CONSULTING CIVIL ENGINEERS
RIECHERS & SPENCE ASSOCIATES

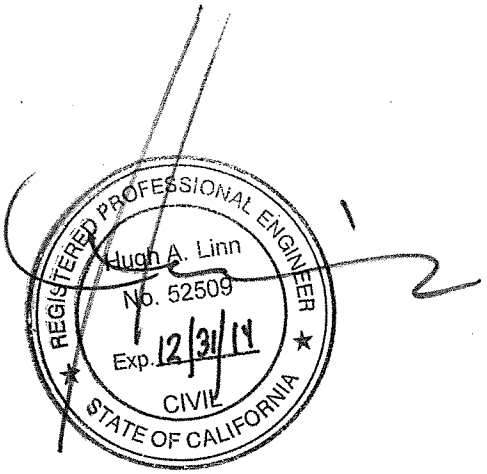
PRELIMINARY STORMWATER RUNOFF MANAGEMENT PLAN (SRMP)

Prepared for

KRUPP BROTHERS WINERY
3150 Silverado Trail
Napa, CA 94558

April 15, 2014
RSA Project # 4111005.0

Project Engineer:
Bruce W. Fenton, P.E.



1515 Fourth Street, Napa, CA 94559 www.rsacivil.com 707.252.3301.v 707.252.4966.f

TABLE OF CONTENTS

ATTACHMENTS

I. Purpose

This report addresses Napa County Stormwater Runoff Management Plan (SRMP) requirements. The project's post-construction stormwater management level is identified as a "Priority Project." The requirements are outlined in the Napa County Post-Construction Runoff Management Requirements, dated June 3, 2008.

This report also addresses Marin Napa Solano Sonoma Stormwater Association (MNSSSA) compliance requirements. The project is classified as a Tier 2 project. Requirements are outlined in the Model Stormwater Technical Guide Draft for compliance with stormwater post-construction requirements to begin implementation by June 30, 2015. The preliminary design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the current edition of the MNSSSA Stormwater Technical Guide.

II. Existing Conditions

The Krupp Brothers Winery project is located at 3150 Silverado Trail, Napa, California. The APN is 039-610-006 and the parcel has an area of 13 +/- acre. Most of the property is relatively level and is currently used for vineyards. Hardman Creek, a blue-line stream, runs roughly north to south on the eastern side of the property. There is a residence and pool located on the east side of Hardman Creek. A wetland swale exists in the southeast corner of the site. Refer to Attachment 1 for a Site Location Map and a USGS Site Map showing the parcel topography, features and boundary.

III. Proposed Development

The Owner is applying to the County of Napa modification to a Winery Use Permit that will allow operation of a 50,000 gallon per year winery. Public access to the proposed winery will be from Silverado Trail. The proposed location for the winery is currently an area of vineyard between Silverado Trail and Hardman Creek, on the northern portion of the parcel.

Runoff from the proposed project will be directed to bioretention facilities on site. The proposed project will disturb an area of approximately 2.5 acres. Refer to Civil Improvement Plans in Attachment 2, for the overall scope of the project.

IV. Drainage Study

This is a Priority Project that proposes over 10,000 sq.ft. of new or reconstructed impervious space, so a drainage study is required by the Napa Post-Construction Runoff Management Requirements. This drainage study was performed in compliance with the new Marin Napa Solano Sonoma Stormwater Association Model Stormwater Technical Guide Draft. It requires that the project demonstrate that runoff from impervious area be directed to a bioretention facility, and that the bioretention areas have a surface area equal or greater than 4% of the total tributary area to the bioretention facility.

The project site consists of one Drainage Management Area (DMA) as shown in Exhibit in Attachment 3. Table 1 shows bioretention area sizing.

Table 1.

DMA Name	Area (SF)	Post-Project Surface Type	Runoff Factor	DMA Area x Runoff Factor	Sizing Factor	Minimum Area (SF)	Proposed Area (SF)
Winery	59,800	Impervious	1	59,800	0.04	2392	2500

The proposed development will have 2500 SF of bioretention area to treat stormwater runoff to the maximum extent practicable.

V. Stormwater Pollution Control

Anticipated Activities and Pollutants

The proposed project construction activities will potentially include the following pollutant sources:

A. Vehicle fluids
B. Base and subbase materials
C. Cement associated with PCC concrete/shotcrete operations
D. General Litter
E. Mortar Mix
F. Treated Lumber
G. Clearing and Grubbing Operations
H. Solvent and Adhesives
I. Paint
J. Cleaning Chemicals
K. Grading Operations
L. Material Stockpiles
M. Sediments

The potential contaminants of concern based on the potential pollutant sources outlined above are as follows:

A. Sediments
B. Nutrients
C. Trash and Debris
D. Metals
E. Total Petroleum Hydrocarbons

Receiving Waters of Concern

Stormwater from the site discharges to natural vegetated flow lines, and eventually drains into the Napa River. According to Appendix F of the Napa County Post-Construction Runoff Management requirements, the potential pollutants of concern developed by this project are:

1. Sediment
2. Nutrients
3. Metals

Stormwater Best Management Practices (BMPs) are implemented to reduce potential pollutants from the proposed uses. The proposed disturbed area exceeds 1 acre. A Storm Water Pollution Prevention Plan will be prepared for the project. A Notice Of Intent will be filed with the San Francisco Regional Water Resources Control Board.

VI. Post-Construction BMPs

This project is classified as a Priority Project by the Napa County Post-Construction Runoff Management Requirements. As such, appropriate Site Design, Source Control BMPs, and Treatment Control BMPs have been incorporated into this project. The stormwater Best Management Practices (BMPs) listed below are implemented to reduce the post-development runoff volume and peak runoff rate, and limit pollution generation from the source, prior to discharge off-site.

There are relatively few potential pollution sources associated with the proposed fuel terminal. The primary sources are concentrated flows and driveway/roof runoff. Existing vegetation will be maintained downslope of the project area to treat contaminant laden runoff to the maximum extent practicable (MEP) and the bioretention areas will be used to treat stormwater and mitigate increased flows resulting from increased impervious area. Design and selection of these methods are based upon the California Stormwater Best Management Practices (BMP) Handbook published by the California Stormwater Quality Association (CASQA), and new Napa County Stormwater standards.

Site Design BMPs

Post-Development runoff volume has been designed to not exceed pre-development runoff volume for the 2-year, 24-hour storm event. The following BMPs have been implemented to reduce the post-development runoff volume:

- *Minimize impervious footprint*. Vegetated swales are used in this project to reduce the impervious areas. Streets, sidewalks, and parking lots aisles will be designed to the minimum widths necessary, provided that public safety and walkable environment for pedestrians are not compromised.

- *Conserve natural areas*. Natural drainage and vegetated swales will be used to the maximum extent practicable. The surrounding natural and agricultural areas will remain undisturbed.

- *Minimize directly connected Impervious Areas*. The proposed impervious areas will drain to vegetated swales, or a detention pond. Roofs will drain into adjacent landscape areas.

- *Maximize canopy interception and water conservation*. Surrounding native landscaping will be preserved. New landscape will be professionally designed to incorporate native or drought tolerant plants and large shrubs in place of non-drought-tolerant species.

Source Control BMPs

The following BMPs have been implemented to limit pollution generation from the source:

A. Roads and Driveways

- The surfaces and slopes of new driveways shall comply with the latest version of the Napa County Road and Street Standards.

B. Parking Areas

- Runoff from paved parking areas will be directed to vegetated swales or to a detention pond to infiltrate and treat stormwater.

C. New or Reconstructed Stormwater Conveyance Systems

- Energy dissipaters shall be installed at the outlets of new storm drains to minimize erosion.
- Ditches and other open conveyance systems shall be lined with vegetation to minimize erosion of the bed and bank.
- Ditches and other open conveyance systems shall have a vegetated buffer to protect exposed soils and to filter stormwater runoff before entering the conveyance system.

D. Storm Drain Inlets, Open Channels, and Creeks

- Signage shall be provided at all stormwater conveyance system inlets and catch basins within the project area with prohibitive language (e.g., "No Dumping - Drains to River") in English and in Spanish.

E. Landscaping

- Existing native trees, shrubs, and groundcover shall be preserved to the maximum extent practicable.

- New Landscape will be professionally designed to minimize irrigation, runoff, and the use of fertilizers and pesticides that can contribute to stormwater pollution. Plants shall be selected as appropriate to the soils, slopes, climate, sun, wind, and other site conditions.

F. Trash Storage Areas

- Trash storage areas shall be paved with an impervious surface, designed not to allow run-on from adjoining areas, and screened or walled to prevent off-site transport of trash.

- Trash storage areas will contain a roof or awning to minimize direct precipitation or contain attached lids on all trash containers that exclude rain.

H. Roofs, Gutters, and Downspouts

- All roofs, gutters, and/or downspouts will consist of protected metals or shall discharge to landscaping designed and maintained appropriately to prevent soil erosion.

K. Processing Areas

- Processing areas shall be paved and performed indoors or under cover to keep rainwater out of the processing area. If the processing area is outdoors it must be graded or bermed to prevent run-on from surronding areas.

- No storm drains will be constructed in the processing area.

- The processing area will be sloped to an area drain to the sanitary sewer system or other approved collection system.

N. Food Service Equipment Cleaning

- A cleaning area will be constructed and shall be indoors or in a covered area outdoor. The cleaning area shall be plumbed to the sanitary sewer

- The area for cleaning floor mats, containers, and equipment shall be large enough to clean the largest mat or piece of equipment to be cleaned, and the cleaning area shall be connected to a grease interceptor prior to discharging into the sanitary sewer system.

O. Interior Floor Drains

- Interior floor drains shall be plumbed to the sanitary sewer system or closed loop system and shall not be connected to storm drains.

Treatment Control BMPs

Engineered Treatment control BMPs are required for this project because it is a Priority project. The following BMPs that have been incorporated into this project to treat runoff prior to discharge.

1. Vegetated Buffer Strips

Vegetated buffer strips are vegetated surfaces that are designed to treat sheet flow from adjacent surfaces. Filter strips function by slowing runoff velocities and allowing sediment and other pollutants to settle, and by providing some infiltration into underlying soils. The vineyard cover crop downslope of the proposed development will be maintained to filter runoff.

2. Vegetated Swales

Vegetated swales are open shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff. Vegetated swales can serve as part of a stormwater drainage system and can replace curbs, gutters, and storm drains.

3. Bioretention Facilities

Bioretention areas are landscaping features that are expanded to provide on-site treatment of stormwater runoff. Surface runoff is directed into shallow, landscaped depressions that are designed to infiltrate and treat stormwater runoff. The runoff filters through the mulch and prepared soil mix. The filtered runoff can be collected in a perforated underdrain and returned to the storm drain system.

4. Energy Dissipater/Rock Outfalls

Energy dissipaters also know as rock outfalls, are rock aprons located at stormdrain pipe or discharge points. They are designed to slow and dissipate runoff velocities as they exit the stormdrain pipe or drainage channel. By slowing the velocity and dissipating the flow the risk of erosion due to concentrated flows reduces.

Routine maintenance is critical to the successful operation of BMPs. General maintenance includes inspection of BMPs at the beginning and end of the wet season, vegetation management, debris and sediment removal, restoration of damaged area in a BMP, and possible vector control.

The applicant accepts responsibility for interim operation and maintenance of stormwater treatment and flow-control facilities until such a time as this responsibility is formally transferred to a subsequent owner. The owner shall execute a Maintenance and Operation Agreement with the County of Napa.

