



May 30, 2014
Revision #1: October 22, 2014

Job No. 13-150

Nate Galambos, PE
Engineering Services Division
Planning, Building and Environmental Services Department
Napa County
1195 Third Street, Suite 201
Napa, CA 94559

Re: Post Construction Runoff Management for the
Hudson Vineyards Winery Use Permit Application
5398 Carneros Highway, Napa, CA 94559 (APN 047-070-016)

Dear Mr. Galambos:

Hudson Vineyards is proposing to build a new winery facility at 5398 Carneros Highway in Napa County, California. The project will generally include construction of new winery buildings and a cave that will incorporate spaces for fermentation, barrel storage and hospitality as well as a mechanical equipment areas, improvements to an existing driveway to meet County requirements, new water storage tank(s), new sanitary and process wastewater disposal systems and new employee and visitor parking stalls at the proposed winery site. This post construction runoff management report is being submitted as part of the Use Permit Application and is therefore conceptual in nature.

The Applicant has completed Napa County Post-Construction Runoff Management Requirements Appendix A – Applicability Checklist, Appendix E – Source Control BMP Selection Worksheet and Appendix F – Treatment Control BMP Selection Worksheet. These three forms are included with this letter for your reference.

Based on our analysis of the existing site conditions and the proposed project as outlined in the Appendix A Checklist we understand that this project is categorized as a “Priority” project because the number of proposed parking stalls exceeds 25. As such, the project is required to incorporate several Site Design, Source Control and Treatment Control Best Management Practices (BMPs) to meet the standards set forth in the Napa County Post-Construction Runoff Management Requirements dated June 3, 2008.

The remainder of this letter outlines the Site Design, Source Control and Treatment Control BMPs that will be incorporated into the final design of the project and analyzes pre-project and post-project runoff volumes from the new winery facility area.

SITE DESIGN, SOURCE CONTROL & TREATMENT CONTROL BMPS

Several Site Design, Source Control and Treatment Control BMPs and design features will be incorporated to satisfy the post construction runoff management requirements including:

Site Design BMPs

In an effort to minimize changes to runoff rates the following Site Design BMPs have been incorporated into the project:

- **Minimize Impervious Footprint**
 - The new development area is located in an area that is served by an existing ranch access road thus minimizing the amount of new impervious surface required to provide access to the site.
 - The driveway improvements are designed to meet the minimum dimensions required by the Napa County Road and Street Standards and to provide safe access without creating excess pavement.
 - A significant portion of the production facility is located in subterranean caves which minimizes the impervious footprint associated with new buildings.

- **Conserve Natural Areas**
 - The new development was located to preserve existing native trees, vegetation and vineyards surrounding the project area to the greatest extent possible. The area selected for the proposed development has largely been used for livestock grazing and therefore will result in less potential impact than developing a more natural, less disturbed area.
 - The only trees that will be removed are planted olive trees which will all be replanted as part of the development project.

- **Minimize Directly Connected Impervious Areas**
 - Directly connected impervious surfaces will be minimized by draining new impermeable surfaces to grassy drainage swales and / or vegetated vineyard and landscape areas to slow and filter runoff and to promote infiltration.

- **Maximize Canopy Interception and Water Conservation**
 - The Applicant intends to transplant all olive trees that are removed in the vicinity of the proposed project area.
 - Additional trees will be planted in the landscaping surrounding the proposed winery.

Existing and Proposed Runoff Volume Analysis

The Napa County Post-Construction Runoff Management Requirements state that the proposed project must not result in an increase in runoff volume from the 2 year, 24 hour storm. The intent of this requirement is to minimize downstream water quality impacts associated with increased runoff volume from small storms. In order to analyze the effect of the proposed project, we have calculated the runoff curve number that is used to determine runoff quantities using USDA TR-55 methodology.

Existing Land Use Conditions

The project site is located on a moderately sloping hillside in the northeast portion of the property. Runoff in the project area is generally via overland sheet flow towards the southwest. Sheet flow ultimately concentrates in the existing irrigation reservoir that is located approximately 350 feet southwest from the proposed project site.

The project area is currently occupied by an old olive grove and livestock pastures. The area beneath the olive trees is grazed by cattle, sheep and other livestock. Slopes on the project site are moderate (approximately 15% to 25% average slope). The USDA Soil Map for Napa County shows this area primarily mapped as Fagan gravelly loam which is classified as a hydrologic soil group (HSG) "B" soil. A small portion of the project site is mapped as Diablo clay which is classified as HSG "C".

Using TR-55 Table 2-2c we determined that the existing project area most closely resembles "Woods-grass combination – poor condition" and the CN for this land use and hydrologic soil group is 73.

Proposed Land Use Conditions

At the winery building site approximately 3 acres of the project area will be covered with new building and other impervious pavement surfaces. It is expected that all areas adjacent to the development area will remain undisturbed or will be returned to their existing condition upon completion of the project.

Using TR-55 Table 2-2a we determined that the CN for the new impervious surfaces is 98.

This analysis shows that the proposed design will result in a post project curve number that is higher than the existing curve number due to the installation of approximately 3 acres of new impervious surfaces and thus the project would be expected to result in a net increase in storm water runoff volume from the project area. In order to quantify the expected increase in runoff volume we modeled the pre- and post-project conditions using the USDA TR-55 spreadsheet for calculating stormwater runoff volume that was developed by the Napa County Public Works Department. Our calculations predict net runoff volumes for the 2 year, 24 hour design storm of 11,405 cubic feet and 33,401 cubic feet for pre- and post-project conditions, respectively. This would be a net increase of 22,000 cubic feet of runoff for the 2 year, 24 hour storm event.

