BC Engineering Group
Civil Engineering & Land Planning

Initial Storm Water Low Impact Development Report

For

Jackson Family Investments III, LLC

3225 Bloomfield Road

Sebastopol, CA

APN: 025-100-043

July 26, 2021

Prepared by

Jessica Begley, P.E.
No. 90909
Exp. March 2022
Job# 1869-20
jb@bcengineeringgroup.com

418 B Street, 3rd Floor
Santa Rosa, CA 95401
707-542-4321
www.bcengineeringgroup.com

BC Engineering Group
Civil Engineering & Land Planning

Contents

Project Description 1

Pollution Prevention and Runoff Reduction Measures 1

Proposed BMPs: Design and Calculations 1

Maintenance and Funding Source 3

Conclusion 3

Appendices .... A

- Appendix A: Pre and Post Development Site Exhibits .... A
- Appendix B: Calculation Details from Storm Water Calculator .... B
- Appendix C: Calculation References C
- Appendix D: BMP Details and Determination Worksheet .... D
- Appendix E: Fact Sheets, Maintenance Check List, and Draft Maintenance Agreement .... E

418 B Street, 3rd Floor
Santa Rosa, CA 95401
707-542-4321
www.bcengineeringgroup.com

Project Description

This report addresses the Storm Water Low Impact Development associated with the proposed minor subdivision located at 3225 Bloomfield Road in Sebastopol. The overall project encompasses approximately 347.24 acres. The minor subdivision proposes two lots, one at 133.92 acres and the second at 213.32 acres. Of this area, 178.17 acres are encompassed by vineyards. The parcel is zoned as Land Extensive Agriculture, as are the lots to the west, south, and east. The parcels to the north are zoned as Diverse Agriculture. Existing features to remain include the vineyards, residence, driveway, accessory structures, streams, and two irrigation ponds.

No improvements are proposed with this subdivision at this time, and therefore no stormwater treatment is required. However, the 2017 Storm Water Low Impact Development Technical Design Manual states that all project phases must be included when evaluating treatment requirements. This subdivision has the potential to create or replace more than a combined total of 1 acre of impervious area in the future and therefore could require permanent storm water best management practices to provide 100 % treatment and volume capture of the post project runoff volume generated by 1" of rain over a 24-hour period. This report determines the potential project buildout and project site runoff for the design storm and evaluates the project's capacity to provide adequate stormwater treatment to meet the hydromodification control requirement.

Pollution Prevention and Runoff Reduction Measures

In accordance with the County's grading ordinance, this project will be designed to incorporate temporary and permanent pollution prevention and storm water Best Management Practices measures to minimize the introduction of pollutants in downstream bodies of water. A Sediment Control Plan shall also be prepared and included with the construction drawings that will require temporary storm water BMPs to be installed by the contractor during construction.

Runoff Reduction Measures, such as interceptor trees and impervious area disconnection, may be incorporated into the final site design but are not included in the initial runoff calculations. These reduction credits may be utilized during the development of Construction Drawings when information about the site plan and proposed features are available.

Proposed BMPs: Design and Calculations

As previously stated, Lot 2 will maintain its existing structures and driveway and Lot 1 has no improvements proposed at this time. Therefore, an accurate calculation for hydromodification control requirements cannot be completed. It is the purpose of this report to demonstrate that, with the ultimate allowable buildout, there is sufficient area to accommodate hydromodification control requirements on each lot.

In order to ensure that the calculations are applicable to most site development options, a number of conservative assumptions are made. First, it is assumed that both the driveway and structure improvements will be developed at one time. Second, Lot 1 will maintain the zoning designation of LEA B6 160 Z, which does not have a maximum lot coverage capacity. However, the tentative map designates approximately 71,500 sf potential building envelope. Once the map is recorded, site development of structures for Lot 1 will be held to this area and therefore this square footage is considered the ultimate buildout of the site.

Third, additional impervious surface on the lot will be limited to the driveway. The driveways shall be assumed as 12 feet wide to meet Section 13-37 of the County's Fire Safe Standards and shall be approximately 2,300 feet in length. This results in an additional 27,600 sf of impervious area. It should be noted that a gravel vineyard drive lane exists in the location of the future driveway. However, due to the existing steep slopes the driveway is required to be paved to meet current Fire Standards. Therefore, the impervious surface associated with the driveway is not increasing stormwater runoff to the same extent as the proposed buildable area.

Any additional paving would be nominal to the overall calculations and is not included at this time. Additional treatment over the 100% volume requirement for hydromodification control is provided in the calculations to provide a buffer for potential additional flatwork.

The above assumptions result in the following potential impervious areas:

71,500 sf buildable area
27,600 sf driveway improvements
99,100 sf total

As previously stated, this resulting overall area is over the 1 acre threshold and therefore will require hydromodification control.

The existing residence on proposed Lot 2 will remain undisturbed, therefore not requiring any stormwater treatment or capture.

The Hydrologic Soil Groups of this project site are classified as Groups 'B' and 'C' based on the results presented in the Custom Soil Resource Report provided through the USDA and Natural Resources Conservation Service website. The future buildable area is located fully within the Group 'B' soil group, while the future driveway is split between Groups 'B' and 'C'. Refer to Appendix C for a copy of this report.

Runoff Curve numbers are determined according to the TR-55 manual and can be found in Appendix C for 'TR-55 Runoff Curve Numbers for Urban Areas'. The post-development "buildable area" conservatively assumed to have a curve number of 98 to reflect the impervious designated building envelope and driveway. The overall curve number was calculated to be 81.7, and was rounded up to 82 during further calculations. More detailed curve numbers may be calculated in the final report once improvements are proposed and a site plan is developed.

Calculations were prepared to determine the total amount of post development storm water runoff volume required for capture and treatment of the map-delineated site buildout. The proposed bioretention design assumes that the soil media used has a porosity of at least 40%. Priority 1 'Swale with Bioretention" facilities are anticipated to be utilized throughout the site. Details for this feature is included in Appendix D. Calculations included in Appendix B demonstrate that the remaining landscape area is more than enough to accommodate the BMPs sized to meet hydromodification control requirements.

As shown on the proposed Tentative Map, no grading or other improvements are proposed at this time. Therefore, the existing drainage patterns of the site are undisturbed. Water will continue to sheet flow into the various existing streams and drainage ditches on site, which ultimately flow north and feed into Blucher Creek. Once improvements are proposed and a grading plan is prepared, the site shall be fine graded to direct runoff to bioretention areas for treatment and 100% capture. BMPs will be incorporated throughout the site to capture post development stormwater runoff during light storm events, and each BMP area will be designed with larger overflow structures to capture runoff from larger events so as not to inundate the surrounding paved areas. Stormwater features shall be located so that existing drainage patterns can be maintained while providing pollution prevention prior to the runoff entering downstream water courses. Please refer to the Post Development Site Exhibit in Appendix A for proposed preliminary sizes and locations of treatment areas.

Maintenance and Funding Source

The BMPs in this project shall be maintained, inspected, and replaced by the property Owner as necessary to ensure they continue to function effectively. A maintenance agreement shall be recorded against the property and run with the title of the land. A draft of this agreement is included in Appendix E of this report.

