APPENDIX 3.6-C: WATER USE ASSESSMENT

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Since publication of the Draft Environmental Impact Report/Environmental Impact Statement, the following substantive changes have been made to this appendix:

- Additional text was added to clarify how construction water estimates were developed.
- Additional text was added to identify the potential sources of water for construction.

This appendix presents an analysis and evaluation of anticipated water use requirements for both construction and operation of the California High-Speed Rail (HSR) System for the San Francisco to San Jose Project Section (Project Section or project). This appendix also identifies current water use within the project footprints, and available water supply sources to meet the anticipated HSR water demand for construction.

Executive Summary

Construction of the Project Section would require water to prepare concrete, increase the water content of soil to optimize compaction, clean equipment, control dust, and reseed disturbed areas; and conduct drilling and other ground excavation activities. The Project Section would provide HSR service to the existing 4th and King Street Station in downtown San Francisco and the existing Millbrae Station and San Jose Diridon Station, and would build and operate a new light maintenance facility (LMF) in Brisbane. Therefore, in addition to water demand for construction of the track modifications, stations, and Brisbane LMF, there would be project-related demand for water for operation of the stations and Brisbane LMF.

Analysts estimated water demand for construction and operation of the project alternatives. The water demand for construction was determined based on the estimated number of water trucks that would be required during construction. The water demand for operation was determined by applying a rate for water use based on square footage of the stations and LMF. This rate was determined based on actual water use at the existing San Jose Diridon Station. Analysts then evaluated existing water use along the project alignment and calculated the increase in water demand due to construction and operation of the project. During construction, the project would temporarily increase the water demand by 0.15 percent under Alternative A, 0.16 percent under Alternative B (Viaduct to Interstate [I-] 880) and 0.22 percent under Alternative B (Viaduct to Scott Boulevard) of the existing water use in 2015.

Background

The California High-Speed Rail Authority (Authority), a state governing board formed in 1996, has responsibility for planning, designing, constructing, and operating the California HSR System. Its mandate is to develop an HSR system that coordinates with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports. The California HSR System would provide intercity, high-speed service on more than 800 miles of tracks throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The California HSR System would be implemented in two phases. Phase 1 would connect San Francisco to Los Angeles and Anaheim via the Pacheco Pass and the Central Valley. The sequence of system phasing would first connect the Silicon Valley to the San Joaquin Valley for initial operating section service in 2025.

The Project Section would connect to the San Jose to Merced Project Section at its south end. The project would run through portions of San Francisco, San Mateo, and Santa Clara Counties. The project is divided into five subsections: San Francisco to South San Francisco, San Bruno to San Mateo, San Mateo to Palo Alto, Mountain View to Santa Clara, and San Jose Diridon Station Approach.

Methodology

Analysts completed the following steps to estimate potential water needs required under the project alternatives and available water supplies:

1. Reviewed existing relevant information, reports, and documents to identify project features and activities that would require significant water usage during construction and operation.
2. Developed water demand estimates for construction of the alignment, stations, and maintenance facilities for each alternative. These construction water estimates were developed by the engineering team based on professional experience and consideration of the following factors:
    a. Type of activity (e.g., water trucks would be needed for compaction, excavation, dust control activities, and equipment cleaning).
    b. Number of water trucks appropriate for each activity (e.g., it is assumed that use of a single grader would require two water trucks).
    c. Intensity of construction activity.
    d. Duration of construction activity.
3. Developed water demand estimates for operation of stations and the LMF.
4. Identified available existing water supply and additional water supply sources, if needed, to provide the required water to each section feature, during both construction and operation.

The following subsections provide a more detailed description of the approach for estimating the project's water usage. Analysts did not evaluate existing water uses within the project footprint because the predominant land use type within the project footprint is transportation; transportation uses require limited water usage and these lands would continue to be used for transportation with implementation of the project.

Identification of Project Features with Significant Water Usage

Analysts reviewed relevant project documents to identify project features that would have significant water demand requirements. During construction, water would be required for construction activities including preparation of cement, concrete work, earthwork and soil conditioning, fugitive dust suppression, and landscaping. Operations would require water for operation of stations and the Brisbane LMF. Radio towers would be unmanned, remotely operated facilities with no dedicated water supply and no water use requirements.