While the current Napa County Post Construction Runoff Control Requirements would require that the net increase in runoff be captured in onsite retention ponds we propose an alternate means of compliance. Our proposal is in accordance with the upcoming regulations that will be implemented by Napa County by June of 2015 and will supersede the current requirements. We recommend that bioretention areas be provided to treat runoff from the impervious areas at the winery project site. We recommend the bioretention areas be designed and sized in accordance with Bay Area Stormwater Management Agency Association (BASMAA) guidelines such that the total bioretention surface area is at least 4% of the tributary impervious area. For the current site design approximately 5,300 square feet of bioretention area must be provided and incorporated into the final project design. These bioretention areas will achieve the intent of the Napa County Post Construction Runoff Control Requirements by protecting downstream water quality.

While limited site design information was available at the time of this Use Permit Application it is our opinion that the onsite bioretention requirement can be accommodated by incorporating bioretention basin(s) in the project landscape design during the design development phase of the project. In the worst case scenario, if adequate landscape area is not available to construct the bioretention basin(s) immediately adjacent to the hardscape areas the bioretention basins can be constructed in the fields to the southwest of the winery site and runoff can be conveyed from the development area to the bioretention areas for treatment. Regardless of where they are located the bioretention areas must have a minimum combined volume of 5,300 cubic feet.

Furthermore, it should be noted that runoff volumes and flow rates from the development area will be attenuated through the existing irrigation reservoir which is located 350 feet southwest of the winery site and will capture all runoff from the winery site. Ignoring the effect of the new bioretention areas the 22,000 cubic feet of additional runoff equates to approximately one inch of depth in the reservoir when it is near capacity and thus the downstream conveyances will be insulated from the effects of the upstream changes in runoff volume in accordance with the intent of the Napa County Post Construction Runoff Control Requirements.

Source Control BMPs

In an effort to limit the introduction of contaminants into storm water runoff the following Source Control BMPs will be incorporated into the project:

- Driveways
 - The winery driveway improvements will be designed to comply with the Napa County Road and Street Standards as required by the Napa County Post Construction Runoff Management Policy.
 - The driveway improvements will be designed to drain into adjacent vegetated swales and buffer areas wherever feasible. These vegetated features will act as filters to remove sediment and other contaminants from driveway runoff.

- **Parking Areas**
 - Runoff will be directed to vegetated areas and/or bioretention areas to promote infiltration and treatment of storm water runoff before it reaches the receiving waters.

- **New or Reconstructed Stormwater Conveyance Systems**
 - Energy dissipaters will be designed at the outlet of all storm drain pipes to reduce the runoff energy and minimize the potential for erosion.
 - New open channel drainage conveyances will be lined with vegetation to minimize the potential for erosion (other armaments may be incorporated if needed to protect the bed and banks of the channel but vegetation will be used where possible).
 - Where feasible, storm drain conveyance systems will have a vegetated buffer between the impervious surfaces and the conveyance to filter runoff before it enters the conveyance system.

- **Landscaping**
 - Landscaping for the project area will be designed by the Landscape Architect to be in accordance with applicable water conservation requirements which will minimize irrigation and irrigation runoff.
 - The use of fertilizers and pesticides will be kept to the minimum amount necessary to sustain the landscaping.
 - The soil in landscape areas will be amended to promote infiltration and water holding capacity as recommended by the Landscape Architect.
 - Plants in landscape areas and bioretention areas that will be used to infiltrate or detain runoff will be selected to accommodate these semi and completely saturated soil conditions as appropriate.
 - All plants will be selected by the project Landscape Architect to be appropriate for the soils, slopes and climate where they will be located.

- **Storm Drain Inlets and Drainage Channels or Creeks**
 - Storm drain inlets will be labeled with placards or signage to prohibit dumping and identify the receiving water that the inlet drains to.

- **Trash Storage Areas**
 - Trash and recycling will be collected in watertight containers and will be temporarily stored in the trash enclosure before being hauled offsite by the garbage company.
 - The trash enclosure area will have an impervious floor and roof.
 - The trash enclosure will be located in a manner that prevents run-on. If the trash enclosure is equipped with a drain it will be covered and the drain will connect to the wastewater disposal system.
 - The trash enclosure will have walls or screening to prevent the offsite transport of trash and debris.

- Pools, Spas and Fountains

The site plan does not currently indicate any pool, spas or fountains as part of the proposed project. However, if a fountain is incorporated during the design development phase the following BMP will be implemented:

 - The fountain drain will not be connected directly to the storm drain system or the septic system. Instead it will be directed to a landscape area that will contain and infiltrate the water when the fountain is drained.
- Roofs, Gutters and Downspouts
 - If copper or other non-protected metal gutters are used they will be designed to discharge to landscape areas and will not be connected directly to a storm water conveyance system. The discharge area will be designed to prevent erosion.
- Loading and Unloading Dock Areas
 - The site plan does not currently indicate any loading docks at the proposed facility.
- Processing Areas
 - All fruit processing, barrel washing and other wine making activities will take place either in a building, in the cave or in the covered crush pad area. No uncovered outdoor fruit processing or winemaking areas are proposed and no storm drain connections will be allowed within the covered processing areas. All processing and wine making areas will drain exclusively to the onsite wastewater disposal system. This minimizes the chance for storm water coming in contact with winery processing wastewater.
- Interior Floor Drains
 - All interior floor drains will be connected to the wastewater disposal system.

Treatment Control BMPs

As a “Priority” project the Napa County Post-Construction Runoff Management Requirements stipulate that runoff from the project site must be treated before being discharged to the storm drain system or receiving waters.

We have used the Napa County Post-Construction Runoff Management Requirements Appendix F – Treatment Control BMP Selection Worksheet to determine the best treatment control BMP for this project given the nature of the project and the sensitivity of the receiving waters (Napa River). As previously noted, bioretention will be incorporated in the final project design to achieve the treatment control BMP requirements.

