centers in Southern California for both drivers and Metrolink riders; 87 percent of the potential market for trips between Las Vegas and Southern California (equivalent to 42.7 million of the one-way, in-scope trips in 2025) live within 75 miles of the location of the proposed Rancho Cucamonga station.

The proposed station in Rancho Cucamonga, with a Metrolink connection to Los Angeles, would further meet the forecasted demand of the 49.1 million one-way trips between Las Vegas and Southern California estimated in 2025. Similarly, the proposed Hesperia station would be at the convergence of US Highway 395 (US 395) and I-15, so it would serve commuters to Greater Los Angeles from the major corridors in the Victor Valley.

The Project would also support SCAG's Connect SoCal Passenger Rail Technical Report, which identifies closing connectivity gaps as a major strategy to increase mobility and improve sustainability. The Project would facilitate transit connections and would allow residents of the Greater Los Angeles and the Riverside-San Bernardino-Ontario Metropolitan areas to travel exclusively by mass transit and passenger rail to and from the High Desert of San Bernardino and connect to the BLW station at Victor Valley for a connection to Las Vegas. Southern California residents could take the Los Angeles Metro rail, regional bus systems, Amtrak, or Metrolink to Los Angeles Union Station to connect via the Metrolink San Bernardino Line to the Rancho Cucamonga station. Residents could also take the planned West Valley Connector Bus Rapid Transit service that will operate between the Pomona station on the Metrolink Riverside Line in eastern Los Angeles County and the Rancho Cucamonga station. While still in early planning and design stages, the planned Tunnel to Ontario International Airport (ONT) project may provide an additional connection from the Rancho Cucamonga station to the Ontario International Airport.

Additionally, SBCTA and SCAG's 2015 Advanced Regional Rail Integrated Vision – East (ARRIVE Corridor) plan proposes strategies for transitioning the Metrolink San Bernardino Line, which would serve the Rancho Cucamonga station, from a traditional commuter rail line to one that promotes transit-oriented development. Improvements to Metrolink, its transit connections, and additional development of the station areas with transit-supportive uses at greater densities and intensities will encourage the formation of areas that are walkable and that provide mobility options in the region. The Project would further the goals of the ARRIVE Corridor plan by increasing the activity centers that can be accessed by Southern California's rail network. Additionally, the Southern California Optimized Rail Expansion (SCORE) program is intended to increase speeds, reliability, and capacity on Metrolink lines including on the San Gabriel Subdivision which serves the Rancho Cucamonga station.

In 2010, the San Bernardino Associated Governments (the predecessor agency to SBCTA) completed the Victor Valley Long Distance Commuter Needs Assessment, which identified a

phased set of commuter improvement projects. Those projects ranged from expanded park and ride facilities to an express bus service linking the Victor Valley area of the High Desert to the Rancho Cucamonga Metrolink station. The Joshua Street Park & Ride is near the Project's proposed station in Hesperia. Such commuter-focused planned improvements highlight the need for travel options that reduce the number of single occupancy automobiles on I-15 in San Bernardino County, particularly through the Cajon Pass.

FHWA's Southern California Regional Freight Study (USDOT 2020) identifies I-15 as a major interstate highway corridor that provides access to the interior of the United States for goods arriving at the ports of the Los Angeles region and ranks it among the highest truck volume corridors in the western United States. Caltrans' 2015 Interregional Transportation Strategic Plan identifies I-15 as a high priority corridor, among six nationally identified "Corridors of the Future," and a "vital link between Mexico, Southern California, and locations to the north and east of the region." I-15 also connects Southern California and the southwestern United States to the San Joaquin Valley's agricultural goods via SR-58. By providing passenger rail capacity in the corridor, the Project would help maintain freeway capacity for truck freight use by removing passenger vehicles from the roadway network.

2.3.2.3. Safety

Alternatives to automobile travel would provide improved safety conditions on the I-15 corridor with diversion of vehicle trips to HSR. On a national level, comparing miles traveled via commercial aircraft, train, and automobiles on highways, auto travel on highways has by far the highest rate of passenger fatalities per mile traveled. In 2019, the average rate of passenger fatalities from highway travel was more than 75 times the comparable rate for travel by air and 34 times the comparable rate by rail. For 2016, the Bureau of Transportation Statistics' National Transportation Statistics (USDOT 2018) reported a rate of passenger fatalities per 100 million passenger miles traveled by highway nearly 10 times greater than the rates for travel by air or rail. HSR is one of the safest forms of travel.