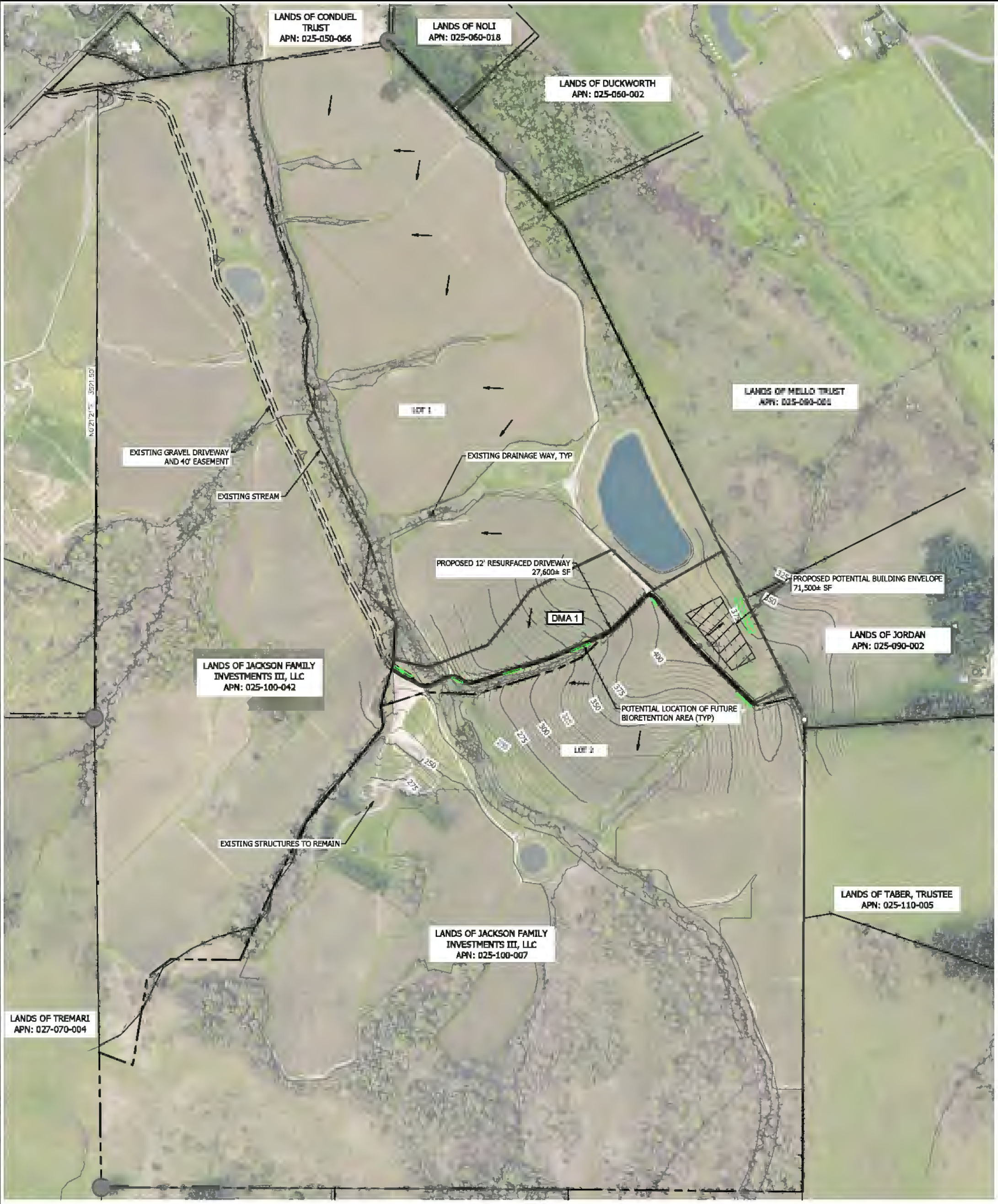
Inspections shall be performed twice annually for sediment and/or trash accumulation in the gutter. If obstructions and/or trash are observed, they shall be removed and properly disposed of. Inspections shall be performed twice during the rainy season to check for ponded water. Pesticides and fertilizers shall not be used in the bioretention area, and plants shall be pruned, weeds pulled, and dead plants replaced as needed. For further maintenance recommendations specific to BMP type, refer to Appendix E. All inspection and maintenance activities shall be recorded using the sample Maintenance Checklists included in Appendix E and kept on file to be provided to County staff and/or the Regional Water Quality Control Board (RWQCB) staff upon request.

Conclusion

The included calculations provide the approximate volume of hydromodification control required with maximum site buildout, even with unlikely conservative assumptions. It is also demonstrated that Lot 1 has more than enough area to accommodate adequate storm water treatment and volume capture. While no development is proposed at this time, this project can meet the requirements from the County of Sonoma and RWQCB for low impact development.

Appendix A: Pre and Post Development Site Exhibits

418 B Street, 3rd Floor
Santa Rosa, CA 95401
707-542-4321
www.bcengineeringgroup.com



Linetype Legend

- SUBJECT PROPERTY LINE
- ADJOINING PROPERTY LINE
- EXISTING EASEMENT
- DRIVEWAY CENTERLINE

Drainage Area Legend

- DMA 1 — DRAINAGE AREA
- DRAINAGE AREA BOUNDARY
- LINE OF ANALYSIS
- BIORETENTION AREA

NOT FOR CONSTRUCTION

Job: 1869-20 July 26, 2021

BC ENGINEERING GROUP, INC.
CIVIL ENGINEERING & LAND PLANNING
www.bcengineeringgroup.com
Phone: 707.542.4321
418 B Street, Third Floor
Santa Rosa, CA 95401

Jackson Family Investments III, LLC
INITIAL SWLID EXHIBIT

3225 Bloomfield Road
Sebastopol, CA
APN 025-100-043

Appendix B: Calculation Details from Storm Water Calculator

418 B Street, 3rd Floor
Santa Rosa, CA 95401
707-542-4321
www.bcengineeringgroup.com

City of Santa Rosa WATER

STORM WATER CALCULATOR

LID BMP Summary Page & Site Global Values

Project Information:

Project Name: Jackson Family Investments III, LLC
Address/Location: 3225 Bloomfield Road, Sebastopol, CA
Designer: JAB
Date: 7/26/2021

Site Information:

Mean Seasonal Precipitation (MSP) of Project Site: 32.50 (inches)
K=MSP/3(K= 1.08

Impervious area - pre development: 0.0 ft^2
Impervious area - post development: 688,700.0 ft^2

Based upon the pre and post development impervious area, the post construction BMP requirement is:

100% Capture & Treatment

Summary of Saved BMP Results:

		Tributary Area		Requirements		BMP Design Results						
							Hydromodification Control		Flow Base Treatment		Delta Volume Capture	
	BMP ID:	Tributary Area (ft^2.)	Runoff Reduction Measures (Y/N)	Type of Requirement Met	Type of BMP Design	Percent Achieved	Required $V_{Hydromod}$ (ft^3)	Achieved (ft^3)	Required Q Treatment (cfs)	Achieved (ft^3)	Required Vdelta (ft^3)	Achieved (ft^3)
1	Lot 1	688,700	No	Hydromod Volume Capture	Priority 1: P1-06 Swale with Bioretention	107.3	8388.3662	9000.0001				
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

STORM WATER CALCULATOR

City of Santa Rosa WATER

BMP Tributary Parameters

Project Name: Jackson Family Investments III, LLC

BMP ID: Lot 1

BMP Design Criteria: 100% Capture & Treatment

Type of BMP Design: Priority 1: P1-06 Swale with Bioretention

BMP's Physical Tributary Area: 688,700.0 ft^2

Description/Notes:

Hydromodification Requirement: 100% Volume Capture; $V_{HYDROMOD}$

$V_{HYDROMOD}$ = 8,388.37 ft^3

Post development hydrologic soil type within tributary area: C: 0.05 - 0.15 in/hr infiltration (transmission) rate

Post development ground cover description: Residential - 1/4 acre lots

CN_{POST}:

User Composite post development CN: 82.0

BMP Sizing Tool: Hydromodification Requirement

Percent of Goal Achieved = 107.29 %

	BMP Volume Below Ground			Ponded Water Above Ground	
Porosity:	0.40				
Depth below perforated pipe if present:	3.00	ft	Depth:	0.00	ft
Width:	10.00	ft	Width:	0.00	ft
Length:	750.00	ft	Length:	0.00	ft
Area:	0.00	ft^2	Area:	0.00	ft^2

STORM WATER CALCULATOR

CN Composite Work Sheet

Project:	Jackson Family Investments III, LLC
Address/Location:	3225 Bloomfield Road, Sebastopol, CA
Designer:	JAB
Date:	June 3, 2021
Inlet Number/Tributary Area/BMP:	Lot 1

INSTRUCTIONS: Please refer to the "Urban Hydrology for Small Watersheds" (TR-55 manual).

