

Appendix H
Stormwater Control Plan for Commercial Component; and
Stormwater Control Plan for Residential Component

STORMWATER CONTROL PLAN
for
FAIRVIEW AT NORTHGATE COMMERCIAL PROJECT
COOKE PROPERTY, CITY OF VALLEJO

November 6, 2018

Prepared for:

Vallejo-Fairfield Developers, LLC

Prepared by:

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Appendix A. Rainfall Isohyetal Map

Appendix B. IMP Calculations

I. Project Data and Objective

The following Stormwater Control Plan Report for the Fairview at Northgate Commercial Project, presented herein, follows the Contra Costa County Stormwater C.3 Guidebook, 7th edition. The Fairview at Northgate Residential Project is located in the City of Vallejo within Solano County, however, per the request of the City (email from Alea Gage dated October 25, 2018), the present analysis follows the Contra Costa County procedures. A summary of relevant project data is shown in **Table 1**.

The overall objective of this report is to demonstrate the Fairview at Northgate Commercial Project fulfills C.3 compliance requirements set forth in the California Regional Water Quality Control Boards' Municipal Regional Permit.

The Commercial Project must comply with Hydromodification Management Plan (HMP) requirements as the proposed development creates more than 1-acre of impervious land; the existing project site is pervious, barren land. Per the County Stormwater C.3 Guidebook, compliance with HMP may be met through one of two options: (i) apply "LID Design Guide" in Chapter 3 of the C.3 Guidebook to satisfy both treatment and flow-control requirements or (ii) apply a continuous simulation hydrologic modeling analysis to verify post-project flows match pre-project flows for 10% of 2-year peak up to 10-year peak. To satisfy HMP for the Fairview at Northgate Commercial Project, the former option – "LID Design Guide" will be applied.

Table 1. Project Data

Project Name/Number	Fairview at Northgate Commercial Project
Application Submittal Date	November 6, 2018
Project Location	APN 0081-490-010 City of Vallejo, Solano County, CA 94591
Name of Applicant	Vallejo-Fairfield Developers, LLC
Project Phase No.	N/A
Project Type and Description	CP (Pedestrian Shopping and Service), MUPD (Mixed Use Planned Development)
Project Watershed	Blue Rock Springs Creek
Total Project Site Area ^[1]	21.7 acres (946,593 sf)
Total Area of Land Disturbed ^[1]	21.7 acres (946,593 sf)
Total New Impervious Surface Area	771,138 sf
Total Replaced Impervious Surface Area	0 sf
Total Pre-Project Impervious Surface Area	0 sf

Total Post-Project Impervious Surface Area	771,138 sf
50% Rule ^[2]	Applies
Project Density	Floor Area Ratio 0.40 (maximum)
Applicable Special Project Categories	None
Percent LID and non-LID treatment	100% LID Treatment
HMP Compliance ^[3]	Does Apply

Notes:

[1] Refer to Figure 2 for “Total Project Site Area” boundary of the Commercial Project

[2] 50% rule applies if:

Total Replaced Impervious Surface Area > 0.5 x Pre-Project Impervious Surface Area

[3] HMP applies if:

(Total New Impervious Surface Area + Total Replaced Impervious Surface Area) ≥ 1 acre

II. Setting

II.A. Project Overview

The proposed 21.7-acre “Commercial Project” site is located in the City of Vallejo within Solano County, California. The project is east of the Interstate 80 freeway and is bounded by Turner Parkway on the north and Admiral Callaghan Lane on the east. A vicinity map for the Fairview at Northgate Commercial Project is shown on **Figure 1**.

The proposed project development will be utilized for a mixed-use development, which includes 150,000 square feet of floor space for a main building (Costco Wholesale) and 28,000 square feet of additional building space for retail shopping. Approximately 133,000 square feet of landscaped buffer strips and parking medians interspersed throughout the site will provide tree plantings and regions for multiple stormwater quality treatment facilities.

II.B. Existing Site Condition

The existing 21.7-acre site is composed of natural open space with low-lying vegetation and minimal tree canopy cover. Since the late 1930s, the site has been undeveloped and was used for grazing activities until the early 1970s.

In terms of physiographic features, the site soils are classified as elastic silt (MH), lean clay (CL), lean clay with gravel (CL), clayey sand with gravel (SC), siltstone, and sandstone. Based on preliminary subsurface exploration performed by the geotechnical (ENGEO), the site does not have perched groundwater at pit depths of 10-feet and the site presents a low seismic hazard risk.

Elevations for the existing site range from 88 ft to 137 ft (NAVD88), and surface water generally flows to the northeast towards a natural drainage swale which conveys flows towards Turner Parkway. Runoff ultimately discharges into Blue Rock Springs Creek. An existing site map for the Commercial Project location is shown on **Figure 2**.

II.C. Constraints and Opportunities for Stormwater Control

The Commercial Project has the following constraints and opportunities:

Constraints

- The composition of the existing silty soils and clayey sands on the project site translates to lower permeability and higher runoff potential. For stormwater treatment facilities, soils with moderate to high infiltration rates are ideal.
- The overall Commercial Project site has a relatively high impervious fraction of 80%, thus causing larger peak flows and faster runoff travel times.

Opportunities

- Proposed grading for the commercial site shows there is sufficient drainage relief with overland slopes ranging from 1% to 3%. These moderate slopes will benefit the ability to surface flow runoff into stormwater treatment facilities, instead of relying on subsurface pipe routing.
- According to the preliminary geotechnical investigation, there is no high groundwater table, no liquefaction susceptibility, and no high risk of uplift/subsidence. In general, the existing site soil conditions are moderately adequate for the proposed stormwater treatment basin facilities.

III. Low Impact Development Design Strategies

III.A. Site Design Optimization

There are no existing natural drainage features within the project boundary, however, stormwater runoff drains east to a 5.7-acre off-site open space, natural drainage corridor which directs flows north, and eventually west along Turner Parkway before discharging into Blue Rock Springs Creek. The proposed commercial site drainage generally mimics the watercourse paths of the existing site condition.

The Commercial Project uses numerous parking medians within the parking lot and a long perimeter strip of softscape along Admiral Callaghan Lane as locations for stormwater basin facilities. For aesthetic purposes, suitable deciduous trees and ground plantings will be placed within each basin facility area. The strip of trees planted amongst the basin facilities paralleling Admiral Callaghan Lane provides a visual barrier to roadway traffic.

III.B. Permeable Pavements

Presently, the Commercial Project does not plan to incorporate permeable pavements into the site design.

III.C. Dispersal of Runoff to Pervious Areas

About 20% of the commercial site will be pervious landscape, which presents a less favorable scenario for flow dispersal from impervious runoff. Majority of stormwater runoff from impervious cover, specifically the parking lot, surface flows directly into stormwater treatment facilities.

III.D. Integrated Management Practices

The proposed Commercial Project will implement “Integrated Management Practices to treat a total drainage area of 946,593 square feet (21.7-acre) with an impervious ratio of 81.5%. A total of twenty bioretention treatment facilities, located throughout the site, provide a cumulative treatment area of 42,245 square feet. The bioretention facilities are designed to meet both treatment and flow-control requirements.

IV. Documentation of Drainage Design

IV.A. Drainage Management Area Overview

To simplify the IMP sizing analysis, the Commercial Project was delineated into a single “Drainage Management Area” (DMA); refer to **Figure 3**. Further division of the DMA is not warranted given the current stage of the project and the present project objectives.

IV.A.1. Summary of Drainage Management Area

For the Commercial Project, a summary of impervious, pervious, and bioretention areas is shown in **Table 2**. The total area of bioretention is based on an iterative approach using the Contra Costa County IMP Calculator program.

Table 2. Drainage Management Areas for Commercial Project

DMA Name	Drainage Area (sf)	Impervious Surface: Concrete or Asphalt (sf)	Pervious Surface: Landscape, Soil Group D (sf)	Total Bioretention Facility Area (sf)
DMA “A”	946,593	771,138	133,210	42,245

IV.A.2. Drainage Management Area Description

DMA “A” for the Commercial Project, totaling 946,593 square feet, includes 771,138 square feet of impervious cover and 133,210 square feet of pervious landscape. The impervious area includes approximately 176,577 square feet of shops/retail building area and 594,561 square feet of parking and walkways. Untreated stormwater surface flows and enters through numerous curb-cut openings for the twenty bioretention facilities interspersed throughout the commercial site. The precise conveyance details and hydraulic design of the proposed treated and untreated stormdrain system have not been finalized, but will be completed with the preparation of construction documents.