The California Office of Traffic Safety ranks San Bernardino County 16th-worst out of 58 counties for total fatal and injury crashes in 2018 (the most recent year of data available). According to the University of California, Berkeley, and SafeTREC's Transportation Injury Mapping System, there were 819 collisions with one or more deaths or injuries along I-15 in San Bernardino County in 2019. Of these, nearly one quarter (199) occurred in the 12 miles of the Cajon Pass, although the Cajon Pass accounts for only 6.5 percent of the length of I-15 in the county.

A study by the I-15 Mobility Alliance found that the segment of I-15 from I-215 in San Bernardino to I-40 in Barstow had a fatality rate 0.009 per million VMT, well above the alliance's performance goal of 0.003 fatalities per million. By connecting the Victor Valley to Rancho Cucamonga, the Project would allow more travelers to stay off segments of I-15.

2.4. Project Elements

2.4.1. Build Alternative

The Build Alternative (i.e., the Project) consists of a proposed HSR passenger railway with associated infrastructure, including two proposed passenger stations. Nearly all of the Project would be built within the I-15 right-of-way. Near the proposed southern terminus station in

Rancho Cucamonga, approximately 1 mile of the rail alignment would be in city street, railroad, or utility rights-of-way.

The proposed rail alignment would be located within the median of the I-15 freeway between Victor Valley and Rancho Cucamonga except at the approach to the proposed Rancho Cucamonga station. The rail alignment would be predominantly at grade (the same elevation as the existing freeway), with select segments of the alignment on aerial structures or in a trench to allow for grade separations (including 4 BNSF and 3 UP railroad crossings) and to provide a safe incline for train operation. The rail alignment would be predominantly single-track, with limited double-track segments in Victor Valley (2.6 miles, including 0.9 miles constructed as part of the DesertXpress High-Speed Passenger Train Project), Hesperia (5.5 miles), and Rancho Cucamonga (2 miles). This would allow for 45-minute headways in the opening year between Victor Valley and Rancho Cucamonga and with additional infrastructure, 22.5-minute headways after year 11. These headways, along with the ability to couple trains (double passenger capacity), would address projected ridership needs for the foreseeable future.

Temporary construction areas, or TCAs, are properties that would be temporarily utilized for construction staging and storage. The Project would require TCAs along the alignment between Victor Valley and Rancho Cucamonga.

For analytical purposes, the Build Alternative is described in three sections. Sections were developed to reflect similarly developed areas with similar environmental sensitivity. The sections include:

- **Section 1:** High Desert – from the Victor Valley station, continuing south along I-15, to the I-15/Oak Hill Road interchange in Hesperia
- **Section 2:** Cajon Pass – from the I-15/Oak Hill Road interchange, continuing south along I-15, through the Cajon Pass, to the I-15/Kenwood Avenue interchange
- **Section 3:** Greater Los Angeles – from the I-15/Kenwood Avenue interchange in San Bernardino, continuing south along I-15, through the existing Metrolink station in Rancho Cucamonga to Haven Avenue

2.4.1.1. Section 1 – High Desert

The proposed rail alignment would connect to the DesertXpress High Speed Train alignment approximately one mile south of the Victor Valley station in Apple Valley. The Victor Valley station was proposed by the DesertXpress High Speed Train Project (DesertXpress Project) and approved in 2011 and modified by the re-evaluation in 2020. From this point, the alignment would continue south within the I-15 median. The rail alignment throughout Section 1 would be predominantly single track; however, the rail alignment would be double-track north of Stoddard Wells Road to the northern terminus of the alignment as it approaches the train platforms of the Victor Valley station. The Project would include a new structure over the existing CEMEX railroad bridge. Based on future discussion with CEMEX, the existing railroad bridge may be reconstructed as part of the DesertXpress project, in which case the alignment would run at-grade in the median under the railroad bridge.

Brightline West will build a new Southbound on ramp and bridge at South Stoddard Wells Rd. to replace similar existing facilities further south.[1] This in-turn requires modifications of I-15 up to and including the Mojave River crossing.

At the Mojave River, a new rail bridge will be constructed within the median of I-15. The existing I-15 bridge would be widened to accommodate the rail line. The alignment would then continue at grade in the I-15 median with minor roadway widenings for the remainder of Segment 1. This portion of the alignment would interface with the following interchanges: Stoddard Wells Road North, Stoddard Wells Road South, D Street/E Street, Mojave Drive, Roy Rogers Drive/Hook Road, Palmdale Road, La Mesa Road/Nisqualli Road, Bear Valley Road, Main Street/Phelan Road, Joshua Street, US 395, Ranchero Road, and Oak Hill Road.

A new substation would be constructed to support the Project along I-15, between Mesa Street and Mojave Street. The area is currently largely undeveloped, other than existing overhead power lines and utility access.