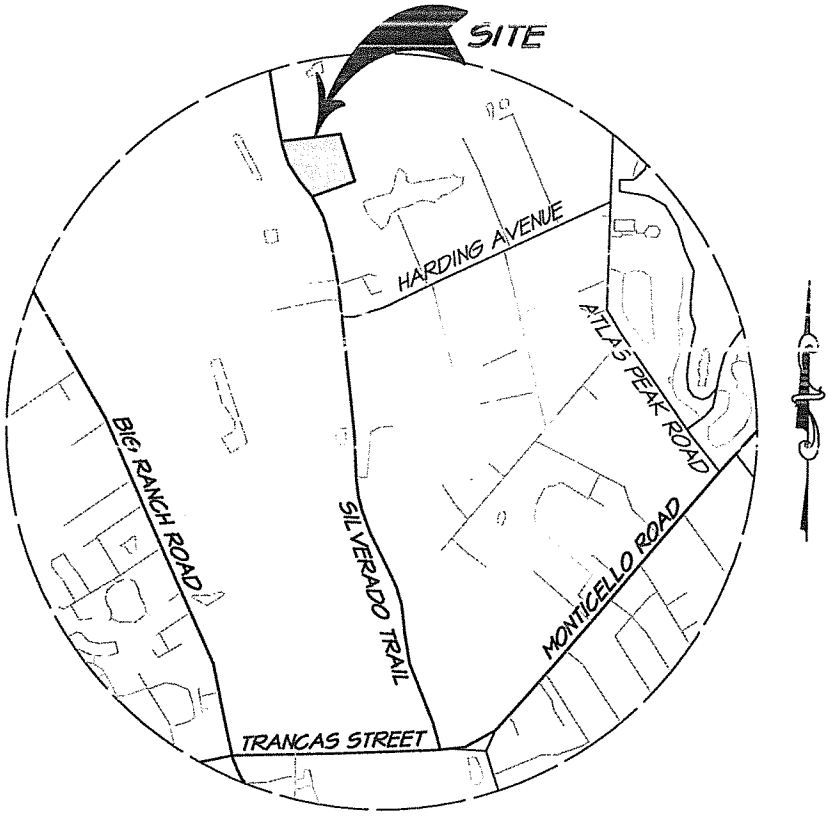
VII. Conclusions

The stormwater runoff management plan outlined above is incorporated into the design of the proposed Krupp Brothers Winery project. This plan demonstrates that appropriate, site specific best management practices will be implemented to minimize contaminant laden runoff from leaving the parcel. With the implementation and proper maintenance of stormwater treatment controls, the proposed project can control the runoff volume, flow rate and treatment of contaminant laden runoff.

ATTACHMENT 1

Vicinity Map, USGS Map, Aerial Image (Current Site Photo)

KRUPP BROTHERS WINERY
VICINITY MAP
NAPA CALIFORNIA

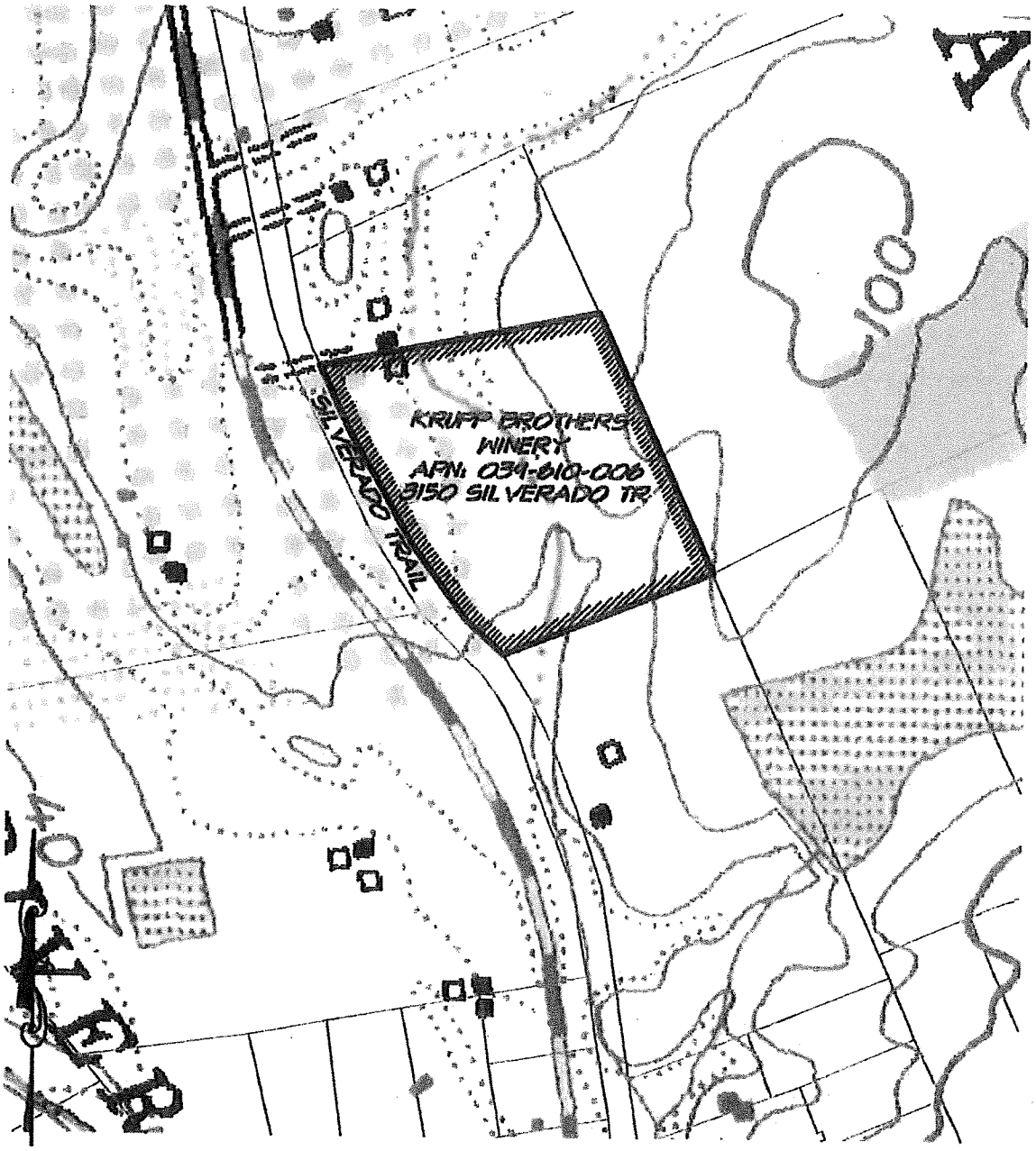


CONSULTING CIVIL ENGINEERS
RIECHERS & SPENCE ASSOCIATES
1515 Fourth Street
Napa, Calif. 94559
v 707.252.3301
f 707.252.4966

AUGUST 15, 2011

4111005.0

KRUPP BROTHERS WINERY
USGS MAP
NAPA COUNTY CALIFORNIA



GRAPHIC SCALE

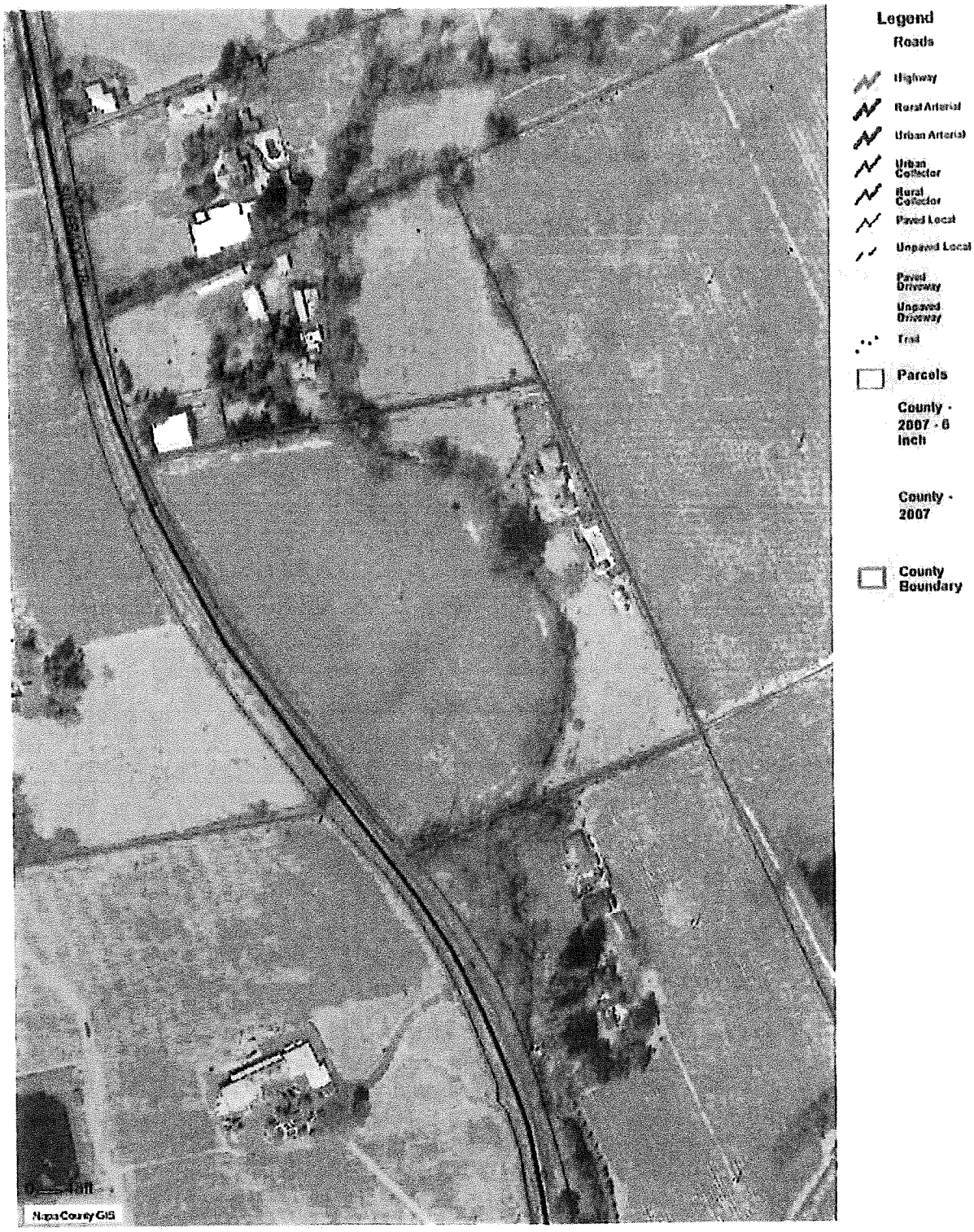
400 0 400 800

(IN FEET)
1 inch = 400 FT

CONSULTING CIVIL ENGINEERS
RIECHERS SPENCE & ASSOCIATES
1515 Fourth Street
Napa, Calif. 94559
v 707.252.3301
f 707.252.4966

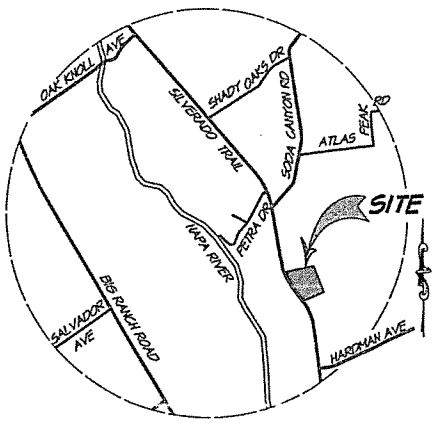
AUG. 11, 2011

4111005.0 usgs.dwg sheet 1


Legend
Roads
Highway
Rural Arterial
Urban Arterial
Urban Collector
Rural Collector
Paved Local
Unpaved Local
Paved Driveway
Unpaved Driveway
Trail
Parcels
County - 2007 - 6 inch
County - 2007
County Boundary
0 400 Feet
Napa County GIS

ATTACHMENT 2

Reduced Use Permit Plan Set



LOCATION MAP
NO SCALE

PROJECT INFORMATION

OWNER:	BART AND PATRICIA KRUPP
OWNER ADDRESS:	300 UPPER MOUNTAIN AVE MONTCLAIR, NJ 07043
SITE ADDRESS:	3150 SILVERADO TRAIL NAPA, CA 94558
CIVIL ENGINEER:	RIECHERS SPENCE & ASSOC. [illegible] FOURTH STREET NAPA, CA 94559
CONTACT:	HUGH LINN TEL: 707-252-3301
APN:	034-610-006
PARCEL AREA:	18.23 ACRES±
EXISTING USE:	RURAL HOMESITE
PROPOSED USE:	WINERY
EXISTING ZONING:	AP
PROPOSED ZONING:	AP

BOUNDARY NOTES

THE BOUNDARIES SHOWN HEREIN ARE BASED UPON TOPOGRAPHIC MAP PREPARED BY RSA, DATED MARCH 2011.