Estimating Future Water Demand Requirement for the Project

Water demand estimates were developed for construction activities and for operations including three HSR stations (4th and King Street Station, Millbrae Station, and San Jose Diridon Station) and the Brisbane LMF. The process for estimating water demand for construction of each alternative included the following:

- Identification of the project footprint for each of the project alternatives
- Identification of the different construction components associated with construction of the track, including:
    - Manufacturing concrete
    - Earthwork and soil conditioning
    - Dust suppression
    - Landscaping

Analysts developed water usage estimates for construction of the track alignment, stations, and Brisbane LMF based on the anticipated project construction schedule and estimates of the required types and quantities of construction equipment.

Water Use Assessment

Existing Water Supply Sources

The San Francisco Public Utilities Commission (SFPUC) provides water to the City and County of San Francisco, as well as all the other jurisdictions in the Project Section (SFPUC 2016). In accordance with the 2009 Water Supply Agreement, the SFPUC provides for 184 million gallons per day (mgd) on an annual average basis as the Individual Supply Guarantee to the SFPUC's wholesale customers, subject to certain reduction conditions stipulated in the contract (City and County of San Francisco 2009). The Cities of Brisbane San Bruno, Millbrae, Burlingame, Redwood City, Menlo Park, Palo Alto, Mountain View, Sunnyvale, and Santa Clara are wholesale customers of the SFPUC. The California Water Services Company, which is an investor-owned utility and a wholesale customer of the SFPUC, provides water service distribution to South San Francisco, San Mateo, Belmont, San Carlos, and Atherton.

Table 1 summarizes the existing water use for jurisdictions along the Project Section. These existing water uses are based on the actual amount of water purchased by jurisdictions in 2015 from the SFPUC, as reported in the *2015 Urban Water Management Plan for the City and County of San Francisco* (SFPUC 2016). In addition, for San Jose, the existing water uses are based on the actual amount of water used from July 2014 to June 2015, as reported in the *2015 Urban Water Management Plan: San Jose Municipal Water System* (City of San Jose 2016).

Table 1 Existing Water Use Summary within Jurisdictions along the Project Section

Jurisdiction	Existing Water Use (mgd)
San Francisco to South San Francisco Subsection	
City and County of San Francisco	70.1
Brisbane	0.6
South San Francisco[1]	5.8
San Bruno to San Mateo Subsection	
San Bruno	1.3
Millbrae	1.9
Burlingame	3.7
San Mateo[1]	5.8
San Mateo to Palo Alto Subsection	
Belmont[1]	5.8
San Carlos[1]	5.8
Redwood City	8.0
Atherton[1]	5.8
Menlo Park	2.6
Palo Alto	9.7

Jurisdiction	Existing Water Use (mgd)
Mountain View to Santa Clara Subsection	
Mountain View	7.6
Sunnyvale	7.8
Santa Clara	1.8
San Jose Diridon Station Approach Subsection	
San Jose	**14.0** [2]
Total	**158.1**

Sources: SFPUC 2016; City of San Jose 2016
mgd = million gallons per day
[1] Actual water use for the Cities of South San Francisco, San Mateo, Belmont, San Carlos, and the Town of Atherton was estimated by dividing the total water use for the California Water Service Company (29.05 mgd) by five, for a total of 5.81 mgd per jurisdiction.
[2] The Urban Water Management Plan for the City of San Jose identifies that between July 2014 and June 2015, approximately 15,707 acre-feet of water was used. The units in acre-feet were converted to mgd using the following conversion ratio: 325,851 gallons per 1 acre-foot and 365 days in one year. 14.0 mgd = (15,707 acre-foot per year * 325,851 gallons per acre-foot / 365 days per year)/ 1,000,000 gallons.

Construction Water Use

Construction of the project would require water to prepare concrete, increase the water content of soil to optimize compaction, clean equipment, control dust, and reseed disturbed areas; and conduct drilling and other ground excavation activities. Table 2 shows the summary of the water that would be required for each project alternative by subsection. Water use for construction would be approximately 257 million gallons for Alternative A, 290 million gallons for Alternative B (Viaduct to I-880), and 342 million gallons for Alternative B (Viaduct to Scott Boulevard).