Hesperia Station

Section 1 includes a new passenger station in Hesperia, at the I-15/Joshua Street interchange. This station would serve daily travelers between the High Desert of San Bernardino County and the Los Angeles Basin. This would be a limited service for select southbound AM and northbound PM weekday on selected Brightline train coaches. The northbound on-ramp to Joshua Street would be realigned closer to the freeway, and station parking would be on the north side of Joshua Street. Parking would be accessed at the location of the existing northbound ramp intersection. To accommodate the rail alignment, the existing US-395 northbound connector and the existing Joshua Street bridge would be replaced. The Joshua Street bridge would be reconstructed at a higher elevation, requiring raising of the I-15 ramps and Mariposa Road. The passenger platform would be located within the I-15 median, with direct access from the reconstructed Joshua Street bridge at the southern end of the double-track segment in Hesperia. The Project design includes adequate parking areas to accommodate parking demand.

Design Elements

Segment 1 of the Project includes the following design elements.

- Reconstructions/Interchange Modifications: Widening portions of the I-15 freeway and modifications to interchanges at Stoddard Wells Road southbound on- and off-ramp, D Street/E Street, Mojave Drive, Roy Rogers Drive/Hook Road, Palmdale Road, La Mesa Road/Nisqualli Road, Bear Valley Road, Main Street/Phelan Road, US-395, Ranchero Road, Oak Hill Road, and Joshua Street
- ·New Substation: Construction of a new substation along I-15 between Mesa Street and Mojave Street
- Station Area: Hesperia station platform, station access/infrastructure, surface parking lot accommodating approximately 360 vehicles, bus pick up/drop off areas, Kiss and Ride

[1] These improvements would be consistent with Caltrans' planned Interstate 15 Interchange Reconstruction (D Street, E Street, Stoddard Wells Road, and Mojave River Bridge)project, which was originally analyzed under an Initial Study / Environmental Assessment in 2008.

2.4.1.2. Section 2 – Cajon Pass

Beginning at the I-15/Oak Hill Road interchange and traveling south, the alignment would run on the west side of the I-15 northbound lanes at grade and within the existing I-15 right-of-way. In this area, the I-15 runs through the San Bernardino National Forest for approximately 12 miles. The rail alignment throughout Section 2 would be entirely single-track. The Project would require replacement of California Highway Patrol (CHP) emergency crossovers where the new guideway would block existing crossovers. Four new crossovers would be placed to take advantage of existing CHP access between the separated I-15 alignments in the following locations:

- West of Forestry Road crossing the northbound lanes.
- Approximately 1.25 miles in the southbound direction along I-15 from the crossover near Forestry Road, across the northbound lanes.
- West of the Baldy Mesa (Trestles) OHV Staging Area, across the northbound lanes.
- West of Perdew Canyon and approximately 1.25 miles north of Mathews Ranch Road, across both the north and southbound lanes.

The alignment would remain at grade throughout Segment 2.

Where I-15 northbound and southbound lanes reconnect at the foot of the Cajon Pass, the rail alignment would be within the I-15 median. This would require widening portions of the I-15 freeway and minor realignment of ramps at the I-15/SR-138 interchange.

Design Elements

Segment 2 of the Project includes the following design elements.

- Bridges/Viaducts: None
- Reconstructions/Interchange Modifications: Widening portions of the I-15 freeway including several miles of retained fill, and realignment of ramps at the I-15/SR-138 interchange
- Other Facilities: CHP emergency crossovers

2.4.1.3. Section 3 – Greater Los Angeles

Beginning at the Kenwood Avenue interchange, the proposed rail alignment would continue at grade in the I-15 median. At the I-15/I-215 interchange, the alignment would continue between the divided I-15 freeway at the same elevation as the freeway including the Devore interchange viaduct, curving to the southwest parallel to freeway. The rail alignment would require I-15 freeway and interchange ramp modifications at Baseline Avenue, SR-210, Beech Avenue, Duncan Canyon Road, Sierra Avenue, and Glen Helen Parkway.

The rail alignment would transition to an aerial alignment and elevate over the I-15 southbound lanes south of Church Street and cross at Foothill Boulevard. It would continue along the west side of the I-15 freeway on an elevated alignment to enter the San Gabriel Subdivision and Eighth Street corridor. The alignment would transition onto an aerial structure and would turn west, running parallel to and partially within the existing rail corridor and partially within the Eighth Street right-of-way before entering the existing Rancho Cucamonga Metrolink station

area on an elevated structure. The rail alignment would maintain a single-track configuration prior to exiting the freeway median south of Church Street, where it would transition to a double-track configuration for the remaining distance to the Rancho Cucamonga station. At the Rancho Cucamonga station, an elevated station with a center platform and tracks on either side would be constructed parallel to and above the existing eastbound Metrolink platform, extending over Milliken Avenue. A new parking structure is proposed at Rancho Cucamonga Station, and would replace existing surface parking to accommodate increased parking demand. The Project design includes adequate parking areas to accommodate parking demand in the opening year.

