

# Appendix F Hydrology and Water Quality

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# Attachment 1

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MEMO – HYDROLOGY AND WATER QUALITY

ATTACHMENT 1 – PLANS, POLICIES, AND REGULATIONS



Source Document	Policies
BART	
Phase II MS4 Permit	<p>For planning purposes, assume general Phase II MS4 permit standards and BMPs apply:</p> <ul style="list-style-type: none"> <li>• Stormwater treatment and baseline hydromodification management is required for projects that create and/or replace more than 5,000 sq. ft of impervious surface</li> <li>• Full hydromodification management is required for projects that create and/or replace 1 acre or more of impervious surface</li> </ul>
Oakland	
General Plan	Policy OS-8.1
	Policy OS-8.2
	Policy OS-12.1
	Policy OS-12.2
	Policy OS-12.3
	Policy CO-1.1
	Policy CO-1.2
	Policy CO-4.2
	Policy CO-5.1
	Policy CO-5.2
	Policy CO-5.3
	Policy CO-6.1
	Policy CO-6.2
	Policy CO-6.3
	Policy CO-6.5
	Policy CO-6.6
Policy CO-7.4	

Source Document	Policies
	Policy FL-1
	Policy FL-3
	Policy FL-4
Municipal Code	Chapter 12.12: Excavation
	Chapter 12.32: Street Trees and Shrubs
	Chapter 12.36: Protected Trees
	Chapter 13.14: Storm Drainage Standards
	Chapter 13.16: Creek Protection, Storm Water Management and Discharge Control
<b>San Leandro</b>	
General Plan	Policy EH-1
	Policy EH-1.6
	Policy EH-1.7
	Chapter 7-9: Floodplain Management
<b>Castro Valley (Alameda County)</b>	
General Plan	Policy 10.2-3
<b>Hayward</b>	
General Plan	HAZ-3.1
	HAZ-3.2
	HAZ-3.3
	HAZ-3.4
	HAZ-3.5
	PFS-5.1

Source Document	Policies
	PFS-5.2
	PFS-5.6
	PFS-6.1
	PFS-6.2
	PFS-6.3
	PFS-6.4
	PFS-6.5
	PFS-6.6
Municipal Code	SEC. 10-12.17
<b>Fremont</b>	
General Plan	Chapter 10: Safety – Flood Hazard
Municipal Code	Ch. 18.200 Flood Damage Prevention
<b>Union City</b>	
	S-5.1
	S-5.2
	S-5.3
General Plan	S-5.4
	S-5.5
	S-5.6
	S-2.B



MEMO – HYDROLOGY AND WATER QUALITY

Source Document	Policies
Municipal Code	Article V. Floodplain Management and Flood Damage Prevention
	Article VI: Stream Buffer Protection
<b>Newark</b>	
General Plan	EH-3.1
	EH-3.2
	EH-3.3
	EH-3.4
	EH-3.5
	EH-3.6
	EH-3.7
	EH-3.8
	EH-3.A
	EH-3.B
	EH-3.C
	EH-3.D
	EH-3.E
	Policy CSF-5.4
Municipal Code	Chapter 15.40: Construction in Flood Hazard Areas
<b>Alameda County</b>	
General Plan	Safety Element Chapter 4.1 P1
	Safety Element Chapter 4.1 P2





MEMO – HYDROLOGY AND WATER QUALITY

Source Document	Policies
	Safety Element Chapter 4.1 P4
	Safety Element Chapter 4.1 P5
	Safety Element Chapter 4.1 P6
	Safety Element Chapter 4.1 P7
	Safety Element Chapter 4.1 P9
	Safety Element Chapter 4.1 P10
	Safety Element Chapter 4.1 P12
	Safety Element Chapter 4.1 P14
Ordinance Code	Chapter 6.36: Flood Control and Water Conservation District Use Regulations
	Chapter 15.40. Floodplain Management

Notes: FEMA=Federal Emergency Management Agency; FIRM=Flood Insurance Rate Map; CEQA=California Environmental Quality Act