CONCLUSIONS

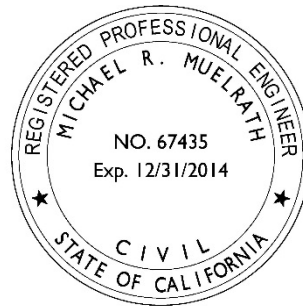
In summary, the proposed project will be required to incorporate several Site Design, Source Control and Treatment Control BMP features to meet the Napa County Post Construction Runoff Management Requirements. Our analysis outlined above shows that the proposed Site Design measures, along with a new stormwater management system consisting of one or more bioretention areas, can effectively meet the goals of the Napa County Post Construction Runoff Management Requirements. Additional details regarding the stormwater management system must be developed for the building permit submittal package for further review and approval.

We trust that this information is sufficient for your review and approval of the subject Use Permit Application. Please feel free to contact us at (707) 320-4968 if you have any questions.

Sincerely,

Applied Civil Engineering Incorporated

By:



Michael R. Muelrath, RCE 67435
Principal

Enclosures:


- Appendix A – Applicability Checklist
- Appendix E – Source Control BMP Selection Worksheet
- Appendix F – Treatment Control BMP Selection Worksheet
- USDA TR-55 Supporting Information

Copy:

- Lee Hudson, Hudson Vineyards (via email)
- George Monteverdi, Monteverdi Consulting (via email)
- Ned Forrest, Forrest Architects (via email)

NAPA COUNTY POST-CONSTRUCTION RUNOFF MANAGEMENT REQUIREMENTS

APPENDIX A – APPLICABILITY CHECKLIST

Post-Construction Runoff Management Applicability Checklist	County of Napa Department of Public Works 1195 Third Street Napa, CA 94559 (707) 253-4351 for information	
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Project Address: 5398 Carneros Highway Napa, CA 94558	Assessor Parcel Number(s): 047-070-016	Project Number: <i>(for County use Only)</i>
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Instructions:

Structural projects requiring a use permit, building permit, and/or grading permit must complete the following checklist to determine if the project is subject to the Post-Construction Runoff Management Requirements. In addition, the impervious surface worksheet on the reverse page must also be completed to calculate the amount of new and reconstructed impervious surfaces proposed by your project. This form must be completed, signed, and submitted with your permit application(s). Definitions are provided in the Post-Construction Runoff Management Requirements policy. **Note:** If multiple building or grading permits are required for a common plan of development, the total project shall be considered for the purpose of filling out this checklist.

- POST-CONSTRUCTION STORMWATER BMP REQUIREMENTS (Parts A and B)**
- ✓ If any answer to Part A are answered "yes" your project is a "Priority Project" and is subject to the Site Design, Source Control, and Treatment Control design standards described in the Napa County Post-Construction Runoff Management Requirements.
 - ✓ If all answers to Part A are "No" and any answers to Part B are "Yes" your project is a "Standard Project" and is subject to the Site Design and Source Control design standards described in the Napa County Post-Construction Runoff Management Requirements.
 - ✓ If every question to Part A and B are answered "No", your project is exempt from post-construction runoff management requirements.

Part A: Priority Project Categories

Does the project meet the definition of one or more of the priority project categories?

1. Residential with 10 or more units	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Commercial development greater than 100,000 square feet.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Automotive repair shop.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Retail Gasoline Outlet.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Restaurant.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Parking lots with greater than 25 spaces or greater than 5,000 square feet.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>

*Refer to the definitions section for expanded definitions of the priority project categories.

Part B: Standard Project Categories

Does the project propose:

1. A facility that requires a NPDES Permit for Stormwater Discharges Associated with Industrial Activities?.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. New or redeveloped impervious surfaces 10,000 square feet or greater, excluding roads?.....		<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Hillside residential greater than 30% slope.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Roadway and driveway construction or reconstruction which requires a Grading Permit.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Installation of new storm drains or alteration to existing storm drains?.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Liquid or solid material loading and/or unloading areas?.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Vehicle and/or equipment fueling, washing, or maintenance areas, excluding residential uses?.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Commercial or industrial waste handling or storage, excluding typical office or household waste?.....	Yes	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Note: To find out if your project is required to obtain an individual General NPDES Permit for Stormwater discharges Associated with Industrial Activities, visit the State Water Resources Control Board website at, www.swrcb.ca.gov/stormwtr/industrial.html

**NAPA COUNTY POST-CONSTRUCTION RUNOFF MANAGEMENT REQUIREMENTS
APPENDIX A – APPLICABILITY CHECKLIST**

Impervious Surface Worksheet

Project phasing to decrease impervious surface area shall not exempt the project from Post-Construction Runoff Management requirements. A new development or redevelopment project must comply with the requirements if it is part of a larger common plan of development that would result in the creation, addition and/or reconstruction of one acre or more of impervious surface. (For example, if 50% of a subdivision is constructed and results in 0.9 acre of impervious surface, and the remaining 50% of the subdivision is to be developed at a future date, the property owner must comply with the Post-Construction Runoff Management requirements.)

Type of Impervious Surface	Impervious Surface (Sq Ft)			Total New and Reconstructed Impervious Surfaces (Sq Ft)
	Pre-Project (if applicable)	New (Does not replace any existing impervious area)	Reconstructed (Replaces existing impervious area)	
Buildings, Garages, Carports, other Structures with roofs	20,358	38,370		58,728
Patio, Impervious Decking, Pavers and Impervious Liners	61,136	38,713		99,849
Sidewalks and paths	X	8,361		8,361
Parking Lots	X	6,988		6,988
Roadways and Driveways,	192,974	80,389		273,363
Off-site Impervious Improvements				
Total Area of Impervious Surface (Excluding Roadways and Driveways)	81,494	92,432		173,926

.....

Incorrect information on proposed activities or uses of a project may delay your project application(s) or permit(s).

