

Initial Storm Water Low Impact Development Submittal

For

Parkland Farms Subdivision, Phase 11

120 Parkland Farms Boulevard
Healdsburg, California
APN 091-040-111 & 114

JN 14032

March 8, 2018

Prepared for:
Urban Green Investments, LLC
c/o Barrett Elmer
1746 Union Street
San Francisco, CA 94123


James L. Jensen, RCE 73042
My license expires 12/31/2018



Prepared by:

 adobe associates, inc.
civil engineering | land surveying | wastewater

1220 N. Dutton Ave., Santa Rosa, CA 95401

P. (707) 541-2300 F. (707) 541-2301

Website: www.adobeinc.com

Prepared By: AP
Checked By: JLJ

Table of Contents

Project Description

Pollution Prevention Measures and BMP Selection

Treatment and Volume Capture

Maintenance and Funding

Conclusion

Appendices

Appendix A – Determination Worksheet

Appendix B – Preliminary SWLIDS Exhibit and Calculations

Appendix C – Vegetated Buffer Strip Detail & Infiltration Trench Detail & Fact Sheets

Appendix D – Operation and Maintenance Checklists

Appendix E – Soil Classification Fact Sheets

Initial Storm Water Low Impact Development Submittal
For
Parkland Farms Subdivision, Phase 11
120 Parkland Farms Boulevard

Project Description:

The Parkland Farms Subdivision project is located at 120 Parkland Farms Boulevard in Healdsburg, California. This project proposes to subdivide APN 091-040-114 into 9 residential lots and to include APN 091-040-111 as part of the subdivision. An AC paved private road is also proposed as part of this project along with associated drainage and Low Impact Development (LID) improvements. The amount of proposed impervious surface triggers the requirement for the SWLID and installation of Post-Construction BMPs.

The existing property is currently undeveloped; coverage consists of existing grasses and sparse to dense tree coverage, there are two abandoned buildings on site that will be removed. The trees on site will be preserved to the maximum extent practicable. The parcel has varying terrain with slopes ranging from 10 to 35%. The property sits near the top of the ridge so there is minimal run-on from the surrounding areas. There is an active fault west of Canyon Run, and a transitional landslide area at the northwest corner of proposed Lot 3. Both of these areas are outside of the extents of the proposed improvements and will not have an impact on the private road.

Pollution Prevention Measures and BMP Selection:

Runoff from proposed impervious areas will be concentrated and treated onsite. There will be designated vegetated buffer strips to provide treatment and infiltration trenches at various pipe outfalls to provide required retention. There will also be extensive natural vegetation that will remain untouched that will provide additional treatment for the proposed improvements. The vegetated buffer strips will be installed per attached detail P1-04 "Priority 1 Vegetated Buffer Strip", and the infiltration trench will be installed per attached detail P1-07 "Priority 1 Infiltration Trench" from the Santa Rosa Low Impact Development (LID) Design Manual.

Additional prevention measures are:

- Design of landscaping to prevent sediment entering the storm drain system and to meet vector control requirements (draw down less than 72 hours).
- Incorporate Integrated Pest Management (IPM) principles and techniques for design and maintenance.
- Contain litter and trash so that it is not dispersed by the wind or runoff during waste removal.
- Maintain stabilized construction entrance to reduce sediment transport offsite.
- Conduct street sweeping at regular intervals to reduce sediment tracking.

Treatment and Volume Capture:

The Design Goal of the Delta Volume Capture has been achieved for the private road. There will be adequate volume provided in the gravel section of the bioretention facilities at the t-dissipators to retain the increase in runoff for the 85th percentile storm event. Additional volume storage has been added to BMP 3 and BMP 4 to account for the estimated impervious area for Lots 7 and 9 respectively. Treatment will be provided in the vegetation and amended soil layers above the gravel section and in the existing vegetation on site. Credits were taken for the existing tree canopy area which reduced the tributary area for the project by 43,375 square feet total.

Post Construction BMPs will not be constructed for the majority of the proposed lots but assumptions have been made to ensure that there will be adequate space available at such a time when the lots are developed. It was assumed that each lot would have no more than 5,000 square feet of impervious surface based on the limit of maximum 35% coverage for Lot 5. Lot 5 was used as it is the smallest lot and would provide a conservative result. Based off of this assumption each lot will need to provide a maximum of 170 cubic feet of retention to achieve the Delta Volume Capture Goal. If treatment cannot be achieved it is estimated that a minimum of 246 cubic feet of retention would need to be provided to achieve the 100% Volume Capture Goal. The exact footprint and layout of the BMPs will be determined at the time of Design Review development of each custom lot.

Maintenance and Funding:

Monitoring and maintenance of the shared post-construction BMPs shall be the responsibility of Urban Green Investments, LLC until such a time as the Home Owner Association is in place. Once the Home Owner Association has been established it will be responsible to verify that there is adequate funding to cover the cost of the shared BMP maintenance. BMPs shall be inspected and maintained following the guidelines in attached "Vegetated Buffer Strip Inspection and Maintenance Checklist" and "Infiltration Trench Inspection and Maintenance Checklist" from the Santa Rosa LID Design Manual. Legal paperwork and maintenance agreements shall be included in the Final SWLID report.

Conclusion

Runoff from the proposed private road will be directed toward the proposed vegetated buffer strips and infiltration trenches on site and will eventually be discharged to existing vegetation in a sheetflow condition. The infiltration trenches will be sized to achieve the Design Goal of Delta Volume Capture of the runoff generated from the 85th percentile storm event. The vegetated buffer strips and existing vegetation will provide treatment for 100% of the post construction runoff for the 85th percentile storm event.

APPENDIX A

Determination Worksheet

FOR OFFICE USE ONLY:

Does this project require permanent storm water BMP's?

Y N

Date Submitted: _____



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

Parkland Farms Subdivision

Project Name

120 Parkland Farms Boulevard

Project Site Address

Healdsburg, CA 95448

Project City/State/Zip

Permit Number(s) - (if applicable)

Adobe Associates, Inc.

Designer Name

Santa Rosa, CA 95401

Designer City/State/Zip

Urban Green Investments, LLC

Applicant (owner or developer) Name

1746 Union Street

Applicant Mailing Address

San Francisco, CA 94123

Applicant City/State/Zip

(415) 659-8806

Applicant Phone/Email/Fax

1220 N. Dutton Avenue

Designer Mailing Address

(707) 541-2300

Designer Phone/Email

Type of Application/Project:

- Subdivision
 Grading Permit
 Building Permit
 Hillside Development
 Design Review
 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 surface¹, 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 activity² 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 surface¹ 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 reconstruction³? Yes No

3. Does this project create or replace a combined total of 1.0 acre or more of impervious surface¹ 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 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 "Routine 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: 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.:

Two miscellaneous structures to be removed, active fault adjacent to Canyon Run, landslide area in northwest corner of parcel.

3. Existing impervious surface area: 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.:

This project proposes to subdivide APN 091-040-114 and 091-040-111 into 10 residential lots with a subdivisions road that will run from Parkland Farms Boulevard to the existing paved road along the southern property boundary adjacent to Long Acres Place.

~~Existing~~ ^{Proposed} impervious surface area: 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

