Alameda CTC – RSEP

Berkeley IS/MND

WATER QUALITY AND DRAINAGE MEMO

FEBRUARY 21, 2023 | DRAFT

Prepared By:

Kimley»Horn

Contents

Tables

EXECUTIVE SUMMARY

This drainage memo has been prepared to analyze the drainage conditions for each crossing with respect to water quality requirements and peak runoff impacts. Based upon the location of the projects, the disturbed area for construction, and the governing agency requirements we have noted the following requirements to be addressed by each location:

- The project does not violate water quality standards or waste discharge requirements
- The project does not substantially degrade surface or groundwater quality
- The project does not interfere or impede groundwater recharge or management
- The project does not alter the existing drainage pattern
- The project does not result in substantial erosion or siltation
- The project does not substantially increase the rate or amount of surface runoff
- The project does not create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems, or provide substantial additional sources of polluted runoff
- The project does not impede or redirect flood flows
- The project is located within a tsunami zone
- The project does not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan

Each crossing project is subject to the following requirements and recommendations:

A. Conformance with Alameda County Stormwater Quality Best Managements Practices (BMPs) for source control measures
B. Existing and Proposed Drainage inlets to be marked “No Dumping – Drains to Bay” within project limits
C. Stormwater quality treatment measures are not required based upon the proposed construction
D. No improvements to the drainage conveyance system (inlets and underground pipe) are required based upon the proposed construction

1.0 PROJECT SETTING AND EXISTING CONDITIONS

1.1 PROJECT LOCATION AND DESCRIPTION

The project site consists of three existing at-grade rail crossings in the City of Berkeley, in Alameda County, California. Crossings are in the western portion of Berkeley in predominantly business, commercial, and light industrial areas. Alameda County Transportation Commission (Alameda CTC) is the lead agency under the California Environmental Quality Act (CEQA). The crossings are along Union Pacific Railroad (UPRR) tracks where UPRR tracks intersect with local streets. Each of the crossings is listed from north to south in **Table 1** below, noting the local street intersections. The Map ID number corresponds to crossing locations shown on **Figure 1**. Detailed drawings of each crossing are attached.

1.2 LOCATION DATA

Table 1. Location Data

Jurisdiction	Intersection	Map ID
Berkeley	Virginia Street	1
Berkeley	Hearst Street	2

1.3 EXISTING SITE FEATURES

Table 2. Existing Conditions

Intersection	Description
Virginia Street	Two-lane side street with a single-arm railroad gate (one in each direction) with lights and street painting. Developed area with little pervious surface except gravel shoulder of UPRR tracks
Hearst Avenue	Two-lane side street with a single-arm railroad gate (one in each direction) with lights and street painting. Developed area with little pervious surface except gravel shoulder of UPRR tracks

Source: Circlepoint, 2021

1.4 EXISTING SOIL AND GROUNDWATER

Existing soil data was obtained from the National Resource Conservation Service (NRCS) Web Soil Survey Groundwater depth data was obtained from EnviroStor, the Department of Toxic Substances Control's (DTSC) online data management system, and GeoTracker, the California State Water Resources Control Board's data management system **(Appendix C**, D**).**

Table 3. Summary of Soil Data

Intersection	NRCS Soil Classification	Groundwater Depth
Virginia Street	146 – Urban Land	5-ft bgs
Hearst Street	146 – Urban Land	5-ft bgs

2.0 POST-CONSTRUCTION STORMWATER

2.1 GROUND COVER COMPARISON

The volume and rate of stormwater runoff is directly related to groundcover. By directly comparing the change in impervious ground cover the potential hydrologic impact can be assessed. For each project location the increase in impervious area poses no impact as an increase in up to 1,500sf equates to a 0.1cfs increase for a ten-year storm event. A comparison of pre-project to post-project conditions is summarized in Table 4 below.