I declare under penalty of perjury, that to the best of my knowledge, the information presented herein is accurate and complete.

Name of Owner or Agent (Please Print): Ned Forrest, Architect c11568	Title: Agent
Signature of Owner or Agent:	Date: 10/21/14

NAPA COUNTY POST-CONSTRUCTION RUNOFF MANAGEMENT REQUIREMENTS APPENDIX E – SOURCE CONTROL BMP SELECTION WORKSHEET

All Standard and Priority Projects must complete and sign the Source Control BMP Selection Worksheet and submit it with their Stormwater Runoff Management Plan (SRMP).

Date of Application: May 30, 2014

Type of Application: Use Permit Building Permit Grading Permit

Project Location or Address: 5398 Carneros Highway, Napa, CA 94559

Project Name: Hudson Vineyards Winery

Property Owner Name: Hudsonia LLC

Applicant's Name: Lee Hudson

Project Number: _____
(For County Use Only)

Owner Contractor Engineer/Architect Developer

Applicant's Address: 5398 Carneros Highway, Napa, CA 94559

Applicant's Phone: (707) 255-1455 **Fax:** (707) 255-4772 **E-mail:** lhudson@hudsonvineyards.com

Parcel/Tract #: _____ **Lot #:** _____ **APN:** 047-070-016

Fill out the table below to indicate which Source Control BMPs in Chapter 4.2 apply to your project.

Check box to indicate proposed activity	Land Use/Activities	Limited Exclusion (Check box if project is excluded)	Source Control BMP Standard
XXXXX	Roads and driveways.	None	4.2.A
XXXXX	Parking Areas	None	4.2.B
XXXXX	New or Reconstructed Stormwater Conveyance Systems	None	4.2.C
XXXXX	Storm drain Inlets and open channels or creeks.	<input type="checkbox"/> Detached Residential Homes	4.2.D
XXXXX	Landscaping	None	4.2.E
XXXXX	Trash Storage Areas.	<input type="checkbox"/> Detached Residential Homes	4.2.F
	Pools, Spas, and Fountains.	None	4.2.G
XXXXX	Roofs, Gutters, and Downspouts.	None	4.2.H
	Loading and Unloading Dock Areas	None	4.2.I
	Outdoor Material Storage Areas.	<input type="checkbox"/> Detached Residential Homes	4.2.J
XXXXX	Processing Areas.	None	4.2.K
	Vehicle and Equipment Repair and Maintenance Areas	<input type="checkbox"/> Detached Residential Homes	4.2.L
	Vehicle and Equipment Wash Areas	<input type="checkbox"/> Detached Residential Homes	4.2.M
	Food Service Equipment Cleaning	None	4.2.N
XXXXX	Interior Floor Drains.	None	4.2.O
	Fueling Areas.	None	4.2.P

Incorrect information on proposed activities or uses of a project may delay your project application(s) or permit(s).

I declare under penalty of perjury, that to the best of my knowledge, the information presented herein is accurate and complete.

Name of Owner or Agent (Please Print): <u>R L HUDSON</u>	Title: <u>owner</u>
Signature of Owner or Agent: <u>[Signature]</u>	Date: <u>6-4-14</u>

NAPA COUNTY POST-CONSTRUCTION RUNOFF MANAGEMENT REQUIREMENTS APPENDIX F - TREATMENT CONTROL BMP SELECTION WORKSHEET

This worksheet was developed to help you with the selection of a Treatment Control BMP or combination of Treatment Control BMPs to remove anticipated pollutants, to the maximum extent practicable, from stormwater runoff generated during the use of the project. All project applications subject to Treatment Control BMP requirements must submit this worksheet with their SRMP.

Date of Application: May 30, 2014

Type of Application: Use Permit Building Permit Grading Permit

Project Location or Address: 15398 Carneros Highway, Napa, CA 94559

Project Name: Hudson Vineyards Winery

Property Owner Name: Hudsonia LLC

Applicant's Name: Lee Hudson

Owner Contractor Engineer/Architect Developer

Applicant's Address: 5398 Carneros Highway, Napa, CA 94559

Applicant's Phone: (707) 255-1455 **Fax:** (707) 255-4772 **E-mail:** lhudson@hudsonvineyards.com

Parcel/Tract #: _____ **Lot #:** _____ **APN:** 0547-070-016

Step 1: Determine Anticipated Pollutants of Concern

Use the table below to determine the types of anticipated pollutants your project may generate based on land use type.

CHECK BOX TO INDICATE PROPOSED LAND USE	PROJECT POLLUTANT SOURCES	POLLUTANTS OF CONCERN	If you checked a box next to a land use that may potentially generate a pollutant or stressor, explain why that pollutant or stressor is or is not anticipated to be generated by the proposed project.
XXXXX	Lawns, Landscaping, and Parks	Sediment (coarse and fine) Nutrients (dissolved and particulate) Pesticides, pathogens, trash and debris	
XXXXX	Parking Lots and Driveways	Sediment (fine) Metals (dissolved and particulate) TPH, trash	
	Roads and Highways	Sediment (coarse and fine) Metals (dissolved and particulate) TPH, PAH, trash and debris	
XXXXX	Food-Related Commercial	Pathogens, oil and grease	All food related work will occur indoors in the commercial kitchen.
	Animal-Related Commercial	Pathogens	
	Auto-Related Commercial	Metals (dissolved and particulate) TPH, PAH, surfactants	
	Industrial	Sediment (coarse and fine) Metals (dissolved and particulate) TPH, PAH, PCB, pH, surfactants	

Step 2: Determine Conditions of Concern for Receiving Waters

Check off the watershed your project is located in to determine the conditions of concern downstream from your project. This information will help you select treatment control BMP(s) that maximize the removal of pollutants that are already impairing downstream receiving waters.