IV.B. Integrated Management Practices

The bioretention treatment facilities for the Fairview at Northgate Commercial Project will be designed and constructed per the requirements of the Contra Costa County Stormwater C.3 Guidebook, 7th edition. A summary of these requirements are as follows:

- Each layer built flat, level, and to the elevations specified in the plans:
 - Bottom of Gravel Layer (BGL)
 - Top of Gravel Layer (TGL)
 - Top of Soil Layer (TSL)
 - Overflow Grate

- Facility Rim
- 12 inches Class 2 permeable, Caltrans specification 68-2.02F(3).
- 18 inches sand/compost mix meeting the specifications approved by the Regional Water Quality Control Board in April 2016.
- 4-inch minimum diameter PVC SDR 35 perforated pipe underdrain, installed with the invert at the top of the Class 2 permeable layer with holes facing down, and connected to the overflow structure at that same elevation.
- 6-inch-deep reservoir between top of soil elevation and overflow grate elevation
- Concrete drop inlet with frame overflow structure, with grate set to specified elevation, connected to storm drain in main street.
- Plantings selected for suitability to climate and location, bioretention soil media (well-drained, low-fertility), and for water conservation.
- Irrigation system on a separate zone, with drip emitters and “smart” irrigation controllers.

A typical detail view for the bioretention treatment facility is shown on **Figure 4**.

IV.C. Tabulation and Sizing Calculations

The “Integrated management Practices” sizing calculations were performed by applying the IMP Calculator program developed by the County (Contra Costa Clean Water Program). The program computes the minimum IMP area according to the following relationships:

$$\text{Min. IMP Area or Volume} = \sum \left(\frac{\text{DMA Square Footage}}{\text{DMA Runoff Factor}} \right) \times \left(\frac{\text{IMP Sizing Factor}}{\text{Factor}} \right) \times \left(\frac{\text{Rain Adjustment Factor}}{\text{Factor}} \right)$$

$$\text{IMP Sizing Factor (For Bioretention)} = \begin{cases} 0.07 & \text{for Soil Group A} \\ 0.11 & \text{for Soil Group B} \\ 0.06 & \text{for Soil Group C} \\ 0.05 & \text{for Soil Group D} \end{cases}$$

$$\text{Rain Adjustment Factor} = \frac{-0.0022 \times (\text{MAP}_{\text{project site}} - 20.2) + 0.05}{0.05}$$

Table 3 provides an overview of the IMP design input values. A mean annual precipitation (MAP) of 22.5 inches for the project site is determined from the Solano County rainfall isohyetal map, as shown in **Appendix A**. The IMP design calculations apply Soil Group “D”, as this classification is representative of the initial subsurface exploration performed by ENGEO. The geotechnical investigation revealed near-surface soils with high-fines and insubstantial permeability values, indicating low stormwater infiltration rates. Additionally, the IMP design calculations are performed for “Treatment Plus Flow Control” as hydromodification management applies for the Commercial Project. Program output from the County IMP Calculator are included in **Appendix B**, and the results are summarized in **Table 4**.

Table 3. IMP Design Input for Commercial Project

Total Impervious Area	771,138 sf (Concrete or Asphalt)
Total Pervious Area	133,210 sf (Landscape)
Mean Annual Precipitation	22.5 inches
NRCS Soil Group	"D"
IMPs Designed For	Treatment Plus Flow Control

Table 4. IMP Design Results for Commercial Project

IMP Name: Bio Basin A IMP Type: Bioretention Facility Drainage Area: 946,593 sf Mean Annual Precipitation: 22.5 inches					IMPs Designed for: Treatment Plus Flow Control Soil Type: "D"				
DMA Name	DMA Area (sf)	Post-Project Surface Type	DMA Runoff Factor	(DMA Area) x (Runoff Factor)					
DMA A1	771,138	Concrete or Asphalt	1.00	771,138					
DMA A2	133,210	Landscape	0.70	93,247					
			Total =	864,385					

IMP Sizing Factor	Rain Adjustment Factor	Minimum Area (sf)
0.050	0.899	38,845

The Commercial Project proposes a total bioretention facility area of 42,245 square feet, and the IMP Calculator program computed a required minimum area of 38,845 square feet. As the Commercial Project moves into the design phase, the proposed bioretention facilities will be refined.

V. Source Control Measures

V.A. Site Activities and Potential Sources of Pollutants

The Fairview at Northgate Commercial Project will create potential sources of stormwater pollutants, and includes the following sources to be controlled:

- Onsite Storm Drain Inlets
- Interior Floor Drains
- Landscape/Outdoor Pesticide Use
- Refuse Areas
- Vehicle / Equipment Repair and Maintenance
- Fuel Dispensing Areas
- Fire Sprinkler Test Water
- Sidewalks and Parking Lots

V.B. Table of Sources and Permanent/Operational Controls

Table 5. Summary of Source Controls

Potential Source of Runoff Pollutants	Permanent Source Control BMPS	Operational Source Control BMPS
Onsite Storm Drain Inlets	Inlets that are accessible from driveways/walkaways will be marked with "No Dumping Drains to Bay" or a similar message.	Inlet markings will be inspected annually and replaced or, repainted as needed. Stormwater pollution prevention information will be provided to new site owners, lessees, or operators.
Interior Floor Drains	Interior floor drains will be plumbed to sanitary sewer.	Drains will be inspected and maintained annually to prevent blockages and overflow.
Landscape/Outdoor Pesticide Use	Native trees, shrubs, and ground cover on the site will be preserved to the maximum extent possible. Landscaping will be designed to minimize required irrigation and runoff, to promote surface infiltration, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. When feasible, pest-resistant plants will be selected, especially for locations adjacent to hardscape. Plants will be selected appropriate to site soils, slopes, climate, sun, wind, rain, landuse, air movement, ecological consistency, and plant interactions.	Owners, lessees, or operators will receive Integrated Pest Management (IMP) information. All open space landscaping is to be maintained by a professional landscaping contractor utilizing integrated pest management methods. Pesticides will only be applied by appropriately licensed contractors.

Potential Source of Runoff Pollutants	Permanent Source Control BMPS	Operational Source Control BMPS
Refuse Areas	Trash and recycling facilities will be enclosed with roof and wall. The facilities will also be screened to limit the access from the public and will include a sign stating, "Do Not Dump Hazardous Materials Here" or a similar message.	Receptacles will be inspected annually and replaced to prevent leakage. Spills will be cleaned up immediately.
Vehicle / Equipment Repair and Maintenance	Maintenance and repairs will only take place at designated areas away from storm drain conveyance facilities. Leaks of machinery fluids will be prevented thru; routinely inspections. Drip pans will be employed, and fluids will be properly disposed. EVAC equipment will be used to capture oils and retain for site removal.	No cars will be maintained, cleaned, or fueled onsite, except in designated areas where washwater is contained and treated. No vehicle fluids, hazardous materials, or rinse water from parts cleaning will be disposed down storm drains.
Fuel Dispensing Areas	Fuel areas will have an impermeable ground surface and covered with a roof.	Fueling area will be routinely inspected and maintained through a dry sweep.
Fire Sprinkler Test Water	Fire sprinkler test valves will be equipped with a means to divert test water to the sanitary sewer.	Inform owners, lessees, or operators to review CASQA fact sheet regarding hard metal accumulation and the BOD problem associated with sprinkler water.
Sidewalks and Parking Lots	Water runoff will be collected via storm drain pipes to bioretention areas for treatment.	Regular street sweeping to control pollutants. Overflow storm drain inlets will be checked regularly to clear debris.

VI. Stormwater Facility Maintenance

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

The ownership and operation/maintenance responsibility for all stormwater facilities lies within Vallejo-Fairfield Developers, LLC. The “Stormwater Facilities O&M (Operation and Maintenance) Plan” for the Fairview at Northgate Commercial Project will be documented prior to the recording of the Final Map.

VI.B. Maintenance Requirements for Stormwater Facilities

- Prior to the start of the rainy season, in September of each year, inspect bioretention basin inlet and outlet structures for erosion or obstruction.
- Following a significant rain event of 0.5-inches or more, within a 24-hour period, perform the following for bioretention basins:
 - Check the facility for prolonged ponding.
 - Inspect the mulch layer for material movement, replace mulch and rake smooth if required.
 - Inspect basin side slopes for evidence of instability or scour and fix as necessary.
- Observe soil at the bottom of the bioretention basin for uniform percolation throughout. If portions of the basin do not drain within 48 hours after the end of a storm event, the soil should be tilled and replanted. Remove any debris or sediment accumulation.
- Examine the vegetation of the bioretention basin to ensure that it is vigorous and dense enough to provide filtering and to protect soils from erosion. Replenish mulch as necessary, remove fallen leaves and debris, prune large shrubs or trees, and mow turf areas. When mowing, remove no more than one-third the height of grasses. Verify that irrigation is adequate and not excessive. Replace dead plants and remove noxious and invasive vegetation.
- Abate any potential vectors by filling ground holes in and around the bioretention basin, and by ensuring there are no areas where water ponds longer than 48 hours following a storm event. If mosquito larvae are present and persistent, contact the Solano County Mosquito Abatement District for information and advice. Mosquito larvicides should be applied only when necessary, and only by a licensed individual or contractor.

VII. Construction Plan C.3 Checklist

The Construction Plan C.3 Checklist for the Commercial Project is shown in **Table 6** and is subject to additional updates.