BENCHMARK

NAPA COUNTY #138-C. ELEVATION = 36.44' (NSVD 1929).

SHEET INDEX

SYMBOL LEGEND

PROPOSED

1 DRAIN LINE — SD —	STORM DRAIN LINE
FIRE MAIN	FIRE MAIN
? LINE	
O REMAIN	PROPERTY LINE
	DIRECTION OF EX. DRAINAGE
YOUR LINE	100-YEAR OVERLAND RELEASE PATH
ELEVATION	

ABBREVIATIONS

AD	AREA DRAIN
AB	AGGREGATE BASE
AC	ASPHALT CONCRETE
ARV	AIR RELEASE VALVE
BFP	BACK FLOW PREVENTER
BM	BENCHMARK
BO	BLOWOFF
BSW	BACK OF SIDEWALK
C&G	CURB AND GUTTER
CB	CATCH BASIN
℄	CENTERLINE
CIPP	CAST IN PLACE PIPE
CMP	CORRUGATED METAL PIPE
CO	CLEANOUT
CPP	CORRUGATED PLASTIC PIPE
CV	CHECK VALVE
DI	DROP INLET
DIP	DUCTILE IRON PIPE
DS	DOWNSPOUT
DCV	DOUBLE CHECK VALVE
DDCV	DOUBLE DETECTOR CHECK VALVE
EP	EDGE OF PAVEMENT
EX	EXISTING
FC	FACE OF CURB
FDC	FIRE DEPT. CONNECTION
FF	FINISH FLOOR
FFC	FINISH FLOOR OF CAVE
FG	FINISH GRADE
FH	FIRE HYDRANT
FS	FIRE SERVICE
IE	FLOW LINE
FW	FIRE WATER LINE
GB	GRADE BREAK
HP	HIGH POINT
INV	INVERT
IP	IRON PIPE
JP	JOINT POLE
LF	LINEAL FEET/FOOT
LP	LOW POINT
MH	MANHOLE
OC	ON CENTER
OH	OVERHEAD
PCC	PORTLAND CONCRETE CEMENT
PG&E	PACIFIC GAS AND ELECTRIC
PIV	POST INDICATOR VALVE
PL	PROPERTY LINE
PRC	POINT OF REVERSE CURVE
PVC	POLYVINYL CHLORIDE
PW	PROCESS WASTE
R	RADIUS
RSA	RIECHERS SPENCE & ASSOCIATES
ROW	RIGHT OF WAY
RCP	REINFORCED CONCRETE PIPE
S	SLOPE (FEET/FOOT)
SD	STORM DRAIN
SS	SANITARY SEWER
STA	STATION
STD	STANDARD
STL	STEEL PIPE
TC	TOP OF CURB
TW	TOP OF WALL
VCP	VITRIFIED CLAY PIPE
W	DOMESTIC WATER LINE
WM	WATER METER
WV	WATER VALVE

REGISTERED PROFESSIONAL ENGINEER
HUGH ALEXANDER LINN
No. 52509
Exp. 12-31-14
CIVIL ENGINEER
STATE OF CALIFORNIA

PREPARED UNDER THE DIRECTION OF:

HUGH A. LINN RCE 52509 EXP 12-31-14

NO.	DATE	REVISIONS	BY	APP'D

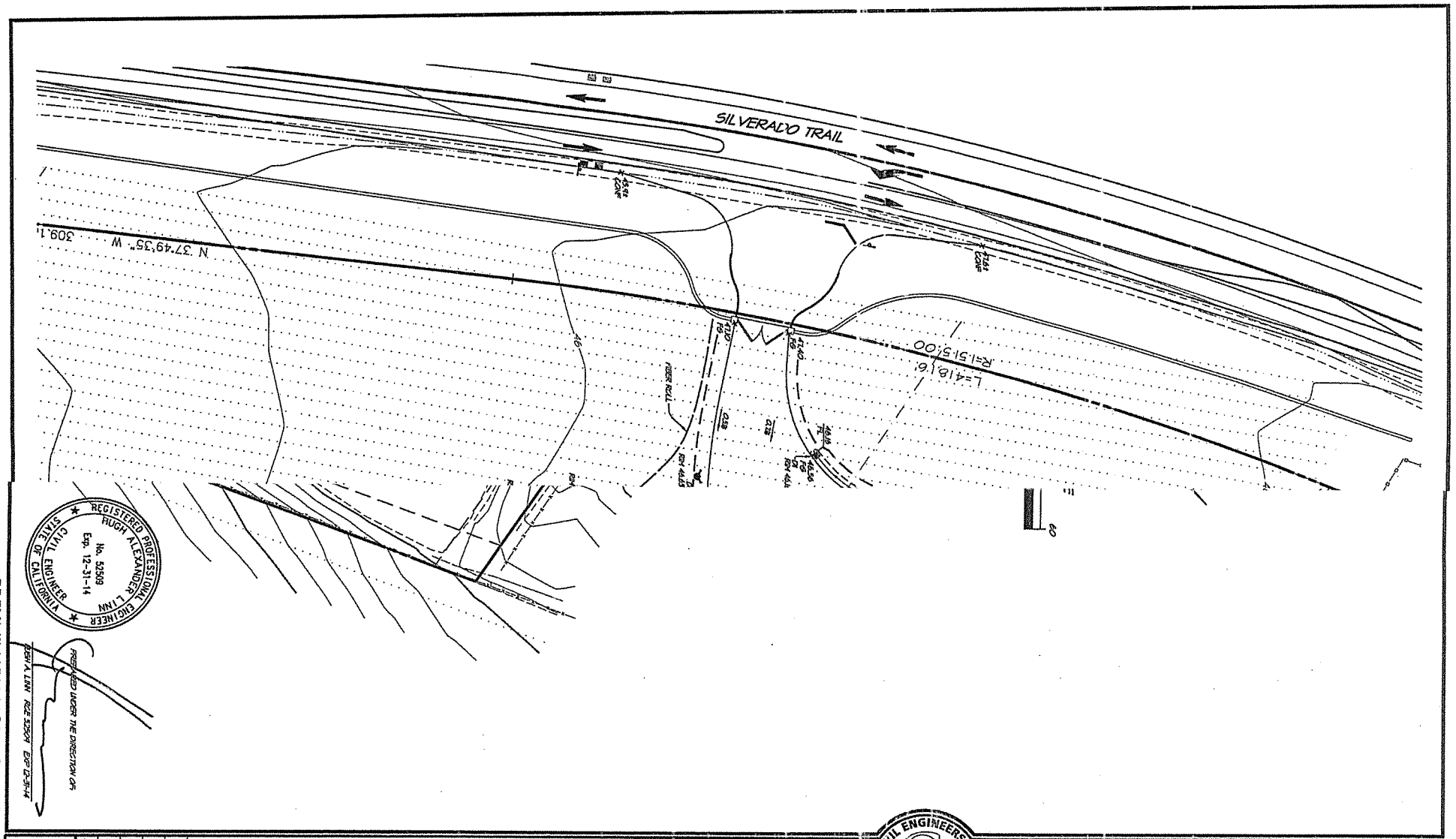
RIECHERS SPENCE & ASSOCIATES
CIVIL ENGINEERS CONSULTING
1515 Fourth Street
Napa, California 94559
v 707.252.3301
f 707.252.4965

KRUPP BROTHERS WINERY
SITE PLAN
NAPA COUNTY CALIFORNIA

DATE	04/16/2014
DRAWN	ECB/JFH
DESIGNED	ECB
CHECKED	BWF
JOB NO.	4111005.0
SHEET NO.	UP1 OF 3 SHEETS

R:\JOBS\4111005.0_Krupp_Wine_Permit\CAD\SVP-HOD\UP1.dwg 04/16/2014 5:20:41 PM jillson COPYRIGHT Riechers Spence & Assoc.

PRELIMINARY NOT FOR CONSTRUCTION



PRELIMINARY NOT FOR CONSTRUCTION

KRUPP BROTHERS WINERY
GRADING AND EROSION CONTROL PLAN

NAPA COUNTY CALIFORNIA

SHEET NO. UP2 OF 9 SHEETS

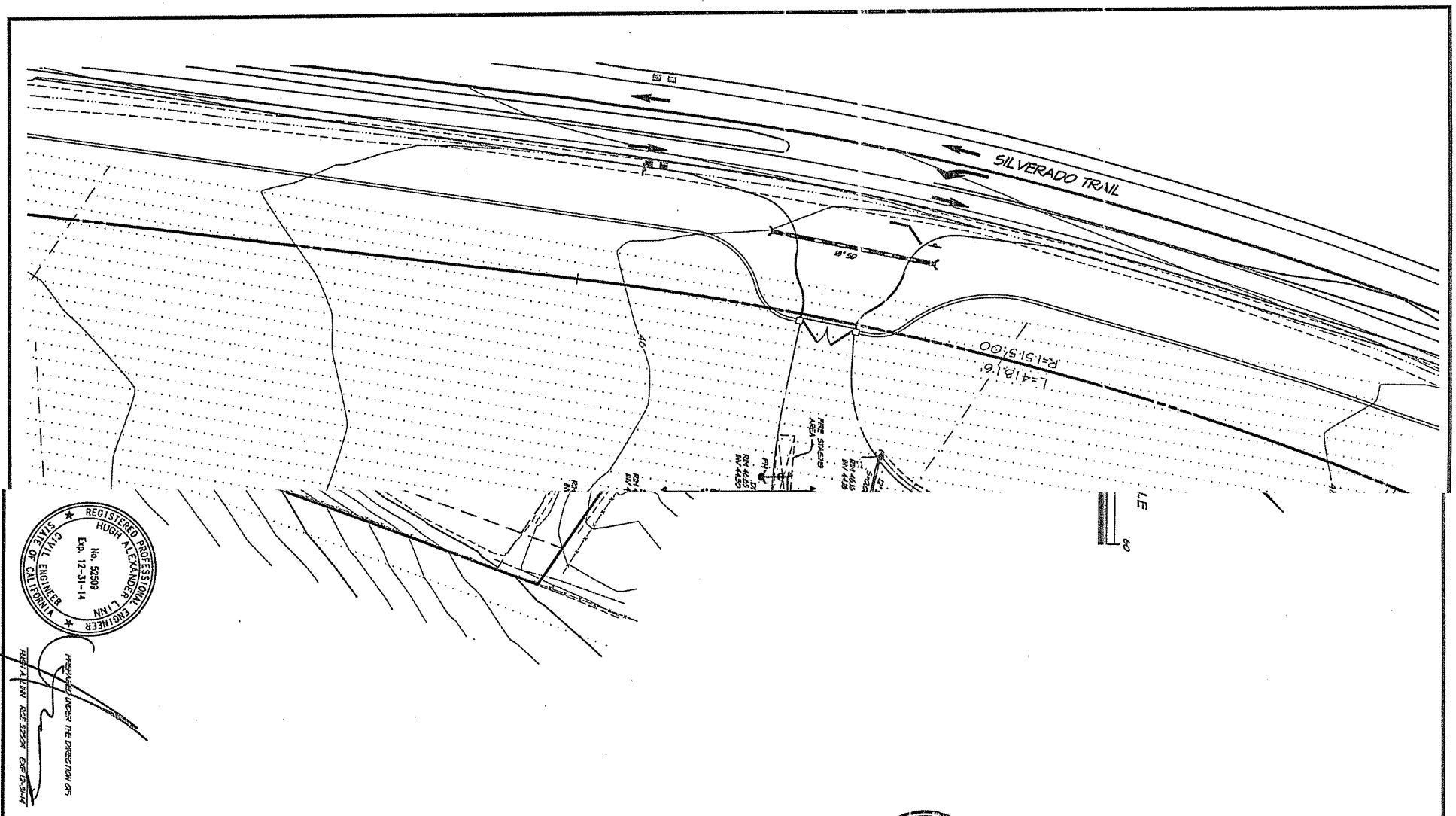
JOB NO. 4111205.0

CHECKED	DESIGNED	DRAWN	DATE
BMF	EJB	EJB/PH	04/16/2014

CIVIL ENGINEERS CONSULTING
RIECHERS SPENCE & ASSOCIATES
1515 Fourth Street
Napa, California 94559
v 707.252.3301
f 707.252.4966