Design Elements

Segment 3 of the Project includes the following design elements.

- Bridges/Viaducts: Viaduct of approximately 3.5 miles to cross I-15 southbound lanes and along existing rail corridor near Rancho Cucamonga station
- Reconstructions/Interchange Modifications: I-15 freeway and interchange ramp modifications at SR-210, Beech Avenue, Duncan Canyon Road, and Glen Helen Parkway
- Station: Dedicated Brightline station adjacent to the existing Rancho Cucamonga Metrolink station, with vertical circulation down to the platform, shared access with existing Metrolink station, a share parking structure for vehicles, and a bus plaza

2.5. Construction

In general, construction activities would consist of clearing, grading, excavation, placing fill, stockpiling materials, installing sub-ballast and subgrade, placing and anchoring railroad ties, placing ballast material, and tamping ballast, mobilization and demobilization. Construction equipment would likely include dump trucks, excavators, loaders, cranes, water trucks, backhoes, scrapers, rollers, ballast tampers, concrete trucks, and drill rigs.

For new and reconstructed overpasses and bridges, construction activities would include clearing, grubbing, demolition of existing structures, excavation and drilling for foundations, concrete pouring, formwork and rebar placement for foundations, falsework installation, construction of bridge decking, placement of ballast and ties, mobilization and demobilization.

Most construction activities would occur on Caltrans right-of-way. Some, for the rail stations and power stations, would occur on public property owned by the City of Rancho Cucamonga, SBCTA, or State of California. Temporary construction areas, or TCAs, are properties that would be temporarily utilized for construction staging and storage. The Project would require TCAs along the alignment between Victor Valley and Rancho Cucamonga.

Construction activities on Caltrans right-of-way would comply with the State Construction General Permit (CGP). The CGP and the Caltrans Storm Water Management Plan (SWMP) both require best management practices (BMPs) to be incorporated during all phases of construction to prevent contaminated stormwater runoff, a major contributor to water quality degradation. A Storm Water Pollution Prevention Plan (SWPPP), which will include placement of temporary water pollution control BMPs throughout the project site, will be required prior to commencement of construction.

Construction of at least two bridges, over the Mojave River and Lytle Creek, would involve work within the streambed. Placement of columns needed for those bridge spans may involve phased construction with best management practices (BMPs), such as flow diversion around work areas, to protect the stream during construction. Staging, equipment storage, and stockpiling would occur outside the floodplain. The final construction plans would include the BMPs for grading, erosion control, and flow diversion that are necessary to reduce erosion and sedimentation. Such BMPs would be selected to control erosion and sediment removal and would represent the best available technology that is economically achievable. Standard erosion control measures, such as management, structural, and vegetative controls, would be implemented for all construction activities that expose soil. BMPs to be implemented may include, but would not be limited to, the following:

- Temporary erosion control measure BMPs that would apply to construction of the stations and the rail (such as silt fences, staked straw bales/wattles, silt/sediment basins and traps, check dams, geofabric, mulch or duff, and sandbag berms) for erosion control from disturbed areas
- Grading to eliminate any direct conveyance routes such as rills or gullies that may allow runoff to flow directly to streams, rivers, floodplains and washes
- Incorporation of BMPs in Temporary Water Pollution Control (TWPC) Plans that will be included in the Storm Water Pollution Prevention Plan (SWPPP)
- Regular inspection and maintenance of BMPs shown in the TWPCs

Construction BMPs specifically for rail installation would also include:

- Erosion control material consisting of silt fences along the outside limits of construction on both sides of the disturbance corridor for track construction
- Clearing the construction area of brush and vegetation
- Stripping any topsoil and transporting it to stockpile (outside the limits of any floodplain) where it will be covered with a protective layer impervious to water for protection from rainfall
- Excavation and fill for culvert extensions using good quality material for fill and transporting poor quality material to stockpile
- Using stabilized construction entrances and exits along the project site (outside the limit of floodplains) to minimize deposition of tire dust and associated contaminants off of the track site
- Placement of diversion BMPs around the area where construction activities are occurring in a floodplain, such as at proposed bridge columns and abutments
- Storing construction equipment or materials outside the limits of influence of the 100-year floodplain so as to avoid redirecting 100-year flood flows that could cause structural damage or pose a safety risk to workers.