NAPA COUNTY POST-CONSTRUCTION RUNOFF MANAGEMENT REQUIREMENTS APPENDIX F - TREATMENT CONTROL BMP SELECTION WORKSHEET

Napa River and tributaries

- Sediment
- Nutrients
- Pathogens
- Mercury
- Nickel
- Selenium
- Furan Compounds
- Chlordane
- Diazinon
- PCBs

Putah Creek and tributaries

- Mercury
- Nickel
- Selenium
- Furan Compounds
- Chlordane
- Diazinon
- PCBs

Susuin Creek and tributaries

- Mercury
- Nickel
- Selenium
- Furan Compounds
- Chlordane
- Diazinon
- PCBs

Step 3: Select Treatment Control BMPs

Based upon your list of anticipated pollutants of concern (Step 1) and the conditions of concern downstream of your project (Step 2) you are ready to select the treatment control BMPs that maximize the removal of these pollutants. Using the table below, break your project into discrete drainage areas and list the land uses and associated pollutants of concern within each drainage area. Then refer to the Treatment Control BMP Selection Matrix to select BMPs for each drainage area that maximize the removal of anticipated pollutants.

Note: If the project is anticipated to generate one or more pollutants (Step 1) that the receiving water is listed for, select one or more BMPs from Treatment Control BMP Selection Matrix (Table 5) that maximize the removal for those pollutants. Any pollutants the project is expected to generate that are also causing a Clean Water Act section 303(d) impairment of the downstream receiving shall be given top priority in selecting treatment BMPs.

Basin	Anticipated Activities	Anticipated Pollutants	Treatment BMP	Treatment BMP Performance
New parking lot	Parking	Sediment, metals, TPH,	Bioretention	Good
Landscaping	Landscaping	Sediment, nutrients , pesticides	Bioretention	Good

Note that site conditions (soil type, groundwater elevation), size of the project, and other factors may limit your options for treatment control BMPs. If you cannot design a treatment control BMP or combination of treatment control BMPs into your project design, use the table below to list better performing treatment control BMPs and explain why they cannot be incorporated into the project design.

Basin	Treatment Control BMP	Statement of Impracticability

NAPA COUNTY POST-CONSTRUCTION RUNOFF MANAGEMENT REQUIREMENTS APPENDIX F - TREATMENT CONTROL BMP SELECTION WORKSHEET

Treatment Control BMP Selection Matrix.

Note: The Treatment control BMP Selection Matrix is provided for guidance purposes only. The performance of any given BMP may depend on the pollutant loading generated as well as local site conditions such as soil type and topography. The selection process must take into account the suitability of the BMP for the site. Alternative treatment control BMPs not identified in the matrix below may be approved at the discretion of the Director, provided the alternative BMP is as effective, or more effective, in the removal of pollutants of concern as other feasible BMPs listed in the matrix.

BMP Type	BMP	Constituent/Performance (G = Good, F = Fair, P = Poor)										
		Coarse Sed	Fine Sed	NO ₃	Total N	Total P	Pb	Zn	Cu	Pathogens	Oil and Grease	Trash and Debris
Detention Basins	Wet Pond	G	G	P	F	F	G	G	F	F	NR	G
	Extended Wet Pond	G	G	F	F	G	G	G	P	F	NR	G
	Extended Dry Pond	G	F	P	F	P	F	F	F	P	NR	G
Water Quality Wetlands	Shallow Wetlands	G	G	F	P	F	F	G	F	G	NR	G
	Extended Detention Wetland	G	G	F	P	F	F	G	F	G	NR	G
Biofilters (Horizontal)	Bioswale	G	F	P	F	F	G	F	F	P	F	F
	Filter Strip	G	F	P	F	F	G	F	F	P	F	F
Filters (Vertical)	Sand Filter	G	G	P	F	F	G	G	F	F	G	G
	Media Filter	G	G	P	F	F	G	G	G	F	F	NR
	Bioretention	G	G	P	G	G	G	G	G	P	G	NR
Solid Separators	Rotational Flow	G	F	P	F	F	F	F	F	P	G*	G
	Multi-Chamber	F	P	P	F	P	F	F	P	P	F	G
Inserts	Catch Basin Insert	G	F	P	F	F	F	F	F	P	G*	G

Incorrect information on proposed activities or uses of a project may delay your project application(s) or permit(s).

I declare under penalty of perjury, that to the best of my knowledge, the information presented herein is accurate and complete.

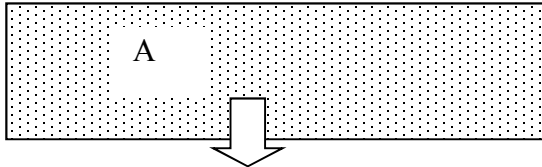
Name of Owner or Agent (Please Print): <i>R L Hudson</i>	Title: <i>owner</i>
Signature of Owner or Agent: <i>R L Hudson</i>	Date: <i>6.4.14</i>

Pre-Development Total Runoff Volume
NRCS Curve Number Procedure, Weighted Average Volume Technique

$Q=(P-0.2S)^2/(P+0.8S)$ where, $S=1000/CN-10$

2-Year, 24-Hour Storm (Inches):
 3.30

Hydrologic Condition and Direction of Runoff



Area ID	Area (Acres)	Land Use	Soil Group	CN (Curve Number)	S	Q (Rainfall Excess, inches)	Runoff Volume (acre-feet)	Runoff Volume (cu ft)
A	3	Composite	B	73	3.70	1.047	0.262	11,405
Total Runoff Volume							0.26	11,405

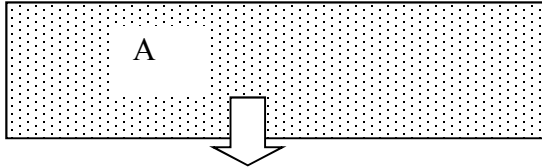
Post-Development Total Runoff Volume
NRCS Curve Number Procedure, Weighted Average Volume Technique