As described above in the *Methodology* section, the Authority estimated the amount of water to construct the project and the related number of water trucks required to bring said water to project construction sites. These estimates and calculations were based on professional experience and the consideration of various factors. The estimates for construction water use shown in Table 2 were calculated based on the number of water trucks per day that would be required for construction, the estimated number of workdays that a water truck would be required, and the capacity of the water trucks. It is expected that the sources for the water used for construction would come from multiple water systems and will be determined by the construction contract. These water systems include those in the Bay area (e.g., SFPUC, EBMUD), systems outside of the Bay area, and potentially producers of recycled water (e.g., City of San Francisco, City of Redwood City).

Table 2 Construction Water Use by Alternative and Project Feature

Project Component	Total Construction Water Use (million gallons)
Alternative A	
San Francisco to South San Francisco Subsection	
Track alignment	53.8
4th and King Street Station	2.2
East Brisbane LMF	2.1
San Bruno to San Mateo Subsection	
Track alignment	45.7
Millbrae Station	2.2

Project Component	Total Construction Water Use (million gallons)
San Mateo to Palo Alto Subsection	
Track alignment	68.3
Mountain View to Santa Clara Subsection	
Track alignment	52.7
San Jose Diridon Station Approach Subsection	
Track alignment	28.4
San Jose Diridon Station	1.3
Total	**256.7**
Alternative B (Viaduct to I-880)	
San Francisco to South San Francisco Subsection	
Track alignment	53.8
4th and King Street Station	2.2
West Brisbane LMF	2.0
San Bruno to San Mateo Subsection	
Track alignment	45.7
Millbrae Station	2.2
San Mateo to Palo Alto Subsection	
Track alignment and passing track	107.7
Mountain View to Santa Clara Subsection	
Track alignment	52.7
San Jose Diridon Station Approach Subsection	
Track alignment	21.7
San Jose Diridon Station	2.4
Total	**290.4**
Alternative B (Viaduct to Scott Boulevard)	
San Francisco to South San Francisco Subsection	
Track alignment	53.8
4th and King Street Station	2.2
West Brisbane LMF	2.0
San Bruno to San Mateo Subsection	
Track alignment	45.7
Millbrae Station	2.2
San Mateo to Palo Alto Subsection	
Track alignment and passing track	107.7
Mountain View to Santa Clara Subsection	
Track alignment	52.7

Project Component	Total Construction Water Use (million gallons)
San Jose Diridon Station Approach Subsection	
Track alignment	73.3
San Jose Diridon Station	2.4
Total	**342.0**

Sources: Authority 2019a, 2019b
I- = Interstate
LMF = light maintenance facility

Table 3 provides a comparison of existing daily water use within each subsection, as well as the construction water use that would be required for each subsection of the project alternative. As shown, construction of either of the project alternatives would result in a small percentage of the existing water use. Construction of Alternative A would require 0.15 percent of the water that was used in 2015, construction of Alternative B (Viaduct to I-880) would require 0.16 percent of the water that was used in 2015, and construction of Alternative B (Viaduct to Scott Boulevard) would require 0.22 percent of the water that was used in 2015.

Construction water use is not continuous because needs are sporadic and a function of the particular construction activities at the time. Water would be supplied to construction work sites by water tanker truck. As a result, construction demand is frequently offset by a water supply system storage, so there would not be a noticeable drop in public utility water pressure or flow during construction-related activities. Also, the construction contractors could provide water storage on-site, and replacement water would be planned for periods of low demand. These activities would reduce potential surges in water demand to utility customers.