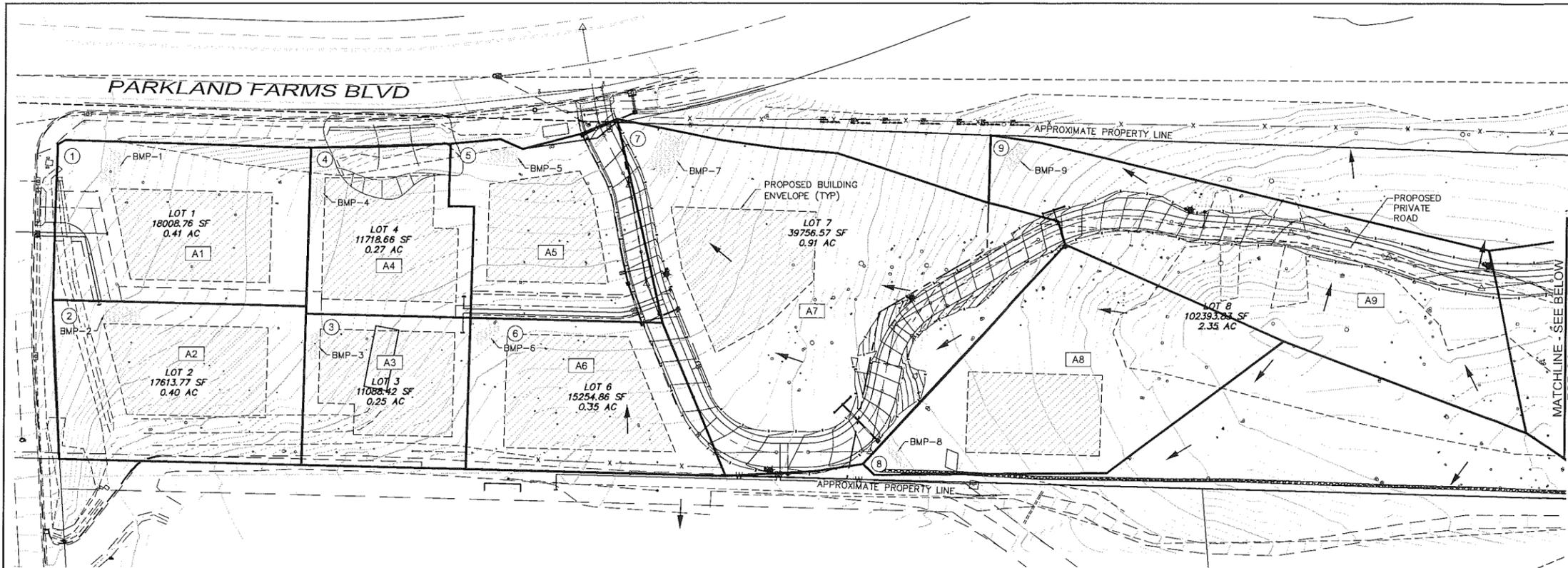
Hydromodification Control/100% Volume Capture: Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by a 1.0" 24-hour storm event, as calculated using the "Urban Hydrology for Small Watersheds" TR-55 Manual method. This is a retention requirement.

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.

APPENDIX B

Exhibits and Calculations



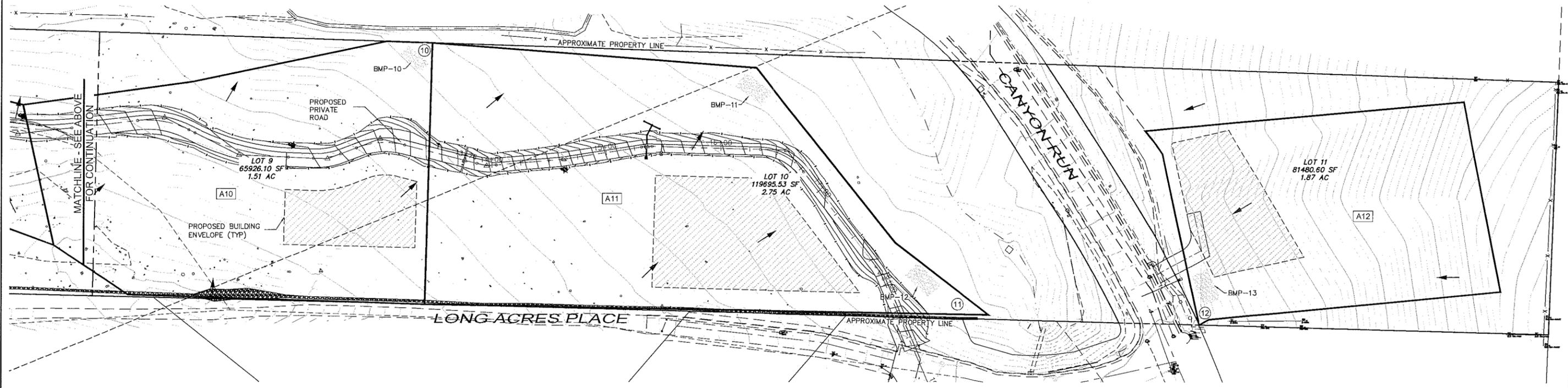
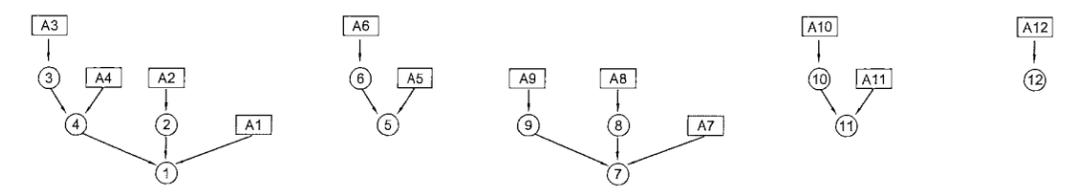
DRAINAGE AREA LEGEND

- A1 DRAINAGE AREA
- DRAINAGE AREA BOUNDARY
- ① POINT OF CONCENTRATION
- ← FLOW DIRECTION

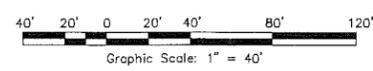
DRAINAGE AREA TABLE

A1=0.41 AC (18,011 SF)	A7=1.00 AC (43,514 SF)
A2=0.40 AC (17,555 SF)	A8=0.53 AC (23,154 SF)
A3=0.25 AC (11,088 SF)	A9=0.68 AC (29,441 SF)
A4=0.27 AC (11,782 SF)	A10=1.48 AC (64,686 SF)
A5=0.33 AC (14,443 SF)	A11=1.86 AC (81,056 SF)
A6=0.35 AC (15,255 SF)	A12=1.02 AC (44,644 SF)

DRAINAGE ROUTING



PRELIMINARY SWLID EXHIBIT



March 7, 2018

<p>PRELIMINARY SWLID EXHIBIT</p> <p>PARKLAND FARMS SUBDIVISION 120 Parkland Farms Blvd, Healdsburg, CA APN 091-040-111 & 114</p>	<p>adobe associates, inc. Civil Engineering & Land Surveying & Wastewater</p> <p>1230 N. Dutton Ave., Santa Rosa, CA 95401 P: (707) 544-3300 F: (707) 544-3301 Website: www.adobeinc.com</p> <p><small>*A Service You Can Count On!</small></p>
---	--

T:\2014 PROJECTS\14032\Map\Drainage\14032 Preliminary SWLID Exhibit.dwg, Alice Park, 3/7/2018, 11:48:18 AM

Worksheet 2: Runoff Curve Number and Runoff

Project: 14032 - Parkland Farms Subdivision By: AP Date: 3/7/2018
 Location: A2

----- PRE-Construction Conditions -----

1. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Goulding Clay Loam, Hydrologic Soil Group D	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	79			0.40	31.60
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 0.40 31.60

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 79.00 Use CN 79

Worksheet 2: Runoff Curve Number and Runoff

Project:	14032 - Parkland Farms Subdivision	By:	AP	Date:	3/7/2018
Location:	A2				

----- POST-Construction Conditions -----

I. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Goulding Clay Loam, Hydrologic Soil Group D	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	79			0.26	20.54
Goulding Clay Loam, Hydrologic Soil Group D	Impervious Areas-Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98			0.14	13.72
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 0.40 34.26

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 85.65 Use CN 86

Worksheet 2: Runoff Curve Number and Runoff

Project: **14032 - Parkland Farms Subdivision** By: **AP** Date: **3/7/2018**
 Location: **A3**

----- POST-Construction Conditions -----

I. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Goulding Clay Loam, Hydrologic Soil Group D	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	79			0.12	9.48
Goulding Clay Loam, Hydrologic Soil Group D	Impervious Areas-Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98			0.13	12.74
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 0.25 22.22

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 88.88 Use CN 89

Worksheet 2: Runoff Curve Number and Runoff

Project: 14032 - Parkland Farms Subdivision By: AP Date: 3/7/2018
 Location: A4

----- PRE-Construction Conditions -----

1. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Goulding Clay Loam, Hydrologic Soil Group D	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	79			0.27	21.33
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 0.27 21.33

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = $\frac{79.00}{1}$ Use CN 79

Worksheet 2: Runoff Curve Number and Runoff

Project: **14032 - Parkland Farms Subdivision** By: **AP** Date: **3/7/2018**
 Location: **A4**

----- POST-Construction Conditions -----

1. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Goulding Clay Loam, Hydrologic Soil Group D	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	79			0.11	8.69
Goulding Clay Loam, Hydrologic Soil Group D	Impervious Areas-Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98			0.16	15.68
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
Totals					0.27	24.37