Table 6. Summary of C.3 Checklist

Stormwater Control Plan Page #	BMP Description	See Plan Sheet #
6	Optimize site layout	----
6	Disperse runoff	----
7	Implement "Integrated Management Practices	----
----	Stormwater Control Plan	To be completed with the design phase

VIII. Certifications

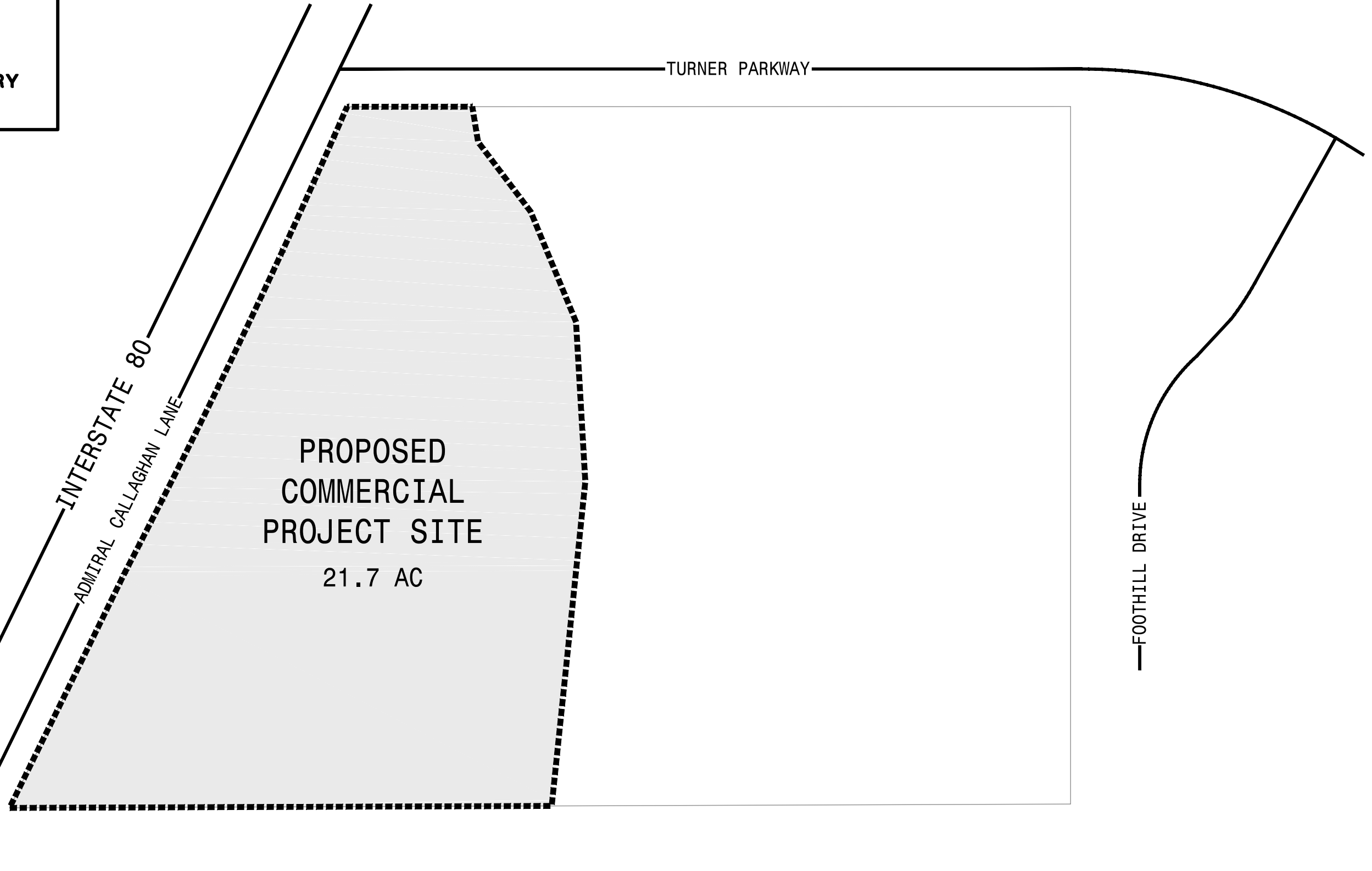
The selection, sizing, and preliminary design of stormwater treatment and other control measures in the Stormwater Control Plan for the Fairview at Northgate Commercial Project meets the requirements of Regional Water Quality Control Board Order R2-2015-0049.

LEGEND

..... **PROJECT
BOUNDARY**



NOT TO SCALE



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STORMWATER CONTROL PLAN REPORT

**FAIRVIEW AT NORTHGATE
COMMERCIAL PROJECT**

CITY OF VALLEJO

CALIFORNIA

**PROJECT VICINITY
MAP**

FIGURE

1

LEGEND

PROJECT
BOUNDARY



0 30 60 120
SCALE: 1"=60'



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**FAIRVIEW AT NORTHGATE
COMMERCIAL PROJECT**
CITY OF VALLEJO CALIFORNIA

EXISTING SITE
MAP

FIGURE
2

LEGEND

DMA
BOUNDARY

IMPERVIOUS
AREA

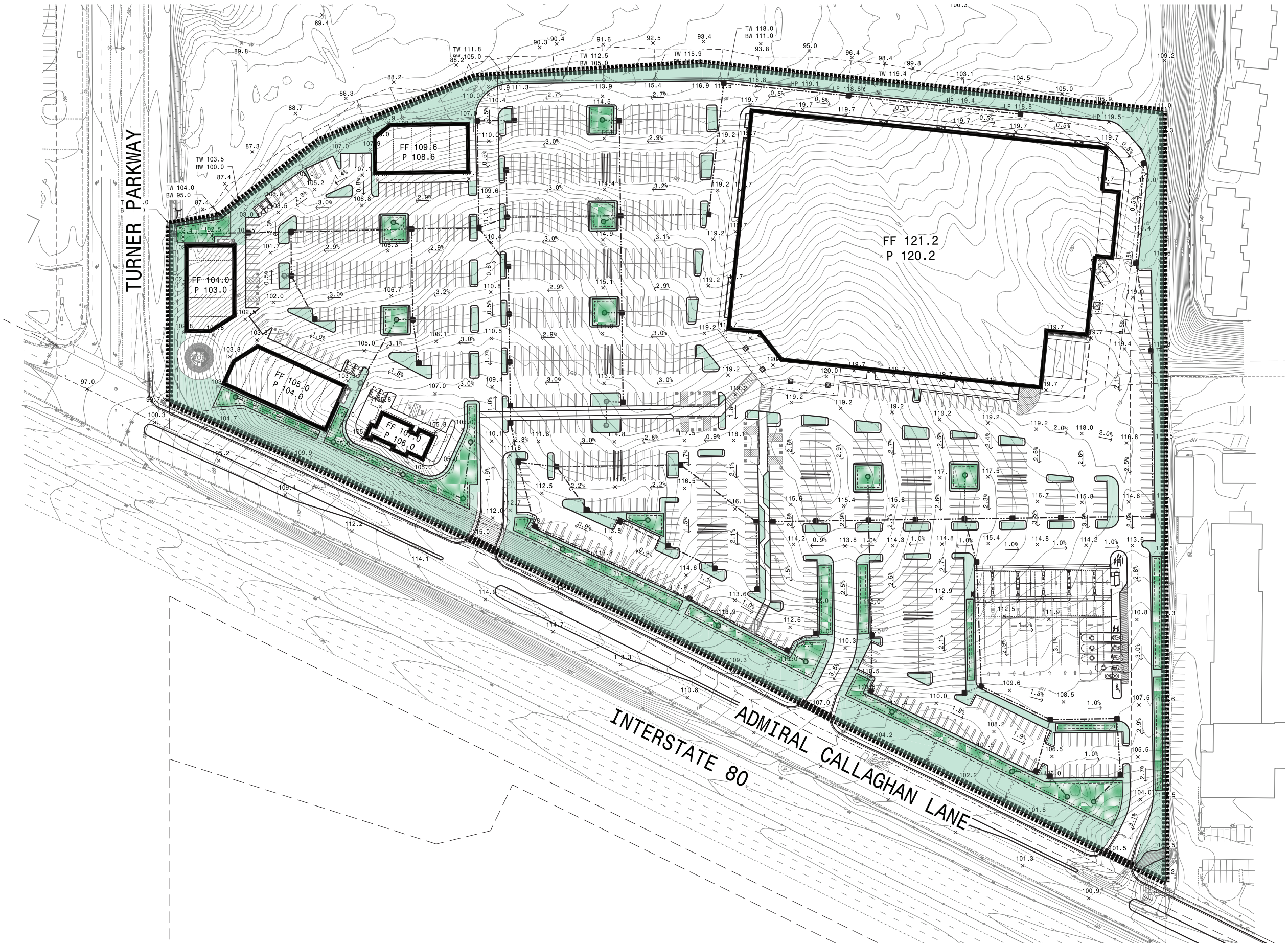
PERVIOUS
AREA

BIORETENTION
AREA



0 30 60 120
SCALE: 1"=60'

COMMERCIAL PROJECT AREA TOTALS	
LAND COVER	AREA (SF)
IMPERVIOUS	771,138
PERVIOUS	133,210
BIORETENTION	42,245
TOTAL	946,593