NO.	DATE	REVISIONS	BY	APPD

R:\2011\4111005.0_Krupp_Winery_Use_Permit\CAD\3DUP-MOD\UP2.dwg 04/16/2014 3:52:12PM jwilson



REGISTERED PROFESSIONAL ENGINEER
HUGH ALEXANDER LINN
No. 52509
Exp. 12-31-14
STATE OF CALIFORNIA CIVIL ENGINEER

PREPARED UNDER THE DIRECTION OF:
HUGH A. LINN RCE 52509 EXP 12-31-14

PRELIMINARY NOT FOR CONSTRUCTION

SHEET NO. UP3 OF 3 SHEETS

JOB NO. 4111.005.0

CHECKED BAF | DESIGNED ECB | DRAWN SGB/JRH | DATE 04/16/2014

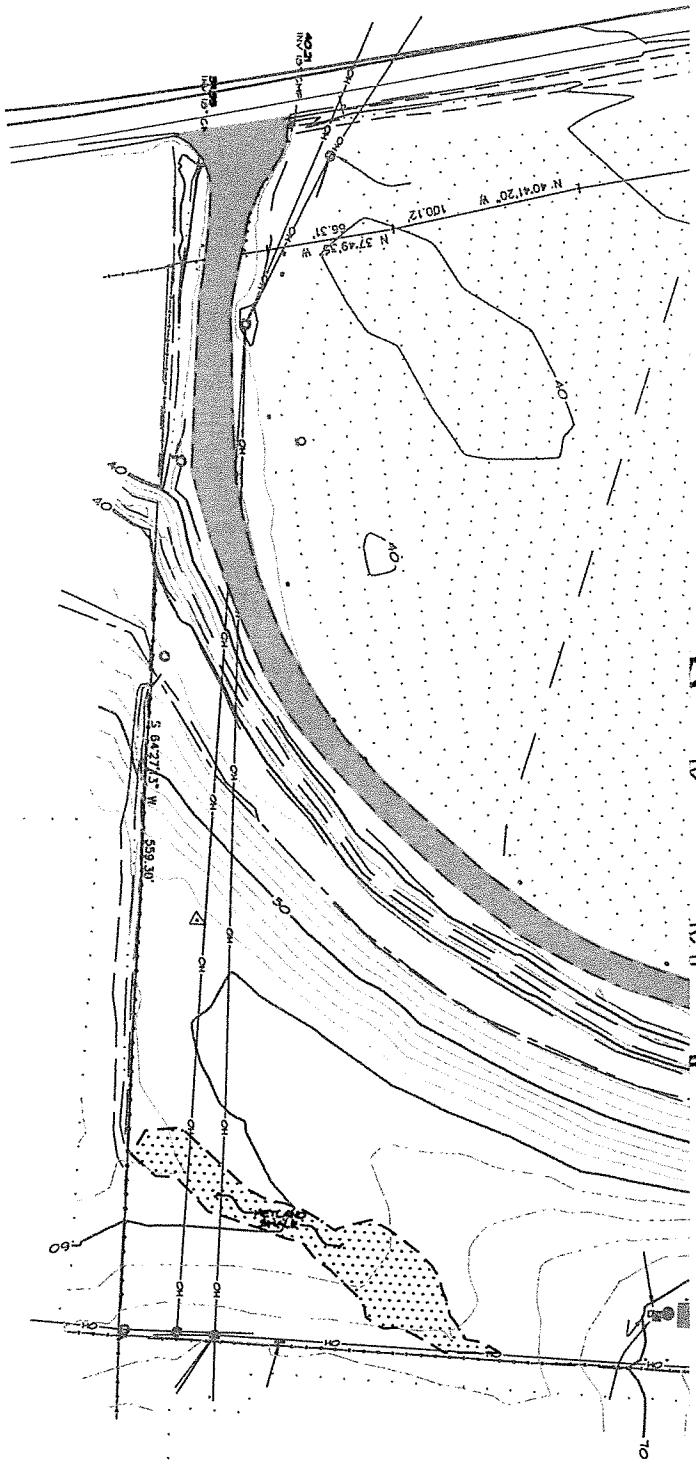
KRUPP BROTHERS WINERY
UTILITY PLAN
NAPA COUNTY CALIFORNIA

CIVIL ENGINEERS & CONSULTING
RIECHERS SPENCE & ASSOCIATES
1515 Fourth Street
Napa, California 94559
v 707.252.3301
f 707.252.4966

NO.	DATE	REVISIONS	BY	APPD

ATTACHMENT 3

Impervious Areas and Drainage Management Area Exhibits



D

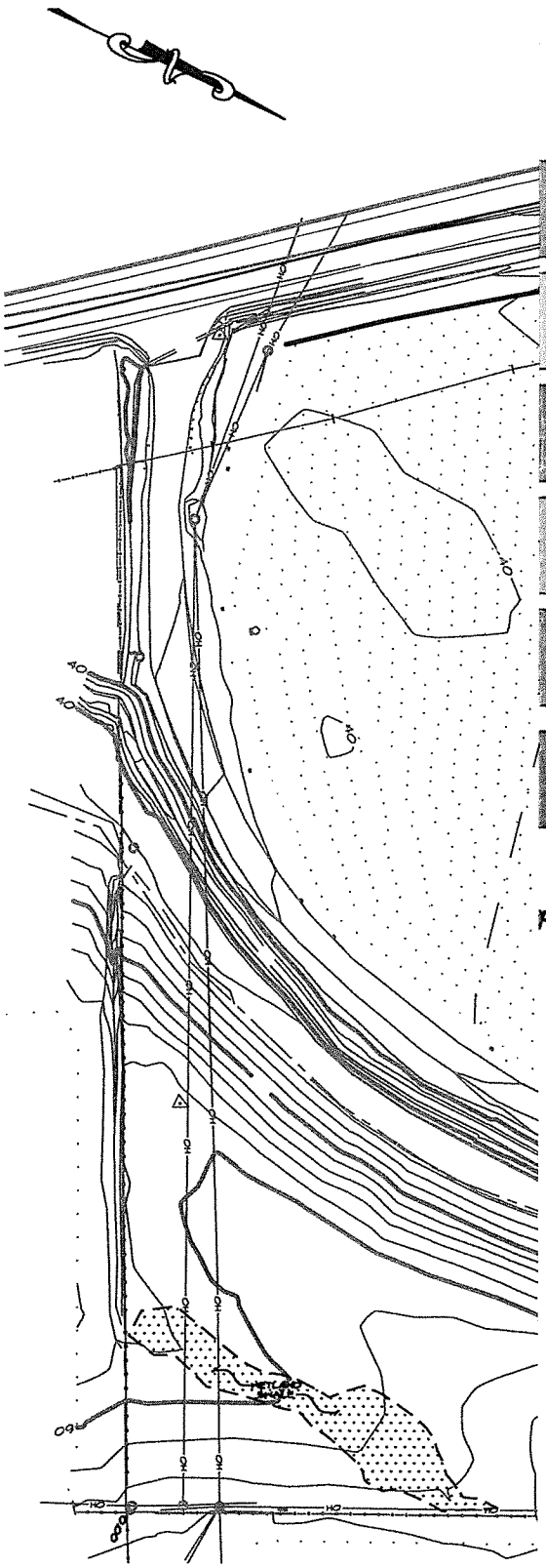
ROOFS, PATIOS, PARKING LOTS, ETC.

REA: COMPACTED DIRT, GRAVEL
FT.

FT.

CONSULTING CIVIL ENGINEERS
RIECHERS & SPENCE ASSOCIATES
1515 Fourth Street
Napa, Calif. 94559
v 707.252.3301
f 707.252.4966

A



LEGEND

BLDGS, STRUCTURES WITH ROOF
= 18,472 SF

PATIO, IMPERVIOUS DECKS, PAVERS
= 2,576 SF

SIDEWALKS & PATHS = 6,263 SF

PARKING LOTS = 8,108 SF

ROADWAYS & DRIVEWAYS = 17,141 SF

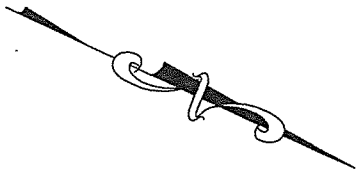
OFF-SITE IMPROVEMENTS = 7,240 SF

PERVIOUS AREA: 59,800 SQ. FT.

CONSULTING CIVIL ENGINEERS
RIECHERS & SPENCE ASSOCIATES
1515 Fourth Street
Napa, Calif. 94559
v 707.252.3301
f 707.252.4966

04-04-2014 4111005

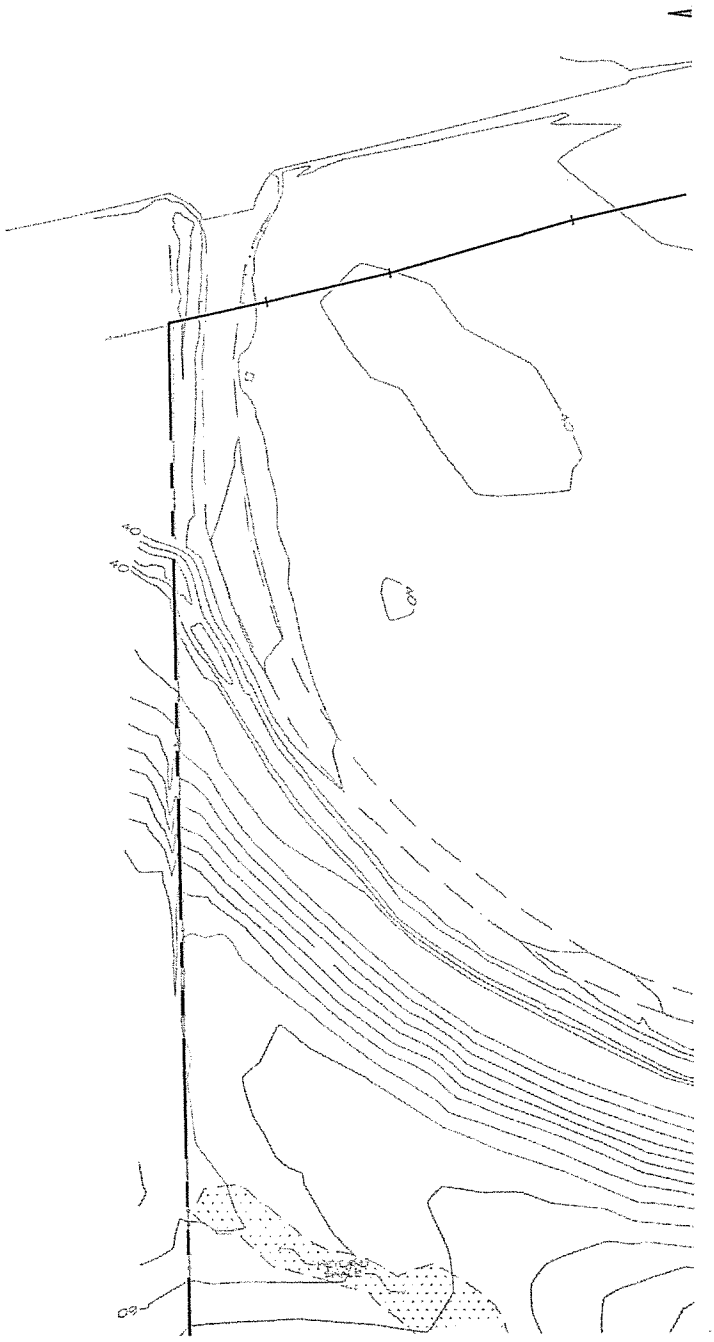
D R I T



GRAPHIC SCALE

100' 0 100' 200'

1 inch = 100 ft.



