

“M”

## Stormwater Control Plan



# STORMWATER CONTROL PLAN FOR A REGULATED PROJECT

Prepared for

**NOVA WAREHOUSE  
NAPA, CA**

THIS REPORT WAS PREPARED IN CONJUNCTION WITH THE INSTRUCTIONS, CRITERIA, AND MINIMUM REQUIREMENTS IN THE BAY AREA STORMWATER MANAGEMENT AGENCIES ASSOCIATION'S (BASMAA'S) POST CONSTRUCTION MANUAL.

Prepared for:  
Nova Group, LLC.  
185 Devlin Road  
Napa, CA 94558



RSA+ Project No. 4116001.0

August 11, 2017



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## I. Project Data

Table 1. Project Data Form

Project Name/Number	Nova Warehouse (4116001.0)
Application Submittal Date	October, 2016
Project Location	185 Devlin Road Napa, California 94558 APN: 057-170-008, -019
Project Phase No.	N/A
Project Type and Description	New Warehouse
Total Project Site Area (acres)	19.80 Acres
Total New and Replaced Impervious Surface Area	16.92 Acres
Total Pre-Project Impervious Surface Area	0.5 Acres
Total Post-Project Impervious Surface Area	16.94 Acres

## II. Setting

### II.A. Project Location and Description

The proposed Nova Warehouse is located at 185 Devlin Road, Napa, California. Refer to Attachment 1 for Location Map. The project spans two existing undeveloped parcels with APNs 057-170-005 and 057-170-019. The parcels have a combined area of 44.84 acres, however the project is mostly contained on the western portion. The area is bordered by Devlin Road and State Highway 12 to the east, Suscol Creek, and a small family vineyard to the north, agricultural land to the west and southwest, and developed commercial property to the southeast. The project will include construction of a new 400,000 sq. ft. warehouse building, truck loading docks, parking areas and a new driveway with access from Devlin Road. Refer to Attachment 2 for Drainage Management Areas Exhibit, Bioretention Facility Cross-section and Bioretention Construction Inspection Checklist.

### II.B. Existing Site Features and Conditions

The existing site has a crushed gravel path loop through otherwise undeveloped grassy land. The new warehouse will span the western half of the two parcels, with access off of Devlin Road. The site is bounded by riparian areas and the Suscol Creek, Devlin Road, and agricultural and commercially zoned lands.

The predominant soil type in the project area is Coombs Gravelly Loam, which are of the Hydraulic Soil Group C. Refer to Attachment 1 for Soils Map. The project area is relatively flat with gentle slopes draining toward the west. Stormwater is ultimately conveyed to the Napa River.



## II.C. Opportunities and Constraints for Stormwater Control

Stormwater treatment facilities have been integrated into the planning, design, construction, operation, and maintenance of the proposed development. The following potential opportunities and constraints were considered in determining the best stormwater control design for this development.

Opportunities for the site include Bioretention Facilities will be installed within these locations to treat stormwater runoff prior to discharge from the site. Runoff will be conveyed to Bioretention Facilities via surface flows.

Constraints include the site location and existing grades.

## III. Low-Impact Development Design Strategies

### III.A. Optimization of Site Layout

#### 1. Limitation of development envelope

The shallow slopes of the site make the chosen areas suitable for development.

#### 2. Preservation of natural drainage features

Bioretention Facilities will be installed to treat and retain stormwater before it enters the natural drainage of the site.

#### 3. Setbacks from creeks, wetlands, and riparian habitats

A 150-foot setback from Suscol Creek exists on the property.

#### 4. Minimization of imperviousness

Walkways and parking areas are designed to the minimum widths necessary without compromising public safety and a walkable environment. Landscaped areas are used instead of decorative impervious areas. Existing vegetation will be preserved to the maximum extent practicable.

#### 5. Use of drainage as a design element

Bioretention Facilities are incorporated into the aesthetic landscape design of the site.

### III.B. Use of Permeable Pavements

Permeable pavements are not in the scope of this project.

### III.C. Dispersal of Runoff to Pervious Areas

Stormwater runoff will be directed to landscaped areas to the maximum extent practicable.

### III.D. Stormwater Control Measures

Bioretention Facilities have been incorporated as stormwater control measures. The Bioretention Facilities will treat onsite stormwater. Refer to Attachment 2 for Bioretention Facility Cross-section and Bioretention Construction Inspection Checklist.