In addition to the BMPs listed above, the Project would restore disturbed areas after construction.

3. Methodology

3.1. Relevant Regulations, Plans, and Policies

Executive Order 11988 (Floodplain Management) addresses floodplain issues related to public safety, conservation, and economics and requires that federal agency construction, permitting, and funding of a project:

- Identify risks of the action
- Avoid incompatible floodplain development
- Be consistent with the standards and criteria of the National Flood Insurance Program
- Restore and preserve natural and beneficial floodplain values
- Address measures to minimize any net rise in floodplain level

The base floodplain is defined as "the area subject to flooding by the flood or tide having a one percent chance of being exceeded in any given year." An encroachment is defined as "an action within the limits of the base floodplain."

3.2. Study Area

The study area for floodplains is defined as the area within the Project footprint, which comprises the temporary and permanent Project footprint, except for the area at Lytle Creek and Mojave River where the study area extends further than the project footprint in order to study the Project's effect on these two floodplains. At these two locations, the study area is extended both 500-ft upstream and downstream of the project limits for evaluation of hydraulics in the floodplain. Note that some areas adjoining the project limits include floodplains that are not in the project limits. However, these floodplains are in such close proximity to the project, they are also discussed in this report.

As shown in Figure 2, the Project would cross or be next to five high-risk flood zones identified by the Federal Emergency Management Agency (FEMA). They consist of the Mojave River, Cajon Wash, Lytle Creek/Wash, Hawker-Crawford Channel, and Etiwanda Creek/Channel.

3.3. Methods Used

FEMA Flood Insurance Rate Maps (FIRMs) were reviewed to identify the location of high-risk flood zones within the study area. Existing design information was then reviewed to determine if the Project would affect identified flood zones by placing fill, including structures, within the floodplain.

Based on the initial design, the Project would place bridge columns within the FEMA high-risk flood zones of the Mojave River and Lytle Creek. Preliminary, one-dimensional, hydraulic models were developed, using the Hydraulic Engineering Centers-River Analysis System (HEC-RAS) computer program, to analyze the potential effects of the Project on the upstream water surface during the 100-year storm event at the Project crossings of the Mojave River and Lytle Creek. Pre-project and post-project scenarios were developed for each of the two sites.

4. Existing Conditions

The geography of the study area mainly consists of:

- San Bernardino Valley (located south of Lytle Creek where runoff flows southwesterly toward Etiwanda Creek and ultimately to the Middle Santa Ana River)
- Cajon Pass (located from Lytle Creek to the mountain peak located north of the Cajon Wash where runoff flows southerly to Lytle Creek and the Cajon Wash and ultimately to the Middle Santa Ana River)
- High Desert (located north of the Cajon Pass where runoff generally flows northeasterly toward the Mojave River)

FEMA subdivides floodplains into flood zones to capture the frequency of flood events in areas susceptible to flooding. Based on a review of the FEMA FIRMS that cover the study area, the project alignment would cross though two high-risk flood hazard zones: A and AE. FEMA defines these flood zones as follows:

- **Zone A:** Areas subject to inundation by the 1-percent-annual-chance (100-year) flood event. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown.
- **Zone AE:** Areas subject to inundation by the 100-year flood event determined by detailed methods. BFEs are shown within these zones for floodways.

Flood zones A and AE are in the cities of Victorville, Fontana, Rialto, and Rancho Cucamonga and in parts of unincorporated San Bernardino County. The locations of the high-risk flood zones are illustrated on Figure 2. The Project would cross the following high-risk flood zones:

- Mojave River (Victorville) – Zone AE
- Lytle Creek and Lytle Creek Wash (San Bernardino County/Rialto) – Zone A
- Etiwanda Channel/Creek (Fontana/Rancho Cucamonga) – Zone AE (floodway is contained in the channel [FEMA 2020])

The Project is next to the following high-risk flood zones:

- Cajon Wash (downstream of the Project, in unincorporated San Bernardino County) – Zone A
- Hawker-Crawford Channel (in Rancho Cucamonga) – Zone A