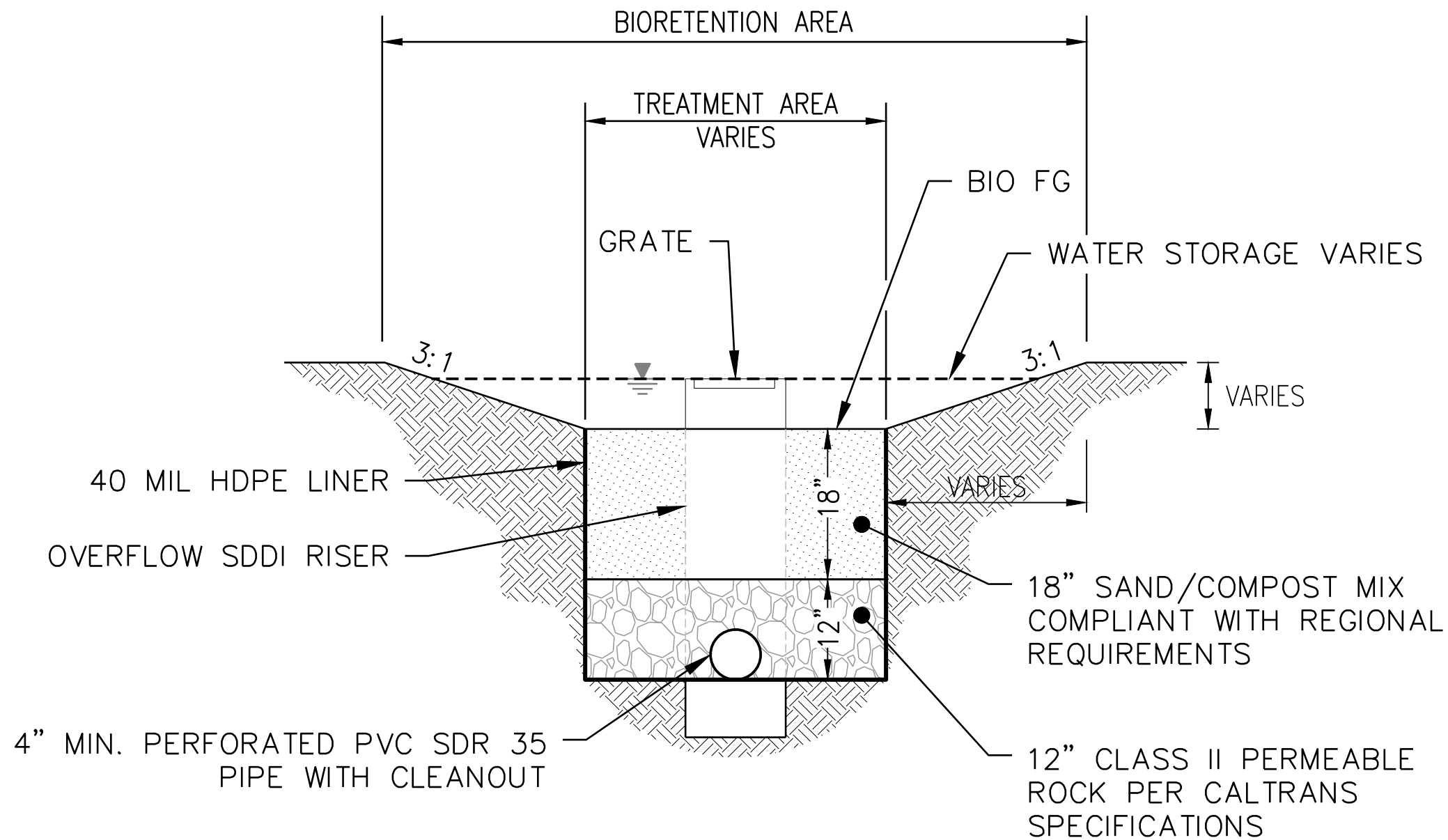
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PROJECT: FAIRVIEW AT NORTHGATE COMMERCIAL PROJECT
CITY OF VALLEJO, CALIFORNIA
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STORMWATER CONTROL PLAN REPORT
FAIRVIEW AT NORTHGATE
COMMERCIAL PROJECT
CITY OF VALLEJO, CALIFORNIA

DRAINAGE MANAGEMENT
AREA MAP

FIGURE
3



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COMMERCIAL PROJECT
CITY OF VALLEJO CALIFORNIA

**BIORETENTION FACILITY
DETAIL**

**FIGURE
4**

Appendix A.

Rainfall Isohyetal Map

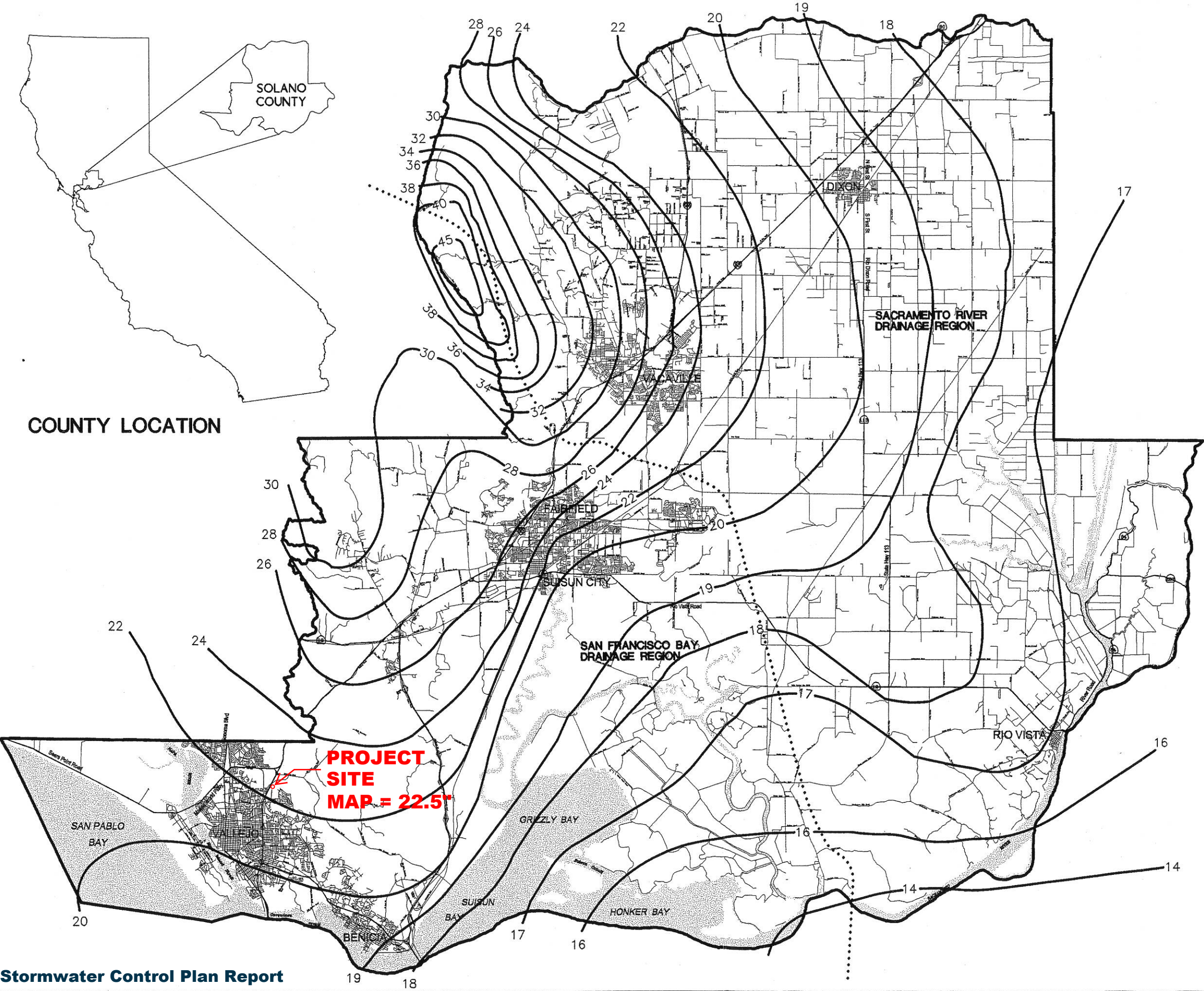
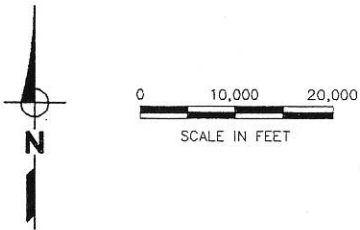


Figure 1

Solano County
Design Rainfall Study

ISOHYETAL MAP OF
SOLANO COUNTY
MEAN ANNUAL PRECIPITATION



- NOTES:
- 1. SOURCE OF UNDERLYING MAPPING SHOWN HEREON IS DIGITIZED USGS QUAD MAPS AS SUPPLIED BY AMERICAN DIGITAL CARTOGRAPHY.
 - 2. BOUNDARIES ARE APPROXIMATE AND HAVE BEEN ADJUSTED TO FIT USGS QUAD MAPS.
 - 3. BASED ON OR CORRECTED TO THE 1951 TO 1980 BASE PERIOD.
 - 4. ISOHYETAL LINES ARE FROM DESIGN RAINFALL FOR SOLANO COUNTY. PREPARED BY JAMES D. GOODRIDGE, SEPTEMBER 5, 1998.