## IV. Documentation of Drainage

### IV.A Drainage Management Areas

Table 2. Drainage Management Areas

DMA Name	Impervious Area (square feet)	Pervious Area (square feet)	Total Area (square feet)
DMA-1	79,323	6,758	86,081
DMA-2	137,360	18,882	156,242
DMA-3	225,517	36,940	262,457
DMA-4	274,155	21,813	295,968
DMA-5	21,236	>403,484	>424,720

#### Drainage Management Area Descriptions

DMA 1, consists of the northern roof section and the northern parking area. Drainage from the roof and parking areas are conveyed to the north, via storm drains and sheet flow, and outfall into Bioretention Facility 1.

DMA 2, consists of the eastern truck loading dock and auto parking areas. Drainage from this area sheet flows easterly to curb cuts and drop inlets before being conveyed to Bioretention Facility 2 along the eastern property line.

DMA 3, consists of the eastern and southern warehouse roof drainage and the southern driveway. Drainage from the roof areas will be conveyed south via storm drains. The southern portion of the driveway will sheet flow to storm drains. The storm drains will outfall into Bioretention Facility 3.

DMA 4, consists of the western warehouse roof drainage and the western parking area. The roof drainage will be conveyed via storm drains and the parking lot will sheet flow to curb cuts and storm drains. The curb cuts and storm drains will outfall into Bioretention Facility 4.

DMA 5, consists of the proposed driveway from Devlin Road to the warehouse. Drainage from the driveway will sheet flow to vegetation. DMA 5 is considered self-treating and shown as Self-Treating Area 1.



IV.B. Tabulation and Sizing Calculations

Table 3. Information Summary for Bioretention Facility Design

DMA	Total Project Area (Square Feet)
DMA-1	86,081
DMA-2	156,242
DMA-3	262,457
DMA-4	295,968

Table 4. Self-Treating Areas

DMA Name	Area (square feet)
DMA-5	>424,720

Table 5. Self-Retaining Areas

**This site does not contain any Self-Retaining Areas.**

DMA Name	Area (square feet)
N/A	N/A

Table 6. Areas Draining to Self-Retaining Areas

**This site does not contain any Self-Retaining Areas.**

DMA Name	Area (square feet)	Post-project surface type	Runoff factor	Product (Area x runoff factor)[A]	Receiving self-retaining DMA	Receiving self-retaining DMA Area (square feet) [B]	Ratio [A]/[B]
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A





Table 7. Areas Draining to Bioretention Facilities

DMA Name	DMA Area (Square Feet)	Post-project surface type	DMA Runoff factor	DMA Area × runoff factor	Facility Name		
					Bioretention Facility 1		
DMA-1 <sub>Impervious</sub>	79,323	Impervious	1	79,323	Sizing Factor	Minimum Facility size	Proposed Facility Size
DMA-1 <sub>Pervious</sub>	6,758	Pervious	0.10	676			
Total>				79,999	0.04	3,200	3,400

DMA Name	DMA Area (Square Feet)	Post-project surface type	DMA Runoff factor	DMA Area × runoff factor	Facility Name		
					Bioretention Facility 2		
DMA-2 <sub>Impervious</sub>	137,360	Impervious	1	137,360	Sizing Factor	Minimum Facility size	Proposed Facility Size
DMA-2 <sub>Pervious</sub>	18,882	Pervious	0.10	1,888			
Total>				139,248	0.04	5,570	6,250

DMA Name	DMA Area (Square Feet)	Post-project surface type	DMA Runoff factor	DMA Area × runoff factor	Facility Name		
					Bioretention Facility 3		
DMA-3 <sub>Impervious</sub>	225,517	Impervious	1	225,517	Sizing Factor	Minimum Facility size	Proposed Facility Size
DMA-3 <sub>Pervious</sub>	36,940	Pervious	0.10	3,694			
Total>				229,211	0.04	9,168	10,820



DMA Name	DMA Area (Square Feet)	Post-project surface type	DMA Runoff factor	DMA Area × runoff factor	Facility Name		
					Bioretention Facility 4		
					Sizing Factor	Minimum Facility size	Proposed Facility Size
DMA-4 <sub>Impervious</sub>	274,155	Impervious	1	274,155			
DMA-4 <sub>Pervious</sub>	21,813	Pervious	0.10	2,181			
Total>				276,336	0.04	11,053	12,100



## V. Source Control Measures

### V.A. Site activities and potential sources of pollutants

The site activities and potential sources of pollutants for the Nova Warehouse project are listed in Table 8, below:

Table 8. Source Control BMPs

Potential Sources of Runoff Pollutants	Permanent Source Control BMPs	Operational Source Control BMPs
A. On-site storm drain inlets (unauthorized non-stormwater discharges and accidental spills or leaks)	<ul style="list-style-type: none"> <li>▪ Mark all inlets with the words “No Dumping! Flows to River” or similar.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Maintain and periodically repaint or replace inlet markings.</li> <li>▪ Provide stormwater pollution prevention information to new site owners, lessees, or operators.</li> <li>▪ See applicable operational BMPs in Fact Sheet SC-74, “Drainage System Maintenance.”</li> <li>▪ Include the following in lease agreements: “Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.”</li> </ul>
B. Interior floor drains and elevator shaft sump pumps	<ul style="list-style-type: none"> <li>▪ Interior floor drains will be plumbed to the sanitary sewer.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Inspect and maintain drains to prevent blockages and overflow.</li> </ul>
C. Interior parking garages	N/A	N/A
D <sub>1</sub> . Need for future indoor & structural pest control	<ul style="list-style-type: none"> <li>▪ Building design shall incorporate features that discourage entry of pests.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Provide Integrated Pest Management information to owners, lessees, and operators.</li> </ul>
D <sub>2</sub> . Landscape / outdoor pesticide use / building and grounds maintenance	<ul style="list-style-type: none"> <li>▪ Final landscape plans will accomplish all of the following:                             <ul style="list-style-type: none"> <li>▪ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.</li> <li>▪ Minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.</li> </ul> </li> <li>▪ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Maintain landscaping using minimum or no pesticides.</li> <li>▪ See applicable operational BMPs in Fact Sheet SC-41, “Building and Grounds Maintenance.”</li> <li>▪ Provide IPM information to new owners, lessees and operators.</li> </ul>





Potential Sources of Runoff Pollutants	Permanent Source Control BMPs	Operational Source Control BMPs
	<ul style="list-style-type: none"> <li>▪ Use pest-resistant plants, especially adjacent to hardscape.</li> <li>▪ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.</li> </ul>	
E. Pools, spas, ponds, decorative fountains, and other water features	N/A	N/A
F. Foodservice	N/A	N/A
G. Refuse areas	<ul style="list-style-type: none"> <li>▪ Refuse areas shall be paved with an impervious surface, designed not to allow run-on from adjoining areas, and screened to prevent off-site transport of trash.</li> <li>▪ Refuse areas shall contain a roof to minimize direct precipitation.</li> <li>▪ No drain connections shall be made to the Refuse area.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Provide adequate number of receptacles.</li> <li>▪ Inspect receptacles regularly; repair or replace leaky receptacles.</li> <li>▪ Keep receptacles covered.</li> <li>▪ Prohibit/prevent dumping of liquid or hazardous wastes.</li> <li>▪ Post “no hazardous materials” signs.</li> <li>▪ Inspect and pick up litter daily and clean up spills immediately.</li> <li>▪ Keep spill control materials available on-site.</li> <li>▪ Clean by dry sweeping only, or with wet/dry vacuum.</li> <li>▪ See Fact Sheet SC-34, “Waste Handling and Disposal.”</li> </ul>
H. Industrial processes	<ul style="list-style-type: none"> <li>▪ All process activities to be performed indoors. No processes to drain to exterior or to storm drain system</li> </ul>	<ul style="list-style-type: none"> <li>▪ Industrial discharge will be mitigated to the sanitary sewer and will not be discharged to storm drains</li> </ul>
I. Outdoor Storage of Equipment or Materials	N/A	N/A
J. Vehicle / equipment cleaning	N/A	N/A
K. Vehicle / equipment repair and maintenance	N/A	N/A
L. Fuel dispensing areas	N/A	N/A
M. Loading docks	<ul style="list-style-type: none"> <li>▪ Pave loading areas with concrete instead of asphalt.</li> <li>▪ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees.</li> <li>▪ Have employees load and unload all materials and equipment in covered areas such as building</li> </ul>	<ul style="list-style-type: none"> <li>▪ Move loaded and unloaded items indoors as soon as possible, See Fact Sheet SC-30</li> </ul>



Potential Sources of Runoff Pollutants	Permanent Source Control BMPs	Operational Source Control BMPs
	overhangs at loading docks if feasible.	
N. Fire sprinkler test water	<ul style="list-style-type: none"> <li>▪ Fire sprinkler test water shall be discharged to the sanitary sewer.</li> </ul>	<ul style="list-style-type: none"> <li>▪ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance."</li> </ul>
O. Miscellaneous drain or wash water or other sources <ul style="list-style-type: none"> <li>• Boiler drain lines</li> <li>• Condensate drain lines</li> <li>• Rooftop equipment</li> <li>• Drainage sumps</li> <li>• Roofing, gutters, and trim</li> <li>• Other sources</li> </ul>	<ul style="list-style-type: none"> <li>▪ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain.</li> <li>▪ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.</li> <li>▪ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.</li> <li>▪ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.</li> </ul>	<ul style="list-style-type: none"> <li>▪ If architectural copper is used, implement the following BMPs for management of rinse water during installation:</li> <li>▪ If possible, purchase copper materials that have been pre-patinated at the factory.</li> <li>▪ If patination is done on-site, prevent rinse water from entering storm drains by discharging to landscaping or by collecting in a tank and hauling off-site.</li> <li>▪ Consider coating the copper materials with an impervious coating that prevents further corrosion and runoff.</li> <li>▪ Implement the following BMPs during routine maintenance:</li> <li>▪ Prevent rinse water from entering storm drains by discharging to landscaping or by collecting in a tank and hauling off-site.</li> </ul>
P. Plazas, sidewalks, and parking lots		<ul style="list-style-type: none"> <li>▪ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect wash water containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.</li> </ul>