# Attachment 2

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## Coast Subdivision

### North Section

- [Line P \(San Leandro Creek\) and Line N \(Stonehurst Creek\)](#)

The Project crosses the confluence of Line P (San Leandro Creek) and Line N (Stonehurst Creek) on the border of the city of Oakland and San Leandro. The confluence of Line P and N is within a Zone AE Floodway. Refer to Table 1 for the summary of 100-year storm discharges to Line P per FEMA FIS *06001CV001B* (2018a). In addition, Line N runs parallel alongside the Project in the city of Oakland; there was no 100-year storm discharge information for Line N in the summary of discharges. The overall 100-year discharge was published in the FEMA FIS *06001CV001B* (2018a) for Line P.

- [Zone 2 Line A \(Estudillo Canal/ San Leandro Creek\)](#)

The Project crosses a Zone AE Floodway per FEMA FIRM *06001C0258H* (2018b), known as Zone 2 Line A (San Leandro Creek). The Project crosses Zone 2 Line A (San Leandro Creek) on an existing bridge between Farallon Drive to the north and Bayfront Drive/Lewelling Boulevard to the south in the city of San Leandro. Refer to Table 1 for the summary of 100-year discharges to Zone 2 Line A per FEMA FIS *06001CV001B* (2018a). The overall 100-year discharge was published in the FEMA FIS *06001CV001B* (2018a) for Zone 2 Line A (San Leandro Creek).

- [A crossing of an unnamed creek 0.2 miles south of Zone 2 Line A \(Estudillo Canal/San Leandro Creek\)](#)

The Project crosses a Zone AE Floodplain per FEMA FIRM *06001C0258H* (2018b). The Project crosses this unnamed creek on an existing bridge between Farallon Drive to the north and Bayfront Drive/Lewelling Boulevard to the south in the city of San Leandro. A summary of 100-year discharges was not available from the FEMA FIS *06001CV001B* (2018a).

#### [Zone 2 Line B \(San Lorenzo Creek\)](#)

The Project crosses a Zone AE Floodway per FEMA FIRM *06001C0267H* (2018d), known as Zone 2 Line B (San Lorenzo Creek). The Project crosses Zone 2 Line B (San Lorenzo Creek) on an existing bridge between Bayfront Drive/Lewelling Boulevard to the north and Grant Avenue to the south on the border of the city of San Leandro and San Lorenzo, an unincorporated community in Alameda County, respectively. Refer to Table 1 for the summary of discharges to Zone 2 Line B per FEMA FIS *06001CV001B* (2018a). The overall 100-year discharge was published in the FEMA FIS *06001CV001B* (2018a) for Zone 2 Line B (San Lorenzo Creek).

### Central Section

- [Bockman Canal/Line N \(tributary to SF Bay\); Zone 6 Line N-2](#)

The Project crosses a Zone AE Floodplain per FEMA FIRM *06001C0267H* (2018d), known as Bockman Canal/Line N (tributary to SF Bay). The Project crosses Bockman Canal/Line N over an existing timber bridge between Grant Avenue in the north and Winton Avenue in the south within San Lorenzo, an unincorporated community of Alameda County and city of Hayward, respectively. Refer to Table 1 for the summary of discharges for Bockman Canal/Line N (tributary to SF Bay) per FEMA FIS *06001CV001B* (2018a). FEMA FIS *06001CV001B* (2018a) lists Bockman Canal/Line N (tributary to SF Bay) and Zone 6 N-2 together. The overall 100-year discharge was published in the FEMA FIS *06001CV001B* (2018a) for Bockman Canal/Line N; Zone 6 N-2. Line N discharges to Bockman Canal further downstream.

- [Line N-3, Crossing of an Unnamed Creek 0.3 miles south of Zone 6 Line N](#)

The Project crosses a Zone AE Floodplain per FEMA FIRM *06001C0267H*. The Project crosses an unnamed creek 0.3 mile south of Line N over an existing timber bridge between Grant Avenue to the north and Via Sarita to the south in San Lorenzo, an unincorporated community of Alameda County. This unnamed creek discharges to Line N-3, which runs parallel to the tracks, and ultimately discharges to Line N. The overall 100-

year discharge was published in the FEMA FIS *06001CV001B* (2018a) for Line N; Zone 6 N-2. A summary of discharges was not available from the FEMA FIS *06001CV001B* (2018a).