IMPERVIOUS = 59,800 SF

BIORETENTION = 2,500 SF
(4% OF IMPERVIOUS AREA)

CONSULTING CIVIL ENGINEERS
RIECHERS SPENCE & ASSOCIATES
1515 Fourth Street
Napa, Calif. 94559
v 707.252.3301
f 707.252.4966

APRIL 16, 2014

4111005.0 DMA EXHIBIT with 2.dwg

NAPA COUNTY CONSTRUCTION SITE RUNOFF CONTROL REQUIREMENTS
APPENDIX A – PROJECT APPLICABILITY CHECKLIST

Construction Site Runoff Control Applicability Checklist	County of Napa Department of Public Works 1195 Third Street, Suite 201 Napa, CA 94559 (707) 253-4351 www.co.napa.ca.us/publicworks

Project Address:	Assessor Parcel Number(s):	Project Number: *(for County use Only)*
3150 Silverado Trail Napa, CA 94559	039-610-006	

INSTRUCTIONS

Structural projects that require a building and/or grading permit must complete the following checklist to determine if the project is subject to Napa County's Construction Site Runoff Control Requirements. This form must be completed and submitted with your permit application(s). Definitions are provided in the Napa County Construction Site Runoff Control Requirements policy. Note: If multiple building or grading permits are required for a common plan of development, the total project shall be considered for the purpose of filling out this checklist.

DETERMINING PROJECT APPLICABILITY TO THE CONSTRUCTION SITE RUNOFF CONTROL REQUIREMENTS

- ✓ If the answer to question 1 of Part A is "Yes" your project is subject to Napa County's Construction Site Runoff Control requirements and must prepare a Stormwater Pollution Prevention Plan (SWPPP). The applicant must also comply with the SWRCB's NPDES General Permit for Stormwater Associated with Construction Activity and must provide a copy of the Notice of Intent (NOI) and Waste Discharge Identification (WDID).
- ✓ If the answer to question 1 of Part A is "No", but the answer to any of the remaining questions is "Yes" your project is subject to Napa County's Construction Site Runoff Control requirements and must prepare a Stormwater Quality Management Plan (SQMP).
- ✓ If every question to Part A is answered "No" your project is exempt from Napa County's Construction Site Runoff Control Requirements, but must comply will all construction site runoff control standard conditions attached to any building or grading permit (see Appendix D of the Napa County Construction Site Runoff Control Requirements).
- ✓ If any of the answers to the questions in Part A is "Yes", complete the construction site prioritization in Part B below.

OVER

NAPA COUNTY CONSTRUCTION SITE RUNOFF CONTROL REQUIREMENTS
APPENDIX A – PROJECT APPLICABILITY CHECKLIST

Part A: Determine Construction Phase Stormwater Requirements

Would the project meet any of these criteria during construction?

1. Propose any soil disturbance of one acre or more? ..... (Yes) No
2. Does the project propose any soil disturbance greater than 10,000 square feet?..... (Yes) No
3. Does the project propose grading, earth moving, or soil disturbance on slopes 15% or greater?..... Yes (No)
4. Does the project propose earthmoving of 50 cubic yards or more?..... (Yes) No
5. Does the project propose soil disturbance within 50 feet of a stream, ditch, swale, curb and gutter, catch basin or storm drain that concentrates and transports stormwater runoff to a "receiving water" (i.e., Waters of the State defined as all waters, including but not limited to, natural streams, creeks, rivers, reservoirs, lakes, ponds, water in vernal pools, lagoons, estuaries, bays, the Pacific Ocean, and ground water)? (Yes) No

Part B: Determine Construction Site Priority

Projects that are subject to the Construction Site Runoff Control Requirements must be designated with a priority of high, medium, or low. This prioritization must be completed with this form, noted on the plans, and included in the SWPPP or SQMP. Indicate the project's priority in one of the checked boxes using the criteria below. The County reserves the right to adjust the priority of projects both before and during construction.

Note: The construction priority does NOT change construction Best Management Practice (BMP) requirements that apply to projects. The construction priority does affect the frequency of inspections that will be conducted by County staff and associated fees.

Select the highest priority category applicable to the project.

☒ High Priority
- ✓ a) Projects with soil disturbance of one acre or greater.
- b) Projects on slopes of 30% or greater.
- ✓ c) Projects proposing new storm drains.

☐ Medium Priority
- a) Projects on slopes from 5% to 29%.
- b) Projects with soil disturbance between 10,000 sq. ft and one acre.
- ✓ c) Projects with earthmoving of 50 cubic yards or more.

☐ Low Priority
- ✓ a) Projects with soil disturbance within 50 feet stream, ditch, swale, curb and gutter, catch basin or storm drain that concentrates and transports stormwater runoff to a "receiving water".

Name of Owner or Agent (Please Print):	Title:
Jan R Knopp	Owner
Signature of Owner or Agent:	Date:
	4/21/2014

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

Post-Construction Runoff Management Applicability Checklist

County of Napa
Department of Public Works
1195 Third Street
Napa, CA 94559
(707) 253-4351 for information

Project Address:	Assessor Parcel Number(s):	Project Number: *(for County use Only)*
3150 Silverado Trail Napa, CA 94558	039-610-006	

Instructions:

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

POST-CONSTRUCTION STORMWATER BMP REQUIREMENTS (Parts A and B)

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

Part A: Priority Project Categories

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

1. Residential with 10 or more units ..... Yes (No)
2. Commercial development greater than 100,000 square feet..... Yes (No)
3. Automotive repair shop..... Yes (No)
4. Retail Gasoline Outlet..... Yes (No)
5. Restaurant..... Yes (No)
6. Parking lots with greater than 25 spaces or greater than 5,000 square feet..... (Yes) No

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

Part B: Standard Project Categories

Does the project propose:

1. A facility that requires a NPDES Permit for Stormwater Discharges Associated with **Industrial** Activities?..... Yes (No)
2. New or redeveloped impervious surfaces 10,000 square feet or greater, excluding roads?..... (Yes) No
3. Hillside residential greater than 30% slope..... Yes (No)
4. Roadway and driveway construction or reconstruction which requires a Grading Permit..... (Yes) No
5. Installation of new storm drains or alteration to existing storm drains?..... (Yes) No
6. Liquid or solid material loading and/or unloading areas?..... Yes (No)
7. Vehicle and/or equipment fueling, washing, or maintenance areas, excluding residential uses?..... Yes (No)
8. Commercial or industrial waste handling or storage, excluding typical office or household waste?..... (Yes) No

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

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

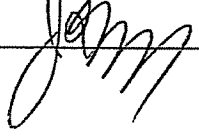
Impervious Surface Worksheet

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

Type of Impervious Surface	Impervious Surface (Sq Ft)			Total New and Reconstructed Impervious Surfaces (Sq Ft)
	Pre-Project (if applicable)	New (Does not replace any existing impervious area)	Reconstructed (Replaces existing impervious area)	
Buildings, Garages, Carports, other Structures with roofs	5,410	18,472	0	18,472
Patio, Impervious Decking, Pavers and Impervious Liners	7,720	2,576	0	2,576
Sidewalks and paths	100	6,263	0	6,263
Parking Lots	6,620	8,108	0	8,108
Roadways and Driveways,	31,280	17,141	0	17,141
Off-site Impervious Improvements (Silverado Trail Widening)	0	7,240	0	7,240
Total Area of Impervious Surface (Excluding Roadways and Driveways)	19,850	35,419	0	35,419

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

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

Name of Owner or Agent (Please Print):	Title:
Jan Knopf	Owner
Signature of Owner or Agent:	Date:
	4/21/14

NAPA COUNTY POST-CONSTRUCTION RUNOFF MANAGEMENT REQUIREMENTS
APPENDIX B – APPLICATION FOR SRMP REVIEW

FOR OFFICE USE ONLY

SUBMITTAL DATE: _____ **FILE #:** _____ **APN #:** _____

USGS QUAD: _____ **CalWatershed:** _____

REQUEST: _____

USE PERMIT CATEGORY: ☐ Hillside Residence ☐ Subdivision ☐ Commercial Facility **TYPE:** ☐ Private ☐ Public

BUILDING AND/OR GRADING PERMIT: ☐ Structure ☐ Driveway ☐ Road ☐ Reservoir ☐ Cave ☐ Other

FINAL APPROVAL: Date: _____

Deposit: $ _____ (Deposit) _____ (Receipt Number) _____ (Received By) _____ (Date)

TO BE COMPLETED BY APPLICANT

(Please type or print legibly)

Applicant's Name: Jan Krupp **Company:** Krupp Brothers, LLC

Telephone #: (707) 226-2215 **Fax #:** (707) 259-6198 **E-Mail:** jan@kruppbrothers.com

Mailing Address: 1345 (No) Hestia Way (Street) Napa (City) CA (State) 94558 (Zip)

Status of Applicant's Interest in Property: Owner

Property Owner's Name: Jan Krupp

Telephone #: (707) 226-2215 **Fax #:** (707) 259-6198 **E-Mail:** jan@kruppbrothers.com

Mailing Address: 1345 (No) Hestia Way (Street) Napa (City) CA (State) 94558 (Zip)

Site Address/Location: 3150 (No) Silverado Trail (Street) Napa (City)

Assessor's Parcel #(s): 039-610-006

SIGNATURE: I hereby certify that all the information contained in this application, including but not limited to, this application form, the Stormwater Runoff Management Plan (SRMP), the supplemental information sheets, site plan, plot plan, cross sections/elevations, is complete and accurate to the best of my knowledge. I hereby authorize such investigations including access to County Assessor's Records as are deemed necessary by the Department of Public Works for evaluation of this application and preparation of reports related thereto, including the right of access to the property involved.

_____ Signature of Applicant _____ Date _____ Signature of Property Owner _____ Date

NAPA COUNTY CONSTRUCTION SITE RUNOFF CONTROL REQUIREMENTS
APPENDIX C – SRMP CHECKLIST FOR A COMPLETE APPLICATION

FOR OFFICIAL USE ONLY

PLAN REVIEWER: _____ DATE RECEIVED: _____

PROJECT NAME: _____ PROJECT NUMBER: _____

PERMIT CATEGORY: ☐ Use Permit ☐ Building Permit ☐ Grading Permit

Project Category (check all applicable Priority or Standard Project categories)

☒ **Priority Project**	☐ **Standard Project**
____ Residential with 10 or more units	✓ Industrial NPDES permit
____ 100,000 sq ft commercial	✓ Impervious surface > 10,000 sq ft (excluding roads)
____ Automotive repair shop	____ Hillside residential on slopes 30% or more
____ Restaurant	✓ Roadways and driveways that require a grading permit
____ Retail Gasoline Outlet	✓ New or alteration of storm drains
✓ Parking Lot (>25 spaces or >5,000SF)	____ Liquid or solid material loading areas
	____ Vehicle or equipment fueling, washing, or maintenance
	✓ Commercial or industrial waste handling and storage

At a minimum, the Stormwater Runoff Management Plan must cover the areas listed below.

√ = Complete, X = Incomplete, NA = Not Applicable

A. Planning and Organization

1. ✓ Completed Post-Construction BMP Applicability Checklist (Appendix A)
2. ✓ Completed SRMP General Information Form (Appendix B).
2. ✓ Vicinity map showing the site in relation to the surrounding area.
3. ✓ If applicable, incorporate or reference other regulatory permits and their requirements. **Note:** All State and Federal Permits (1600, 401/404, General Permit, etc) must be approved prior to any construction within State Waters.
4. ✓ Describe the nature of the proposed use of the development project.