V.C. Features, Materials, and Methods of Construction of Source Control BMPs

Source control BMPs will be designed and implemented per construction specifications and CASQA BMP fact sheets.

**VI. Stormwater Facility Maintenance**

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

The applicant accepts responsibility for interim operation and maintenance of stormwater treatment and flow-control facilities until such time as this responsibility is formally transferred to a subsequent owner.



An Operations & Maintenance Plan has been prepared for this project. The owner shall execute a Post-Construction BMP Maintenance Agreement upon request of the permitting authority.

**VI.B. Summary of Maintenance Requirements for Each Stormwater Facility**

The site contains four Bioretention Facilities. The Bioretention Facilities require as needed maintenance for any damage that may occur, including periodic maintenance on the sub-drain systems. Semi-annual inspections are required for possible erosion, damaged vegetation, debris, the health of any trees or shrubs, and function of the sub-drain system. These inspections usually occur at the beginning of the wet season and end of the wet season. Any dead or diseased vegetation should be removed and replaced during the inspection. An annual inspection is required to complete the annual report for each Bioretention Facility. During this inspection mulch may be added, and tree stakes and wires replaced. Refer to the Operation & Maintenance Plan for a full description of required inspections and maintenance requirements.

**VII. Construction Checklist**

Table 9. Construction Checklist

Stormwater Control Plan Page #	Source Control or Treatment Control Measure	Sheet
5	Bioretention Facilities	DMA/C3.0
6	A. On-site storm drain inlets	C3.0
6	B. Interior floor drains and elevator shaft sump pumps	ARCH
6	D1. Need for Future indoor & structural pest control	ARCH
6	D2. Landscape/ outdoor pesticide use/ building and ground maintenance	L. ARCH
7	G. Refuse areas	ARCH
7	N. Fire sprinkler test water	ARCH
7	O. Miscellaneous drain or wash	ARCH
8	P. Plazas, sidewalks, and parking lots	Civil Plans

**VIII. Certifications**

The design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the current edition of the BASMAA Post-Construction Manual, dated July 14, 2014.