- [Zone 2, Line K \(Sulphur Creek\)](#)

The Project crosses a Zone AE Floodplain per FEMA FIRM *06001C0267H*, known as Zone 2 Line K (Sulphur Creek). The Project crosses Sulphur Creek on an existing bridge between Via Sarita to the north and Winton Avenue to the south in San Lorenzo, an unincorporated community of Alameda County, and the city of Hayward, respectively. Refer to Table 1 for the summary of discharges to Sulphur Creek per FEMA FIS *06001CV001B* (2018a). The overall 100-year discharge was published in the FEMA FIS *06001CV001B* (2018a) for Sulphur Creek.

- [Zone 4 Line A](#)

The Project crosses a Zone AE Floodway per FEMA FIRM *06001C0269H* (2018e), known as Zone 4 Line A. Zone 4 Line A crosses the Project via a culvert, between Dunn Road and Commerce Place to the east and between Davis Court and McCone Avenue, in the city of Hayward. Refer to Table 1 for the 100-year discharge per FEMA FIS *06001CV001B* (2018a).

- [Zone 3A Line A-2](#)

The Project crosses a Zone AE Floodway per FEMA FIRM *06001C0427G* (2009g), known as Zone 3A Line A-2. The Project crosses Zone 3A Line A-2 on an existing bridge between Baumberg Avenue to the north and Eden Shores Boulevard to the south in the city of Hayward. Refer to Table 1 for the summary of discharges to Zone 3 Line A-2 per FEMA FIS *06001CV001B* (2018a). The overall 100-year discharge was published in the FEMA FIS *06001CV001B* (2018a) for Zone 3A Line A-2.

- [Zone 3A, Line A \(Old ACFCC\)](#)

The Project crosses a Zone AE Floodway per FEMA FIRM *06001C0427G* (2009g), known as Zone 3A Line A (Old ACFCC). The Project crosses Zone 3A Line A (Old ACFCC) between Eden Shore Boulevard to the north and Whipple Road to the south in the city of Hayward. Refer to Table 1 for the summary of discharges to Zone 3A Line A (Old ACFCC) per FEMA FIS *06001CV001B* (2018a). The overall 100-year discharge was published in the FEMA FIS *06001CV001B* (2018a) for Zone 3A Line A (Old ACFCC).

## South Section

- [Crossing of an Unnamed Creek 0.08 miles south of Dyer Street](#)

The Project crosses unnamed creek on an existing timber bridge between Dyer Street in the north and Alvarado Boulevard to the south in the city of Union City. This crossing is located in Unshaded Zone X. A summary of discharges was not available from the FEMA FIS *06001CV001B* (2018a).

- [Alameda County Flood Control Canal \(ACFCC\)](#)

The Project crosses ACFCC on an existing bridge between Lowry Road to the north and Bunkhouse Street and Caliban Drive to the south at the border of the city of Union City and the city of Fremont. ACFCC is in FEMA Zone A and has no published data from FEMA.

- [Zone 5 Line K \(Crandall Creek\)](#)

The Project crosses a Zone AE Floodway per FEMA FIRM *06001C0433G* (2009k), known as Zone 5 Line K (Crandall Creek). The Project crosses Zone 5 Line K (Crandall Creek) on an existing bridge between Farmhouse Street and Capulet Circle to the north and Stallion Street and Juliet Circle to the south in the city of Fremont. Refer to Table 1 for the summary of discharges for Zone 5 Line K (Crandall Creek) per FEMA FIS *06001CV001B* (2018a). The overall 100-year discharge was published in the FEMA FIS *06001CV001B* (2018a) for Zone 5 Line K (Crandall Creek).