Table 4. Summary of Ground Cover

Location	Project Area (sf)	Existing Condition		Proposed Condition		Impervious Area Increase (sf)
		Impervious Area (sf)	Impervious (%)	Impervious Area (sf)	Impervious (%)	
Virginia Street	5,461	2,793	51%	4,545	83%	1,752
Hearst Ave	6,387	3,671	57%	5791	90%	2,120

2.2 POLLUTANTS OF CONCERN

Stormwater run-off naturally contains various constituents, however development and operational activities within developed areas typically increase contaminant concentrations to levels that impact water quality. In addition, development can increase run-off generation from a site by increasing the amount of impervious surfaces. The additional run-off can have detrimental effects on streams and rivers in the form of erosion and sedimentation which can harm water quality and wildlife habitat. Table 5 lists typical pollutants of concern from developed sites.

Table 5. Potential Pollutants of Concern

Pollutant	Impacts on Water Quality
Sediment	Sediment is a common component of stormwater, and can be a pollutant. Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering

	with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water quality analytical parameter.
Nutrients	Nutrients including nitrogen and phosphorous are the major plant nutrients used for fertilizing landscapes, and are often found in stormwater. These nutrients can result in excessive or accelerated growth of vegetation, such as algae, resulting in impaired use of water in lakes and other sources of water supply. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, un-ionized ammonia (one of the nitrogen forms) can be toxic to fish.
Bacteria and Viruses	Bacteria and viruses are common contaminants of stormwater. For separate storm drain systems, sources of these contaminants include animal excrement and sanitary sewer overflow. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming.
Oil and Grease	Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, restaurants, and waste oil disposal.
Metals	Metals including lead, zinc, cadmium, copper, chromium, and nickel are commonly found in stormwater. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in stormwater is associated with sediments. Metals are of concern because they are toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish), and have the potential to contaminate drinking water supplies.
Organics	Organics may be found in stormwater in low concentrations. Often synthetic organic compounds (adhesives, cleaners, sealants, solvents, etc.) are widely applied and may be improperly stored and disposed. In addition, deliberate dumping of these chemicals into storm drains and inlets causes environmental harm to waterways.
Pesticides	Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels, even when pesticides have been applied in accordance with label instructions. As pesticide use has increased, so too have concerns about adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton, provides an avenue for biomagnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds.
Gross Pollutants	Gross Pollutants (trash, debris, and floatables) may include heavy metals, pesticides, and bacteria in stormwater. Typically resulting from an urban environment, industrial sites and construction sites, trash and floatables may create an aesthetic “eye sore” in waterways. Gross pollutants also include plant debris (such as leaves and lawn-clippings from landscape maintenance), animal excrement, street litter, and other organic matter. Such substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in streams, lakes, and estuaries sometimes causing fish kills.
Vector Production	Vector production (e.g., mosquitoes, flies, and rodents) is frequently associated with sheltered habitats and standing water. Unless designed and maintained properly, standing water may occur in treatment control BMPs for 72 hours or more, thus providing a source for vector habitat and reproduction.

Source: CASQA BMP Handbook, 2003

Table 6. Receiving Water Body Pollutant Impacts

Intersection	Receiving Water Body	Pollutant Impacts
Virginia Street	School House Creek	None
Hearst Street	School House Creek	None

2.3 WATER QUALITY MANAGEMENT

The post-construction water quality is governed by the Alameda County Stormwater Control guidelines, established by Regional Water Quality Board Provision C3.i. Per the July 1, 2023 regulation updates, any project that create or replace 5,000sf or more impervious area is considered a Regulated Project. The proposed rail crossings that fall into the classification of a Regulated Project are required to provide stormwater treatment for the project area. Stormwater treatment facilities that are accepted by Alameda County include:

1. Bioretention Facilities
2. Infiltration Trenches
3. Infiltration Drywells

These guidelines define small projects as those which create or replace at least 2,500sf but less than 5,000sf of impervious surface. The proposed rail crossings that fall into the classification of a small site are required to implement one of the following Best Management Practices (BMPs):

1. Direct runoff from sidewalks and walkways onto vegetated areas
2. Direct runoff from driveways onto vegetated areas
3. Construct sidewalks and walkways with permeable surfaces.
4. Construct bike lanes and driveways with permeable surfaces

Table 7. Summary of Post Construction Stormwater Quality Requirements

Intersection	Disturbed Area (sf)	Proposed Imperious Surface (sq-ft)	Post-Construction Stormwater Quality Requirements
Virginia Street	5,461	4,545	Implement one of the small site design measures
Hearst Street	6,387	5,791	Implement one of the stormwater treatment options

2.4 HYDROMODIFICATION MANAGEMENT

Hydromodification is the change in the timing, peak discharge, and volume of run-off from a site due to land development. When a site is developed, the impervious surfaces no longer allow rainwater to infiltrate into the native soils, which then becomes run-off. The additional run-off can add to the erosive level of flows in creeks and rivers.