- LEGEND:
- ROADS & MINOR HIGHWAYS
 - MAJOR HIGHWAYS
 - ISOHYETAL LINES
 - DRAINAGE REGION BOUNDARY

Appendix B.

IMP Calculations

Appendix B.

Fairview at Northgate Commercial Project

Project Name: Fairview Commercial Project
Project Type: Treatment and Flow Control
APN: 0081-490-010
Drainage Area: 946,593
Mean Annual Precipitation: 22.5

IV. Areas Draining to IMPs

IMP Name: Bio Basin A
IMP Type: Bioretention Facility
Soil Group: Bio Basin A

DMA Name	Area (sq ft)	Post Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
DMA A1	771,138	Concrete or Asphalt	1.00	771,138	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA A2	133,210	Landscape	0.70	93,247				
Total				864,385				
Area					0.050	0.899	38,845	0
Surface Volume					0.042	0.899	32,630	0
Subsurface Volume					0.055	0.899	42,730	0
Maximum Underdrain Flow (cfs)								1.93
Orifice Diameter (in)								8.95

Report generated on 11/5/2018 12:00:00 AM by the Contra Costa Clean Water Program IMP Sizing Tool software (version 1.3.1.0).

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November 6, 2018

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Appendix B. IMP Calculations

I. Project Data and Objective

The following Stormwater Control Plan Report for the Fairview at Northgate Residential Project, presented herein, follows the Contra Costa County Stormwater C.3 Guidebook, 7th edition. The Fairview at Northgate Residential Project is located in the City of Vallejo within Solano County, however, per the request of the City (email from Alea Gage dated October 25, 2018), the present analysis follows the Contra Costa County procedures. A summary of relevant project data is shown in **Table 1**.

The overall objective of this report is to demonstrate the Fairview at Northgate Residential Project fulfills C.3 compliance requirements set forth in the California Regional Water Quality Control Boards' Municipal Regional Permit.

The Residential Project must comply with Hydromodification Management Plan (HMP) requirements as the proposed development creates more than 1-acre of impervious land; the existing project site is pervious, barren land. Per the County Stormwater C.3 Guidebook, compliance with HMP may be met through one of two options: (i) apply "LID Design Guide" in Chapter 3 of the C.3 Guidebook to satisfy both treatment and flow-control requirements or (ii) apply a continuous simulation hydrologic modeling analysis to verify post-project flows match pre-project flows for 10% of 2-year peak up to 10-year peak. To satisfy HMP for the Fairview at Northgate Residential Project, the former option – "LID Design Guide" will be applied.

Table 1. Project Data

Project Name/Number	Fairview at Northgate Residential Project
Application Submittal Date	November 6, 2018
Project Location	APN 0081-490-010 City of Vallejo, Solano County, CA 94591
Name of Applicant	Vallejo-Fairfield Developers, LLC
Project Phase No.	N/A
Project Type and Description	LDR (Low Density Residential)
Project Watershed	Blue Rock Springs Creek
Total Project Site Area ^[1]	23.8 acres (1,037,167 sf)
Total Area of Land Disturbed ^[1]	23.8 acres (1,037,167 sf)
Total New Impervious Surface Area	610,205 sf
Total Replaced Impervious Surface Area	0 sf
Total Pre-Project Impervious Surface Area	0 sf

Total Post-Project Impervious Surface Area	610,205 sf
50% Rule ^[2]	Applies
Project Density	Floor Area Ratio 0.40 (maximum)
Applicable Special Project Categories	None
Percent LID and non-LID treatment	100% LID Treatment
HMP Compliance ^[3]	Does Apply

Notes:

[1] Refer to Figure 2 for “Total Project Site Area” boundary of the Residential Project

[2] 50% rule applies if:

Total Replaced Impervious Surface Area > 0.5 x Pre-Project Impervious Surface Area

[3] HMP applies if:

(Total New Impervious Surface Area + Total Replaced Impervious Surface Area) ≥ 1 acre

II. Setting

II.A. Project Overview

The proposed 23.8-acre “Residential Project” site is located in the City of Vallejo within Solano County, California. The project is east of the Interstate 80 freeway and is bounded by Turner Parkway on the north and Admiral Callaghan Lane on the east. A vicinity map for the Fairview at Northgate Residential Project is shown on **Figure 1**.

The proposed project development will be utilized for a low-density residential development, consisting of 86 lots designated as single-family and 92 lots designated as paseo-loaded. Approximately 102,000 square feet of undeveloped land on the western edge of the site will serve as a park-site and a region for two stormwater quality treatment facilities.

II.B. Existing Site Condition

The existing 23.8-acre site is composed of natural open space with low-lying vegetation and minimal tree canopy cover. Since the late 1930s, the site has been undeveloped and was used for grazing activities until the early 1970s.

In terms of physiographic features, the site soils are classified as elastic silt (MH), lean clay (CL), clayey sand (SC), silty clay (CL), siltstone, and sandstone. Based on preliminary subsurface exploration performed by the geotechnical (ENGEO), the site does not have perched groundwater at pit depths of 10-feet and the site presents a low seismic hazard risk.

Elevations for the existing site range from 89 ft to 124 ft (NAVD88), and surface water generally flows to the northwest towards a natural drainage swale which conveys flows towards Turner Parkway. Runoff ultimately discharges into Blue Rock Springs Creek. An existing site map for the Residential Project location is shown on **Figure 2**.

II.C. Constraints and Opportunities for Stormwater Control

The Residential Project has the following constraints and opportunities:

Constraints

- The composition of the existing silty soils and clayey sands on the project site translates to lower permeability and higher runoff potential. For stormwater treatment facilities, soils with moderate to high infiltration rates are ideal.
- The layout of the Residential Project requires usage of a few large, close proximity stormwater treatment basins as opposed to several small, spread out stormwater treatment basins.

Opportunities

- About 40% of the residential site is designated as softscape cover, including trees, shrubs, and grasses. These strategically placed landscaped corridors significantly benefit the dispersal of runoff from impervious surfaces.
- According to the preliminary geotechnical investigation, there is no high groundwater table, no liquefaction susceptibility, and no high risk of uplift/subsidence. In general, the existing site soil conditions are moderately adequate for the proposed stormwater treatment basin facilities.

III. Low Impact Development Design Strategies

III.A. Site Design Optimization

There are no existing natural drainage features within the project boundary, however, stormwater runoff drains west to a 5.7-acre off-site open space, natural drainage corridor which directs flows north, and eventually west along Turner Parkway before discharging into Blue Rock Springs Creek. The proposed residential site drainage generally mimics the watercourse paths of the existing site condition.

The Residential Project incorporates a stormwater treatment facility within a park-site designated as a community focal point. For aesthetic purposes, suitable deciduous trees and ground plantings will be placed within each basin facility area. The park-site basin facility will ideally have gentle side-slopes and a shallow depth as a safety precaution for nearby pedestrians accessing the park.

III.B. Permeable Pavements

Presently, the Residential Project does not plan to incorporate permeable pavements into the site design.

III.C. Dispersal of Runoff to Pervious Areas

About 40% of the residential site will be pervious landscape, which presents a highly-beneficial scenario for flow dispersal from impervious runoff. A large portion of runoff from residential buildings will surface drain to lawns and vegetated regions prior to becoming street flow, and eventually pipe flow routed to the designated stormwater treatment facility.

III.D. Integrated Management Practices

The proposed Residential Project will implement “Integrated Management Practices to treat a total drainage area of 1,037,167 square feet (23.8-acre) with an impervious ratio of 58.8%. A total of two bioretention treatment facilities, at the northwest corner of the site, provide a combined treatment area of 42,640 square feet. The bioretention facilities are designed to meet both treatment and flow-control requirements.

IV. Documentation of Drainage Design

IV.A. Drainage Management Area Overview

To simplify the IMP sizing analysis, the Residential Project was delineated into a single “Drainage Management Area” (DMA); refer to **Figure 3**. Further division of the DMA is not warranted given the current stage of the project and the present project objectives.

IV.A.1. Summary of Drainage Management Area

For the Residential Project, a summary of impervious, pervious, and bioretention areas is shown in **Table 2**. The total area of bioretention is based on an iterative approach using the Contra Costa County IMP Calculator program.

Table 2. Drainage Management Areas for Residential Project

DMA Name	Drainage Area (sf)	Impervious Surface: Concrete or Asphalt (sf)	Pervious Surface: Landscape, Soil Group D (sf)	Total Bioretention Facility Area (sf)
DMA “A”	1,037,167	610,205	384,322	42,640

IV.A.2. Drainage Management Area Description

DMA “A” for the Residential Project, totaling 1,037,167 square feet, includes 610,205 square feet of impervious cover and 384,322 square feet of pervious landscape. The impervious area includes approximately 353,685 square feet of single-family building area and 256,520 square feet of streets and sidewalks. Untreated stormwater is conveyed in street gutters and captured by a series of catch basin inlets which route flows via the untreated stormdrain system to two bioretention facilities located at the northwest corner of the residential site. The precise conveyance details and hydraulic design of the proposed treated and untreated stormdrain system have not been finalized, but will be completed with the preparation of construction documents.