$Q=(P-0.2S)^2/(P+0.8S)$ where, $S=1000/CN-10$

2-Year, 24-Hour Storm (Inches):

3.30

Hydrologic Condition and Direction of Runoff



Area ID	Area (Acres)	Land Use	Soil Group	CN (Curve Number)	S	Q (Rainfall Excess, inches)	Runoff Volume (acre-feet)	Runoff Volume (cu ft)
A	3	Composite	B	98	0.20	3.067	0.767	33,401
Total Runoff Volume							0.77	33,401



NOAA Atlas 14, Volume 6, Version 2
Location name: Napa, California, US*
Latitude: 38.2660°, Longitude: -122.3654°
Elevation: 274 ft*
 * source: Google Maps



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin,
 Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao,
 Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aerals](#)

PF tabular

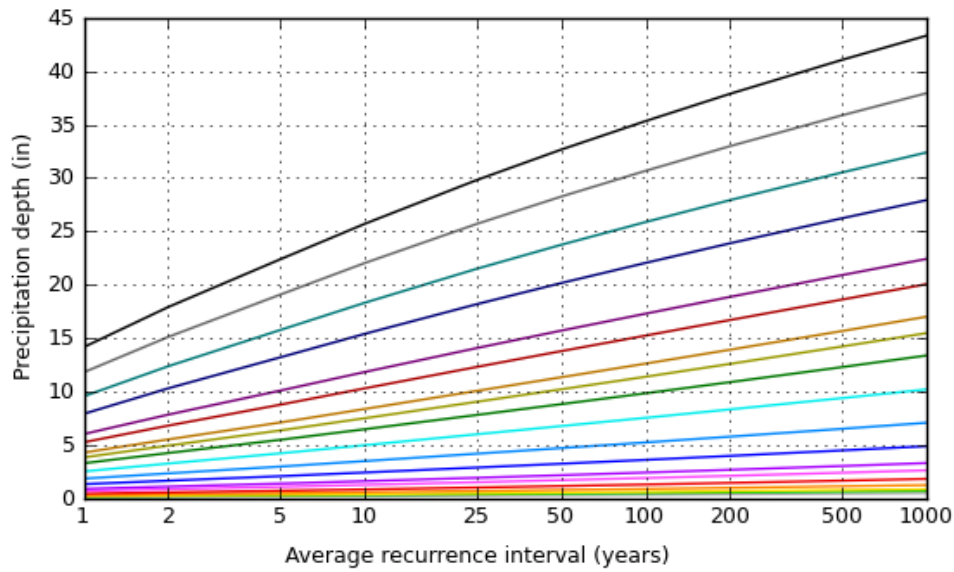
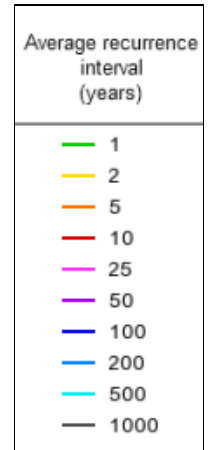
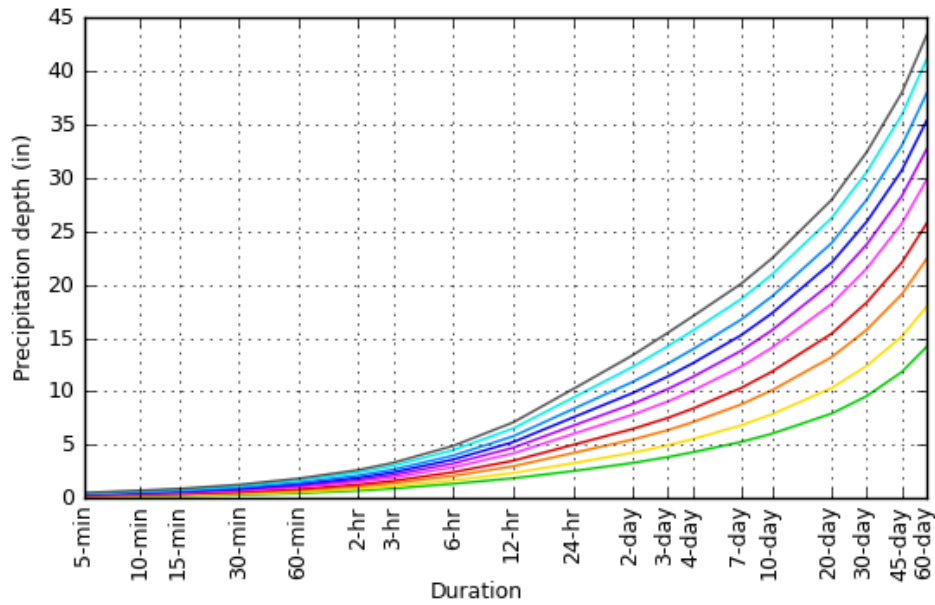
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.132 (0.117-0.150)	0.164 (0.146-0.187)	0.207 (0.184-0.236)	0.243 (0.213-0.279)	0.292 (0.246-0.349)	0.330 (0.272-0.405)	0.370 (0.296-0.466)	0.412 (0.319-0.536)	0.470 (0.347-0.642)	0.516 (0.367-0.733)
10-min	0.189 (0.168-0.215)	0.235 (0.209-0.267)	0.297 (0.263-0.338)	0.348 (0.305-0.400)	0.418 (0.353-0.500)	0.473 (0.390-0.580)	0.530 (0.425-0.669)	0.590 (0.458-0.769)	0.673 (0.498-0.920)	0.740 (0.526-1.05)
15-min	0.229 (0.204-0.260)	0.285 (0.253-0.323)	0.359 (0.318-0.409)	0.420 (0.369-0.484)	0.506 (0.427-0.605)	0.572 (0.472-0.701)	0.641 (0.514-0.808)	0.714 (0.554-0.929)	0.814 (0.602-1.11)	0.895 (0.636-1.27)
30-min	0.327 (0.291-0.371)	0.407 (0.361-0.462)	0.513 (0.454-0.584)	0.600 (0.527-0.691)	0.722 (0.610-0.864)	0.817 (0.673-1.00)	0.916 (0.733-1.15)	1.02 (0.790-1.33)	1.16 (0.860-1.59)	1.28 (0.908-1.81)
60-min	0.474 (0.422-0.538)	0.590 (0.525-0.670)	0.744 (0.659-0.848)	0.871 (0.765-1.00)	1.05 (0.884-1.25)	1.19 (0.977-1.45)	1.33 (1.06-1.68)	1.48 (1.15-1.93)	1.69 (1.25-2.30)	1.85 (1.32-2.63)
2-hr	0.719 (0.640-0.816)	0.888 (0.789-1.01)	1.11 (0.983-1.26)	1.29 (1.13-1.49)	1.54 (1.30-1.84)	1.74 (1.43-2.13)	1.94 (1.55-2.44)	2.14 (1.66-2.79)	2.43 (1.80-3.32)	2.65 (1.89-3.77)
3-hr	0.919 (0.818-1.04)	1.13 (1.01-1.29)	1.41 (1.25-1.61)	1.64 (1.44-1.89)	1.96 (1.65-2.34)	2.20 (1.81-2.69)	2.45 (1.96-3.08)	2.70 (2.10-3.52)	3.06 (2.26-4.17)	3.33 (2.37-4.74)