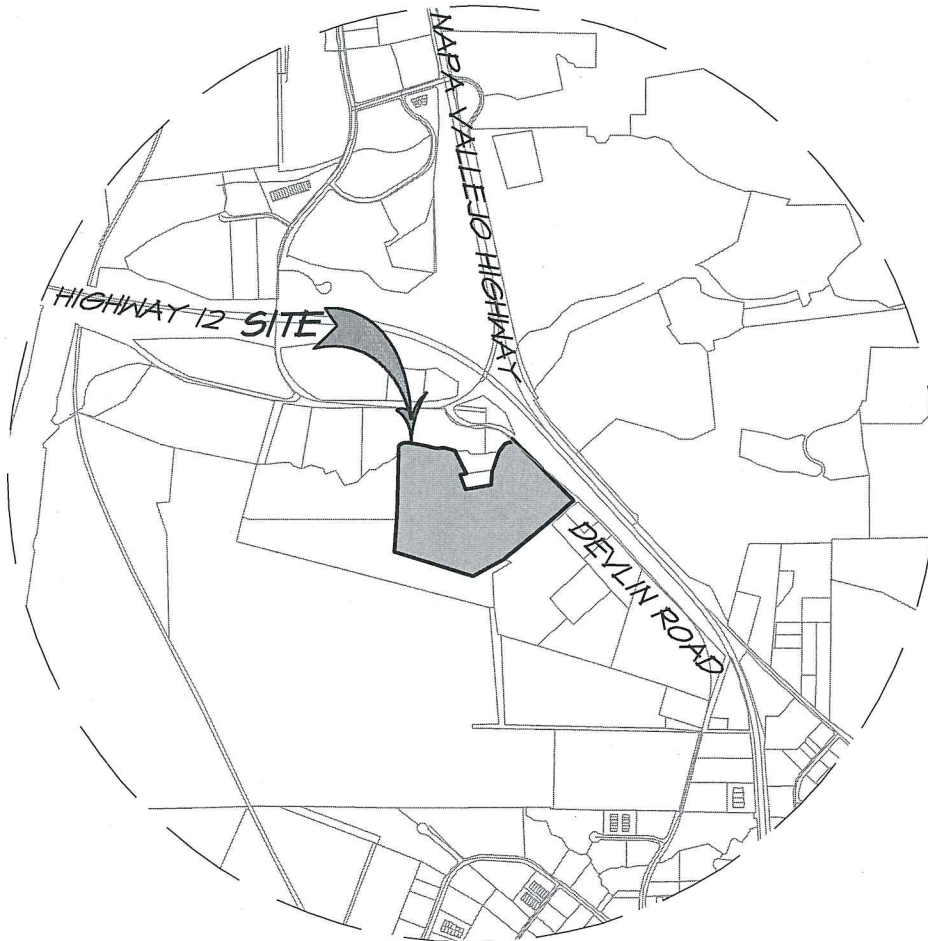


## ATTACHMENT 1

VICINITY MAP, FIRMETTE, SOILS MAP



# NOVA WAREHOUSE VICINITY MAP



**VICINITY MAP**

SCALE: 1" = 2000'

<b>RSA<sup>+</sup></b>	1515 FOURTH STREET
	NAPA, CALIF. 94559
	OFFICE   707   252.3301
+ www.RSAcivil.com +	

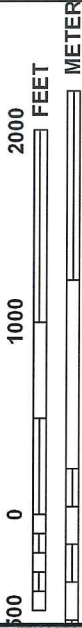
RSA<sup>+</sup> | CONSULTING CIVIL ENGINEERS + SURVEYORS + EST. 1980

September 12, 2016 4116001.0 Exh-Vic Map.dwg





MAP SCALE 1" = 1000'



# NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0610E

## FIRM FLOOD INSURANCE RATE MAP

NAPA COUNTY,  
CALIFORNIA  
AND INCORPORATED AREAS

PANEL 610 OF 650  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
AMERICAN CANYON, CITY OF	060755	0610	E
NAPA COUNTY	060205	0610	E
NAPA, CITY OF	060207	0610	E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER  
06055C0610E

EFFECTIVE DATE  
SEPTEMBER 26, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)



0.2% ANNUAL CHANCE FLOOD  
DISCHARGE CONTAINED IN CHANNEL



Hydrologic Soil Group—Napa County, California  
(Soils Map)



Map Scale: 1:3,280 if printed on A landscape (11" x 8.5") sheet.




































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





## MAP LEGEND

 Area of Interest (AOI)	 C
 Soils	 C/D
<b>Soil Rating Polygons</b>	 D
 A	 Not rated or not available
 A/D	<b>Water Features</b>
 B	 Streams and Canals
 B/D	<b>Transportation</b>
 C	 Rails
 C/D	 Interstate Highways
 D	 US Routes
 Not rated or not available	 Major Roads
<b>Soil Rating Lines</b>	 Local Roads
 A	<b>Background</b>
 A/D	 Aerial Photography
 B	
 B/D	
 C	
 C/D	
 D	
 Not rated or not available	
<b>Soil Rating Points</b>	
 A	
 A/D	
 B	
 B/D	

## 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 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: <http://websoilsurvey.nrcs.usda.gov>  
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: Napa County, California  
Survey Area Data: Version 8, Sep 23, 2015

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

Date(s) aerial images were photographed: Feb 4, 2012—Feb 17, 2012

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.

## Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Napa County, California (CA055)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
123	Coombs gravelly loam, 2 to 5 percent slopes	C	30.0	100.0%
<b>Totals for Area of Interest</b>			<b>30.0</b>	<b>100.0%</b>

### Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

### Rating Options

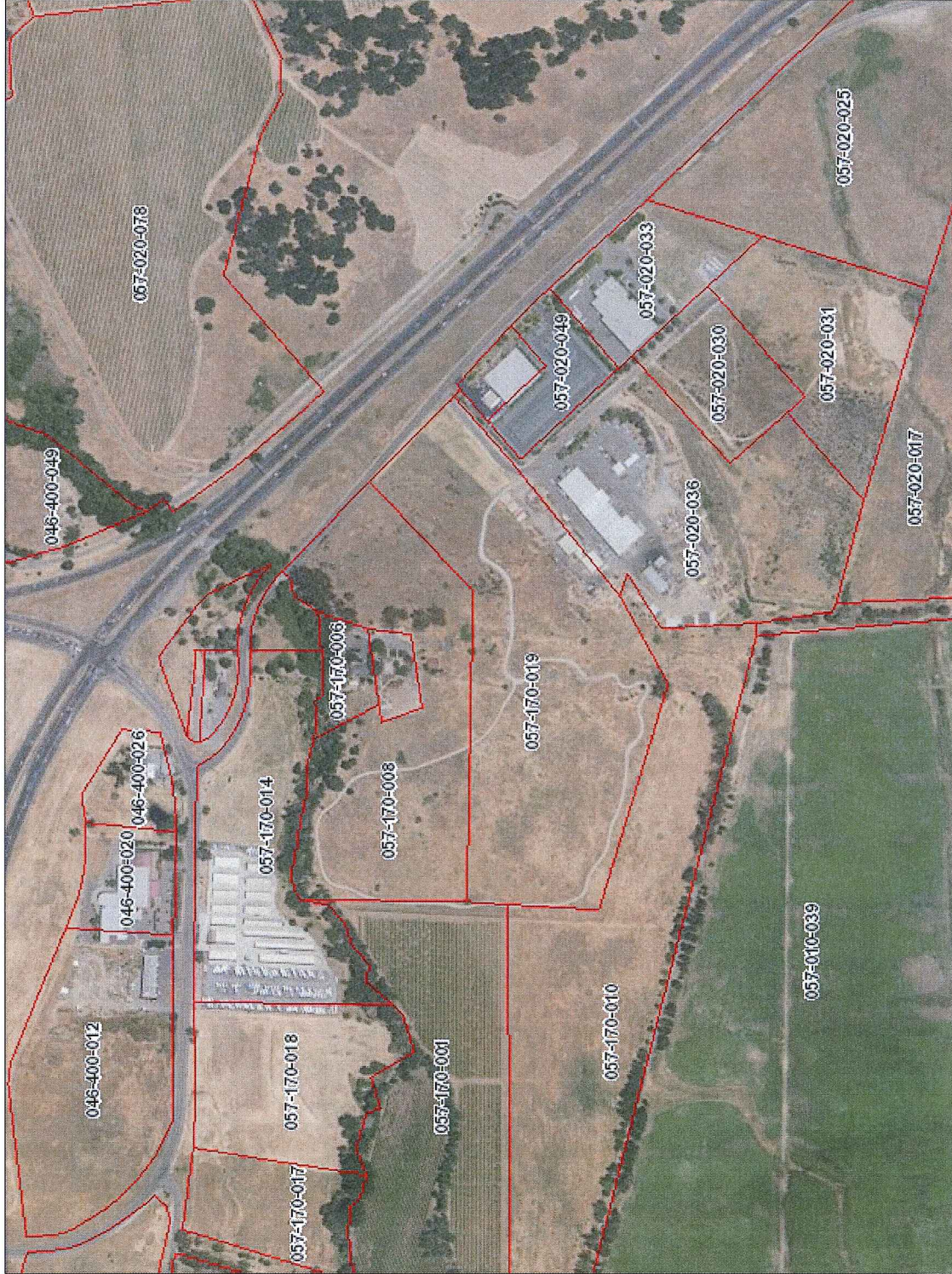
*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified



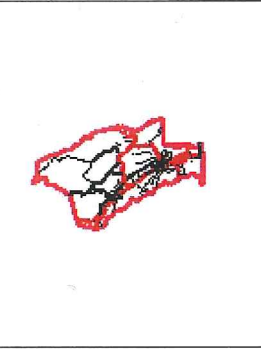


# LOCATION MAP



**Legend**

- Parcels
- County Boundary



1,504.7

0 752.33 1,504.7 Feet

Disclaimer: This map was prepared for informational purposes only. No liability is assumed for the accuracy of the data delineated hereon.

This map was printed on 7/21/2016

**Notes**





ATTACHMENT 2

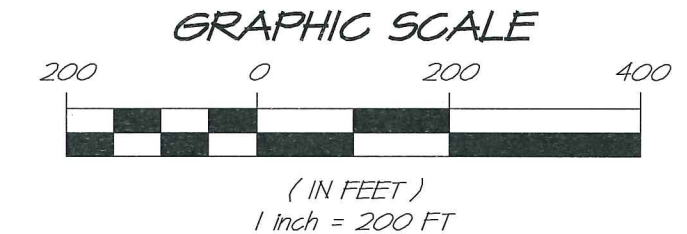
DRAINAGE MANAGEMENT AREAS EXHIBIT  
BIORETENTION FACILITY CROSS-SECTION  
BIORETENTION CONSTRUCTION INSPECTION CHECKLIST