IV.B. Integrated Management Practices

The bioretention treatment facilities for the Fairview at Northgate Residential Project will be designed and constructed per the requirements of the Contra Costa County Stormwater C.3 Guidebook, 7th edition. A summary of these requirements are as follows:

- Each layer built flat, level, and to the elevations specified in the plans:
 - Bottom of Gravel Layer (BGL)
 - Top of Gravel Layer (TGL)
 - Top of Soil Layer (TSL)

- Overflow Grate
- Facility Rim
- 12 inches Class 2 permeable, Caltrans specification 68-2.02F(3).
- 18 inches sand/compost mix meeting the specifications approved by the Regional Water Quality Control Board in April 2016.
- 4-inch minimum diameter PVC SDR 35 perforated pipe underdrain, installed with the invert at the top of the Class 2 permeable layer with holes facing down, and connected to the overflow structure at that same elevation.
- 6-inch-deep reservoir between top of soil elevation and overflow grate elevation
- Concrete drop inlet with frame overflow structure, with grate set to specified elevation, connected to storm drain in main street.
- Plantings selected for suitability to climate and location, bioretention soil media (well-drained, low-fertility), and for water conservation.
- Irrigation system on a separate zone, with drip emitters and “smart” irrigation controllers.

A typical detail view for the bioretention treatment facility is shown on **Figure 4**.

IV.C. Tabulation and Sizing Calculations

The “Integrated management Practices” sizing calculations were performed by applying the IMP Calculator program developed by the County (Contra Costa Clean Water Program). The program computes the minimum IMP area according to the following relationships:

$$\text{Min. IMP Area or Volume} = \sum \left(\frac{\text{DMA Square Footage}}{\text{DMA Runoff Factor}} \times \left(\frac{\text{IMP Sizing Factor}}{\text{IMP Sizing Factor}} \right) \times \left(\frac{\text{Rain Adjustment Factor}}{\text{Rain Adjustment Factor}} \right) \right)$$

$$\text{IMP Sizing Factor (For Bioretention)} = \begin{cases} 0.07 & \text{for Soil Group A} \\ 0.11 & \text{for Soil Group B} \\ 0.06 & \text{for Soil Group C} \\ 0.05 & \text{for Soil Group D} \end{cases}$$

$$\text{Rain Adjustment Factor} = \frac{-0.0022 \times (\text{MAP}_{\text{project site}} - 20.2) + 0.05}{0.05}$$

Table 3 provides an overview of the IMP design input values. A mean annual precipitation (MAP) of 22.5 inches for the project site is determined from the Solano County rainfall isohyetal map, as shown in **Appendix A**. The IMP design calculations apply Soil Group “D”, as this classification is representative of the initial subsurface exploration performed by ENGEO. The geotechnical investigation revealed near-surface soils with high-fines and insubstantial permeability values, indicating low stormwater infiltration rates. Additionally, the IMP design calculations are performed for “Treatment Plus Flow Control” as hydromodification management applies for the Residential Project. Program output from the County IMP Calculator are included in **Appendix B**, and the results are summarized in **Table 4**.

Table 3. IMP Design Input for Residential Project

Total Impervious Area	610,205 sf (Concrete or Asphalt)
Total Pervious Area	384,322 sf (Landscape)
Mean Annual Precipitation	22.5 inches
NRCS Soil Group	"D"
IMPs Designed For	Treatment Plus Flow Control

Table 4. IMP Design Results for Residential Project

IMP Name: Bio Basin A IMP Type: Bioretention Facility Drainage Area: 1,037,167 sf Mean Annual Precipitation: 22.5 inches					IMPs Designed for: Treatment Plus Flow Control Soil Type: "D"				
DMA Name	DMA Area (sf)	Post-Project Surface Type	DMA Runoff Factor	(DMA Area) x (Runoff Factor)					
DMA A1	610,205	Concrete or Asphalt	1.00	610,205					
DMA A2	384,322	Landscape	0.70	269,025					
			Total =	879,230					

IMP Sizing Factor	Rain Adjustment Factor	Minimum Area (sf)
0.050	0.899	39,513

The Residential Project proposes a total bioretention facility area of 42,640 square feet, and the IMP Calculator program computed a required minimum area of 39,513 square feet. As the Residential Project moves into the design phase, the proposed bioretention facilities will be refined.

V. Source Control Measures

V.A. Site Activities and Potential Sources of Pollutants

The Fairview at Northgate Residential Project will create potential sources of stormwater pollutants, and includes the following sources to be controlled:

- Onsite Storm Drain Inlets
- Interior Floor Drains
- Landscape/Outdoor Pesticide Use
- Pools, Spas, Ponds, Decorative Fountains, and Other Water Features
- Sidewalks and Streets

V.B. Table of Sources and Permanent/Operational Controls

Table 5. Summary of Source Controls

Potential Source of Runoff Pollutants	Permanent Source Control BMPS	Operational Source Control BMPS
Onsite Storm Drain Inlets	Inlets that are accessible from driveways/walkways will be marked with "No Dumping Drains to Bay" or a similar message.	Inlet markings will be inspected annually and replaced or, repainted as needed. Stormwater pollution prevention information will be provided to new site owners, lessees, or operators.
Interior Floor Drains	Interior floor drains will be plumbed to sanitary sewer.	Drains will be inspected and maintained annually to prevent blockages and overflow.
Landscape/Outdoor Pesticide Use	Native trees, shrubs, and ground cover on the site will be preserved to the maximum extent possible. Landscaping will be designed to minimize required irrigation and runoff, to promote surface infiltration, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. When feasible, pest-resistant plants will be selected, especially for locations adjacent to hardscape. Plants will be selected appropriate to site soils, slopes, climate, sun, wind, rain, landuse, air movement, ecological consistency, and plant interactions.	Residents will receive Integrated Pest Management (IMP) information. All open space landscaping is to be maintained by a professional landscaping contractor utilizing integrated pest management methods. Pesticides will only be applied by appropriately licensed contractors.
Pools, Spas, Ponds, Decorative Fountains, and Other Water Features	Pools will be plumbed to the sanitary sewer per local municipality requirements.	Educate residents about the "Fountain and Pool Maintenance" guidelines of the CASQA Stormwater Quality Handbook.

Potential Source of Runoff Pollutants	Permanent Source Control BMPS	Operational Source Control BMPS
Sidewalks and Streets	Water runoff will be collected via storm drain pipes to bioretention areas for treatment.	Regular street sweeping to control pollutants. Overflow storm drain inlets will be checked regularly to clear debris.

VI. Stormwater Facility Maintenance

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

The ownership and operation/maintenance responsibility for all stormwater facilities lies within Vallejo-Fairfield Developers, LLC. The “Stormwater Facilities O&M (Operation and Maintenance) Plan” for the Fairview at Northgate Residential Project will be documented prior to the recording of the Final Map.

VI.B. Maintenance Requirements for Stormwater Facilities

- Prior to the start of the rainy season, in September of each year, inspect bioretention basin inlet and outlet structures for erosion or obstruction.
- Following a significant rain event of 0.5-inches or more, within a 24-hour period, perform the following for bioretention basins:
 - Check the facility for prolonged ponding.
 - Inspect the mulch layer for material movement, replace mulch and rake smooth if required.
 - Inspect basin side slopes for evidence of instability or scour and fix as necessary.
- Observe soil at the bottom of the bioretention basin for uniform percolation throughout. If portions of the basin do not drain within 48 hours after the end of a storm event, the soil should be tilled and replanted. Remove any debris or sediment accumulation.
- Examine the vegetation of the bioretention basin to ensure that it is vigorous and dense enough to provide filtering and to protect soils from erosion. Replenish mulch as necessary, remove fallen leaves and debris, prune large shrubs or trees, and mow turf areas. When mowing, remove no more than one-third the height of grasses. Verify that irrigation is adequate and not excessive. Replace dead plants and remove noxious and invasive vegetation.
- Abate any potential vectors by filling ground holes in and around the bioretention basin, and by ensuring there are no areas where water ponds longer than 48 hours following a storm event. If mosquito larvae are present and persistent, contact the Solano County Mosquito Abatement District for information and advice. Mosquito larvicides should be applied only when necessary, and only by a licensed individual or contractor.

VII. Construction Plan C.3 Checklist

The Construction Plan C.3 Checklist for the Residential Project is shown in **Table 6** and is subject to additional updates.

Table 6. Summary of C.3 Checklist

Stormwater Control Plan Page #	BMP Description	See Plan Sheet #
6	Optimize site layout	----
6	Disperse runoff	----
7	Implement "Integrated Management Practices	----
----	Stormwater Control Plan	To be completed with the design phase

VIII. Certifications

The selection, sizing, and preliminary design of stormwater treatment and other control measures in the Stormwater Control Plan for the Fairview at Northgate Residential Project meets the requirements of Regional Water Quality Control Board Order R2-2015-0049.