Soil Type (Infiltration Rate)	Cover Description	CN	Area ft^2	Product of CN x Area
C: 0.05 - 0.15 in/hr infiltration (transmission) rat	Pasture, grassland, range - Fair (50% to 75% ground cover and not heavily grazed)	79	589600	46,578,400.0
C: 0.05 - 0.15 in/hr infiltration (transmission) rat	Impervious - Paved Parking, Rooftop, Driveways	98	99100	9,711,800.0
No Entry	No Entry	0	0	0.0
No Entry	No Entry	0	0	0.0
No Entry	No Entry	0	0	0.0
No Entry	No Entry	0	0	0.0
No Entry	No Entry	0	0	0.0
No Entry	No Entry	0	0	0.0
No Entry	No Entry	0	0	0.0
No Entry	No Entry	0	0	0.0
		Totals =	688700	56,290,200.0

$$CN_{COMPOSIT} = \frac{(CN \times Area) + (CN \times Area) + (CN \times Area) + (CN \times Area) \ldots}{\text{Total Tributary Area}}$$

= **Use this $CN_{COMPOSIT}$ =** **81.7**

BC Engineering Group
Civil Engineering & Land Planning

Appendix C: Calculation References

418 B Street, 3rd Floor
Santa Rosa, CA 95401
707-542-4321
www.bcengineeringgroup.com

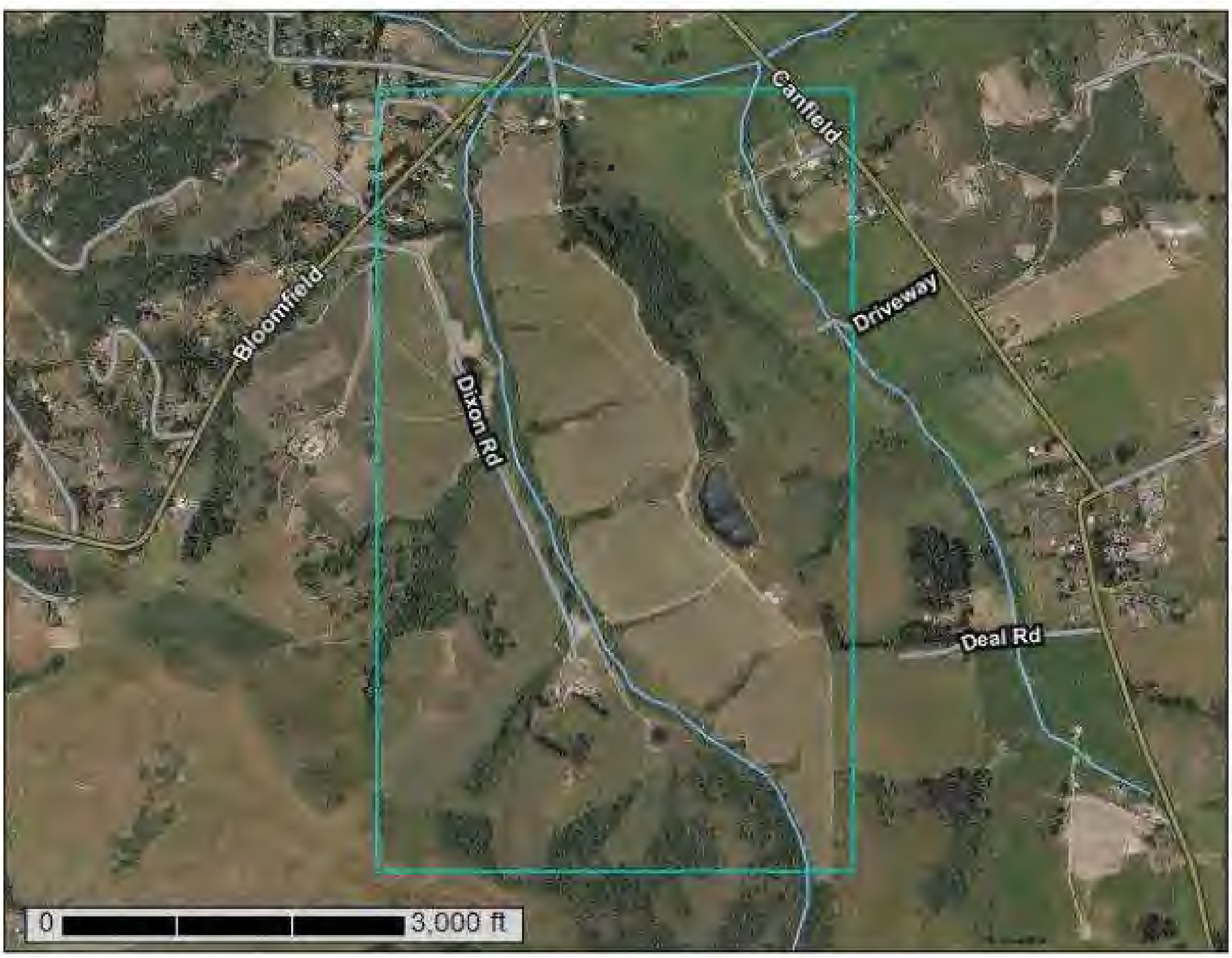
USDA United States Department of Agriculture

NRCS Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Sonoma County, California



May 30, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface...... 2
How Soil Surveys Are Made...... 5
Soil Map...... 8
Soil Map...... 9
Legend...... 10
Map Unit Legend...... 11
Map Unit Descriptions...... 11
Sonoma County, California...... 14
BcA—Blucher fine sandy loam, overwash, 0 to 2 percent slopes...... 14
GdD—Goldridge fine sandy loam, 9 to 15 percent slopes...... 15
LoD—Los Osos clay loam, 2 to 15 percent slopes...... 16
LsE—Los Osos clay loam, thin solum, 15 to 30 percent slopes...... 17
LsF2—Los Osos clay loam, thin solum, 30 to 50 percent slopes...... 18
SnC—Steinbeck loam, 2 to 9 percent slopes...... 20
SnD—Steinbeck loam, 9 to 15 percent slopes...... 21
SnE—Steinbeck loam, 15 to 30 percent slopes...... 22
SnE2—Steinbeck loam, 15 to 30 percent slopes, eroded...... 24
SnF—Steinbeck loam, 30 to 50 percent slopes...... 25
References...... 27

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:12,100 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

Soil Survey Area: Sonoma County, California
Survey Area Data: Version 14, May 29, 2020

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

Date(s) aerial images were photographed: Jun 1, 2020—Oct 30, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcA	Blucher fine sandy loam, overwash, 0 to 2 percent slopes	112.1	17.2%
GdD	Goldridge fine sandy loam, 9 to 15 percent slopes	31.3	4.8%
LoD	Los Osos clay loam, 2 to 15 percent slopes	58.8	9.0%
LsE	Los Osos clay loam, thin solum, 15 to 30 percent slopes	5.7	0.9%
LsF2	Los Osos clay loam, thin solum, 30 to 50 percent slopes	1.1	0.2%
SnC	Steinbeck loam, 2 to 9 percent slopes	14.9	2.3%
SnD	Steinbeck loam, 9 to 15 percent slopes	103.4	15.9%
SnE	Steinbeck loam, 15 to 30 percent slopes	128.3	19.7%
SnE2	Steinbeck loam, 15 to 30 percent slopes, eroded	52.5	8.1%
SnF	Steinbeck loam, 30 to 50 percent slopes	142.1	21.9%
Totals for Area of Interest		**650.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Sonoma County, California

BcA—Blucher fine sandy loam, overwash, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hfb4
Elevation: 0 to 500 feet
Mean annual precipitation: 25 to 50 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Blucher and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blucher

Setting

Landform: Alluvial fans, drainageways
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 20 inches: fine sandy loam
H2 - 20 to 34 inches: fine sandy loam
H3 - 34 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 42 to 60 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: Occasional
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Hydric soil rating: Yes

Minor Components

Pajaro

Percent of map unit: 8 percent

Hydric soil rating: No

Steinbeck

Percent of map unit: 7 percent
Hydric soil rating: No

GdD—Goldridge fine sandy loam, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: hfcz
Elevation: 200 to 2,000 feet
Mean annual precipitation: 40 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 225 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Goldridge and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Goldridge

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 24 inches: fine sandy loam
H2 - 24 to 28 inches: sandy clay loam
H3 - 28 to 72 inches: sandy clay loam

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Cotati
Percent of map unit: 5 percent
Hydric soil rating: No

Sebastopol
Percent of map unit: 5 percent
Hydric soil rating: No

Blucher
Percent of map unit: 5 percent
Hydric soil rating: No

LoD—Los Osos clay loam, 2 to 15 percent slopes

Map Unit Setting
National map unit symbol: hfgv
Elevation: 100 to 3,500 feet
Mean annual precipitation: 14 to 35 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 225 to 350 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Los osos and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Los Osos