These sites are each disturbing less than an acre of land. Therefore, no additional hydromodification management is necessary.

2.5 APPLICABLE BMP'S

Design Engineer should consider implementing the following BMP's during construction:

- EC-1 Scheduling
- NS-3 Paving and Grinding Operations
- NS-8 Vehicle and Equipment Cleaning
- NS-9 Vehicle and Equipment Fueling
- NS-10 Vehicle and Equipment Maintenance
- NS-12 Concrete Curing
- NS-13 Concrete Finishing
- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-7 Street Sweeping and Vacuuming
- SE-8 Sandbag Barrier
- SE-10 Storm Drain Inlet Protection
- WE-1 Wind Erosion Control
- WM-1 Material Delivery and Storage
- WM-2 Material Use
- WM-3 Stockpile Management
- WM-4 Spill Prevention and Control
- WM-5 Solid Waste Management
- WM-8 Concrete Waste Management

3.0 REFERENCES

Alameda County Hydrology & Hydraulics (2018). *Alameda County Flood Control & Water Conservation District.* Available online at: https://acfloodcontrol.org/the-work-we-do/the-work-we-do-hydrology-manual/

C.3 Stormwater Technical Guidance (2017). *Alameda County Clean Water Program.* Available online at: https://www.cleanwaterprogram.org/images/uploads/C3_Technical_Guidance_v6_Oct_2017_FINAL_Errata_updated_04.20.18.pdf

CASQA (2003). *Construction BMP Handbook.* Available online at: www.casqa.org

CEQA Guidelines Appendices (2021). *Association of Environmental Professionals.*

Stormwater Requirements Checklist (2016). *City of Berkeley Public Works Department.* Available online at:https://www.cityofberkeley.info/uploadedFiles/Online_Service_Center/Planning/Stormwater_Requirements_Checklist_C.3.i%20Pojects.pdf

FRA Categorical Exclusion Companion Guide (2019). *U.S. Department of Transportation Federal Railroad Administration.* Available online at: https://railroads.dot.gov/elibrary/fra-categorical-exclusion-companion-guide

EnviroStor (2021). Department of Toxic Substances Control. Available at: https://dtsc.ca.gov/your-envirostor/

GeoTracker (2021). California State Water Resources Control Board. Available at: https://geotracker.waterboards.ca.gov/