# NOVA WAREHOUSE DRAINAGE MANAGEMENT AREAS EXHIBIT



<b>LEGEND</b>	
	BRF BIORETENTION FACILITY
	STA SELF-TREATING AREA

<b>DRAINAGE MANAGEMENT AREAS</b>		
DMA	IMPERVIOUS	PERVIOUS
1	78,122 SF	1,497 SF
2	137,360 SF	18,882 SF
3	261,496 SF	36,940 SF
4	239,373 SF	21,815 SF
5	21,236 SF	> 403,484 SF



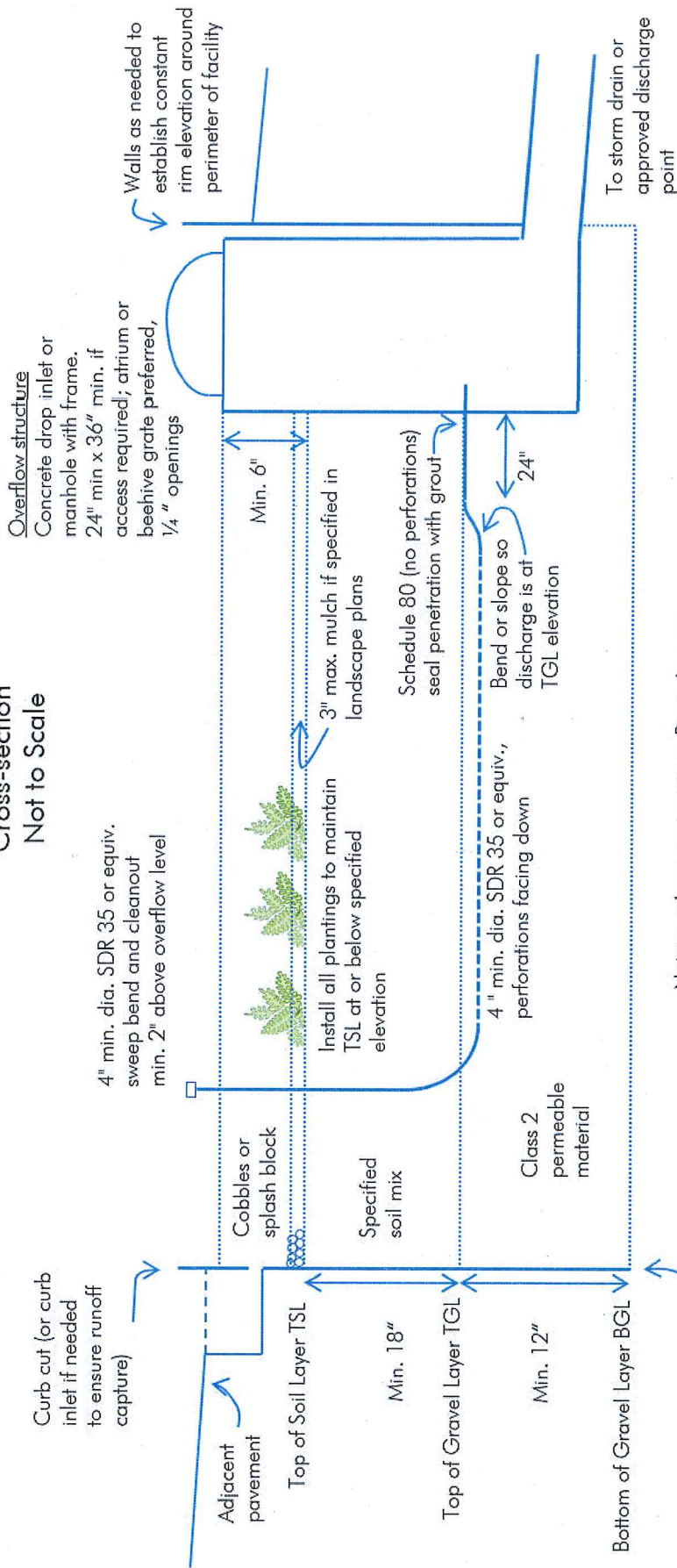
<b>RSA<sup>+</sup></b>	1515 FOURTH STREET NAPA, CALIF. 94559 OFFICE   707   252.3301 + www.RSAcivil.com +
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# Bioretention Facility

Cross-section  
Not to Scale



### Allowed variations for special site conditions:

- Facilities located within 10 feet of structures or other potential geotechnical hazards may incorporate an impervious cutoff wall
- Facilities with documented high concentrations of pollutants in underlying soil or groundwater, facilities where infiltration could contribute to a geotechnical hazard, and facilities located on elevated plazas or other structures may incorporate an impervious liner between the native soil and the BGL and locate the underdrain discharge at the BGL (flow-through planter configuration).
- Facilities located in areas of high groundwater, highly infiltrative soils, or where connection of the underdrain to a surface drain or subsurface storm drain are infeasible may omit the underdrain.