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sedimentary rock

Typical profile
H1 - 0 to 24 inches: clay loam
H2 - 24 to 34 inches: clay
H3 - 34 to 59 inches: weathered bedrock

Properties and qualities
Slope: 2 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R015XD126CA - LOAMY UPLAND
Hydric soil rating: No

Minor Components

Steinbeck

Percent of map unit: 8 percent
Hydric soil rating: No

Pajaro

Percent of map unit: 7 percent
Hydric soil rating: No

LsE—Los Osos clay loam, thin solum, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hfh0
Elevation: 100 to 3,500 feet
Mean annual precipitation: 14 to 35 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 225 to 350 days
Farmland classification: Not prime farmland

Map Unit Composition

Los osos and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Los Osos

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 11 inches: clay loam

H2 - 11 to 22 inches: clay
H3 - 22 to 59 inches: weathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R015XD129CA - SHALLOW LOAMY UPLANDS
Hydric soil rating: No

Minor Components

Steinbeck

Percent of map unit: 5 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: No

Goldridge

Percent of map unit: 5 percent
Hydric soil rating: No

LsF2—Los Osos clay loam, thin solum, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: hfh2
Elevation: 100 to 3,500 feet
Mean annual precipitation: 14 to 35 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 225 to 350 days
Farmland classification: Not prime farmland

Map Unit Composition

Los osos and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Los Osos

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 4 inches: clay loam
H2 - 4 to 20 inches: clay
H3 - 20 to 59 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R015XD130CA - STEEP SHALLOW LOAMY UPLANDS
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 10 percent
Hydric soil rating: No

Goldridge

Percent of map unit: 3 percent
Hydric soil rating: No

Steinbeck

Percent of map unit: 2 percent
Hydric soil rating: No

SnC—Steinbeck loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hfjv
Elevation: 1,500 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Prime farmland if irrigated and drained

Map Unit Composition

Steinbeck and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Steinbeck

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 18 inches: loam
H2 - 18 to 35 inches: fine sandy loam
H3 - 35 to 56 inches: sandy clay loam
H4 - 56 to 60 inches: weathered bedrock

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Cotati

Percent of map unit: 4 percent
Hydric soil rating: No

Pajaro

Percent of map unit: 4 percent
Hydric soil rating: No

Goldridge

Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Landform: Swales
Hydric soil rating: Yes

SnD—Steinbeck loam, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: hfjw
Elevation: 1,500 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Steinbeck and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Steinbeck

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 18 inches: loam
H2 - 18 to 35 inches: fine sandy loam
H3 - 35 to 56 inches: sandy clay loam
H4 - 56 to 60 inches: weathered bedrock

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R015XD126CA - LOAMY UPLAND
Hydric soil rating: No

Minor Components

Pajaro

Percent of map unit: 3 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Landform: Swales
Hydric soil rating: Yes

Goldridge

Percent of map unit: 3 percent
Hydric soil rating: No

Los osos

Percent of map unit: 3 percent
Hydric soil rating: No

Cotati

Percent of map unit: 3 percent
Hydric soil rating: No

SnE—Steinbeck loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hfjy
Elevation: 1,500 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Steinbeck and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Steinbeck

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 16 inches: fine sandy loam
H3 - 16 to 35 inches: sandy clay loam
H4 - 35 to 59 inches: weathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R015XD126CA - LOAMY UPLAND
Hydric soil rating: No

Minor Components

Los osos

Percent of map unit: 5 percent
Hydric soil rating: No

Cotati

Percent of map unit: 5 percent
Hydric soil rating: No

Goldridge

Percent of map unit: 5 percent
Hydric soil rating: No

SnE2—Steinbeck loam, 15 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: hfjz
Elevation: 1,500 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Steinbeck and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Steinbeck

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 12 inches: fine sandy loam
H3 - 12 to 32 inches: sandy clay loam
H4 - 32 to 59 inches: weathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R015XD126CA - LOAMY UPLAND
Hydric soil rating: No

Minor Components

Goldridge

Percent of map unit: 5 percent
Hydric soil rating: No

Los osos

Percent of map unit: 5 percent
Hydric soil rating: No

Cotati

Percent of map unit: 5 percent
Hydric soil rating: No

SnF—Steinbeck loam, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: hfk0
Elevation: 1,500 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Steinbeck and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Steinbeck

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 11 inches: fine sandy loam
H3 - 11 to 30 inches: sandy clay loam
H4 - 30 to 59 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R015XD116CA - STEEP LOAMY
Hydric soil rating: No

Minor Components

Goldridge

Percent of map unit: 8 percent
Hydric soil rating: No

Los osos

Percent of map unit: 7 percent
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2/]	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 2-2b Runoff curve numbers for cultivated agricultural lands [1]

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2]	Hydrologic condition [3]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

1 Average runoff condition, and I_a=0.2S
2 Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.
3 Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description — Cover type	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.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition [2/]	A [3/]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and I_a, = 0.2S. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