*Use only one CB source per line

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 90.26 Use CN 90

Worksheet 2: Runoff Curve Number and Runoff

Project: **14032 - Parkland Farms Subdivision** By: **AP** Date: **3/7/2018**
 Location: **A5**

----- PRE-Construction Conditions -----

1. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			0.33	24.42
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 0.33 24.42

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 74.00 Use CN 74

Worksheet 2: Runoff Curve Number and Runoff

Project: **14032 - Parkland Farms Subdivision** By: **AP** Date: **3/7/2018**
 Location: **A5**

----- POST-Construction Conditions -----

1. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			0.17	12.58
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Impervious Areas-Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98			0.16	15.68
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 0.33 28.26

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 85.64 Use CN 86

Worksheet 2: Runoff Curve Number and Runoff

Project: 14032 - Parkland Farms Subdivision By: AP Date: 3/7/2018
 Location: A6

----- PRE-Construction Conditions -----

I. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			0.35	25.90
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 0.35 25.90

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = $\frac{74.00}{1}$ Use CN 74

Worksheet 2: Runoff Curve Number and Runoff

Project: 14032 - Parkland Farms Subdivision By: AP Date: 3/7/2018
 Location: A6

----- POST-Construction Conditions -----

I. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			0.16	11.84
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Impervious Areas-Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98			0.19	18.62
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 0.35 30.46

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 87.03 Use CN 87

Worksheet 2: Runoff Curve Number and Runoff

Project: 14032 - Parkland Farms Subdivision By: AP Date: 3/7/2018
 Location: A7

----- PRE-Construction Conditions -----

I. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			1.00	74.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 1.00 74.00

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = $\frac{74.00}{1.00}$ Use CN 74

Worksheet 2: Runoff Curve Number and Runoff

Project: **14032 - Parkland Farms Subdivision** By: **AP** Date: **3/7/2018**
 Location: **A8**

----- PRE-Construction Conditions -----

1. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			0.53	39.22
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 0.53 39.22

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 74.00 Use CN 74

Worksheet 2: Runoff Curve Number and Runoff

Project: **14032 - Parkland Farms Subdivision** By: **AP** Date: **3/7/2018**
 Location: **A8**

----- POST-Construction Conditions -----

1. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			0.42	31.08
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Impervious Areas-Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98			0.11	10.78
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 0.53 41.86

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 78.98 Use CN 79

Worksheet 2: Runoff Curve Number and Runoff

Project: 14032 - Parkland Farms Subdivision By: AP Date: 3/7/2018
 Location: A9

----- POST-Construction Conditions -----

1. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			0.56	41.44
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Impervious Areas-Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98			0.12	11.76
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 0.68 53.2

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 78.24 Use CN 78

Worksheet 2: Runoff Curve Number and Runoff

Project: 14032 - Parkland Farms Subdivision By: AP Date: 3/7/2018
 Location: A10

----- PRE-Construction Conditions -----

I. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspens-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			1.48	109.52
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 1.48 109.52

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = $\frac{74.00}{1.48}$ Use CN 74

Worksheet 2: Runoff Curve Number and Runoff

Project: 14032 - Parkland Farms Subdivision By: AP Date: 3/7/2018
 Location: A10

----- POST-Construction Conditions -----

I. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			1.21	89.54
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Impervious Areas-Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98			0.27	26.46
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 1.48 116

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 78.38 Use CN 78

Worksheet 2: Runoff Curve Number and Runoff

Project: **14032 - Parkland Farms Subdivision** By: **AP** Date: **3/7/2018**
 Location: **A11**

----- PRE-Construction Conditions -----

I. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			1.86	137.64
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 1.86 137.64

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 74.00

Use CN 74

Worksheet 2: Runoff Curve Number and Runoff

Project: **14032 - Parkland Farms Subdivision** By: **AP** Date: **3/7/2018**
 Location: **A11**

----- **POST-Construction Conditions** -----

1. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			1.42	105.08
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Impervious Areas-Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98			0.44	43.12
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 1.86 148.2

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 79.68 Use CN 80

Worksheet 2: Runoff Curve Number and Runoff

Project: 14032 - Parkland Farms Subdivision By: AP Date: 3/7/2018
 Location: A12

----- PRE-Construction Conditions -----

I. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			1.02	75.48
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 1.02 75.48

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 74.00 Use CN 74

Worksheet 2: Runoff Curve Number and Runoff

Project: 14032 - Parkland Farms Subdivision By: AP Date: 3/7/2018
 Location: A12

----- POST-Construction Conditions -----

I. Runoff Curve Number

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment and hydrologic condition; percent impervious; unconnected/connected impervious ratio)	TR-55 CN*			Area Acres Miles ² Percent	Product of CNxArea
		Table 2-2a	Figure 2-3	Figure 2-4		
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush, (Poor)	74			0.83	61.42
Guenoc Gravelly Silt Loam, Hydrologic Soil Group C	Impervious Areas-Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98			0.19	18.62
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

*Use only one CB source per line

Totals 1.02 80.04

CN (weighted) = $\frac{\text{Total Product}}{\text{Total Area}}$ = 78.47 Use CN 78

STORM WATER CALCULATOR

LID BMP Summary Page & Site Global Values

Project Information: Project Name: <u>Parkland Farms Subdivision</u> Address/Location: <u>120 Parkland Farms Boulevard, Healdsburg, CA</u> Designer: <u>AJP</u> Date: <u>3/8/2018</u>		Site Information: Mean Seasonal Precipitation (MSP) of Project Site: <u>40.00</u> (inches) K=MSP/3i K= <u>1.33</u> Impervious area - pre development: <u>0.0</u> ft ² Impervious area - post development: <u>105,206.0</u> ft ² <p style="text-align: center; color: red; font-weight: bold;">100% Capture</p>	
Based upon the pre and post development impervious area, the post construction BMP requirement is:			

Summary of Saved BMP Results:

BMP ID:	Tributary Area		Runoff Reduction Measures (Y/N)	Type of Requirement Met	Requirements	Type of BMP Design	Percent Achieved	Hydromodification Control		Flow Base Treatment		Delta Volume Capture	
	Tributary Area (ft ²)	Hydromod Volume Capture						Required V _{Hydromod} (ft ³)	Achieved (ft ³)	Required Q Treatment (cfs)	Achieved (ft ³)	Required Vdelta (ft ³)	Achieved (ft ³)
1	A1	18,011	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.2	377,3479	378,0000				
2	A2	17,555	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.0	543,3975	543,6000				
3	A3	11,088	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.2	454,0739	454,8000				
4	A4	11,782	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.0	534,0242	534,0000				
5	A5	14,443	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.2	440,9024	441,6000				
6	A6	15,255	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.0	518,1516	518,4000				
7	A7	43,514	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.1	884,8232	885,6000				
8	A8	23,154	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.3	332,5878	333,6000				
9	A9	29,441	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.2	377,2455	378,0000				
10	A10	64,686	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.0	845,7817	846,0000				
11	A11	81,056	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.0	1324,7937	1324,8000				
12	A12	44,644	Yes	Hydromod Volume Capture	Priority 1: P1-02	Roadside Bioretention - No Curb and Gutter	100.2	591,7767	592,8000				
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: **Parkland Farms Subdivision**

BMP ID: **A1**

BMP Design Criteria: **100% Capture**

Type of BMP Design: **Priority 1: P1-02 Roadside Bioretention - No Curb and Gutter**

BMP's Physical Tributary Area: **18,011.0 ft²**

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing = **17,485.5 ft²**

Total Runoff Reduction Measures = **525.5 ft²**

Interceptor Trees

Number of *new* interceptor *Evergreen* Trees: **0**

Number of *new* interceptor *Deciduous* Trees: **0**

Square footage of qualifying existing tree canopy: **1,051.0 ft²**

Total Number of Trees in BMP Tributary Area: **0**

Disconnected Roof Drains

Select disconnection condition: **Select disconnection condition**

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts: **0 ft²**

Percent of rooftop area: **0 %**

Select Density: **1** Units per Acre

Paved Area Disconnection

Paved Area Type: **Not Directly-connected Paved Area**

Alternatively designed paved area: **0.0 ft²**

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace: **0.0 ft²**

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

Post development hydrologic soil type within tributary area: **A: greater than 0.30 in/hr infiltration (transmission) rate**

Post development ground cover description: **Brush: weed-grass mixture with brush major element - Poor (<50% ground cover)**