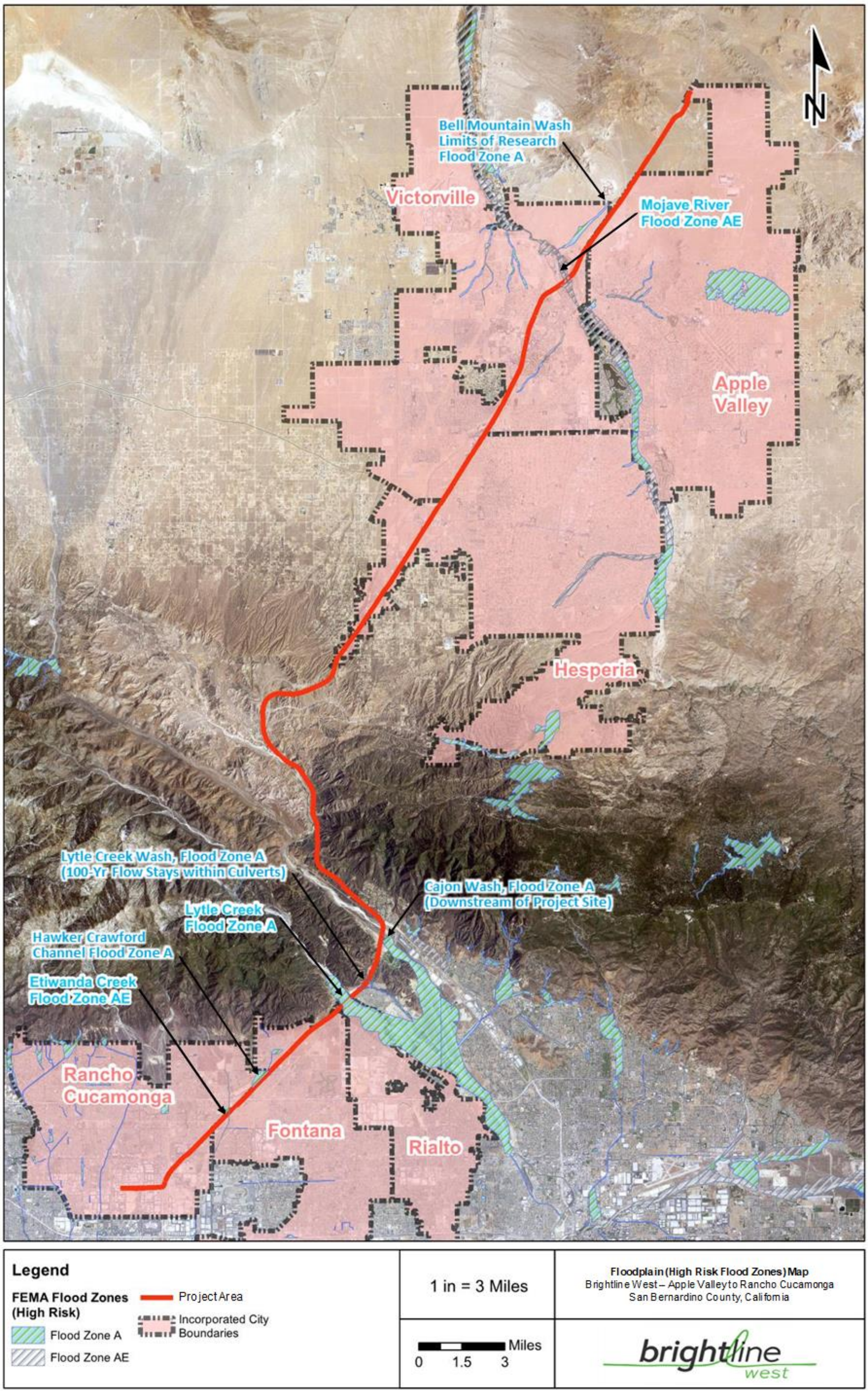

Figure 2. Project Area and Floodplain Map

5. Environmental Effects and Mitigation

5.1. Construction Effects

5.1.1. Railway

During railway construction, site grading for rail, roadway, and structures would expose areas of bare soil to erosive forces (i.e., rainfall, runoff, and wind). In addition, Project construction could involve the use of heavy, earth-moving equipment in the floodplains of the Mojave River and Lytle Creek, and near the floodplains of Etiwanda Channel, and Hawker-Crawford Channel. Use of such equipment could expose disturbed and loosened soils to erosion. Most natural erosion occurs at slow rates; however, the rate increases when the land is cleared or altered and left disturbed. Activities involving soil disturbance, excavation, cutting/filling, and stockpiling could result in increased erosion and sedimentation to surface waters if precautions are not taken to control pollution in the runoff.

Most of the Railway construction activities would occur on Caltrans right-of-way and would comply with the State CGP. The CGP and the Caltrans SWMP both require BMPs to be incorporated during all phases of construction. By implementing measures in the SWMP and SWPPP, the Project would reduce the potential for construction impacts on floodplains; however, some potential for erosion and spills, and for sediment or spilled material to reach floodplains would remain.