LEGEND

..... **PROJECT
BOUNDARY**



NOT TO SCALE

INTERSTATE 80

ADMIRAL CALLAGHAN LANE

TURNER PARKWAY

FOOTHILL DRIVE

PROPOSED
RESIDENTIAL
PROJECT SITE

23.8 AC

Mackay & Somps

ENGINEERS PLANNERS SURVEYORS
5142B FRANKLIN DR, PLEASANTON, CA 94588 (925)225-0690

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11-06-2018
DATE

19899.000
JOB NO.

STORMWATER CONTROL PLAN REPORT

**FAIRVIEW AT NORTHGATE
RESIDENTIAL PROJECT**

CITY OF VALLEJO

CALIFORNIA

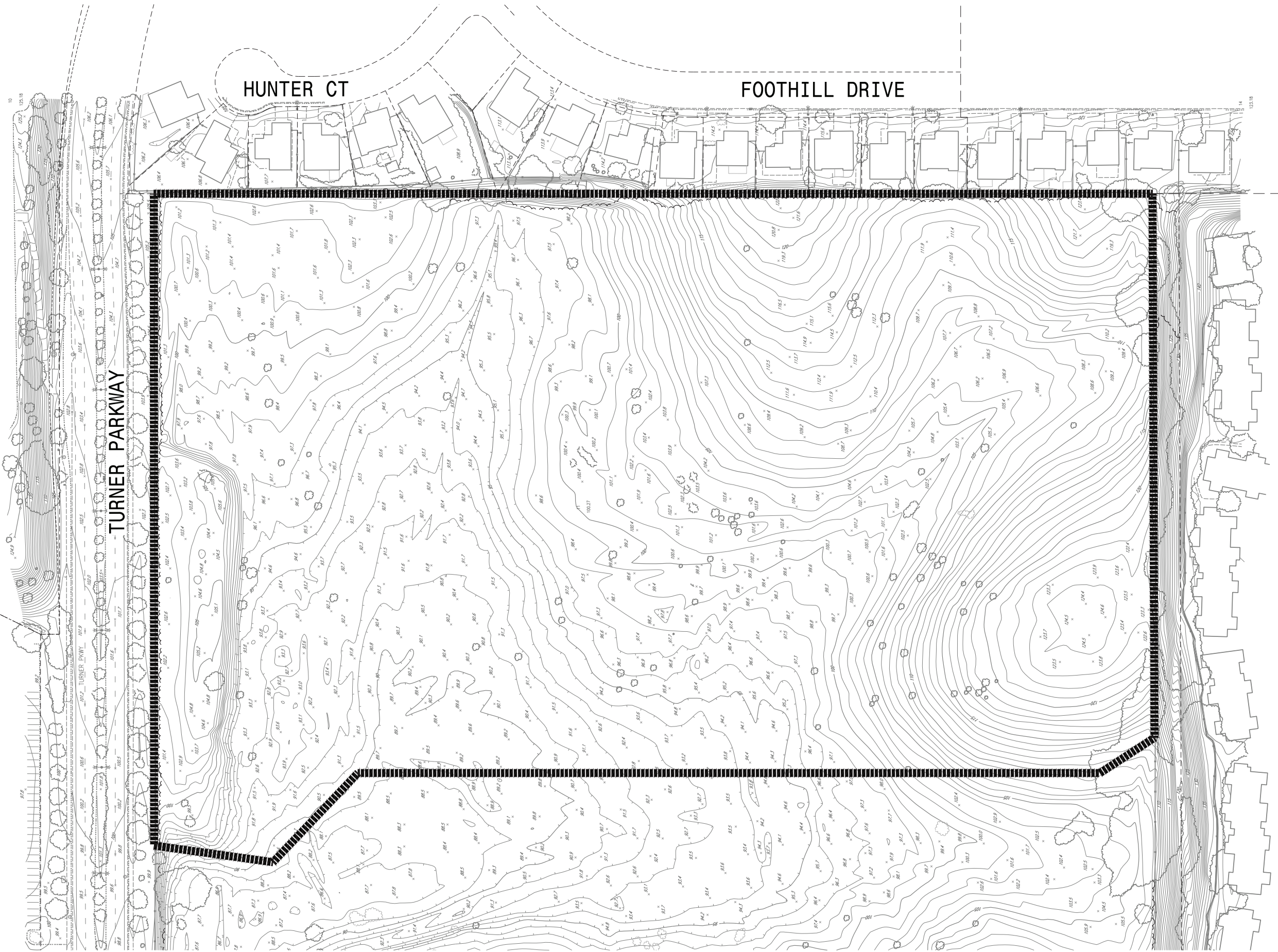
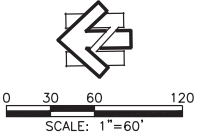
**PROJECT VICINITY
MAP**

FIGURE

1

LEGEND

PROJECT
BOUNDARY



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PLANNING & SURVEYING
51429 FAIRVIEW DR., PLEASANTON, CA 94588 (925)225-0880

PROJECT: FAIRVIEW AT NORTHGATE RESIDENTIAL PROJECT
DATE: 11-06-2018
JOB NO.: 19899.000

STORMWATER CONTROL PLAN REPORT
**FAIRVIEW AT NORTHGATE
RESIDENTIAL PROJECT**
CITY OF VALLEJO CALIFORNIA

EXISTING SITE
MAP

FIGURE
2

LEGEND

DMA
BOUNDARY

IMPERVIOUS
AREA

PERVIOUS
AREA

BIORETENTION
AREA



0 30 60 120
SCALE: 1"=60'

RESIDENTIAL PROJECT AREA TOTALS	
LAND COVER	AREA (SF)
IMPERVIOUS	610,205
PERVIOUS	384,322
BIORETENTION	42,640
TOTAL	1,037,167

RESIDENTIAL LOTS: IMPERVIOUS AND PERVIOUS TOTALS							
LOT TYPE	LOT DESCRIPTION	TOTAL LOT COUNT	BUILDING ENVELOPE AREA (SF)	BUILDING ENVELOPE EFFECTIVE IMPERVIOUS (%)	CUMULATIVE IMPERVIOUS LOT AREA (1) (SF)	CUMULATIVE TOTAL LOT AREA (2) (SF)	CUMULATIVE PERVIOUS LOT AREA (3) (SF)
A	42' X 85'	86	2,450	90%	189,630	354,310	164,680
B	50' X 65' MID	66	1,763	100%	116,358	188,615	72,257
C	50' X 65' END	26	1,835	100%	47,697	74,590	26,893
TOTALS =					353,685	617,515	263,830

NOTES:
[1] (CUMULATIVE IMPERVIOUS LOT AREA) =
(TOTAL LOT COUNT) X (BUILDING ENVELOPE AREA) X (BUILDING ENVELOPE EFFECTIVE IMPERVIOUS)
[2] (CUMULATIVE PERVIOUS LOT AREA) =
(CUMULATIVE TOTAL LOT AREA) - (CUMULATIVE IMPERVIOUS LOT AREA)