CN₂-POST: **82.0**

User Composite post development CN: **82.0**

V_{HYDROMOD} = **377.35 ft³**

BMP Sizing Tool: Hydromodification Requirement

BMP Volume Below Ground

Porosity:	0.40
Depth below perforated pipe if present:	3.00 ft
Width:	0.00 ft
Length:	0.00 ft
Area:	315.00 ft²

BMP Volume Above Ground

Depth:	0.00 ft
Width:	0.00 ft
Length:	0.00 ft
Area:	0.00 ft²

Percent of Goal Achieved = **100.17 %**

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name:

BMP ID:

BMP Design Criteria: **100% Capture**

Type of BMP Design:

BMP's Physical Tributary Area:

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing =

Total Runoff Reduction Measures =

Interceptor Trees

Number of new interceptor *Evergreen Trees*:

Number of new interceptor *Deciduous Trees*:

Square footage of qualifying existing tree canopy:

Total Number of Trees in BMP Tributary Area:

Disconnected Roof Drains

Select disconnection condition:

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts:

Percent of rooftop area:

Select Density:

Paved Area Disconnection

Paved Area Type:

Alternatively designed paved area:

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace:

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

Post development hydrologic soil type within tributary area:

Post development ground cover description:

CN_{POST}:

User Composite post development CN:

V_{HYDROMOD} =

BMP Sizing Tool: Hydromodification Requirement

BMP Volume

Below Ground	Porosity:	<input type="text" value="0.40"/>
	Depth below perforated pipe if present:	<input type="text" value="3.00 ft"/>
	Width:	<input type="text" value="0.00 ft"/>
	Length:	<input type="text" value="0.00 ft"/>
	Area:	<input type="text" value="453.00 ft²"/>

Percent of Goal Achieved =

Ponded Water Above Ground	
Depth:	<input type="text" value="0.00 ft"/>
Width:	<input type="text" value="0.00 ft"/>
Length:	<input type="text" value="0.00 ft"/>
Area:	<input type="text" value="0.00 ft²"/>

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: **Parkland Farms Subdivision**

BMP ID: **A3**

BMP Design Criteria: **100% Capture**

Type of BMP Design: **Priority 1: P1-02 Roadside Bioretention - No Curb and Gutter**

BMP's Physical Tributary Area: **11,088.0 ft²**

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing = **10,727.0 ft²**

Total Runoff Reduction Measures = **361.0 ft²**

Interceptor Trees

Number of new interceptor *Evergreen Trees*: **0**

Number of new interceptor *Deciduous Trees*: **0**

Square footage of qualifying existing tree canopy: **722.0 ft²**

Total Number of Trees in BMP Tributary Area: **0**

Disconnected Roof Drains

Select disconnection condition: **Select disconnection condition**

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts: **0 ft²**

Disconnected Roof Drains Method 2

Percent of rooftop area: **0 %**

Select Density: **1** Units per Acre

Paved Area Disconnection

Paved Area Type: **Not Directly-connected Paved Area**

Alternatively designed paved area: **0.0 ft²**

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace: **0.0 ft²**

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

Post development hydrologic soil type within tributary area: **A: greater than 0.30 in/hr infiltration (transmission) rate**

Post development ground cover description: **Brush: weed-grass mixture with brush major element - Poor (<50% ground cover)**

CN_{Post}: **89.0**

User Composite post development CN: **89.0**

V_{HYDROMOD} = **454.07 ft³**

BMP Sizing Tool: Hydromodification Requirement

BMP Volume

	Below Ground	Ponded Water Above Ground
Porosity:	0.40	
Depth below perforated pipe if present:	3.00 ft	
Width:	0.00 ft	
Length:	0.00 ft	
Area:	379.00 ft²	
		Depth: 0.00 ft
		Width: 0.00 ft
		Length: 0.00 ft
		Area: 0.00 ft²

Percent of Goal Achieved = **100.16 %**

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: Parkland Farms Subdivision

BMP ID: A4

BMP Design Criteria: **100% Capture**

Type of BMP Design: Priority 1: P1-02 Roadside Bioretention - No Curb and Gutter

BMP's Physical Tributary Area: 11,782.0 ft²

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing = 11,533.5 ft²

Total Runoff Reduction Measures = 248.5 ft²

Interceptor Trees

Number of *new* interceptor *Evergreen Trees*: 0

Number of *new* interceptor *Deciduous Trees*: 0

Square footage of qualifying existing tree canopy: 497.0 ft²

Total Number of Trees in BMP Tributary Area:

Disconnected Roof Drains

Select disconnection condition: Select disconnection condition

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts: 0 ft²

Percent of rooftop area: 0 %

Select Density: 1 Units per Acre

Paved Area Disconnection

Paved Area Type: Not Directly-connected Paved Area

Alternatively designed paved area: 0.0 ft²

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace: 0.0 ft²

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

Post development hydrologic soil type within tributary area: A: greater than 0.30 in/hr infiltration (transmission) rate

Post development ground cover description: Brush: weed-grass mixture with brush major element - Poor (<50% ground cover)

CN-Post: 90.0

User Composite post development CN: 90.0

V_{HYDROMOD} = 534.02 ft³

BMP Sizing Tool: Hydromodification Requirement

BMP Volume

Below Ground	Porosity:	<u>0.40</u>
Depth below perforated pipe if present:	Width:	<u>3.00</u> ft
	Length:	<u>0.00</u> ft
	Area:	<u>445.00</u> ft ²

Percent of Goal Achieved = 100.00 %

Ponded Water Above

Ground	Depth:	<u>0.00</u> ft
	Width:	<u>0.00</u> ft
	Length:	<u>0.00</u> ft
	Area:	<u>0.00</u> ft ²

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: Parkland Farms Subdivision

BMP ID: A5

BMP Design Criteria: **100% Capture**

Type of BMP Design: Priority 1: P1-02 Roadside Bioretention - No Curb and Gutter

BMP's Physical Tributary Area: 14,443.0 ft²

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing = 13,730.5 ft²

Total Runoff Reduction Measures = 712.5 ft²

Interceptor Trees

Number of *new* **Evergreen Trees**: 0

Number of *new* **Deciduous Trees**: 0

Square footage of qualifying **existing tree canopy**: 1,425.0 ft²

Total Number of Trees in BMP Tributary Area:

Disconnected Roof Drains

Select disconnection condition: Select disconnection condition

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts: 0 ft²

Disconnected Roof Drains Method 2

Percent of rooftop area: 0 %

Select Density: 1 Units per Acre

Paved Area Disconnection

Paved Area Type: Not Directly-connected Paved Area

Alternatively designed paved area: 0.0 ft²

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace: 0.0 ft²

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

Post development hydrologic soil type within tributary area: A: greater than 0.30 in/hr infiltration (transmission) rate

Post development ground cover description: Brush: weed-grass mixture with brush major element - Poor (<50% ground cover)

CN_{Post}: 86.0

User Composite post development CN: 86.0

V_{HYDROMOD} = 440.90 ft³

BMP Sizing Tool: Hydromodification Requirement

BMP Volume

Below Ground	Porosity:	<u>0.40</u>
Depth below perforated pipe if present:	Width:	<u>3.00 ft</u>
	Length:	<u>0.00 ft</u>
	Area:	<u>368.00 ft²</u>

Percent of Goal Achieved = 100.16 %

Ponded Water Above Ground

Depth:	<u>0.00 ft</u>
Width:	<u>0.00 ft</u>
Length:	<u>0.00 ft</u>
Area:	<u>0.00 ft²</u>

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: **Parkland Farms Subdivision**

BMP ID: **A6**

BMP Design Criteria: **100% Capture**

Type of BMP Design: **Priority 1: P1-02 Roadside Bioretention - No Curb and Gutter**

BMP's Physical Tributary Area: **15,255.0 ft²**

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing = **14,690.5 ft²**

Total Runoff Reduction Measures = **564.5 ft²**

Interceptor Trees

Number of new interceptor *Evergreen* Trees: **0**

Number of new interceptor *Deciduous* Trees: **0**

Square footage of qualifying existing tree canopy: **1,129.0 ft²**

Total Number of Trees in BMP Tributary Area:

Disconnected Roof Drains

Select disconnection condition: **Select disconnection condition**

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts: **0 ft²**

Percent of rooftop area: **0 %**

Select Density: **1** Units per Acre

Paved Area Disconnection

Paved Area Type: **Not Directly-connected Paved Area**

Alternatively designed paved area: **0.0 ft²**

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace: **0.0 ft²**

Hydromodification Requirement: 100% Volume Capture; HYDROMOD

HYDROMOD = **518.15 ft³**

Post development hydrologic soil type within tributary area: **A: greater than 0.30 in/hr infiltration (transmission) rate**

Post development ground cover description: **Brush: weed-grass mixture with brush major element - Poor (<50% ground cover)**

CN_{2-POST}:

User Composite post development CN: **87.0**

BMP Sizing Tool: Hydromodification Requirement

BMP Volume

Below Ground	Porosity:	0.40
	Depth below perforated pipe if present:	3.00 ft
	Width:	0.00 ft
	Length:	0.00 ft
	Area:	432.00 ft²

Percent of Goal Achieved = **100.05 %**

Ponded Water Above Ground	Depth:	0.00 ft
	Width:	0.00 ft
	Length:	0.00 ft
	Area:	0.00 ft²

STORM WATER CALCULATOR

BMP Tributary Parameters

BMP ID: Project Name:

BMP Design Criteria:

Type of BMP Design:

BMP's Physical Tributary Area:

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing =

Total Runoff Reduction Measures =

Interceptor Trees

Number of new *Evergreen Trees*:

Number of new *Deciduous Trees*:

Square footage of qualifying existing tree canopy:

Total Number of Trees in BMP Tributary Area:

Disconnected Roof Drains

Select disconnection condition:

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts:

Disconnected Roof Drains Method 2

Percent of rooftop area:

Select Density: Units per Acre

Paved Area Disconnection

Paved Area Type:

Alternatively designed paved area:

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace:

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

Post development hydrologic soil type within tributary area:

Post development ground cover description:

CN_{Post}:

User Composite post development CN:

V_{HYDROMOD} =

BMP Sizing Tool: Hydromodification Requirement

BMP Volume

Below Ground	Porosity:	<input type="text" value="0.40"/>
	Depth below perforated pipe if present:	<input type="text" value="3.00 ft"/>
	Width:	<input type="text" value="0.00 ft"/>
	Length:	<input type="text" value="0.00 ft"/>
	Area:	<input type="text" value="738.00 ft²"/>

Percent of Goal Achieved =

Ponded Water Above Ground	Depth:	<input type="text" value="0.00 ft"/>
	Width:	<input type="text" value="0.00 ft"/>
	Length:	<input type="text" value="0.00 ft"/>
	Area:	<input type="text" value="0.00 ft²"/>

STORM WATER CALCULATOR

BMP Tributary Parameters

BMP ID: Project Name:

BMP Design Criteria:

Type of BMP Design:

BMP's Physical Tributary Area:

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing =

Total Runoff Reduction Measures =

Interceptor Trees

Number of new interceptor *Evergreen Trees*:

Number of new interceptor *Deciduous Trees*:

Square footage of qualifying existing tree canopy:

Total Number of Trees in BMP Tributary Area:

Disconnected Roof Drains

Select disconnection condition:

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts:

Disconnected Roof Drains Method 2

Percent of rooftop area:

Select Density:

Paved Area Disconnection

Paved Area Type:

Alternatively designed paved area:

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace:

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

Post development hydrologic soil type within tributary area:

Post development ground cover description:

CN₂-post:

User Composite post development CN:

V_{HYDROMOD} =

BMP Sizing Tool: Hydromodification Requirement

BMP Volume

Below Ground	Porosity:	<input type="text" value="0.40"/>
	Depth below perforated pipe if present:	<input type="text" value="3.00 ft"/>
	Width:	<input type="text" value="0.00 ft"/>
	Length:	<input type="text" value="0.00 ft"/>
	Area:	<input type="text" value="278.00 ft²"/>

Percent of Goal Achieved =

Ponded Water Above Ground	Depth:	<input type="text" value="0.00 ft"/>
	Width:	<input type="text" value="0.00 ft"/>
	Length:	<input type="text" value="0.00 ft"/>
	Area:	<input type="text" value="0.00 ft²"/>



STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: **Parkland Farms Subdivision**

BMP ID: **A9**

BMP Design Criteria: **100% Capture**

Type of BMP Design: **Priority 1: P1-02 Roadside Bioretention - No Curb and Gutter**

BMP's Physical Tributary Area: **29,441.0 ft²**

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing = **27,476.0 ft²**

Total Runoff Reduction Measures = **1,965.0 ft²**

Interceptor Trees

Number of new *Evergreen Trees*: **0**

Number of new *Deciduous Trees*: **0**

Square footage of qualifying existing tree canopy: **3,930.0 ft²**

Total Number of Trees in BMP Tributary Area: **0**

Disconnected Roof Drains

Select disconnection condition: **Select disconnection condition**

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts: **0 ft²**

Disconnected Roof Drains Method 2

Percent of rooftop area: **0 %**

Select Density: **1** Units per Acre

Paved Area Disconnection

Paved Area Type: **Not Directly-connected Paved Area**

Alternatively designed paved area: **0.0 ft²**

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace: **0.0 ft²**

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

Post development hydrologic soil type within tributary area: **A: greater than 0.30 in/hr infiltration (transmission) rate**

Post development ground cover description: **Brush: weed-grass mixture with brush major element - Poor (<50% ground cover)**

CN_{POST}: **78.0**

User Composite post development CN: **78.0**

V_{HYDROMOD} = **377.25 ft³**

BMP Sizing Tool: Hydromodification Requirement

BMP Volume

Below Ground	Porosity:	0.40
	Depth below perforated pipe if present:	3.00 ft
	Width:	0.00 ft
	Length:	0.00 ft
	Area:	315.00 ft²

Percent of Goal Achieved = **100.20 %**

Ponded Water Above Ground	Depth:	0.00 ft
	Width:	0.00 ft
	Length:	0.00 ft
	Area:	0.00 ft²

STORM WATER CALCULATOR

BMP Tributary Parameters

BMP ID: Project Name:

BMP Design Criteria:

Type of BMP Design:

BMP's Physical Tributary Area: ft²

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing = ft²

Total Runoff Reduction Measures = ft²

Interceptor Trees

Number of new interceptor *Evergreen Trees*:

Number of new interceptor *Deciduous Trees*:

Square footage of qualifying existing tree canopy: ft²

Total Number of Trees in BMP Tributary Area:

Disconnected Roof Drains

Select disconnection condition:

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts: ft²

Disconnected Roof Drains Method 2

Percent of rooftop area: %

Select Density: Units per Acre

Paved Area Disconnection

Paved Area Type:

Alternatively designed paved area: ft²

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace: ft²

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

Post development hydrologic soil type within tributary area:

Post development ground cover description:

CN_{POST}:

User Composite post development CN:

V_{HYDROMOD} = ft³

BMP Sizing Tool: Hydromodification Requirement

BMP Volume

Below Ground	Porosity:	<input type="text" value="0.40"/>
	Depth below perforated pipe if present:	<input type="text" value="3.00"/> ft
	Width:	<input type="text" value="0.00"/> ft
	Length:	<input type="text" value="0.00"/> ft
	Area:	<input type="text" value="705.00"/> ft ²

Ponded Water Above Ground

Depth:	<input type="text" value="0.00"/> ft
Width:	<input type="text" value="0.00"/> ft
Length:	<input type="text" value="0.00"/> ft
Area:	<input type="text" value="0.00"/> ft ²

Percent of Goal Achieved = %

STORM WATER CALCULATOR

BMP Tributary Parameters

Project Name: **Parkland Farms Subdivision**

BMP ID: **A11**

BMP Design Criteria: **100% Capture**

Type of BMP Design: **Priority 1: P1-02 Roadside Bioretention - No Curb and Gutter**

BMP's Physical Tributary Area: **81,056.0 ft²**

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing = **76,312.5 ft²**

Total Runoff Reduction Measures = **4,743.5 ft²**

Interceptor Trees

Number of new interceptor *Evergreen Trees*: **0**

Number of new interceptor *Deciduous Trees*: **0**

Square footage of qualifying existing tree canopy: **9,487.0 ft²**

Total Number of Trees in BMP Tributary Area: **0**

Disconnected Roof Drains

Select disconnection condition: **Select disconnection condition**

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts: **0 ft²**

Percent of rooftop area: **0 %**

Select Density: **1** Units per Acre

Paved Area Disconnection

Paved Area Type: **Not Directly-connected Paved Area**

Alternatively designed paved area: **0.0 ft²**

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace: **0.0 ft²**

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

Post development hydrologic soil type within tributary area: **A: greater than 0.30 in/hr infiltration (transmission) rate**