As noted in Section 2.5, placement of bridge columns in the streambeds of the Mojave River and Lytle Creek may involve phased construction with flow diversion BMPs such as gravel bag berms placed around the construction areas during construction in the streambed. This would allow water to flow around the construction area and reduce potential for construction material to reach the waterway during a storm event. It would also keep the construction area dry.

Project construction activities within floodplains would likely result in temporary effects on floodplains. These activities could include vegetation clearing, soil disturbance, and construction of bridge piers and abutments. However, disturbed areas would be restored after construction and bridge elements would be constructed in phases with flow diversion BMPs protecting the construction site, and no long-term effects are anticipated. This will be confirmed after more details of project design are available. For further information on restoration of disturbed wetland areas, refer to the Wetlands and Streams Technical Report Section 5.4. Avoidance, Minimization, and/or Mitigation Measures.

5.1.2. Hesperia Station

Site grading for structures would expose areas of bare soil to erosive forces. Activities involving soil disturbance, excavation, cutting/filling, and stockpiling could result in increased erosion and sedimentation to surface waters if precautions are not taken to control pollution in the runoff. However, the Project incorporates BMPs that would minimize the potential for construction impacts.

No FEMA-mapped floodplains are in or near the construction footprint of the proposed Hesperia Station. Therefore, the Project would not affect floodplains or water surface elevations in the proposed station area.

5.1.3. Rancho Cucamonga Station

No FEMA-mapped floodplains are in or near the construction footprint of the proposed Rancho Cucamonga Station. Therefore, the Project would not affect floodplains or water surface elevations in the proposed station area.

5.2. Operation Effects

5.2.1. Railway

The high-risk flood zones of the Cajon Wash and the Hawker-Crawford Channel are next to, but not in, the footprint of the Project as shown in Figure 2 of this report. The FEMA mapped floodplain of the Cajon Wash is immediately downstream of the project site. The Hawker-Crawford Channel floodplain adjoins the southbound I-15 embankment for approximately 3,200 feet, from the Beech Avenue to Cherry Avenue crossings.

At Cajon Wash, project improvements would be located upstream of the mapped floodplain and, therefore, would not affect downstream water surface elevations. For this crossing, the Project would place bridge columns in the streambed in a manner that would minimize impacts on the upstream water surface elevation, even though it is not in a floodplain. The proposed bridge columns would be in line with the existing northbound and southbound I-15 bridge columns located downstream and upstream, respectively).

FEMA mapping shows the Hawker-Crawford Channel to overtop during the 100-year storm event, though the floodplain remains in low-lying area that is below the grade of the proposed Project. The Project would be located outside the floodplain, and proposed Project improvements would have no effect on it.

When project features are located within a FEMA 100-year floodplain, the base elevation of the railway would be elevated above the 100-year floodplain or features would be located to avoid impacts. The Project would cross the FEMA high-risk flood zones of the Etiwanda Creek/Channel, Mojave River, and Lytle Creek. For the Etiwanda Creek/Channel crossing, the Project would fully span the floodplain and would not result in effects because the Etiwanda floodway is contained within the channel, which is owned and maintained by the San Bernardino County Flood Control District. Based on the initial project design, bridge columns would be placed within the floodplains of the Mojave River and Lytle Creek. The bridge columns would be placed next to existing I-15 bridge columns to minimize potential impacts and would result in minimal to no new redirection of flood flows or net rise. As demonstrated by preliminary hydraulic analyses, the Project is not anticipated to result in effects that would impede or redirect flows, as described below.

Preliminary modeling was conducted for the pre-and post-project condition for Lytle Creek and the Mojave River. Results of the HEC-RAS models are provided in Tables 1 and 2. Flow rates were taken from the FEMA FIRMs.

The proposed Lytle Creek Bridge is 1,982 feet long and has 112-foot bridge spans with columns placed between the existing northbound and southbound I-15 bridges. The I-15 bridges have

equivalent spans and columns placed in line with the flow at the same location along the creek cross-section.

The proposed Mojave River Bridge is located in the median of I-15. It would include bridge piers at the same spacing of the existing I-15 bridge that currently crosses the Mojave River channel bottom. The I-15 bridge would also be widened on the upstream and downstream sides of the existing bridge, with proposed piers aligned with existing piers.

As shown in Tables 1 and 2, the model results show no increase in water surface elevation for Lytle Creek and a small increase of 0.16 foot (1.9 inches) in the Mojave River Channel for a distance of approximately 1,600 feet upstream of the bridges, which is well within the minimum freeboard required of the 100-year channel under bridges as per the Caltrans Highway Design Manual.