- [Zone 5 Line H](#)

The Project crosses Zone 5 Line H, which is a Zone AE Floodway per FEMA FIRM 06001C0441G (2009m). Zone 5 Line H runs parallel to the tracks in an open channel before crossing the Project in a culvert. FEMA FIRMs show the floodway not being contained in the channel. Refer to Table 1 for the 100-year discharge per FEMA FIS 06001CV001B (2018a).

- [Zone 5 Line F-1](#)

The Project crosses Zone 5 Line F-1, which is a Zone AE Floodway per FEMA FIRM 06001C0443G (2009n). Zone 5 Line F-1 crosses the Project through a culvert after crossing Cherry Street and Sycamore Street in the city of Newark. FEMA FIRMs show the floodway not being contained in the channel. Refer to Table 1 for the 100-year discharge per FEMA FIS 06001CV001B (2018a).

Table 1: Existing Hydrology

Project's Creeks and Waterbody Crossings	Location Along Waterbody Crossing	FEMA Zone	Drainage Area (square miles)	100-year Discharge <sup>1</sup> (cfs)	FEMA Base Elevation (ft, NAVD 88) <sup>1,2</sup>
Line P (San Leandro Creek)	N/A (Overall)	Zone AE Floodway	N/A	2,800	N/A
	Southern Pacific Railroad (Project)	Zone AE Floodway	N/A	N/A	19
Line N (Stonehurst Creek)	I-880	Zone AE Floodway	N/A	N/A	19
Zone 2 Line A	Southern Pacific Railroad (Project)	Zone AE	8.90	3,600 <sup>3</sup>	10.5
A crossing of an unnamed creek 0.2 miles south of Zone 2 Line A (Estudillo Canal/San Leandro Creek)	Southern Pacific Railroad (Project)	Zone AE	N/A	N/A	N/A
Zone 2 Line B (San Lorenzo Creek)	San Francisco Bay (Closest to Project)	Zone A	N/A	7,615 <sup>4</sup>	N/A
Bochman Canal/ Line N (Tributary to SF Bay)	Southern Pacific Railroad (Project)	Zone AE	2.4	750	10
A crossing of an unnamed creek 0.3 miles south of Bockman Canal/ Line N (Tributary to SF Bay)	Southern Pacific Railroad (Project)	Zone AE	N/A	N/A	N/A

Project's Creeks and Waterbody Crossings	Location Along Waterbody Crossing	FEMA Zone	Drainage Area (square miles)	100-year Discharge <sup>1</sup> (cfs)	FEMA Base Elevation (ft, NAVD 88) <sup>1,2</sup>
Zone 2 Line K (Sulphur Creek)	Southern Pacific Railroad (Project)	Zone AE	3.9	740 <sup>3</sup>	16
Zone 4 Line A	Southern Pacific Railroad (Project)	Zone AE Floodway	1.53	840	23.2
Zone 3 Line A-2	At confluence with Alameda Creek (downstream and closest to Project)	Zone AE Floodway	2.25	960	12
Zone 3A Line A (Old ACFCC)	Southern Pacific Railroad (Project)	Zone AE Floodway	20.48	3,420 <sup>3</sup>	12.3
ACFCC (Alternative E)	Project	Zone A	No Published Data from FEMA		
ACFCC (Alternative B, C, D)	Project	Zone A	No Published Data from FEMA		
Zone 5 Line K (Crandall Creek)	Upstream of Newark Boulevard (downstream of Project)	Zone AE Floodway	2.7	1,200	17
Zone 5 Line H	Thornton Avenue (Downstream of Project)	Zone AE Floodway	2	610	13
	Project	Zone AE Floodway	N/A	N/A	14
Ward Creek	Southern Pacific Railroad (Project)	Zone AE Floodway	6	1,367 <sup>3</sup>	49.5
Zone 3A Line D	Industrial Parkway	Zone AE	3.86	1,681 <sup>1</sup>	16
Zone 3A Line E	Southern Pacific Railroad (Project)	Zone AE	1.00 <sup>5</sup>	910	50-51
Zone 5 Line M	Approximately 800 feet upstream of Southern Pacific Railroad	Zone AH	2.09	720	48
	Upstream of Union Square/ 0.4 miles downstream of Project	Zone AE	2.44	748	42-43