B. Identify Pollutants and Conditions of Concern

1. ✓ Standard and Priority Projects proposing 10,000 or more sq. ft. of new impervious surface, excluding roadways and driveways or projects directly discharging to tidally-influenced receiving waters, must prepare a drainage study that calculates the pre-development runoff volume according to the criteria in Chapter 3.1.
2. ✓ Standard and Priority Projects must provide a completed Source Control BMP Selection Worksheet (Appendix E) that lists all anticipated activities associated with the use of the proposed project that have the potential to generate pollutants.
3. ✓ Standard and Priority Projects must list and describe all stormwater conveyance systems (e.g. storm drain, ditch, creek, etc) within 150 feet of the project footprint. Discretionary projects must also provide an analysis for all open stormwater conveyance systems. At a minimum, the analysis must consider the criteria in Chapter 3.3.

4. ✓ Priority Projects required to incorporate Treatment Control BMPs into the project design shall provide a completed Post-Construction BMP Selection Worksheet (Appendix F).

D. Post-Construction BMPs

Site Design BMPs

1. ✓ List and describe all Site Design BMPs used to maintain stormwater runoff volumes to pre-development conditions according to the criteria described in Chapter 4.1. If structural controls are required to maintain pre-development peak runoff conditions, a description of why Site Design BMPs alone are not practicable for maintaining runoff conditions is required.
2. ✓ List and describe all structures (outfalls, culverts, etc.) proposed within the jurisdiction of the DFG, RWQCB, and/or ACE. The description must include the structure's specifications and designed storm capacity. The structure must be constructed in accordance with all applicable State and Federal permits.
3. ✓ Provide the average slope and minimum and maximum distance between the project footprint and all open stormwater conveyance systems (e.g. ditches, creeks, etc.). Ministerial projects must establish setbacks that comply with the stream setback requirements in the Conservation Regulations and Floodplain Management Regulations. Discretionary projects may establish and/or restore wider buffers zones to protect aquatic resources and structures.

Source Control BMPs

4. ✓ List and describe all source control measures included in the project design to eliminate pollutant contact with stormwater from the anticipated activities identified in the Source Control BMP Selection worksheet (Appendix E). The description must include the location and design specifications for each source control BMP.

Treatment Control BMPs

5. ✓ Priority Projects provide a completed Treatment Control BMP Selection Worksheet (Appendix F) and include a description of the location and design specifications for each treatment control BMP.
6. ✓ Provide the calculations used to design the treatment control BMPs to satisfy the numeric sizing treatment standards in Chapter 4.3. Applicants may count the site design BMPs toward meeting these numeric standards.

F. Site Plan

The site plan shall be neat and legible and shall be drawn on a 24" X 36" sheet and shall be folded to 8 ½" by 11" prior to submittal. When two or more sheets are used to illustrate the plan view, an index sheet is required, illustrating the entire project on one (1) 24" x 36" (minimum) sheet. The entire parcel shall be identified on the plan. If only a portion of the site will be developed, the entire parcel may be shown as a detail, with the area to be developed, cleared, and/or graded drawn to an appropriate scale.

The site plan shall include all of the following:

1. ✓ Provide and legend and north arrow on the plan.
2. ✓ Maximum plan scale of 1" = 100'.
3. ✓ An outline of the entire property.
4. ✓ Provide a "limit of disturbance" line which shows the limit of soil disturbance and areas where existing vegetation is preserved.

5. ✓ All open stormwater conveyance systems (e.g. ditches, creeks) and setback distances must be delineated.
6. NA State and Federal wetlands must be accurately delineated.
7. ✓ The National Flood Insurance Program 100 Year Flood Zone and Flood Way must be delineated.
8. ✓ Drainage areas on the property and direction of flow. Map must extend as far outside the site perimeter as necessary to illustrate relevant drainage areas. Where relevant drainage areas are too large to depict on the map, map notes or inserts are sufficient.
9. ✓ All storm drain inlets and outlets must be located on the plan.
10. ✓ Anticipated stormwater discharge locations.
11. ✓ Location of existing and future Site Design and source Control BMPs.
12. ✓ Location of existing and future Treatment Control BMPs.
13. ✓ Location of existing and future "impervious" areas - paved areas, buildings, covered areas.

G. Post-Construction BMP Implementation and Maintenance Agreement

1. ✓ One of the maintenance mechanisms described in Chapter 5A, which is satisfactory to the Director, must be signed and executed.
2. ✓ Include a signed Owner's Certification that states "I, the undersigned, certify that all land clearing, construction and development shall be done pursuant to the approved plan." This must be signed in ink on each plan submitted or on an original reproducible.

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

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

Date of Application: _____

Project Number: *(For County Use Only)*

Type of Application: ☐ Use Permit ☐ Building Permit ☐ Grading Permit

Project Location or Address: 3150 Silverado Trail Napa, CA

Project Name: Krupp Brothers Winery

Property Owner Name: Jan Krupp

Applicant's Name: Jan Krupp

☒ Owner ☐ Contractor ☐ Engineer/Architect ☐ Developer

Applicant's Address: 1345 Hestia Way Napa, CA 94558

Applicant's Phone: (707)226-2215 **Fax:** (707)259-6198 **E-mail:** jan@kruppbrothers.com

Parcel/Tract #: _____ **Lot #:** _____ **APN:** 039-610-006

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

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

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

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

Name of Owner or Agent (Please Print): Jan Krupp	Title: Owner
Signature of Owner or Agent: J. Krupp	Date: 4/21/11

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

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

Date of Application: _____

Project Number: *(For county Use Only)*

Type of Application: ☒ Use Permit ☐ Building Permit ☐ Grading Permit

Project Location or Address: 3150 Silverado Trail Napa, CA

Project Name: Krupp Brothers Winery

Property Owner Name: Jan Krupp

Applicant's Name: Jan Krupp

☒ Owner ☐ Contractor ☐ Engineer/Architect ☐ Developer

Applicant's Address: 1345 Hestia Way Napa, CA 94558

Applicant's Phone: (707) 226-2215 **Fax:** (707) 259-6198 **E-mail:** jan@kruppbrothers.com

Parcel/Tract #: _____ **Lot #:** _____ **APN:** 039-610-006

Step 1: Determine Anticipated Pollutants of Concern
Use the table below to determine the types of anticipated pollutants your project may generate based on land use type.

Check Box to Indicate Proposed Land Use	Project Pollutant Sources	Pollutants of Concern	If you checked a box next to a land use that may potentially generate a pollutant or stressor, explain why that pollutant or stressor is or is not anticipated to be generated by the proposed project.
✓	Lawns, Landscaping, and Parks	Sediment (coarse and fine) Nutrients (dissolved and particulate) Pesticides, pathogens, trash and debris	Landscape will be professionally designed to reduce the need for fertilizer and pesticides
✓	Parking Lots and Driveways	Sediment (fine) Metals (dissolved and particulate) TPH, trash	Parking areas will drain to vegetated swales or to the detention pond for treatment.
	Roads and Highways	Sediment (coarse and fine) Metals (dissolved and particulate) TPH, PAH, trash and debris	
	Food-Related Commercial	Pathogens, oil and grease	
	Animal-Related Commercial	Pathogens	
	Auto-Related Commercial	Metals (dissolved and particulate) TPH, PAH, surfactants	
✓	Industrial	Sediment (coarse and fine) Metals (dissolved and particulate) TPH, PAH, PCB, pH, surfactants	Processing areas will be covered or indoors, and will drain to the process wastewater system.

Step 2: Determine Conditions of Concern for Receiving Waters
Check off the watershed your project is located in to determine the conditions of concern downstream from your project. This information will help you select treatment control BMP(s) that maximize the removal of pollutants that are already impairing downstream receiving waters.

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

☒ **Napa River and tributaries**
- Sediment
- Nutrients
- Pathogens
- Mercury
- Nickel
- Selenium
- Furan Compounds
- Chlordane
- Diazinon
- PCBs

☐ **Putah Creek and tributaries**
- Mercury
- Nickel
- Selenium
- Furan Compounds
- Chlordane
- Diazinon
- PCBs

☐ **Susuin Creek and tributaries**
- Mercury
- Nickel
- Selenium
- Furan Compounds
- Chlordane
- Diazinon
- PCBs

Step 3: Select Treatment Control BMPs

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

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

Basin	Anticipated Activities	Anticipated Pollutants	Treatment BMP	Treatment BMP Performance
Basin 3	Landscape	Sediment (fine)	Vegetated swales	F/G/F
	Parking Lots	Metals	Bioretention	F/G/F
	Industrial	TPH	Filter Strip	F/G/F
		Trash and debris		F/NR/F
		Pathogens		P/P/P
		Sediment (coarse)		G/G/G

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

Basin	Treatment Control BMP	Statement of Impracticability

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

Treatment Control BMP Selection Matrix.

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

BMP Type	BMP	Constituent/Performance (G = Good, F = Fair, P = Poor)										
		Coarse Sed	Fine Sed	NO_3	Total N	Total P	Pb	Zn	Cu	Pathogens	Oil and Grease	Trash and Debris
Detention Basins	Wet Pond	G	G	P	F	F	G	G	F	F	NR	G
	Extended Wet Pond	G	G	F	F	G	G	G	P	F	NR	G
	Extended Dry Pond	G	F	P	F	P	F	F	F	P	NR	G
Water Quality Wetlands	Shallow Wetlands	G	G	F	P	F	F	G	F	G	NR	G
	Extended Detention Wetland	G	G	F	P	F	F	G	F	G	NR	G
Biofilters (Horizontal)	Bioswale	G	F	P	F	F	G	F	F	P	F	F
	Filter Strip	G	F	P	F	F	G	F	F	P	F	F
Filters (Vertical)	Sand Filter	G	G	P	F	F	G	G	F	F	G	G
	Media Filter	G	G	P	F	F	G	G	G	F	F	NR
	Bioretention	G	G	P	G	G	G	G	G	P	G	NR
Solid Separators	Rotational Flow	G	F	P	F	F	F	F	F	P	G*	G
	Multi-Chamber	F	P	P	F	P	F	F	P	P	F	G
Inserts	Catch Basin Insert	G	F	P	F	F	F	F	F	P	G*	G

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

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

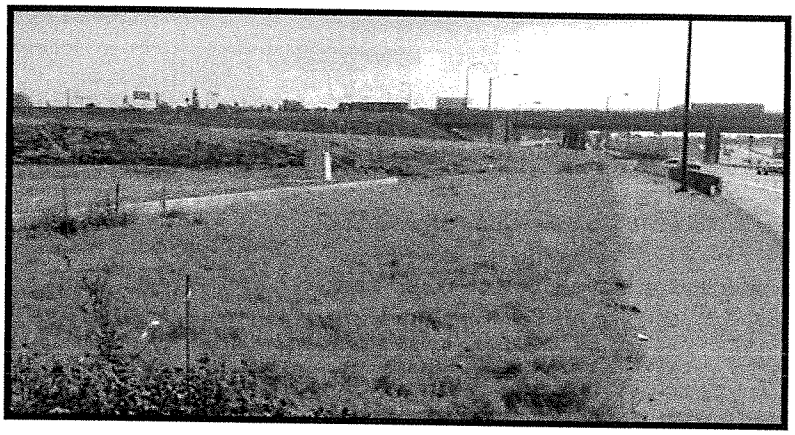
Name of Owner or Agent (Please Print): Jan Knoff	Title: Owner
Signature of Owner or Agent:	Date: 4/21/14

ATTACHMENT 5

Treatment Control BMPs

Vegetated Buffer Strip

TC-31



Maintenance Concerns, Objectives, and Goals

- Clogged Soil or Outlet Structures
- Invasive Species Management
- Vegetation/Landscape Maintenance
- Erosion
- Channelization of Flow
- Aesthetics

General Description

Grassed buffer strips (vegetated filter strips, filter strips, and grassed filters) are vegetated surfaces that are designed to treat sheet flow from adjacent surfaces. Filter strips function by slowing runoff velocities and allowing sediment and other pollutants to settle and by providing some infiltration into underlying soils. Filter strips were originally used as an agricultural treatment practice and have more recently evolved into an urban practice. With proper design and maintenance, filter strips can provide relatively high pollutant removal. In addition, the public views them as landscaped amenities and not as stormwater infrastructure. Consequently, there is little resistance to their use.