6-hr	1.36 (1.21-1.54)	1.69 (1.50-1.91)	2.11 (1.87-2.40)	2.45 (2.15-2.82)	2.91 (2.46-3.48)	3.27 (2.69-4.01)	3.63 (2.91-4.58)	4.01 (3.11-5.22)	4.51 (3.34-6.17)	4.91 (3.49-6.98)
12-hr	1.88 (1.67-2.13)	2.37 (2.11-2.69)	3.00 (2.66-3.42)	3.52 (3.09-4.05)	4.21 (3.55-5.03)	4.73 (3.90-5.80)	5.26 (4.21-6.63)	5.80 (4.50-7.56)	6.54 (4.83-8.93)	7.10 (5.05-10.1)
24-hr	2.55 (2.29-2.89)	3.29 (2.96-3.73)	4.24 (3.80-4.83)	5.00 (4.46-5.73)	6.02 (5.22-7.09)	6.79 (5.79-8.14)	7.57 (6.32-9.25)	8.35 (6.81-10.5)	9.41 (7.41-12.2)	10.2 (7.81-13.6)
2-day	3.31 (2.98-3.76)	4.27 (3.84-4.85)	5.50 (4.94-6.26)	6.50 (5.79-7.44)	7.83 (6.79-9.22)	8.84 (7.53-10.6)	9.86 (8.23-12.1)	10.9 (8.89-13.6)	12.3 (9.69-16.0)	13.4 (10.2-17.9)
3-day	3.86 (3.48-4.38)	4.96 (4.46-5.64)	6.38 (5.72-7.26)	7.53 (6.70-8.62)	9.06 (7.85-10.7)	10.2 (8.71-12.3)	11.4 (9.52-13.9)	12.6 (10.3-15.8)	14.2 (11.2-18.5)	15.5 (11.8-20.7)
4-day	4.31 (3.88-4.89)	5.54 (4.98-6.29)	7.12 (6.39-8.11)	8.39 (7.47-9.61)	10.1 (8.73-11.9)	11.4 (9.67-13.6)	12.6 (10.5-15.4)	13.9 (11.4-17.4)	15.7 (12.3-20.3)	17.0 (13.0-22.7)
7-day	5.27 (4.75-5.98)	6.83 (6.14-7.76)	8.79 (7.88-10.0)	10.3 (9.19-11.8)	12.3 (10.7-14.5)	13.8 (11.8-16.5)	15.3 (12.7-18.7)	16.7 (13.6-20.9)	18.6 (14.7-24.1)	20.1 (15.3-26.8)
10-day	6.04 (5.44-6.85)	7.86 (7.07-8.93)	10.1 (9.06-11.5)	11.8 (10.6-13.6)	14.1 (12.2-16.6)	15.7 (13.4-18.8)	17.3 (14.4-21.2)	18.9 (15.4-23.6)	20.9 (16.5-27.1)	22.4 (17.2-29.9)
20-day	7.93 (7.14-9.00)	10.3 (9.28-11.7)	13.2 (11.9-15.0)	15.4 (13.7-17.7)	18.2 (15.8-21.4)	20.2 (17.2-24.2)	22.1 (18.4-27.0)	23.9 (19.5-29.9)	26.2 (20.7-34.0)	27.9 (21.4-37.3)
30-day	9.57 (8.61-10.9)	12.4 (11.1-14.1)	15.8 (14.1-17.9)	18.3 (16.3-21.0)	21.5 (18.6-25.3)	23.7 (20.2-28.4)	25.9 (21.6-31.6)	27.9 (22.8-35.0)	30.5 (24.0-39.6)	32.4 (24.8-43.2)
45-day	11.8 (10.6-13.4)	15.1 (13.6-17.2)	19.1 (17.1-21.7)	22.0 (19.6-25.2)	25.7 (22.3-30.3)	28.3 (24.1-33.9)	30.7 (25.6-37.5)	33.0 (26.9-41.3)	35.9 (28.2-46.5)	37.9 (29.0-50.6)
60-day	14.2 (12.8-16.1)	17.9 (16.1-20.4)	22.4 (20.1-25.5)	25.7 (22.9-29.4)	29.8 (25.8-35.1)	32.6 (27.8-39.1)	35.3 (29.5-43.2)	37.9 (30.9-47.4)	41.1 (32.3-53.2)	43.3 (33.1-57.8)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at low er and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the low er bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 38.2660°, Longitude: -122.3654°