APPENDIX

Attachment A – Drainage Exhibits

Attachment B – Wetland and Habitat Mapper

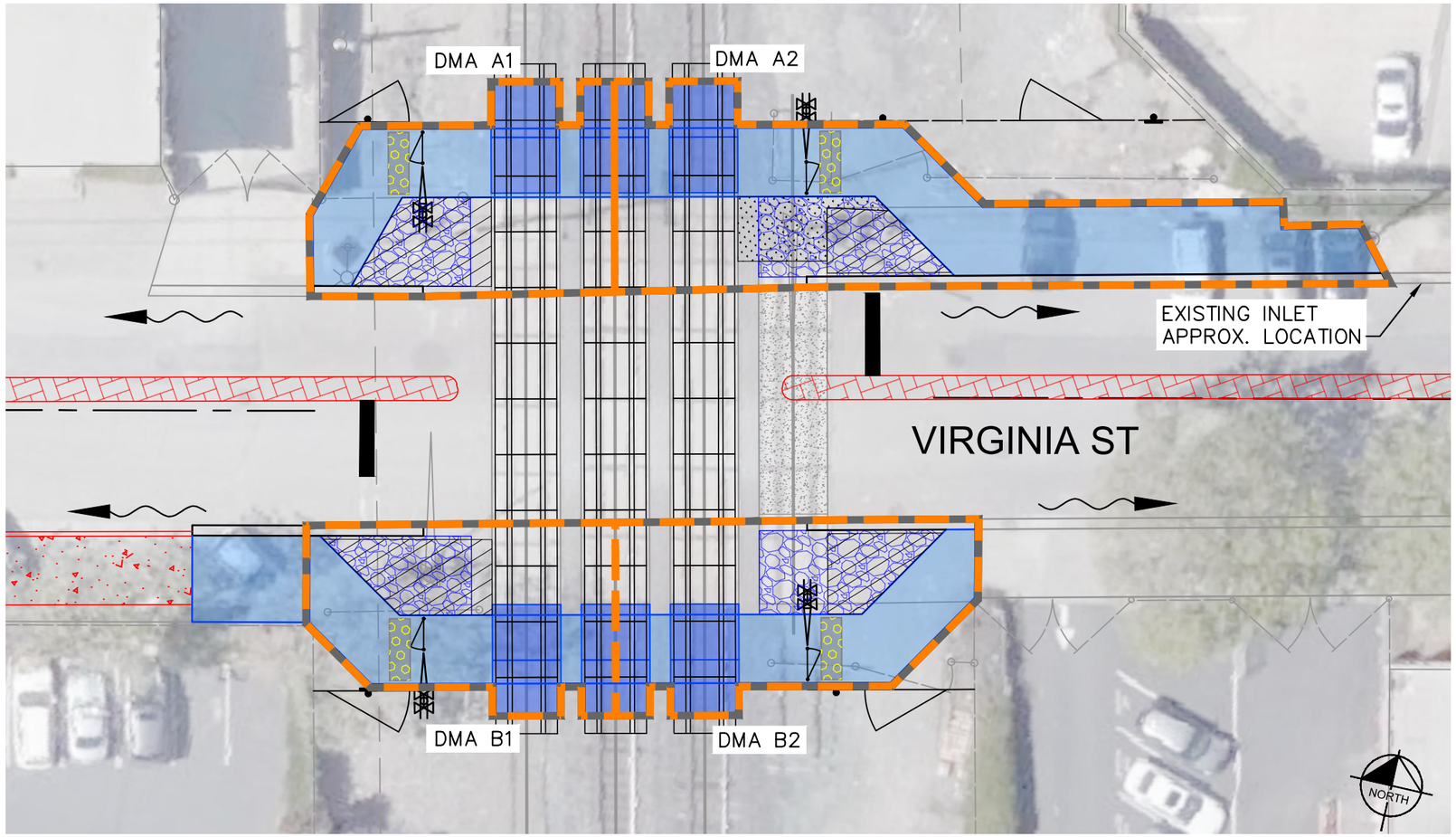
Attachment C – FEMA Firmette Maps

Attachment D – Web Soil Survey Maps

Attachment E – Groundwater Data

Attachment F – Tsunami Hazard Zone Map

ATTACHMENT A – DRAINAGE EXHIBITS



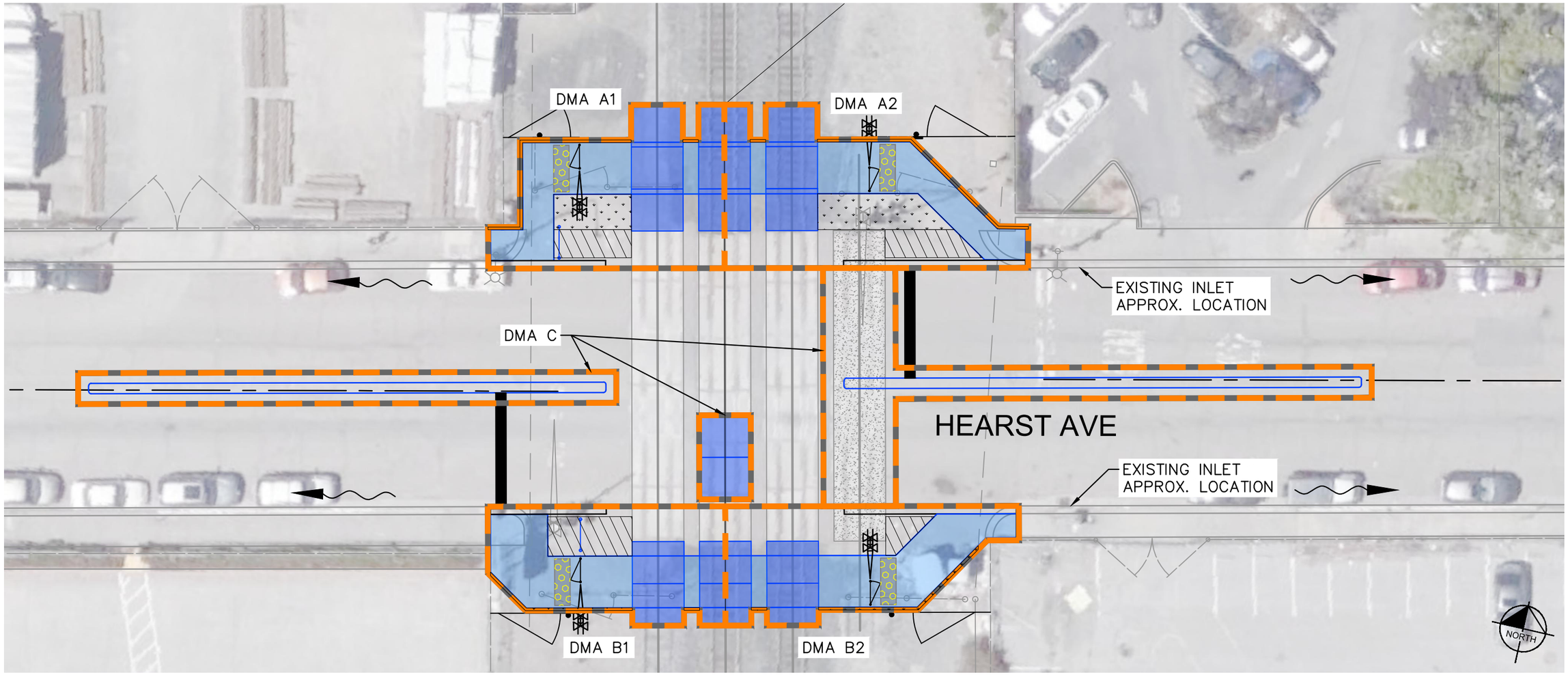
		EXISTING CONDITIONS			PROPOSED CONDITIONS		
DRAINAGE MGMT AREA ID	DISTURBED AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)
A1	1,148	635	513	45%	233	915	80%
A2	1,955	892	1,063	54%	306	1,649	84%
B1	1,094	522	573	52%	227	867	79%
B2	1,264	619	645	51%	149	1,115	88%
TOTAL	5,461	2,668	2,793	51%	916	4,545	83%

LEGEND

- PROJECT LIMITS
- DRAINAGE MANAGEMENT AREA
- PROPOSED TRACK PANELS
- PROPOSED SIDEWALK
- PROPOSED PERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REMOVED (PERVIOUS IN THE PROPOSED CONDITION)
- FLOW DIRECTION

GRAPHIC SCALE IN FEET
0 10 20 40

DRAINAGE EXHIBIT: LOCATION 1 - BERKELEY - VIRGINIA



		EXISTING CONDITIONS			PROPOSED CONDITIONS		
DRAINAGE MGMT AREA ID	DISTURBED AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	PERCENT IMPERVIOUS (%)
A1	1,132	790	342	30%	184	948	84%
A2	1,322	887	435	33%	246	1076	81%
B1	940	562	379	40%	124	816	86%
B2	1,010	477	533	53%	42	968	96%
C	1,983	0	1,983	100%	0	1983	100%
TOTAL	6,387	2,716	3,671	57%	596	5791	90%

LEGEND

- PROJECT LIMITS
- DRAINAGE MANAGEMENT AREA
- PROPOSED TRACK PANELS
- PROPOSED SIDEWALK
- PROPOSED PERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REMOVED (PERVIOUS IN THE PROPOSED CONDITION)
- FLOW DIRECTION