Targeted Constituents

☑	Sediment	■
☑	Nutrients	●
☑	Trash	▲
☑	Metals	■
☑	Bacteria	●
☑	Oil and Grease	■
☑	Organics	▲
☑	Oxygen Demanding	▲

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

Inspection/Maintenance Considerations

Vegetated buffer strips require frequent landscape maintenance. In many cases, vegetated buffer strips initially require intense maintenance, but less maintenance is needed over time. In many cases, maintenance tasks can be completed by a landscaping contractor. Maintenance requirements typically include grass or shrub-growing activities such as irrigation, mowing, trimming, removal of invasive species, and replanting when necessary. Buffer strips require more tending as the volume of sediment increases. Vegetated buffer strips can become a nuisance due to mosquito breeding in level spreaders (unless designed to dewater completely in 72 hours or less) and/or if proper drainage slopes are not maintained.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

TC-31 Vegetated Buffer Strip

Inspection Activities	Suggested Frequency
■ Once the vegetated buffer strip is established, inspect at least three times per year. Repair all damage immediately. ■ Inspect buffer strips after seeding and repair as needed.	Post construction
■ Inspect buffer strip and repair all damage immediately. ■ Inspect soil and repair eroded areas.	After major storms
■ Inspect for erosion or damage to vegetation, preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the strips are ready for winter. However, additional inspection after periods of heavy runoff is desirable. ■ Inspect pea-gravel diaphragm/level spreader for clogging and effectiveness and remove built-up sediment. ■ Inspect for rolls and gullies. Immediately fill with topsoil, install erosion control blanket and seed or sod. ■ Inspect to ensure grass is well established. If not, either prepare soil and reseed or replace with alternative species. Install erosion control blanket. ■ Check for debris and litter, and areas of sediment accumulation.	Semi-annual

Maintenance Activities	Suggested Frequency
■ Water plants daily for 2 weeks after construction.	Post construction
■ Mow regularly to maintain vegetation height between 2 - 4 inches, and to promote thick, dense vegetative growth. Cut only when soil is dry to prevent tracking damage to vegetation, soil compaction and flow concentrations. Clippings are to be removed immediately after mowing. ■ Remove all litter, branches, rocks, or other debris. Damaged areas of the filter strip should be repaired immediately by reseeding and applying mulch. ■ Regularly maintain inlet flow spreader. ■ Irrigate during dry season (April through October) when necessary to maintain the vegetation.	Frequently, as needed
■ Remulch void areas. ■ Treat diseased trees and shrubs, remove dead vegetation.	Semi-annual
■ Remove sediment and replant in areas of buildup. Sediment accumulating near culverts and in channels should be removed when it builds up to 3 in. at any spot, or covers vegetation. ■ Limit fertilizer applications based on plant vigor and soil test results. ■ Rework or replant buffer strip if concentrated flow erodes a channel through the strip.	Annual

Additional Information

Recent research (Colwell et al., 2000) indicates that grass height and mowing frequency have little impact on pollutant removal. Consequently, mowing may only be necessary once or twice a year for safety or aesthetics or to suppress weeds and woody vegetation.

Trash tends to accumulate in swale areas, particularly along highways. The need for litter removal is determined through periodic inspection, but litter should always be removed prior to mowing.

References

Metropolitan Council, Urban Small Sites Best Management Practices Manual. Available at: http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm

U.S. Environmental Protection Agency, Post-Construction Stormwater Management in New Development & Redevelopment BMP Factsheets. Available at: cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm

Ventura Countywide Stormwater Quality Management Program, Technical Guidance Manual for Stormwater Quality Control Measures. July, 2002.

Vegetated Swale

TC-30

Maintenance Concerns, Objectives, and Goals

- Channelization
- Vegetation/Landscape Maintenance
- Vector Control
- Aesthetics
- Hydraulic and Removal Efficacy

General Description

Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Swales can be natural or manmade. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff. Vegetated swales can serve as part of a stormwater drainage system and can replace curbs, gutters and storm sewer systems. Therefore, swales are best suited for residential, industrial, and commercial areas with low flow and smaller populations.

Targeted Constituents

☑	Sediment	▲
☑	Nutrients	●
☑	Trash	●
☑	Metals	▲
☑	Bacteria	●
☑	Oil and Grease	▲
☑	Organics	▲
☑	Oxygen Demanding	▲

Legend *(Removal Effectiveness)*

● Low ■ High

▲ Medium

Inspection/Maintenance Considerations

It is important to consider that a thick vegetative cover is needed for vegetated swales to function properly. Usually, swales require little more than normal landscape maintenance activities such as irrigation and mowing to maintain pollutant removal efficiency. Swales can become a nuisance due to mosquito breeding in standing water if obstructions develop (e.g., debris accumulation, invasive vegetation) and/or if proper drainage slopes are not implemented and maintained. The application of fertilizers and pesticides should be minimized.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Inspection Activities	Suggested Frequency
■ Inspect after seeding and after first major storms for any damages.	Post construction
■ Inspect for signs of erosion, damage to vegetation, channelization of flow, debris and litter, and areas of sediment accumulation. Perform inspections at the beginning and end of the wet season. Additional inspections after periods of heavy runoff are desirable.	Semi-annual
■ Inspect level spreader for clogging, grass along side slopes for erosion and formation of rills or gullies, and sand/soil bed for erosion problems.	Annual
Maintenance Activities	**Suggested Frequency**
■ Mow grass to maintain a height of 3–4 inches, for safety, aesthetic, or other purposes. Litter should always be removed prior to mowing. Clippings should be composted. ■ Irrigate swale during dry season (April through October) or when necessary to maintain the vegetation. ■ Provide weed control, if necessary to control invasive species.	As needed (frequent, seasonally)
■ Remove litter, branches, rocks blockages, and other debris and dispose of properly. ■ Maintain inlet flow spreader (if applicable). ■ Repair any damaged areas within a channel identified during inspections. Erosion rills or gullies should be corrected as needed. Bare areas should be replanted as necessary.	Semi-annual
■ Declog the pea gravel diaphragm, if necessary. ■ Correct erosion problems in the sand/soil bed of dry swales. ■ Plant an alternative grass species if the original grass cover has not been successfully established. Reseed and apply mulch to damaged areas.	Annual (as needed)
■ Remove all accumulated sediment that may obstruct flow through the swale. Sediment accumulating near culverts and in channels should be removed when it builds up to 3 in. at any spot, or covers vegetation, or once it has accumulated to 10% of the original design volume. Replace the grass areas damaged in the process. ■ Rototill or cultivate the surface of the sand/soil bed of dry swales if the swale does not draw down within 48 hours.	As needed (infrequent)

Additional Information

Recent research (Colwell et al., 2000) indicates that grass height and mowing frequency have little impact on pollutant removal. Consequently, mowing may only be necessary once or twice a year for safety or aesthetics or to suppress weeds and woody vegetation.

References

Metropolitan Council, Urban Small Sites Best Management Practices Manual. Available at: http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm

U.S. Environmental Protection Agency, Post-Construction Stormwater Management in New Development & Redevelopment BMP Factsheets. Available at: cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm

Ventura Countywide Stormwater Quality Management Program, Technical Guidance Manual for Stormwater Quality Control Measures. July, 2002.

Bioretention

TC-32

Maintenance Concerns, Objectives, and Goals

- Clogged Soil or Outlet Structures
- Invasive Species
- Vegetation/Landscape Maintenance
- Erosion
- Channelization of Flow
- Aesthetics

General Description

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff's velocity is reduced by passing over or through a sand bed and is subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.

Targeted Constituents

☑ Sediment	■
☑ Nutrients	▲
☑ Trash	■
☑ Metals	■
☑ Bacteria	■
☑ Oil and Grease	■
☑ Organics	■
☑ Oxygen Demanding	■

Legend *(Removal Effectiveness)*

● Low ■ High

▲ Medium

Inspection/Maintenance Considerations

Bioretention requires frequent landscaping maintenance, including measures to ensure that the area is functioning properly, as well as maintenance of the landscaping on the practice. In many cases, bioretention areas initially require intense maintenance, but less maintenance is needed over time. In many cases, maintenance tasks can be completed by a landscaping contractor, who may already be hired at the site. In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Inspection Activities	Suggested Frequency
■ Inspect soil and repair eroded areas.	Monthly
■ Inspect for erosion or damage to vegetation, preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the strips are ready for winter. However, additional inspection after periods of heavy runoff is desirable.	
■ Inspect to ensure grass is well established. If not, either prepare soil and reseed or replace with alternative species. Install erosion control blanket.	Semi-annual inspection
■ Check for debris and litter, and areas of sediment accumulation.	
■ Inspect health of trees and shrubs.	

Maintenance Activities	Suggested Frequency
■ Water plants daily for 2 weeks.	At project completion
■ Remove litter and debris.	Monthly
■ Remove sediment.	
■ Remulch void areas.	
■ Treat diseased trees and shrubs.	
■ Mow turf areas.	
■ Repair erosion at inflow points.	As needed
■ Repair outflow structures.	
■ Unclog underdrain.	
■ Regulate soil pH regulation.	
■ Remove and replace dead and diseased vegetation.	Semi-annual
■ Add mulch.	Annual
■ Replace tree stakes and wires.	
■ Mulch should be replaced every 2 to 3 years or when bare spots appear. Remulch prior to the wet season.	Every 2-3 years, or as needed

Additional Information

Landscaping is critical to the function and aesthetic value of bioretention areas. It is preferable to plant the area with native vegetation, or plants that provide habitat value, where possible. Another important design feature is to select species that can withstand the hydrologic regime they will experience. At the bottom of the bioretention facility, plants that tolerate both wet and dry conditions are preferable. At the edges, which will remain primarily dry, upland species will be the most resilient. It is best to select a combination of trees, shrubs, and herbaceous materials.

References

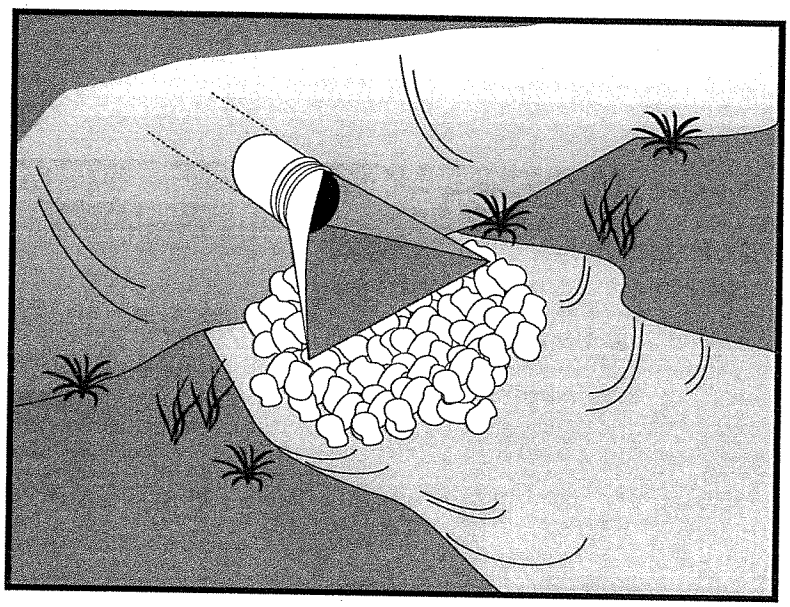
Metropolitan Council, Urban Small Sites Best Management Practices Manual. Available at: http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, revised February, 2002.

U.S. Environmental Protection Agency, Post-Construction Stormwater Management in New Development & Redevelopment BMP Factsheets. Available at: cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm

Ventura Countywide Stormwater Quality Management Program, Technical Guidance Manual for Stormwater Quality Control Measures. July, 2002.

Velocity Dissipation Devices EC-10



Categories		
EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Outlet protection is a physical device composed of rock, grouted riprap, or concrete rubble, which is placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated, high velocity flows.

Suitable Applications

Whenever discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This includes temporary diversion structures to divert runon during construction.