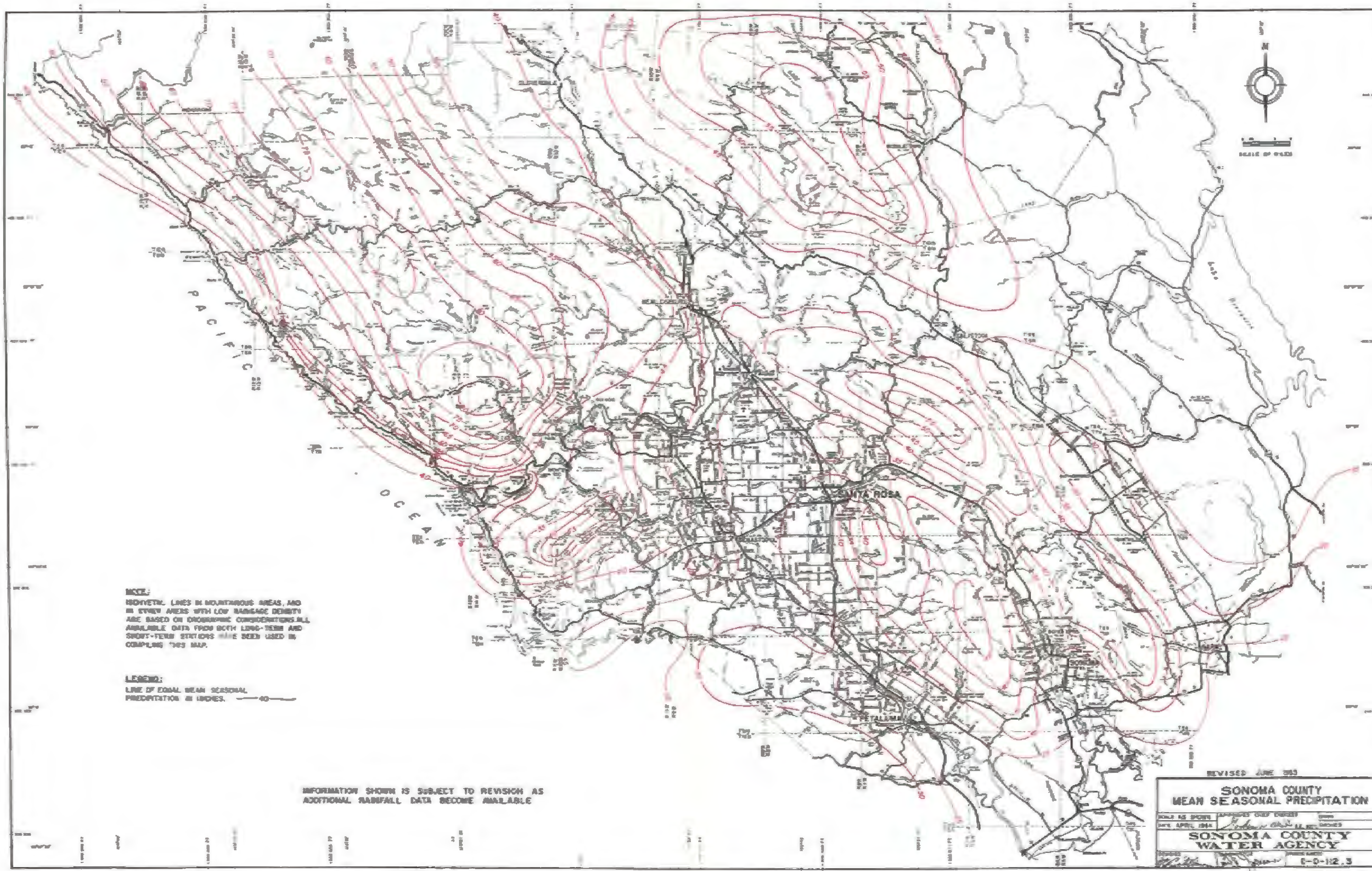

CLOVERDALE
HEALDSBURG
SANTA ROSA
PETALUMA
SONOMA
PACIFIC
OCEAN
NOTE:
ISOHYETAL LINES IN MOUNTAINOUS AREAS, AND IN OTHER AREAS WITH LOW RAINGAGE DENSITY ARE BASED ON OROGRAPHIC CONSIDERATIONS. ALL AVAILABLE DATA FROM BOTH LONG-TERM AND SHORT-TERM STATIONS HAVE BEEN USED IN COMPILING THIS MAP.
LEGEND:
LINE OF EQUAL MEAN SEASONAL PRECIPITATION IN INCHES. ——40——
INFORMATION SHOWN IS SUBJECT TO REVISION AS ADDITIONAL RAINFALL DATA BECOME AVAILABLE
REVISED JUNE 1963
SONOMA COUNTY
MEAN SEASONAL PRECIPITATION
SONOMA COUNTY
WATER AGENCY
C-0-112.3

PLATE No. B-3

BC Engineering Group
Civil Engineering & Land Planning

Appendix D: BMP Details and Determination Worksheet

418 B Street, 3rd Floor
Santa Rosa, CA 95401
707-542-4321
www.bcengineeringgroup.com

FOR OFFICE USE ONLY:
Does this project require permanent storm water BMP's?

☐ Y ☐ N

Date Submitted: ______________

City of Santa Rosa

Print Form

File No:	Quadrant
Related Files:	
Set:	
Department Use Only	

2017 Storm Water LID Determination Worksheet

PURPOSE AND APPLICABILITY: This determination worksheet is intended to satisfy the specific requirements of "ORDER NO. R1-2015-0030, NPDES NO. CA0025054 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS." Additional design requirements imposed by Governing Agencies, such as local grading ordinances, CAL Green, CEQA, 401 permitting, and hydraulic design for flood control still apply as appropriate. Additionally, coverage under another regulation may trigger the requirement to design in accordance with the Storm Water LID Technical Design Manual.

Part 1: Project Information

Jackson Family Investments III, LLC
Project Name

Jackson Family Investments III, LLC
Applicant (owner or developer) Name

3225 Bloomfield Road
Project Site Address

425 Aviation Road
Applicant Mailing Address

Sebastopol/CA
Project City/State/Zip

Santa Rosa/CA/95403
Applicant City/State/Zip

Permit Number(s) - (if applicable)

707-535-0146
Applicant Phone/Email/Fax

BC Engineering Group/Jessica Begley
Designer Name

418 B Street, Third Floor
Designer Mailing Address

Santa Rosa/CA/95401
Designer City/State/Zip

707-542-4321/jb@bcengineeringgroup.com
Designer Phone/Email

Type of Application/Project:

☑ Subdivison ☐ Grading Permit ☐ Building Permit ☐ Hillside Development
☐ DesignReview ☐ Use Permit ☐ Encroachment ☐ Time Extensions ☐ Other :_______________

PART 2: Project Exemptions

1. Is this a project that creates or replaces *less than* 10,000 square feet of impervious surface[1], including all project phases and off-site improvements?

   ☐ Yes ☑ No

1 Impervious surface replacement, such as the reconstruction of parking lots or excavation to roadway subgrades, is not a routine maintenance activity. Reconstruction is defined as work that replaces surfaces down to the subgrade. Overlays, resurfacing, trenching and patching are defined as maintenance activities per section VI.D.2.b.

2. Is this project a routine maintenance activity[2] that is being conducted to maintain original line and grade, hydraulic capacity, and original purpose of facility such as resurfacing existing roads and parking lots?

☐ Yes ☑ No

3. Is this project a stand alone pedestrian pathway, trail or off-street bike lane?

☐ Yes ☑ No

4. **Did you answer "YES" to any of the questions in Part 2?**

☐ **YES:** This project will *not* need to incorporate permanent Storm Water BMP's as required by the NPDES MS4 Permit. **Please complete the "Exemption Signature Section" on Page 4.**

☑ **NO:** Please complete the remainder of this worksheet.

Part 3: Project Triggers

Projects that Trigger Requirements:
Please answer the following questions to determine whether this project requires permanent Storm Water BMP's and the submittal of a SW LIDs as required by the NPDES MS4 Permit order No. R1-2015-0030.

1. Does this project create or replace a combined total of 10,000 square feet or more of impervious surface[1] including all project phases and off-site improvements?

☑ Yes ☐ No

2. Does this project create or replace a combined total or 10,000 square feet or more of impervious streets, roads, highways, or freeway construction or reconstruction[3]? ☐ Yes ☑ No

3. Does this project create or replace a combined total of 1.0 acre or more of impervious surface[1] including all project phases and off-site improvements? ☑ Yes ☐ No

4. **Did you answer "YES" to any of the above questions in Part 3?**

☑ **YES:** This project will need to incorporate permanent Storm Water BMP's as required by the NPDES MS4 Permit. **Please complete remainder of worksheet and sign the "Acknowledgement Signature Section" on Page 4.**

☐ **NO:** This project will *not* need to incorporate permanent Storm Water BMP's as required by the NPDES MS4 permit. **Please complete the "Exemption Signature Section" on Page 4.**

---

1 Imprevious surface replacement, such as the reconstruction of parking lots or excavation to roadway subgrades, is not a routine maintence activity. Reconstruction is defined as work that replaces surfaces down to the subgrade. Overlays, resurfacint, trenching and patching are defined as maintenance activities per section VI.D.2.b.

2 "Rountine Maintenance Activity" includes activities such as overlays and/or resurfacing of existing roads or parking lots as well as trenching and patching activities and reroofing activities per section VI.D.2.b.

3 "Reconstruction" is defined as work that extends into the subgrade of a pavement per section VI.D.2.b.

Part 4: Project Description

1. Total Project area: 347.24 ○ square feet ◉ acres

2. Existing land use(s): (check all that apply)

☐ Commercial ☐ Industrial ☑ Residential ☐ Public ☐ Other

Description of buildings, significant site features (creeks, wetlands, heritage trees), etc.:

Existing house and outbuildings with driveway access off of Bloomfield Road. Surrounding vineyards and irrigation ponds.

3. Existing impervious surface area: 0 ○ square feet ◉ acres

4. Proposed Land Use(s): (check all that apply)

☐ Commercial ☐ Industrial ☑ Residential ☐ Public ☐ Other

Description of buildings, significant site features (creeks, wetlands, heritage trees), etc.:

Existing house, driveway, and outbuildings to remain on Lot 2. Lot 1 for potential development of driveway and new residence. No structures are proposed at this time; impervious surface assumed.

5. Existing impervious surface area: 99,100 ◉ square feet ○ acres

Acknowledgment Signature Section:

As the property owner or developer, I understand that this project is required to implement permanent Storm Water Best Management Practices and provide a Storm Water Low Impact Development Submittal (SW LIDS) as required by the City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems (MS4) Permit Order No. R1-2015-0030. *Any unknown responses must be resolved to determine if the project is subject to these requirements.

______________________________ ______________________________

Applicant Signature Date

Exemption Signature Section:

As the property owner or developer, I understand that this project as currently designed does not require permanent Storm Water BMP's nor the submittal of a Storm Water Low Impact Development Submittal (SW LIDS) as required by the City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems (MS4) Permit*. I understand that redesign may require submittal of a new Determination Worksheet and may require permanent Storm Water BMP's.