GRAPHIC SCALE IN FEET
0 10 20 40

DRAINAGE EXHIBIT: LOCATION 2 - BERKELEY - HEARST

ATTACHMENT B – WETLAND AND HABITAT MAPPER

U.S. Fish and Wildlife Service
National Wetlands Inventory

BERKELEY - VIRGINIA ST

March 3, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

U.S. Fish and Wildlife Service
National Wetlands Inventory

BERKELEY - HEARST AVE

March 3, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

ATTACHMENT C – FEMA FIRMETTE MAPS

National Flood Hazard Layer FIRMette

FEMA

122°18'27"W 37°52'32"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

122°17'49"W 37°52'4"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 — Cross Sections with 1% Annual Chance
- 17.5 — Water Surface Elevation
- 8 — Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/2/2021 at 7:46 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

122°18'24"W 37°52'21"N

122°17'46"W 37°51'53"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
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OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/2/2021 at 7:41 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

ATTACHMENT D – NRCS WEB SOIL SURVEY MAPS

Map Scale: 1:1,910 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 25 50 100 150

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alameda County, California, Western Part
Survey Area Data: Version 17, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 1, 2019—May 31, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
146	Urban land	10.8	100.0%
Totals for Area of Interest		**10.8**	**100.0%**


122° 18' 12" W
122° 17' 57" W
37° 52' 11" N
37° 52' 3" N
561260
561290
561320
561350
561380
561410
561440
561470
561500
561530
561560
561590
561620
4191580
4191550
4191520
4191490
4191460
4191430
4191400
4191370
146
Hearst Ave
2nd St
4th St
Soil Map may not be valid at this scale.
Map Scale: 1:1,690 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 25 50 100 150
Feet
0 50 100 200 300
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
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- Saline Spot
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- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

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Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
146	Urban land	7.7	100.0%
Totals for Area of Interest		**7.7**	**100.0%**

ATTACHMENT E – GROUNDWATER DATA

ENERCON SERVICES, INC.
12100 Ford Road Suite 200
Dallas, TX 75234
(972) 484-3854
Fax: (972) 484-8835

GROUNDWATER SAMPLING RECORD

Client: KP NFS Capital Projects, Regional Ncal
Project Location: Berkeley, California
Well ID: MW23
Project Name: Monitoring Well
Project Number: KAISERP~00010

Well Information

Well ID:	MW23
Surface Elevation (ft.):	3.16'
Total Depth (ft.):	7.70'
Depth to Water:	2.3'
Casing Material:	PVC
Well Diameter (in.):	2"
Volume Water/Well Volume:	est. 1-gallon
Water Level:	0.86' amsl
Pump Type:	Peristaltic
Tubing Material:	Silicone

MW Location: North with coordinates N:573.4511',E:4346.8938'

Notes: Intend to purge 3-6 well volumes then sample groundwater.
Well has good recharge.
Purged from 14:15-14:48 removing 7.125 gallons.
Got muddy at end of purge - let recharge before sampling
Sample time 15:21 - filling 6 containers.

Weather Conditions: Sunny
Sampling Date: 20.November.2019
Sampled By: Theresa Heirshberg, MS PG

GROUNDWATER SAMPLING PARAMETERS

Time	Water Depth	Volume Pumped	Pumping Rate	DO (mg/L)	Temp (°C)	SEC (uS/cm)	pH	ORP (mV)	Turbidity (NTU)
14:43	2.3'		0.23/min	11.05	20.13	1.692	7.42	79.6	
14:45				3.99	20.20	1.742	7.40	83.7	
14:47				3.44	20.25	1.788	7.34	83.0	

Total Volume of Water Removed During Sampling Event: 7.5 gallons

ATTACHMENT F – TSUNAMI HAZARD ZONE MAP


Tsunami Hazard Zone
Hearst Ave and Virgina Street
Virginia Street
Hearst Ave
Northwest Berkeley
Berkeley Marina
Virginia Street Extension
Marina Blvd
San Francisco Bay Trail
San Francisco Bay Trail Spur
Dwight D. Eisenhower Hwy
Second St
Bolivar Dr
Gilman St
Cedar St
Virginia St
Francisco St
Delaware St
Addison St
Cowper St
Allston Way
Bancroft Way
Berkeley Way
University Ave
Hearst Ave
Poets
Google Earth
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1000 ft
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