RESIDENTIAL LOT TYPE A

RESIDENTIAL LOT TYPE B

RESIDENTIAL LOT TYPE C

TURNER PARKWAY

HUNTER CT

FOOTHILL DRIVE

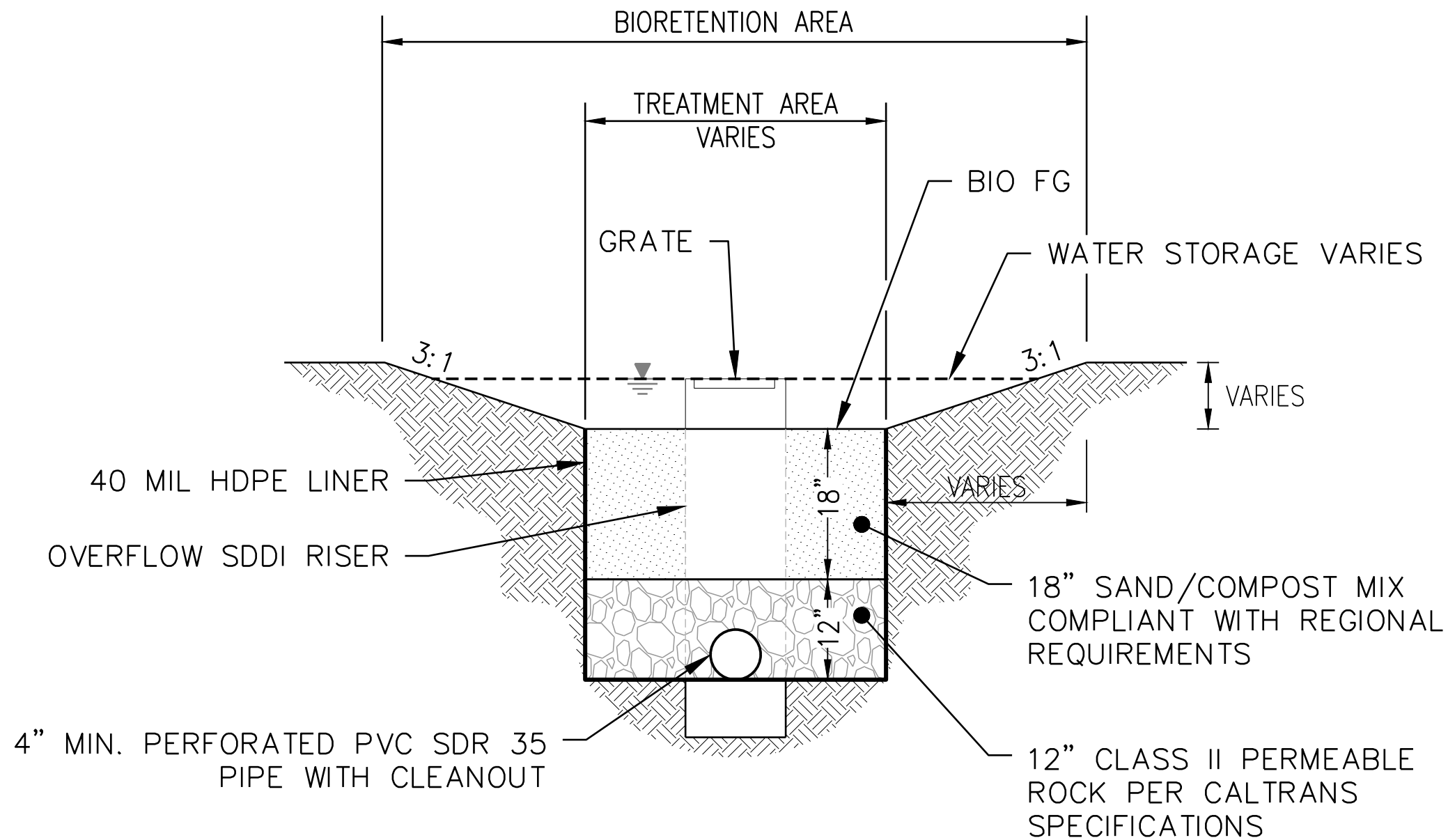
McKay & Sons
PLANNERS
15429 PARKVIEW DR., PLEASANTON, CA 94566 (925)225-0880

PLEASANTON OFFICE 1"=60' SCALE 11-06-2018 DATE 19899.000 JOB NO.

STORMWATER CONTROL PLAN REPORT
FAIRVIEW AT NORTHGATE
RESIDENTIAL PROJECT
CITY OF VALLEJO CALIFORNIA

DRAINAGE MANAGEMENT
AREA MAP

FIGURE
3



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FAIRVIEW AT NORTHGATE
RESIDENTIAL PROJECT
CITY OF VALLEJO CALIFORNIA

**BIORETENTION FACILITY
DETAIL**

**FIGURE
4**

Appendix A.

Rainfall Isohyetal Map

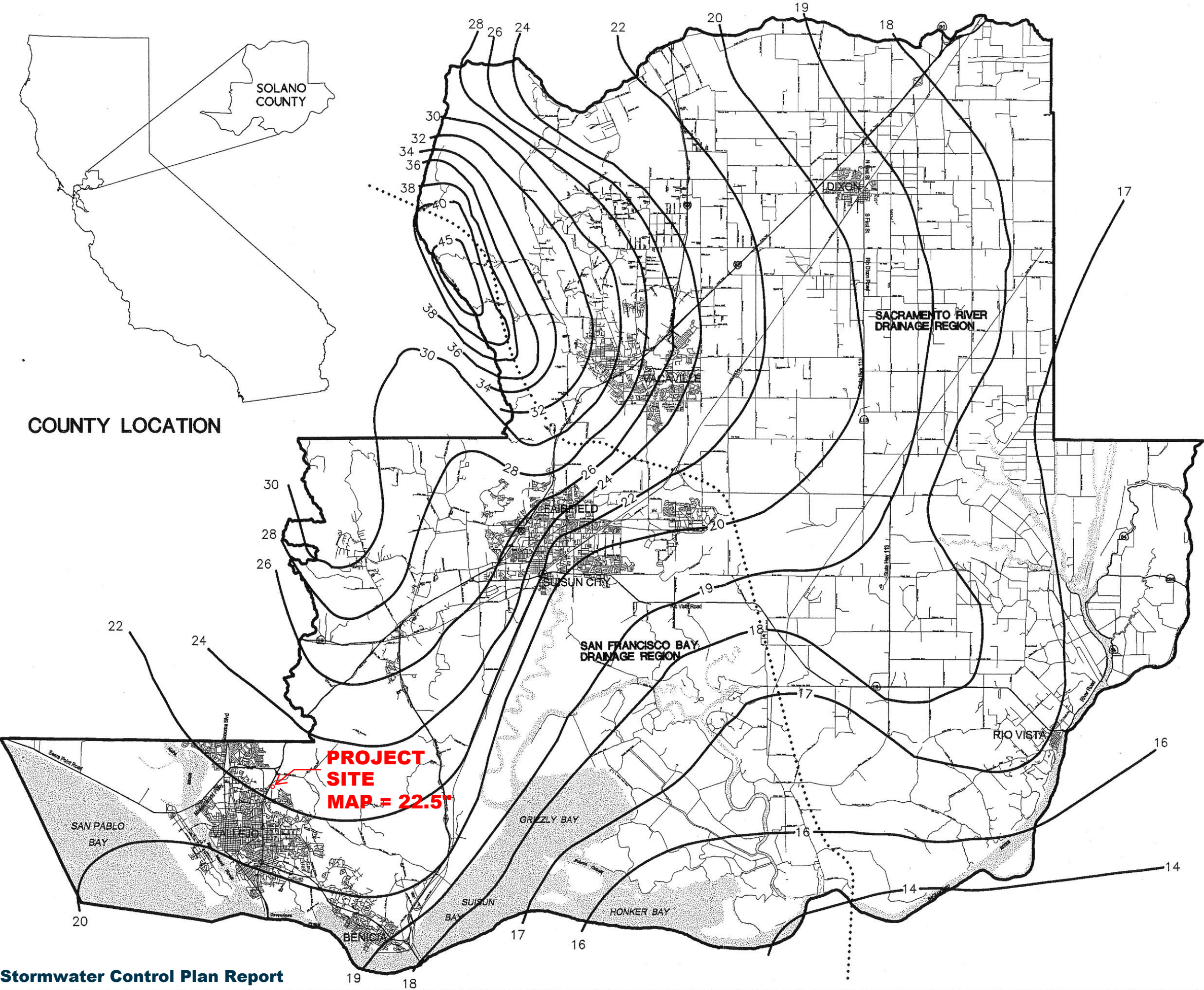
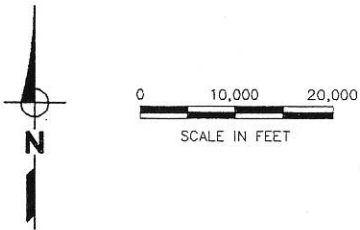


Figure 1
Solano County
Design Rainfall Study
ISOHYETAL MAP OF
SOLANO COUNTY
MEAN ANNUAL PRECIPITATION



- NOTES:
- 1. SOURCE OF UNDERLYING MAPPING SHOWN HEREON IS DIGITIZED USGS QUAD MAPS AS SUPPLIED BY AMERICAN DIGITAL CARTOGRAPHY.
 - 2. BOUNDARIES ARE APPROXIMATE AND HAVE BEEN ADJUSTED TO FIT USGS QUAD MAPS.
 - 3. BASED ON OR CORRECTED TO THE 1951 TO 1980 BASE PERIOD.
 - 4. ISOHYETAL LINES ARE FROM DESIGN RAINFALL FOR SOLANO COUNTY. PREPARED BY JAMES D. GOODRIDGE, SEPTEMBER 5, 1998.

- LEGEND:
- ROADS & MINOR HIGHWAYS
 - MAJOR HIGHWAYS
 - ISOHYETAL LINES
 - DRAINAGE REGION BOUNDARY

Appendix B.

IMP Calculations

Appendix B.

Fairview at Northgate Residential Project

Project Name: Fairview Residential Project
Project Type: Treatment and Flow Control
APN: 0081-490-010
Drainage Area: 1,037,167
Mean Annual Precipitation: 22.5

IV. Areas Draining to IMPs

IMP Name: Bio Basin A
IMP Type: Bioretention Facility
Soil Group: Bio Basin A

DMA Name	Area (sq ft)	Post Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
DMA A1	610,205	Concrete or Asphalt	1.00	610,205	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA A2	384,322	Landscape	0.70	269,025				
Total				879,230				
Area					0.050	0.899	39,513	0
Surface Volume					0.042	0.899	33,191	0
Subsurface Volume					0.055	0.899	43,464	0
Maximum Underdrain Flow (cfs)								2.12
Orifice Diameter (in)								9.38

Report generated on 11/5/2018 12:00:00 AM by the Contra Costa Clean Water Program IMP Sizing Tool software (version 1.3.1.0).