______________________________ ______________________________

Applicant Signature Date

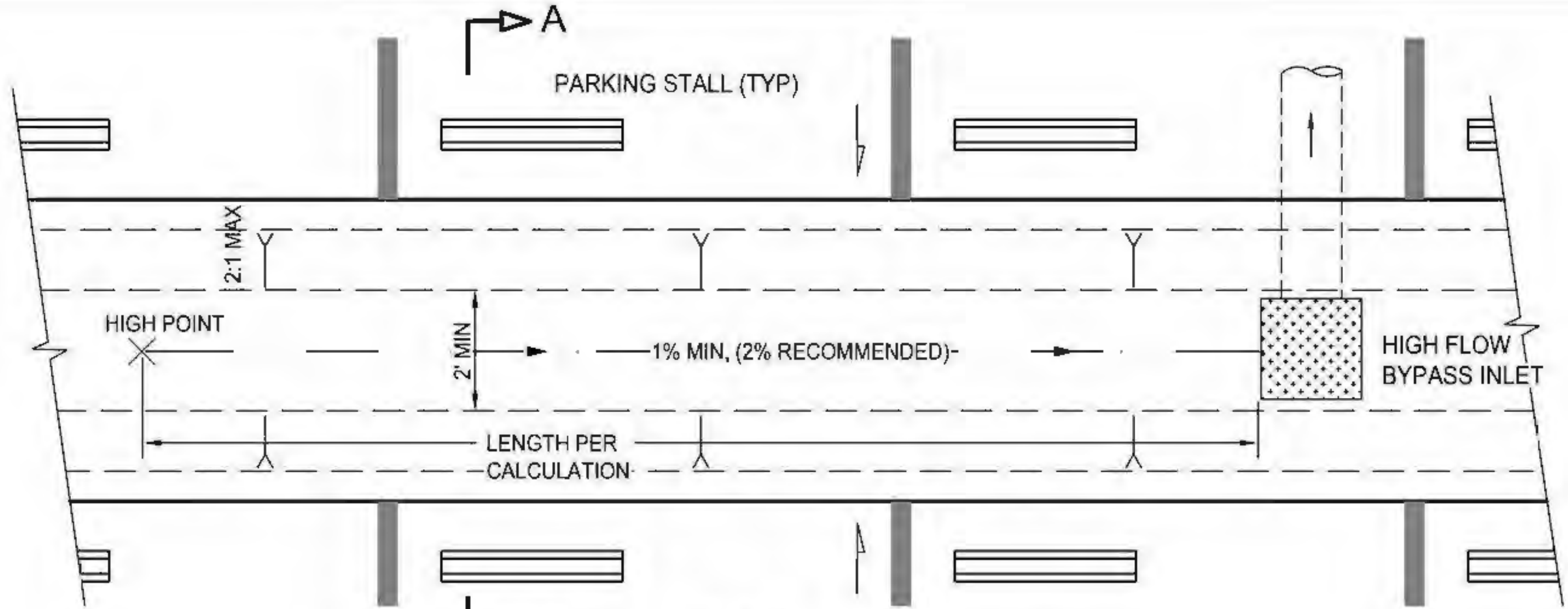
*** This determination worksheet is intended to satisfy the specific requirements of "ORDER NO. R1-2015-0030, NPDES NO. CA0025054 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS." Additional design requirements imposed by Governing Agencies, such as local grading ordinances, CAL Green, CEQA, 401 permitting, and hydraulic design for flood control still apply as appropriate. Additionally, coverage under another regulation may trigger the requirement to design in accordance with the Storm Water LID Technical Design Manual.**

Implementation Requirements: *All calculations shall be completed using the "Storm Water Calculator" available at: www.srcity.org/stormwaterLID*

Hydromodification Control/100% Volume Capture: Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by a 1.0" 24-hour storm event, as calculated using the "Urban Hydrology for Small Watersheds" TR-55 Manual method. This is a retention requirement.

Treatment Requirement: Treatment of 100% of the flow calculated using the modified Rational Method and a known intensity of 0.20 inches per hour.

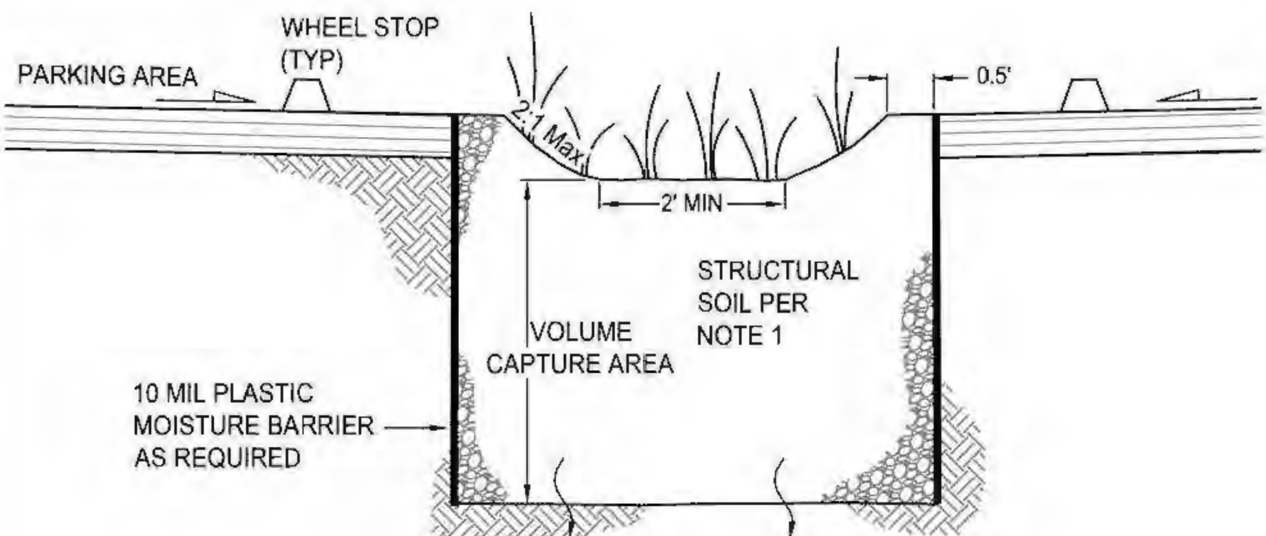
Delta Volume Capture Requirement: Capture (infiltration and/or reuse) of the increase in volume of storm water due to development generated by a 1.0" 24-hour storm event, as calculated using the "Urban Hydrology for Small Watersheds" TR-55 Manual method. This is a retention requirement.



PLAN

NOTES:

1. STRUCTURAL SOIL UNLESS OTHERWISE APPROVED BY GEOTECHNICAL ENGINEER AND ACCEPTED BY GOVERNING AGENCY.
2. SWALE MUST CONVEY FLOOD DESIGN FLOWS PER GOVERNING AGENCY DESIGN STANDARDS.
3. PARKING ISLAND WIDTH PER APPLICABLE GOVERNING AGENCY STANDARDS.



SECTION A-A

Not to Scale

PRIORITY 1 SWALE WITH BIORETENTION		
SCALE: *NONE*		DATE: *04/06/17*
DWN. *DIT* CHK. *HM*	SHEET 1 of 1	P1–06

BC Engineering Group
Civil Engineering & Land Planning

Appendix E: Fact Sheets, Maintenance Check List, and Draft Maintenance Agreement

418 B Street, 3rd Floor
Santa Rosa, CA 95401
707-542-4321
www.bcengineeringgroup.com

Form A
Storm Water Quality Feature Maintenance Check List
- Standard Conditions -

Date: ________________ Inspector: ______________________________________

Start Time: ______________ Project: ______________________________________

Stop Time: ______________ Address: ______________________________________

Inspection Status Codes:
S = Satisfactory * = Refer to Form B (Specials) and/or Form C (Notes).
D = Deficient

Are there any special conditions and/or maintenance requirements noted for BMP(s)? Y N (circle one)

If Yes, attach Form B for Project.