Post development ground cover description: **Brush: weed-grass mixture with brush major element - Poor (<50% ground cover)**

CN_{POST}: **80.0**

User Composite post development CN: **80.0**

V_{HYDROMOD} = **1,324,79 ft³**

BMP Sizing Tool: Hydromodification Requirement

BMP Volume

Below Ground	Porosity:	0.40
Depth below perforated pipe if present:	Width:	3.00 ft
	Length:	0.00 ft
	Area:	1,104.00 ft²

Ponded Water Above Ground

Depth:	0.00 ft
Width:	0.00 ft
Length:	0.00 ft
Area:	0.00 ft²

Percent of Goal Achieved = **100.00 %**

BMP Tributary Parameters

Project Name: Parkland Farms Subdivision

BMP ID: A12

BMP Design Criteria: **100% Capture**

Type of BMP Design: Priority 1: P1-02 Roadside Bioretention - No Curb and Gutter

BMP's Physical Tributary Area: 44,644.0 ft²

Description/Notes:

Runoff Reduction Measures

Resulting reduced Tributary Area used for BMP sizing = 43,100.5 ft²

Total Runoff Reduction Measures = 1,543.5 ft²

Interceptor Trees

Number of *new* **Evergreen Trees**: 0

Number of *new* **Deciduous Trees**: 0

Square footage of qualifying **existing tree canopy**: 3,087.0 ft²

Total Number of Trees in BMP Tributary Area:

Disconnected Roof Drains

Select disconnection condition: Select disconnection condition

Disconnected Roof Drains Method 1

Roof area of disconnected downspouts: 0 ft²

Disconnected Roof Drains Method 2

Percent of rooftop area: 0 %

Select Density: 1 Units per Acre

Paved Area Disconnection

Paved Area Type: Not Directly-connected Paved Area

Alternatively designed paved area: 0.0 ft²

Buffer Strips & Bovine Terraces

Area draining to a Buffer Strip or Bovine Terrace: 0.0 ft²

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

Post development hydrologic soil type within tributary area: A: greater than 0.30 in/hr infiltration (transmission) rate

Post development ground cover description: Brush: weed-grass mixture with brush major element - Poor (<50% ground cover)

CN-Post: 78.0

User Composite post development CN: 78.0

V_{HYDROMOD} = 591.78 ft³

BMP Sizing Tool: Hydromodification Requirement

BMP Volume

Below Ground	Porosity:	<u>0.40</u>
	Depth below perforated pipe if present:	<u>3.00</u> ft
	Width:	<u>0.00</u> ft
	Length:	<u>0.00</u> ft
	Area:	<u>494.00</u> ft ²

Percent of Goal Achieved = 100.17 %

Ponded Water Above Ground	Depth:	<u>0.00</u> ft
	Width:	<u>0.00</u> ft
	Length:	<u>0.00</u> ft
	Area:	<u>0.00</u> ft ²

APPENDIX C

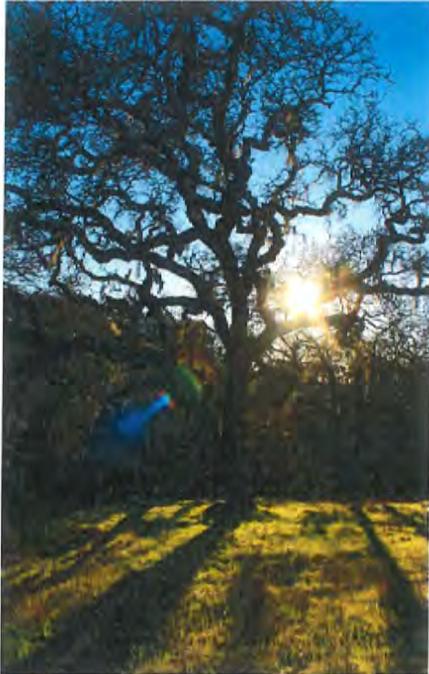
Vegetated Buffer Strip Detail & Infiltration Trench Detail & Fact Sheets

FACT SHEET- VEGETATED BUFFER STRIP

Runoff Reduction Measure

VEGETATED BUFFER STRIP

Also know as: Filter Strip, Grassed Filter



DESCRIPTION

Vegetated buffer strips are sloping planted areas designed to allow storm water to naturally infiltrate sheet flow from adjacent impervious surfaces. Buffer strips slope away from the impervious surface and are most often vegetated with low lying ground cover. Buffer strips function by slowing storm water runoff and allowing sediment and other pollutants to settle and infiltrate. Vegetated buffer strips are well-suited to addressing runoff from roads and highways, roof downspouts, and parking lots.

ADVANTAGES

- Reduces the size of downstream storm water BMPs.
- Enhances water quality of downstream water bodies through natural processes.
- Aesthetically pleasing.
- Can establish habitat for birds and other pollinators like butterflies and bees.
- Require minimal maintenance (typically erosion prevention, mowing, and/or pruning).

FACT SHEET- VEGETATED BUFFER STRIP

LIMITATIONS

- Must receive sheet flow.
- Requires sufficient area.
- Downstream storm water collection needs to be considered in design.
- May not be appropriate for industrial sites or locations where chemical spills may occur.
- A thick vegetative cover is needed for these practices to function properly.
- Prohibited in areas of known contamination. If soil and/or groundwater contamination is present on the site or within a 100' radius of the proposed location, the North Coast Regional Water Quality Control Board review and approval is required.
- Not appropriate for sites with a high risk of landslides or other geotechnical concerns. Slope stability shall be determined by a licensed Geotechnical Engineer.

KEY DESIGN FEATURES

- Slopes should not exceed 15%.
- Slope shall be at least 2%.
- Minimum length (in direction of flow) shall be 15 feet.
- Strip shall be sized as long as the site will reasonably allow.
- Vegetation should be carefully selected per the approved **Plant List** included in Appendix G.
- Strip shall be free of gullies or rills.
- 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, 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 inspection and maintenance shall include the following:

- Mow as needed and irrigate during dry weather to the extent necessary to keep vegetation alive. Remove obstructions and trash from vegetated buffer strip.
- Pesticides and fertilizers shall not be used in the vegetated buffer strip.
- Where mowing is required, grass height shall be maintained between 3" and 6".