- These devices may be used at the following locations:
  - Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits, or channels.
  - Outlets located at the bottom of mild to steep slopes.
  - Discharge outlets that carry continuous flows of water.
  - Outlets subject to short, intense flows of water, such as flash floods.
  - Points where lined conveyances discharge to unlined conveyances

Limitations

- Large storms or high flows can wash away the rock outlet protection and leave the area susceptible to erosion.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Sediment captured by the rock outlet protection may be difficult to remove without removing the rock.
- Outlet protection may negatively impact the channel habitat.
- Grouted riprap may break up in areas of freeze and thaw.
- If there is not adequate drainage, and water builds up behind grouted riprap, it may cause the grouted riprap to break up due to the resulting hydrostatic pressure.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in velocity dissipation devices.

Implementation

General

Outlet protection is needed where discharge velocities and energies at the outlets of culverts, conduits or channels are sufficient to erode the immediate downstream reach. This practice protects the outlet from developing small eroded pools (plange pools), and protects against gully erosion resulting from scouring at a culvert mouth.

Design and Layout

As with most channel design projects, depth of flow, roughness, gradient, side slopes, discharge rate, and velocity should be considered in the outlet design. Compliance to local and state regulations should also be considered while working in environmentally sensitive streambeds. General recommendations for rock size and length of outlet protection mat are shown in the rock outlet protection figure in this BMP and should be considered minimums. The apron length and rock size gradation are determined using a combination of the discharge pipe diameter and estimate discharge rate: Select the longest apron length and largest rock size suggested by the pipe size and discharge rate. Where flows are conveyed in open channels such as ditches and swales, use the estimated discharge rate for selecting the apron length and rock size. Flows should be same as the culvert or channel design flow but never the less than the peak 5 year flow for temporary structures planned for one rainy season, or the 10 year peak flow for temporary structures planned for two or three rainy seasons.

- There are many types of energy dissipaters, with rock being the one that is represented in the attached figure.
- Best results are obtained when sound, durable, and angular rock is used.
- Install riprap, grouted riprap, or concrete apron at selected outlet. Riprap aprons are best suited for temporary use during construction. Grouted or wired tied rock riprap can minimize maintenance requirements.
- Rock outlet protection is usually less expensive and easier to install than concrete aprons or energy dissipaters. It also serves to trap sediment and reduce flow velocities.
- Carefully place riprap to avoid damaging the filter fabric.

- Stone 4 in. to 6 in. may be carefully dumped onto filter fabric from a height not to exceed 12 in.

- Stone 8 in. to 12 in. must be hand placed onto filter fabric, or the filter fabric may be covered with 4 in. of gravel and the 8 in. to 12 in. rock may be dumped from a height not to exceed 16 in.

- Stone greater than 12 in. shall only be dumped onto filter fabric protected with a layer of gravel with a thickness equal to one half the D_{50} rock size, and the dump height limited to twice the depth of the gravel protection layer thickness.

- For proper operation of apron: Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.

- Outlets on slopes steeper than 10 percent should have additional protection.

Costs

Costs are low if material is readily available. If material is imported, costs will be higher. Average installed cost is $150 per device.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur. Minimize areas of standing water by removing sediment blockages and filling scour depressions.

- Inspect apron for displacement of the riprap and damage to the underlying fabric. Repair fabric and replace riprap that has washed away. If riprap continues to wash away, consider using larger material.

- Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.

- Temporary devices should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction.

References

County of Sacramento Improvement Standards, Sacramento County, May 1989.

Erosion and Sediment Control Handbook, S.J. Goldman, K. Jackson, T.A. Bursztynsky, P.E., McGraw Hill Book Company, 1986.

Handbook of Steel Drainage & Highway Construction, American Iron and Steel Institute, 1983.

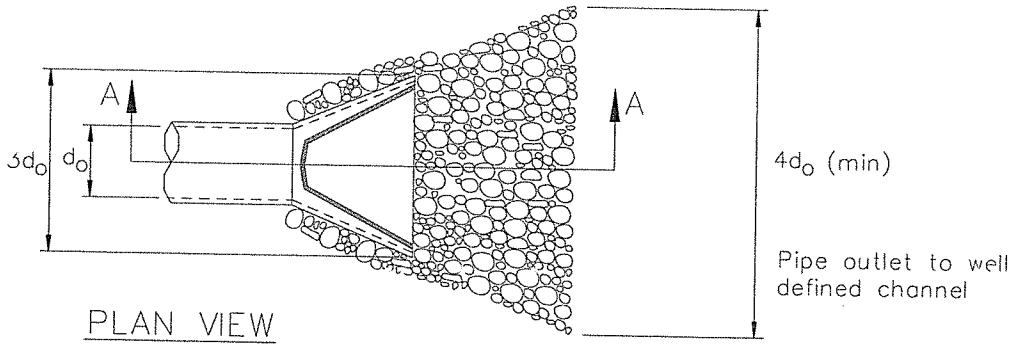
Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Metzger, M.E. 2004. Managing mosquitoes in stormwater treatment devices. University of California Division of Agriculture and Natural Resources, Publication 8125. On-line: http://anrcatalog.ucdavis.edu/pdf/8125.pdf

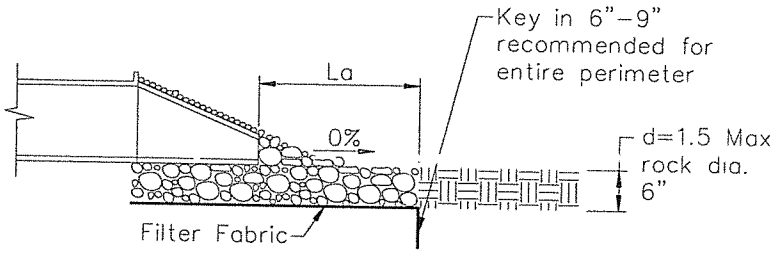
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, state of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



PLAN VIEW



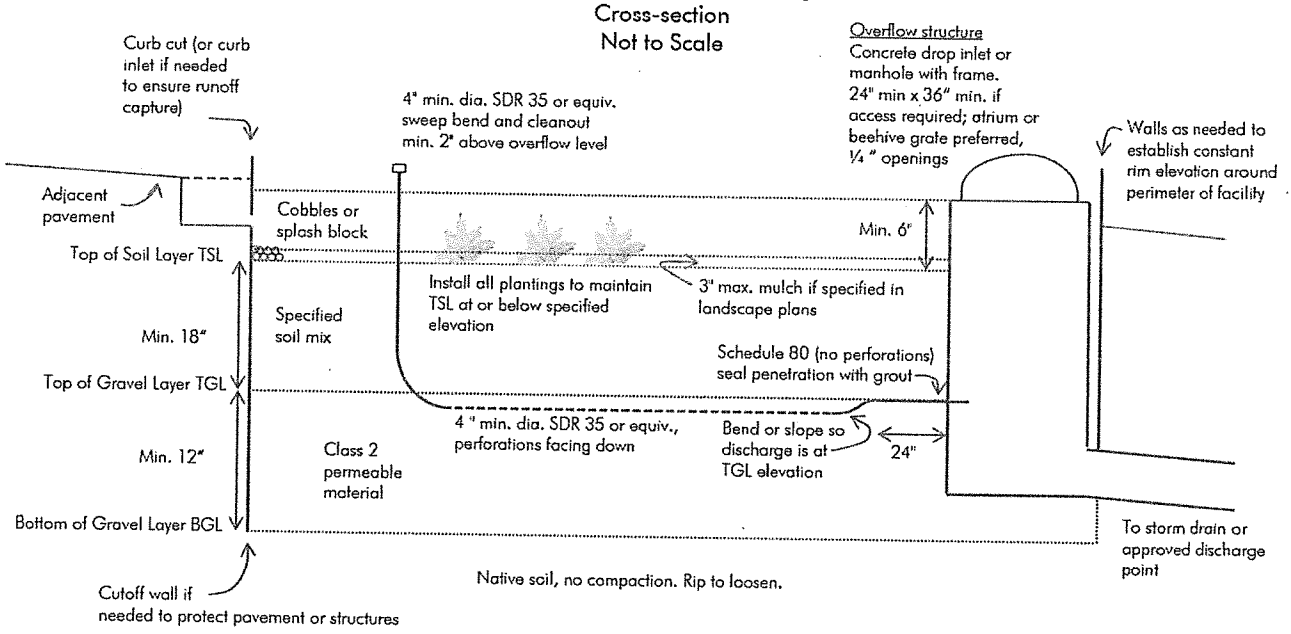
SECTION A–A

Pipe Diameter inches	Discharge ft^3/s	Apron Length, La ft	Rip Rap D_{50} Diameter Min inches
12	5	10	4
	10	13	6
18	10	10	6
	20	16	8
	30	23	12
	40	26	16
24	30	16	8
	40	26	8
	50	26	12
	60	30	16

For larger or higher flows consult a Registered Civil Engineer
Source: USDA - SCS

Bioretention Facility

Cross-section
Not to Scale



Allowed variations for special site conditions:

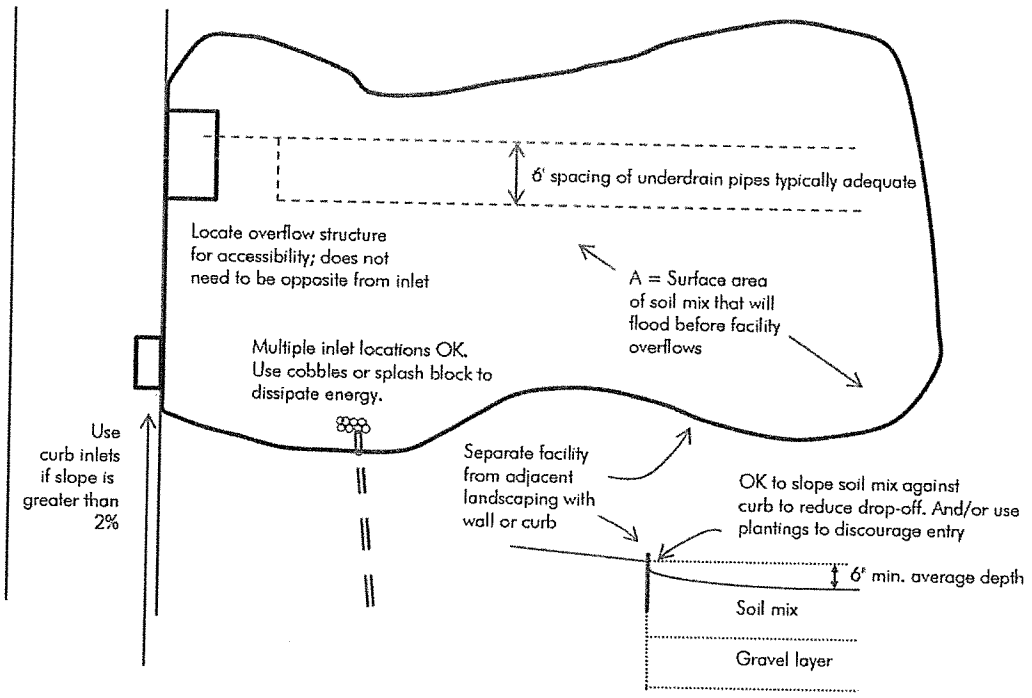
- Facilities located within 10 feet of structures or other potential geotechnical hazards may incorporate an impervious cutoff wall
- Facilities with documented high concentrations of pollutants in underlying soil or groundwater, facilities where infiltration could contribute to a geotechnical hazard,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

Notes:

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

Bioretention Facility

Plan (Not to Scale)



Note: Call out elevations of curb, pavement, inlet, top of soil layer (TSL), bottom of soil layer (BSL), and bottom of gravel layer (BGL) at all inlets and outlets and at key points along edge of facility.

ATTACHMENT 6

OWNER'S CERTIFICATION

OWNER'S CERTIFICATION

I, the undersigned, certify that all land clearing, construction and development shall be done pursuant to the approved plan.

_____ _____

Signature of Property Owner Date

_____

Name, Title

_____

Company/Corporation/Partnership Name