Table 1. HEC-RAS Model Results for Lytle Creek

Lytle Creek Station	Flow Rate (cfs)[1]	Pre-Project Model Water Surface (feet)	Post-Project Model Water Surface (feet)	Change in Water Surface (feet)
10075	29,800	1,975.5	1,975.5	0.0
10748 (right-of-way)	29,800	1,993.6	1,993.6	0.0
11215 (downstream of bridges)	29,800	2,007.8	2,007.8	0.0
11476 (upstream of bridges)	29,800	2,016.3	2,016.3	0.0
11813 (right-of-way)	29,800	2,025.2	2,025.2	0.0
12422	29,800	2,036.9	2,036.9	0.0

Notes: 1. Flow rate is for the 100-year storm event.

Table 2. HEC-RAS Model Results for Mojave River

Mojave River Station	Flow Rate (cfs)[1]	Pre-Project Model Water Surface (feet)	Post-Project Model Water Surface (feet)	Change in Water Surface (feet)
1401	26,500	2,700.5	2,700.5	0.0
1908 (downstream of bridges)	26,500	2,702.8	2,702.8	0.0
2225 (upstream of bridges)	26,500	2,706.0	2,706.1	0.1
2917 (700 feet upstream)	26,500	2,707.4	2,707.6	0.2
4708	26,500	2,711.4	2,711.4	0.0

Notes: 1. Flow rate is for the 100-year storm event.

During final design, hydrology and hydraulics analyses for the Project would be completed to confirm whether final column placement in the Mojave River and Lytle Creek floodplains would result in a net rise in water surface elevation and/or impede or redirect flows at these two locations.

Preliminary modeling using the conceptual design for the Lytle Creek and Mojave River Bridge has been conducted as part of this analysis. A final HEC-RAS analysis will be conducted as part of the Design-Build process. Portions of the rail alignment that use track support columns located in the 100-year floodplain would be evaluated for upstream flooding impacts using the HEC-RAS model or similar. Modeling would be completed and evaluated by a registered professional during the design-build process. The design plans would incorporate all feasible recommendations of the final HEC-RAS analysis such as placement of columns in line with existing columns already in the floodplain and in the direction of flow.

The Project would increase the amount of impervious surfaces, and, thus, the amount of stormwater runoff, in some areas, such as along I-15 where the pavement would be widened to place the track in the median. However, no effects are anticipated on floodplains from increased flows because the Project would follow applicable agency requirements for flow control. In addition to the planned hydrology and hydraulics analyses for the Project, further refinement of the project design and coordination with agencies, including the San Bernardino Flood Control District, will occur.

To determine the appropriate size of drainage facilities during final design for the Project, the total increase in impervious surface will be included in the hydraulic calculations to determine the increase in peak storm discharges resulting from the Project. The 100-year, 24-hour storm event will be used in the calculations. Drainage facilities will be designed to retain flows so as not to contribute to additional flows in the Mojave River, Lytle Creek, or other streams or washes. The Project design would incorporate hydromodification facilities such as detention basins, infiltration basins, infiltration trenches, design pollution prevention infiltration areas, and other permanent BMPs included in the Caltrans SWMP. Also, drainage facilities for the proposed railway, as well as for station facilities and I-15 roadway, will be sized to accommodate the design flow. New culverts will be sized to accommodate the 100-year, 24-hour storm flow so on-site flooding would not occur during such events.

5.2.2. Hesperia Station

The Hesperia Station would not affect floodplains because there are no floodplains in the proposed station area.

Adding the station would add impervious surfaces and increase stormwater runoff. However, no effects are anticipated on floodplains because the Project would follow City of Hesperia MS4 permit requirements for controlling peak storm water flow rates entering their systems.

5.2.3. Rancho Cucamonga Station

The Rancho Cucamonga Station would not affect floodplains because there are no floodplains in the proposed station area.

Adding the station would add impervious surfaces and increase stormwater runoff. However, no effects are anticipated on floodplains because the Project would City of Rancho Cucamonga MS4 permit requirements for controlling peak storm water flow rates entering their systems.

5.3. Cumulative Effects

The Project would not contribute to cumulative effects because there would be minimal net rise in surface water elevations and no flood flow impediments or redirections are anticipated.

This will be verified through hydrology and hydraulic analyses that will be performed for the Project.

5.4. Avoidance, Minimization, and/or Mitigation Measures

Construction BMPs will be implemented prior to construction by the contractors to minimize the temporary effects on floodplains, and construction equipment and materials will not be stored within the floodplain. Any temporary effects on floodplains would be returned to preconstruction conditions. No additional mitigation measures are necessary.

During operation, no mitigation would be required because virtually no effects on floodplains are anticipated. This would be confirmed at the final design stage when location hydraulics studies are completed for all bridges.

6. References

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