Table 3 Daily Construction Water Use Summary by Alternative

Alternative/Subsection	Daily Water Use (mgd)		
	Existing Use (2015)	Construction Use[1]	Percent of Existing Use
Alternative A			
San Francisco to South San Francisco Subsection	76.5	0.05	0.07
San Bruno to San Mateo Subsection	12.7	0.04	0.31
San Mateo to Palo Alto Subsection	37.7	0.06	0.16
Mountain View to Santa Clara Subsection	17.2	0.04	0.23
San Jose Diridon Station Approach Subsection	14.0	0.05	0.4
Total	**158.1**	**0.24**	**0.15**
Alternative B (Viaduct to I-880)			
San Francisco to South San Francisco Subsection	76.5	0.05	0.07
San Bruno to San Mateo Subsection	12.7	0.04	0.31
San Mateo to Palo Alto Subsection	37.7	0.09	0.24
Mountain View to Santa Clara Subsection	17.2	0.04	0.23
San Jose Diridon Station Approach Subsection	14.0	0.04	0.3
Total	**158.1**	**0.26**	**0.16**

Alternative/Subsection	Daily Water Use (mgd)		
	Existing Use (2015)	Construction Use[1]	Percent of Existing Use
Alternative B (Viaduct to Scott Boulevard)			
San Francisco to South San Francisco Subsection	76.5	0.05	0.07
San Bruno to San Mateo Subsection	12.7	0.04	0.31
San Mateo to Palo Alto Subsection	37.7	0.09	0.24
Mountain View to Santa Clara Subsection	17.2	0.04	0.23
San Jose Diridon Station Approach Subsection	14.0	0.12	0.9
Total	**158.1**	**0.34**	**0.22**

Sources: SFPUC 2016; Authority 2019a, 2019b
I- = Interstate
mgd = million gallons per day
[1] The construction water use was estimated in mgd by dividing the total amount of water that would be used for the San Francisco to South San Francisco Subsection; San Bruno to San Mateo Subsection; San Mateo to Palo Alto Subsection; Mountain View to Santa Clara Subsection by the number of working days (1,235 working days). The construction water use for the San Jose Diridon Station Approach Subsection was estimated in mgd by dividing the total amount of water that would be used by the number of working days (652 working days).

Operations Water Use

Water would also be required for operation of stations and the Brisbane LMF for the project. The 4th and King Street Station, Millbrae Station, San Jose Diridon Station, and LMF would require operational water supply for a variety of uses, including drinking fountains and restrooms, landscaping irrigation, and station and LMF wash water. The operations water use for these stations and LMF would be the same for the project alternatives. Table 4 summarizes the water that would be required daily for operation of the 4th and King Street Station, Millbrae Station, San Jose Diridon Station, and East or West Brisbane LMF under existing conditions, under the proposed project operations, and under existing plus project conditions. Analysts calculated water use for the two stations and the Brisbane LMF based on known rates of water use at the San Jose Diridon Station (89 gallons per square foot per year) and the square footage of the proposed facilities.

Table 4 Operations Water Use

Project Component	Existing Water Use (gpd)	Additional Water Use due to Project (gpd)	Total Water Use for Existing Plus Project (gpd)
4th and King Street Station	4,145.2	2,048.2	6,193.4
Millbrae Station	7,519.9	5,943.5	13,463.4
East or West Brisbane LMF	0.0	105,732.0	105,732.0
San Jose Diridon Station	5,400	18,800	24,200
Total	**17,065.1**	**132,523.7**	**149,588.8**

gpd = gallons per day
LMF = light maintenance facility

Conclusions

Construction of the project alternatives would result in a negligible increase in water consumption. Alternative A would require 0.24 mgd of water, Alternative B (Viaduct to I-880) would require 0.26 mgd of water, and Alternative B (Viaduct to Scott Boulevard) would require 0.34 mgd of water. There is sufficient capacity to support this temporary demand for water. As shown in Table 3, the amount of water that would be required during construction would represent an insignificant percentage of the water that was used by jurisdictions along the Project Section in 2015—0.15 percent for Alternative A, 0.16 percent for Alternative B (Viaduct to I-880), and 0.22 percent for Alternative B (Viaduct to Scott Boulevard).

The increase in water consumption for operation of the three stations and operation of the Brisbane LMF would be approximately 132,500 gallons per day, which is equivalent to approximately 48.3 million gallons per year. This increase in water demand represent an approximately 0.05 percent increase in the water that was used in 2015. The increased operational water demand is relatively minor and existing water supplies would be able to meet the increased demand.

References

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