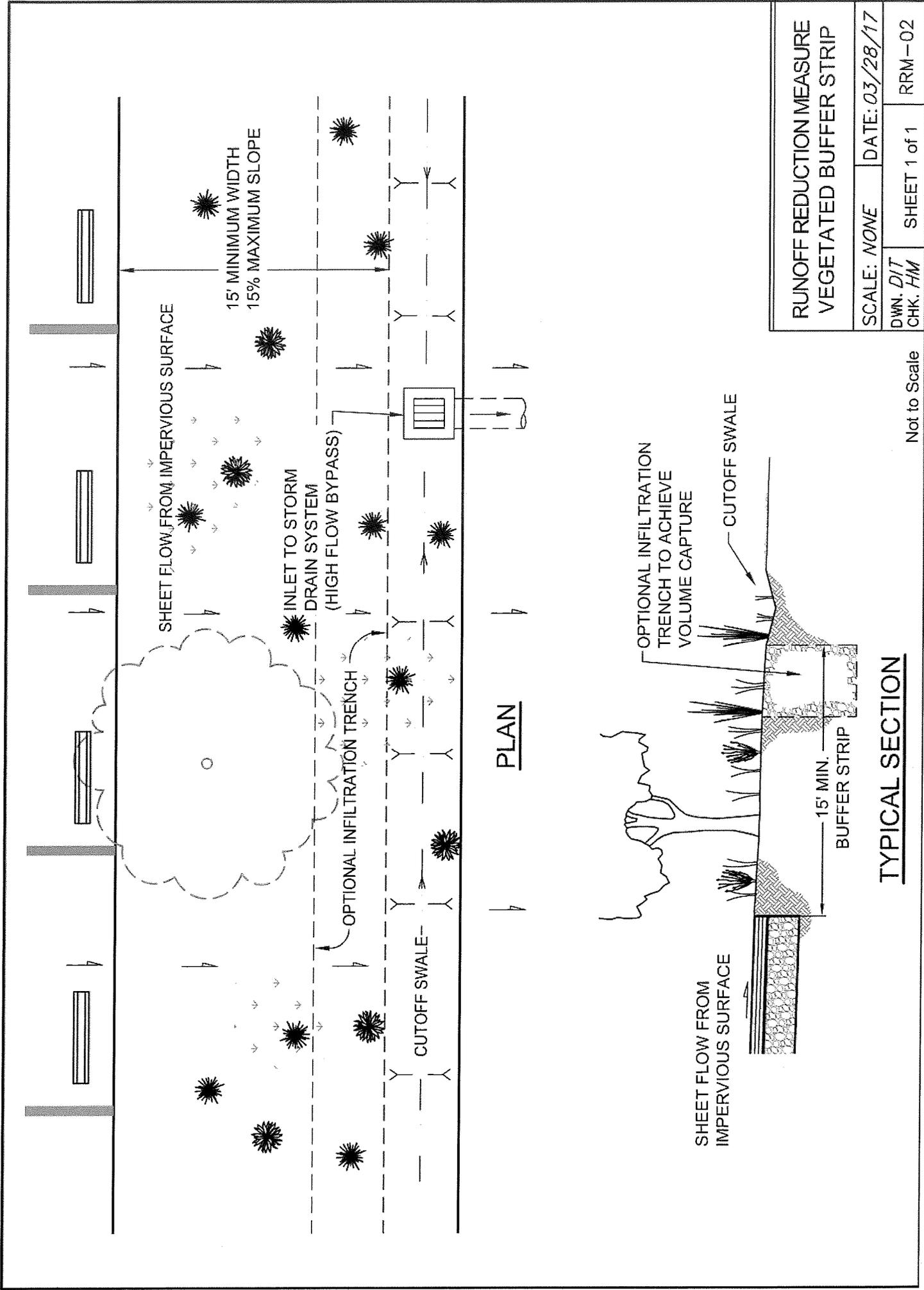
Vegetated buffer strips shall be inspected and maintained twice a year to review:

- Condition of vegetation.
- Obstructions and trash.
- Pondered flow is drained within 72 hours after a rainfall event.

FACT SHEET- VEGETATED BUFFER STRIP

Runoff Reduction Measure

- If ponding is observed, grading will be required to restore positive drainage.



**RUNOFF REDUCTION MEASURE
VEGETATED BUFFER STRIP**

SCALE: NONE DATE: 03/28/17

DWN. D/T
CHK. HM

SHEET 1 of 1

RRM-02

Not to Scale

TYPICAL SECTION

INFILTRATION TRENCH

Also known as: Infiltration Gallery, Soakage Trench



DESCRIPTION

Infiltration Trenches are typically long narrow trenches that are filled with gravel that receive storm water and allow it to infiltrate into the soil. Infiltration trenches can be used to intercept storm water from landscape or open space before it crosses onto paved area or can be used as part of a treatment train with other BMP (such as Vegetated Buffer Strips or Vegetated Swales) to achieve the Volume Capture requirement.

ADVANTAGES

- Provides volume capture.
- Can be used as part of a treatment train with other BMPs.
- Can be used on sloped sites.
- Simple to install.

LIMITATIONS

- Impacts to adjacent buildings and overflow requirements need to be considered in design.
- Requires adequate space.

KEY DESIGN FEATURES

- Install a designated high flow bypass inlet or route.
- Design to prevent standing water. All surface water must drain within 72 hours to prevent mosquito breeding.

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.

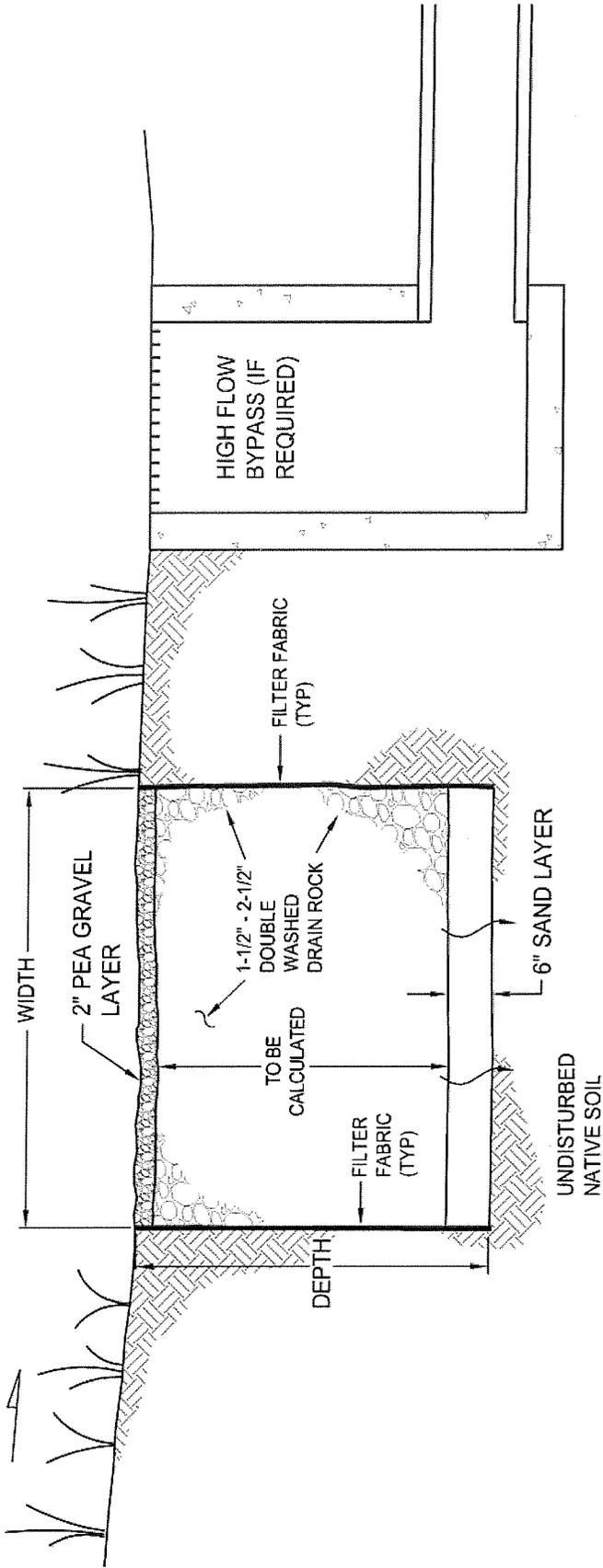
INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SWLID Submittal. The maintenance plan shall include recommended maintenance practices, identify 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 inspection and maintenance shall include the following:

- Inspect twice annually for ponded water. If ponded water is observed, the top layer of pea gravel will need to be replaced.
- If ponded water remains, further grading and replacement may be necessary to prevent mosquito breeding.
- The high flow inlet should be inspected and cleaned as necessary to remove any obstructions.
- Pesticides and fertilizers shall not be used in vegetated areas draining to the infiltration trench.
- Remove any accumulated sediment and/or trash.

SHEET FLOW



NOTES:

1. DEPTH SHALL NOT EXCEED WIDTH OR LENGTH.
2. TO BE USED AS PART OF A TREATMENT TRAIN.
3. ALL SURFACE WATER MUST DRAIN WITHIN 72 HOURS.