	Drainage				**Erosion**						**Vegetation**				**General**			**Special Features**
	Drawdown - Drainage - Vector Risk - Pump Out-Blockage				Hydraulic Function - Failure - Sediment Clogging						Excessive Mowing - Herbicide Overuse - Health of Desired Vegetation -				Trash and Debris - Improper Modifications - Damage			
Reference code	D1	D2	D3	D4	E1	E2	E3	E4	E5	E6	V1	V2	V3	V4	G1	G2	G4	S
BMP ID:	Evidence of standing or ponding of water in the BMP area after 72 hours of dry weather?	Does the high flow bypass function as designed?	Is there sediment acumination in or around BMP?	Has water been observed flowing in the pervious concrete section during a low intensity storm?	Is there under cutting or washouts along the sidewalks and/or curbs abutting the planter area?	Is there channelization (gully) forming along the length of the planter area?	Is there accumulation of sediment (sand, dirt, mud) in the planter area ?	Observed or potential transport of mulch to drainage system?	Are there voids or holes present in the BMP?	Is there evidence of animal activity?	Is the vegetation clogging the inlet or flow path?	Evidence of Excessive Mowing and/or Herbicide Overuse?	Are there dead or dry plants or excessive weeds?	Is there an absence of correct vegetation?	Is there debris/trash accumulation in the BMP or high flow by pass?	Missing or damage structural features? (Grates, pipes, walls, curbs, etc.)	Evidence of improper modifications or removal of BMP?	**See Additional Special Conditions or Features Check List Requirement Form B**

Office Use:
Complete: _______ Issues Corrective Action: _______ Re-Inspection Required: __________

Page _____ of ______

Storm Water Quality Special Feature Maintenence Check List

Date: ________________

Start Time: ________________

Stop Time: ________________

Inspector: ______________________________

Project: ______________________________

Address: ______________________________

Inspection Status Codes:

S = Satisfactory

D = Deficient

* - See Notes on Form C

Special Feature or Conditions

Reference code	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
Additional Special Maintenance Inspection Criterial	Add special inspection requirements in addition to Form A here.	Add special inspection requirements in addition to Form A here.	Add special inspection requirements in addition to Form A here.	Add special inspection requirements in addition to Form A here.	Add special inspection requirements in addition to Form A here.	Add special inspection requirements in addition to Form A here.	Add special inspection requirements in addition to Form A here.	Add special inspection requirements in addition to Form A here.	Add special inspection requirements in addition to Form A here.	Add special inspection requirements in addition to Form A here.	Add special inspection requirements in addition to Form A here.
BMP ID:											

Office Use:

Complete: _______ Issues Corrective Action: _______ Re-Inspection Required: __________

Form C
Storm Water Quality Feature Maintenence Check List
- Inspection Notes -

Date: ___________________

Inspector: ____

Project: ____

Address: ____

BMP ID:	Reference Code	**Notes**

Page _____ of _____

FACT SHEET- BIORETENTION

BIORETENTION

Also know as: Rain garden, roadside bioretention, and bioretention cell

DESCRIPTION

The bioretention area best management practice (BMP) functions as a soil and plant-based filtration and infiltration feature that removes pollutants through a variety of natural physical, biological, and chemical treatment processes.

ADVANTAGES

- Can be designed to achieve Treatment, Delta Volume Capture, or Hydromodification requirements.
- Enhances water quality of downstream water bodies through natural processes.
- Aesthetically pleasing.
- The vegetation can provide shade and wind breaks, absorbs noise, reduces heat island effects and improves an area's landscape.
- Provides habitat for birds and attracts other pollinators like butterflies and bees.
- Does not interrupt utility installation.
- Does not interfere with tree planting.

LIMITATIONS

- Specialized design is required for areas where street slopes exceed 10%.
- Should not be used in areas of know contamination. If soil and/or groundwater contamination is present on the site or within a 100' radius of the proposed BMP location, the North Coast Regional Water Quality Control Board will need to be contacted and the site reviewed.
- Should not be used in areas of high groundwater. In general a minimum of 2' of clearance should be provided between the bottom of the bioretention cell and seasonal high groundwater.
- Should not be used in areas of slope instability where infiltrated storm water may cause failure. Slope stability should be determined by a licensed geotechnical engineer.
- Do not use in locations that can negatively impact building foundation or footings. Location shall be approved by a licensed Geotechnical Engineer.

KEY DESIGN FEATURES

ALL BIORETENTION

- Structural soil should be used within the bioretention area requiring load bearing capacity (adjacent to roadways and/or buildings).
- Structural soil, if used, shall be installed as described in Appendix E.
- Some BMPs may not require the use of structural soil and a more organic type planting soil and/or treatment media may be used in its place. It may be possible in some cases to use native soil or to amend the native soil so that it is suitable. Use of non-structural soil will depend on evaluation of the criteria in "Chapter 4-Site Assessment" as well as consideration of structural needs and may require evaluation by a licensed Geotechnical Engineer.
- Underlining native soil should remain un-compacted to preserve infiltration capacity. Fence off the area during construction to protect it from compaction.
- Bottom of bioretention should be un-lined to allow infiltration into native soil.
- Moisture barrier must be installed vertically to protect road sub-base and any trenches adjacent to the bioretention area.
- If used, pervious concrete shall be designed and installed as described in Appendix E and protected during construction to prevent sediment loading.
- If the porous gutter design option is used additional trash and sediment capture BMPs is required.
- A curb opening type design may be used in place of a porous gutter if appropriate for the project and does not require additional trash capture.
- Bioretention areas shall be planted with plants from the approved **Plant List** and **Tree List** included in Appendix F and shall be planted to achieve 51% cover.
- All bioretention areas shall be designed with a designated high flow bypass inlet for storms larger than the design storm.

- For designs that include perforated pipe, the 6” perforated pipe must be installed a minimum of 6” below the adjacent road structural section.
- Perforated pipe shall be installed in straight runs only.
- The volume below the perforated pipe must be sufficient to hold and infiltrate the design volume.

SIZING DESIGN- GOAL AND REQUIREMENTS

- **For all projects:** The treatment component requires that all of the runoff generated by this water quality design storm from impermeable surfaces must be treated on site for the pollutants of concern.
- ***For projects that increase the amount of impervious surface, but create or replace less than a total of one acre:*** The **Delta Volume Capture** component requires that any increase in volume due to development for the water quality design storm must be infiltrated and/or reused on site. Further discussion of the Treatment and Delta Volume Capture requirements and the accompanying formulas can be found in Chapter 6.
- ***For projects that create or replace one acre or more of impervious surface*****:** These larger projects must mitigate their impacts by meeting the **Hydromodification Requirement** by capturing 100% of the post development volume generated by the water quality rain event.
- All calculations shall be completed using the “Storm Water Calculator” available at www.srcity.org/stormwaterLID.

INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SWLID Submittal. The maintenance plan shall include recommended maintenance practices, state the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary and provide site specific inspection checklist.

At a minimum maintenance shall include the following:

- Dry street sweeping upon completion of construction
- Dry street sweeping annually, and
  - When water is observed flowing in the gutter during a low intensity storm.
  - Algae is observed in the gutter.
  - Sediment/debris covers 1/3 of the gutter width or more.
- Inspect twice annually for sedimentation and trash accumulation in the gutter. Obstructions and trash shall be removed and properly disposed of.
- Inspect twice during the rainy season for ponded water.
- Pesticides and fertilizers shall not be used in the bioretention area.
- Plants should be pruned, weeds pulled and dead plants replaced as needed.

FEE WAIVED PER GOVERNMENT CODE 27383

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO:

County of Sonoma
Permit and Resource Management Department
Engineering Division
2550 Ventura Avenue
Santa Rosa, California 95403

Property: [ADDRESS], County of Sonoma, California
APN: [000-000-000]

MAINTENANCE AGREEMENT FOR MONITORING STORM WATER BMP FACILITIES AND DECLARATION OF COVENANTS

THIS AGREEMENT is made and entered into this ____________ (Effective Date), by and between **Grantor [NAME]** (Landowner), and **Grantee** County of Sonoma (County).

RECITALS

WHEREAS, the North Coast Regional Water Quality Control Board (NCRWCB) and the San Francisco Bay Region Water Quality Control Board (SFBRWQCB) National Pollutant Discharge Elimination Systems Permits, (NPDES Permits), require that the County shall require all new development and redevelopment projects subject to post-construction Best Management Practice (BMP) requirements provide for maintenance of BMPs by way of legally binding maintenance agreements and/or other equivalent measures.

WHEREAS, the NPDES Permits further require that BMP maintenance agreements shall ensure that the BMPs implemented will remain fully functional, and that all areas identified for treatment will discharge to the treatment BMP system.

WHERAS, the NPDES Permits further specifically require:

- The developer's signed statement accepting responsibility for maintenance of BMPs until the responsibility is legally transferred; and
- Written conditions in any sales or lease agreement, in enough detail to be easily understood by the future owner or tenant, that require the property owner or tenant to assume responsibility for BMP maintenance and conduct a maintenance inspection at least once a year; and
- Property owner shall submit to Permit and Resource Management Department (Permit Sonoma) annually the results of the Storm Water BMP inspection. Inspection shall include but is not limited to the Inspection and Maintenance Checklists, photo evidence of BMP existing conditions, and a report of any maintenance activity, remediation, or replacement of BMP features; and
- The County to notify the Regional Water Board and commence progressive

enforcement against the owner or operator where necessary to rectify failure to implement and maintain post-construction BMPs.