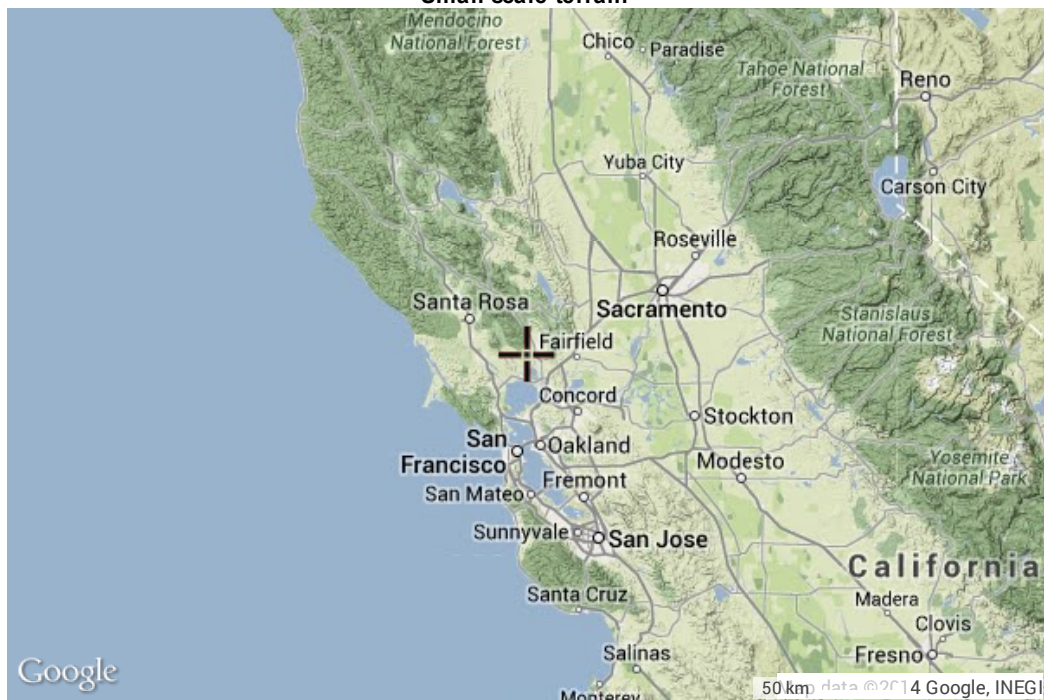


Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

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Maps & aerials

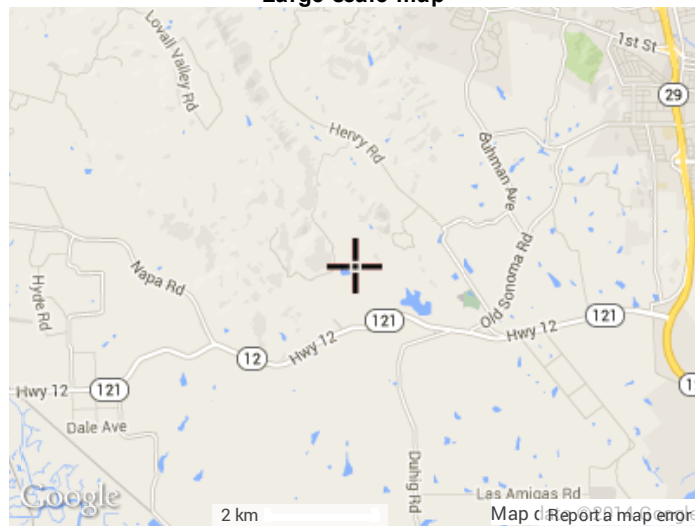
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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[Office of Hydrologic Development](#)
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Silver Spring, MD 20910
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[Disclaimer](#)

Hydrologic Soil Group—Napa County, California
(5398 Carneros Highway)




Map Scale: 1:1,300 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)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines


-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points






-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available


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: <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 5, Nov 25, 2013

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

Date(s) aerial images were photographed: Nov 2, 2010—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
126	Diablo clay, 5 to 9 percent slopes	C	0.6	20.2%
139	Forward gravelly loam, 9 to 30 percent slopes	B	2.3	79.8%
Totals for Area of Interest			2.9	100.0%

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

Tie-break Rule: Higher

Table 2-2a Runoff curve numbers for urban areas ^{1/}

Cover description	Average percent impervious area ^{2/}	Curve numbers for hydrologic soil group			
		A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) ^{3/} :					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ^{4/}		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas					
(pervious areas only, no vegetation) ^{5/}		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

¹ Average runoff condition, and $I_a = 0.2S$.² The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.³ CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.⁴ Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.⁵ Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands ^{1/}

Cover description	Hydrologic condition	Curve numbers for hydrologic soil group			
		A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. ^{2/}	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. ^{3/}	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 ^{4/}	48	65	73
Woods—grass combination (orchard or tree farm). ^{5/}	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. ^{6/}	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 ^{4/}	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

¹ Average runoff condition, and $I_a = 0.2S$.² **Poor:** <50% ground cover or heavily grazed with no mulch.**Fair:** 50 to 75% ground cover and not heavily grazed.**Good:** > 75% ground cover and lightly or only occasionally grazed.³ **Poor:** <50% ground cover.**Fair:** 50 to 75% ground cover.**Good:** >75% ground cover.⁴ Actual curve number is less than 30; use CN = 30 for runoff computations.⁵ CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.⁶ **Poor:** Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.**Fair:** Woods are grazed but not burned, and some forest litter covers the soil.**Good:** Woods are protected from grazing, and litter and brush adequately cover the soil.