PRIORITY 3
INFILTRATION TRENCH

SCALE: NONE DATE: 04/06/17

DWN. DIT
CHK. HM

P1-07

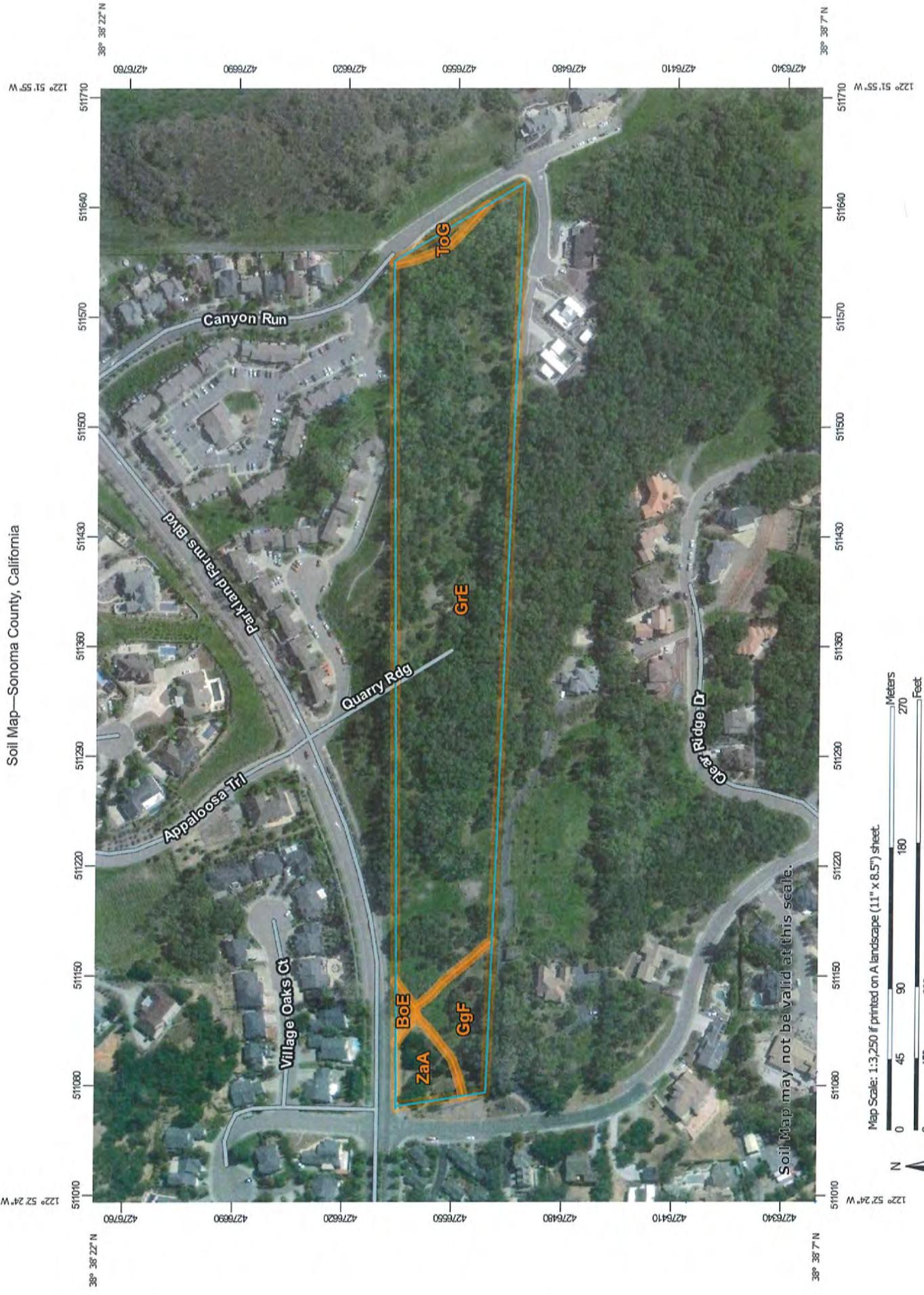
Not to Scale

APPENDIX D

Operation and Maintenance Checklists

Soil Classification Fact Sheets

APPENDIX E



Soil Map may not be valid at this scale.

Map Scale: 1:3,250 if printed on A landscape (11" x 8.5") sheet.

Meters 0 45 90 180 270
Feet 0 150 300 600 900
Map projection: Web Mercator Corner coordinates: WGS84 Edge ties: UTM Zone 10N WGS84



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

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
- 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.

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

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

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

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

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

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

Soil Survey Area: Sonoma County, California
 Survey Area Data: Version 11, Sep 21, 2017

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

Date(s) aerial images were photographed: Dec 31, 2009—Nov 22, 2016

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
BoE	Boomer loam, 7 to 50 percent slopes, moist, MLRA 15	0.1	0.7%
GgF	Goulding clay loam, 30 to 50 percent slopes	0.6	6.7%
GrE	Guenoc gravelly silt loam, 5 to 30 percent slopes	8.4	87.3%
ToG	Toomes rocky loam, 30 to 75 percent slopes	0.1	1.1%
ZaA	Zamora silty clay loam, 0 to 2 percent slopes	0.4	4.2%
Totals for Area of Interest		9.6	100.0%

Sonoma County, California

BoE—Boomer loam, 7 to 50 percent slopes, moist, MLRA 15

Map Unit Setting

National map unit symbol: 2w8db
Elevation: 210 to 1,840 feet
Mean annual precipitation: 38 to 73 inches
Mean annual air temperature: 57 to 60 degrees F
Frost-free period: 300 to 345 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Boomer

Setting

Landform: Ridges, hillslopes
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 11 inches: loam
AB - 11 to 19 inches: loam
Bt1 - 19 to 37 inches: clay loam
Bt2 - 37 to 47 inches: gravelly clay loam
Bt3 - 47 to 55 inches: gravelly clay loam
Crt - 55 to 65 inches: cemented bedrock

Properties and qualities

Slope: 7 to 50 percent
Depth to restrictive feature: 30 to 70 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat):
Moderately low (0.01 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.2 to 0.5 mmhos/cm)
Available water storage in profile: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Hugo

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

Josephine

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

Red hill

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

Data Source Information

Soil Survey Area: Sonoma County, California
Survey Area Data: Version 11, Sep 21, 2017

Sonoma County, California

GgF—Goulding clay loam, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: hfd7
Elevation: 1,500 to 5,000 feet
Mean annual precipitation: 30 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 220 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Goulding

Setting

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

Typical profile

H1 - 0 to 9 inches: gravelly clay loam
H2 - 9 to 18 inches: very gravelly clay loam
H3 - 18 to 24 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

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

Minor Components

Spreckels

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

Toomes

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

Rock outcrop

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

Henneke

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

Data Source Information

Soil Survey Area: Sonoma County, California

Survey Area Data: Version 11, Sep 21, 2017

Sonoma County, California

GrE—Guenoc gravelly silt loam, 5 to 30 percent slopes

Map Unit Setting

National map unit symbol: hfdj
Elevation: 400 to 3,000 feet
Mean annual precipitation: 25 to 50 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 260 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Guenoc

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 igneous rock

Typical profile

H1 - 0 to 17 inches: gravelly silt loam
H2 - 17 to 38 inches: gravelly clay
H3 - 38 to 44 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 30 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

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

Minor Components

Boomer

Percent of map unit: 4 percent

Hydric soil rating: No

Supan

Percent of map unit: 4 percent

Hydric soil rating: No

Rock outcrop

Percent of map unit: 4 percent

Hydric soil rating: No

Spreckels

Percent of map unit: 3 percent

Hydric soil rating: No

Data Source Information

Soil Survey Area: Sonoma County, California

Survey Area Data: Version 11, Sep 21, 2017

Sonoma County, California

ToG—Toomes rocky loam, 30 to 75 percent slopes

Map Unit Setting

National map unit symbol: hfkq
Elevation: 150 to 4,000 feet
Mean annual precipitation: 8 to 25 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Toomes and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Toomes

Setting

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

Typical profile

H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 13 inches: gravelly clay loam
H3 - 13 to 23 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 4 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: SHALLOW ROCKY (R015XD132CA)
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 10 percent

Hydric soil rating: No

Goulding

Percent of map unit: 5 percent

Hydric soil rating: No

Guenoc

Percent of map unit: 5 percent

Hydric soil rating: No

Spreckels

Percent of map unit: 5 percent

Hydric soil rating: No

Data Source Information

Soil Survey Area: Sonoma County, California

Survey Area Data: Version 11, Sep 21, 2017

Sonoma County, California

ZaA—Zamora silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hfl3
Elevation: 30 to 1,300 feet
Mean annual precipitation: 22 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 250 to 330 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Zamora

Setting

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

Typical profile

H1 - 0 to 5 inches: silty clay loam
H2 - 5 to 29 inches: clay loam
H3 - 29 to 41 inches: clay loam
H4 - 41 to 55 inches: sandy clay loam
H5 - 55 to 60 inches: gravelly clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: 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 storage in profile: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Cole

Percent of map unit: 4 percent

Hydric soil rating: No

Yolo

Percent of map unit: 4 percent

Hydric soil rating: No

Cortina

Percent of map unit: 3 percent

Hydric soil rating: No

Pajaro

Percent of map unit: 3 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Sonoma County, California

Survey Area Data: Version 11, Sep 21, 2017