WHEREAS, the Storm Water NPDES Permits require a legally binding, signed maintenance agreement or equivalent mechanism for all BMPs located on private property.

WHEREAS, the NPDES Permits require that maintenance agreements shall legally assign maintenance responsibility to the property owner; shall be recorded among the deed records at the County Recorder's Office so they will run with the title to the land; and shall be included in any future sales and/or lease agreements.

WHEREAS, the NPDES Permits further require that the funding of all inspection, maintenance, and replacement of BMPs on private land is the sole responsibility of the property owner, and that annual inspections and maintenance and any corrective actions, repairs, or replacements shall be documented, retained for at least five years, and made available to the County upon request.

WHEREAS, Landowner is the owner of certain real property described in **Exhibit A**, attached hereto and incorporated as though fully set forth herein (Property).

WHEREAS, the County has approved a project on the Property consisting of the **[WORK DESCRIPTION AND PERMIT NUMBER]** (Project), subject to conditions of approval and the requirements of the Project proposal statement.

WHEREAS, the Project includes a final Storm Water Low Impact Development Submittal (SW LIDS) that has been submitted, reviewed, and approved, and that includes provisions for the construction of BMPs identified in **Exhibit B**, attached hereto and incorporated as though fully set forth herein.

WHEREAS, the (SW LIDS) identifies post-construction storm water management BMPs, assigns monitoring and maintenance responsibility to the project owner, and includes Inspection and Maintenance Checklists that identify when and how BMPs will be inspected, when maintenance will be required, and how maintenance has or will be conducted.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing recitals, the mutual covenants contained herein, and the following terms and conditions, the parties agree as follows:

1. Landowner shall, at its sole cost and expense, construct, inspect, and maintain the BMPs in accordance with the conditions of approval and SW LIDS specifications.

2. Landowner shall ensure the BMPs remain fully functional and in good working condition as determined solely by the County, and that all areas identified for treatment discharge to the treatment BMP system. Landowner shall ensure proper clean-up of BMPs which will include removal of any and all soil or debris blocking planter inlets or overflows; removal of trash that typically collects near inlets or gets caught in vegetation.

3. Landowner accepts sole responsibility for all inspection, maintenance, remediation, and replacement of the BMPs.

4. These responsibilities run with the land, and shall transfer to the new owner or tenant in the event the Property is sold or leased.

5. Landowner will perform inspections and maintenance in accordance with the SW LIDS. All work shall conform to the requirements of the SW LIDS, County-identified BMP manuals and handbooks, and specific maintenance requirements established by the manufacturer as approved by the County. Specific manufacturer maintenance requirements for the BMP will be submitted to the County.

6. Landowner hereby grants permission to the County and its authorized agents and employees to enter the Property and inspect the storm water management/BMP facilities whenever the County deems necessary. The purpose of the inspection is to assure safe and proper functioning of the facilities, including any berms, inlet and outlet structures, vegetation, infiltration media, pond areas, underground retention areas, and access roads. If deficiencies are noted, County shall notify Landowner and provide the inspection findings and requirements to cure the deficiencies. Landowner shall reimburse County within 30 days of receipt of notice of all costs incurred by the County to undertake such inspection work at the then current fee schedule rate. If Landowner fails to reimburse County for these costs within 30 days, County shall have the right to record a lien against the property in the amount of such costs, plus the legal rate of interest for judgments, and may enforce the lien in the same manner a lien for real property taxes may be enforced.

7. Landowner hereby grants permission to County and its authorized agents, employees, and consultants to enter upon the Property to install, operate and maintain equipment to monitor the flow characteristics and pollutant content of the influent, effluent and intermediate points in the facilities. Landowner further agrees to design and construct the facility to provide access for monitoring as outlined in design manuals and/or in the manufacturer manual for the BMP.

8. All records regarding inspections and maintenance shall be retained by Landowner for at least five years and made available to the County upon request. These records shall include copies of completed inspection reports and maintenance checklists to document any inspection and maintenance activities that were conducted over the last five years. Any corrective actions, repairs, or replacements shall also be documented and kept in the BMP inspection and maintenance records for a minimum of five years.

9. In the event Landowner fails to maintain the storm water management/BMP facilities in good working condition acceptable to County, County may enter upon the Property and take whatever steps it deems reasonably necessary to maintain the storm water management/BMP facilities. This provision shall not be construed to allow County to erect any structure of a permanent nature on the Property outside of an easement in favor of County. It is expressly understood and agreed that County is under no obligation to maintain or repair facilities, and in no event shall this Agreement be

construed to impose such an obligation on County.

10. In the event that County, pursuant to this Agreement, performs work of any nature, or expends any funds in the performance of such work for labor, use of equipment, supplies, materials, and the like, due to the failure of Landowner to perform such maintenance or work, Landowner shall reimburse County within 30 days of receipt of notice of all costs incurred by the County to undertake such work. If Landowner fails to reimburse County for these costs within 30 days, County shall have the right to record a lien against the property in the amount of such costs, plus the legal rate of interest for judgments, and may enforce the lien in the same manner a lien for real property taxes may be enforced.

11. Landowner shall indemnify, defend and hold harmless County and its employees, officials, and agents, from and against any liability, (including liability for claims, suits, actins arbitration proceedings, administrative proceedings, regulatory proceedings, losses, expenses or costs of any kind, whether actual, alleged or threatened, interest, defense costs, and expert witness fees), where same results from or arises out of the construction, presence existence, or maintenance of the storm water management/BMP facilities or the performance of this Agreement by Landowner, its officers, employees, agents, and sub-contractors, excepting only that resulting from the sole, active negligence or intentional misconduct of County, its employees, officials, or agents. This indemnification obligation is not limited in any way by any limitation on the amount or type of damages or compensation payable to or for Landowner or its agents under workers' compensation acts, disability benefits acts or other employee benefits acts. In the event a claim is asserted against County, its agents or employees, County shall promptly notify landowner. Thereafter, Landowner shall defend at its own expense any suit based upon such claim. If any judgment or claim against the County, its agents or employees, shall be entered, Landowner shall pay all costs and expenses in connection therewith.

12. Any violation of the final SW LIDS or this Agreement by Landowner shall be deemed a public nuisance under the Sonoma County Code and the County shall be entitled to the remedies available to it under the Sonoma County Code, in addition to and cumulative of all other remedies, civil or criminal, which may be pursued by the County.

13. Landowner shall not assign this Agreement to a third party without the express prior written consent of the County, provided that such consent will not be unreasonably withheld and that such consent shall not be required for Landowner to sell or lease the property to a third party.

14. Landowner binds itself, its partners, successors, legal representatives and assigns to the County and to the partners, successors, legal representatives and assigns of the County with respect to all promises and agreements contained herein.

15. This Agreement shall be recorded by Landowner, and shall: a) constitute a "covenant running with the land"; b) be binding in perpetuity upon Landowner and Landowner's successors, heirs, and assigns; and, 3) benefit the County of Sonoma, its successors, and assigns. Any breach of this Agreement shall render Landowner or Landowner's heirs, successors or assigns liable pursuant to the provisions of the Sonoma County Code.

16. All future sales or lease agreements shall include a copy of this Agreement, and written conditions, in enough detail to be easily understood by the future property owner or tenant, that require the property owner or tenant to assume responsibility for BMP maintenance and compliance with this Agreement.

17. If any provisions of the Agreement shall be held to be invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provision shall not in any way be affected or impaired thereby.

18. This Agreement shall be governed according to the laws of the State of California. Because this Agreement is to be performed in the County of Sonoma, the parties hereto agree that the forum for the adjudication of any dispute regarding the Agreement or enforcement shall be brought exclusively and solely in Sonoma County, California.

19. This Agreement is effective as of the Effective Date identified above.

LANDOWNER:

By: ____________________________
Name: _________________________
Title: __________________________

THE COUNTY OF SONOMA:

By: ____________________________
Name: _________________________
Title: __________________________

Attachments:

Exhibit A – Property description
Exhibit B – Location map of BMPs as part of this agreement
Exhibit B1 – Details of BMPs
Notary Acknowledgment