### Notes:

- No liner, no filter fabric, no landscape cloth.
- Maintain BGL, TGL, TSL throughout facility area at elevations to be specified in plan.
- Class 2 perm layer may extend below and underneath drop inlet.
- Elevation of underdrain discharge is at top of gravel layer.
- See Chapter 4 for instructions on facility sizing and additional specifications.

## Appendix B. Bioretention Construction Inspection Checklist

### Layout (to be confirmed prior to beginning excavation)

- Square footage of the facility meets or exceeds minimum shown in Stormwater Control Plan
- Site grading and grade breaks are consistent with the boundaries of the tributary Drainage Management Area(s) (DMAs) shown in the Stormwater Control Plan
- Inlet elevation of the facility is low enough to receive drainage from the entire tributary DMA
- Locations and elevations of overland flow or piping, including roof leaders, from impervious areas to the facility have been laid out and any conflicts resolved
- Rim elevation of the facility is laid out to be level all the way around, or elevations are consistent with a detailed cross-section showing location and height of interior dams
- Locations for vaults, utility boxes, and light standards have been identified so that they will not conflict with the facility
- Facility is protected as needed from construction-phase runoff and sediment

### Excavation (to be confirmed prior to backfilling or pipe installation)

- Excavation conducted with materials and techniques to minimize compaction of soils within the facility area
- Excavation is to accurate area and depth
- Slopes or side walls protect from sloughing of native soils into the facility
- Moisture barrier, if specified, has been added to protect adjacent pavement or structures.
- Native soils at bottom of excavation are ripped or loosened to promote infiltration

### Overflow or Surface Connection to Storm Drainage

(to be confirmed prior to backfilling with any materials)

- Overflow is at specified elevation
- No knockouts or side inlets are in overflow riser
- Overflow location selected to minimize surface flow velocity (near, but offset from, inlet recommended)
- Grating excludes mulch and litter (beehive or atrium-style grates with 1/4" openings recommended)
- Overflow is connected to storm drain via appropriately sized piping

### Underground connection to storm drain/outlet orifice

(to be confirmed prior to backfilling with any materials)

- Perforated pipe underdrain (PVC SDR 35 or approved equivalent) is installed with holes facing down
- Perforated pipe is connected to storm drain at specified elevation (typ. bottom of soil elevation)
- Cleanouts are in accessible locations and connected via sweep bends



**Drain Rock/Subdrain** (to be confirmed prior to installation of soil mix)

- Rock is installed as specified, 12" min. depth. Class 2 permeable, Caltrans specification 68-2.02F(3) recommended
- Rock is smoothed to a consistent top elevation. Depth and top elevation are as shown in plans
- Slopes or side walls protect from sloughing of native soils into the facility
- No filter fabric is placed between the subdrain and soil mix layers

**Soil Mix**

- Soil mix is as specified.
- Mix installed in lifts not exceeding 12"
- Mix is not compacted during installation but may be thoroughly wetted to encourage consolidation
- Mix is smoothed to a consistent top elevation. Depth of mix (18" min.) and top elevation are as shown in plans, accounting for depth of mulch to follow and required reservoir depth

**Irrigation**

- Irrigation system is installed so it can be controlled separately from other landscaped areas. Smart irrigation controllers and drip emitters are recommended and may be required by local code or ordinance.
- Spray heads, if any, are positioned to avoid direct spray into outlet structures

**Planting**

- Plants are installed consistent with approved planting plan, consistent with site water allowance
- Any trees and large shrubs are staked securely
- No fertilizer is added; compost tea may be used
- No native soil or clayey material are imported into the facility with plantings
- 1"-2" mulch may be applied following planting; mulch selected to avoid floating
- Final elevation of soil mix maintained following planting
- Curb openings are free of obstructions

**Final Engineering Inspection**

- Drainage Management Area(s) are free of construction sediment and landscaped areas are stabilized
- Inlets are installed to provide smooth entry of runoff from adjoining pavement, have sufficient reveal (drop from the adjoining pavement to the top of the mulch or soil mix, and are not blocked)
- Inflows from roof leaders and pipes are connected and operable
- Temporary flow diversions are removed
- Rock or other energy dissipation at piped or surface inlets is adequate
- Overflow outlets are configured to allow the facility to flood and fill to near rim before overflow
- Plantings are healthy and becoming established
- Irrigation is operable
- Facility drains rapidly; no surface ponding is evident
- Any accumulated construction debris, trash, or sediment is removed from facility
- Permanent signage is installed and is visible to site users and maintenance personnel