

Napa County Resource Conservation District

Your local partner in conservation for over 70 years

Frances Knapczyk Program Director Napa County RCD







- Better local environmental information
- Strong local stewardship ethic & skills
- Enhanced habitat & cleaner water for the next generation



A program of your local Resource Conservation District (RCD) *and* Natural Resources Conservation Service (NRCS)

Napa RCD, Sonoma RCD, Gold Ridge RCD, Mendocino RCD



The LandSmart Brand

- Partner with land managers to understand and achieve natural resource goals
- Technical assistance, training, and funding for conservation on-the-ground
- Connect youth to stewardship of land and water

LandSmart[®] Services

- LandSmart[®] Planning
- •LandSmart[®] On-the-Ground
- •LandSmart[®] Water Resources
- •LandSmart[®] for Kids



LandSmart.org







LandSmart[®] Planning

- Results in a plan to satisfy new water quality regulations
- Option to become Napa Green Land Certified
- Built-in NRCS participation
- Open-source
- Dovetails with LandSmart[®] On-the-Ground



Napa River Sediment TMDL (approved 2009)

- Identified sources of sediment in the watersheds (rural lands, roads, vineyards, grazing lands, etc.)
- Called for regulation to improve water quality and restore fish habitat



Who is Eligible?

- Napa River and Sonoma Creek Watersheds
- Parcels with ≥ 5 acres planted existing and new vineyards
 - For vineyards < 5 acres, Water Board may include property in Permit
- Some new vineyard is excluded EXCLUDES:
 - vineyard development requiring timber conversion plan or permit
 - vineyard development on ridgetop
 - vineyard development on slope greater than 30%

Napa River Watershed Vineyards

New ≥ 5 ac

With timber conversion, ridgetop, slope >30%

Existing Vineyards ≥ 5 ac

Third Party Programs

- Optional
- Help develop and implement Farm Plans
- Farm Plans stay with grower/on property
- 4 Programs
 - Napa RCD/LandSmart option for SIP
 - Sonoma RCD/LandSmart option for SIP
 - Fish Friendly Farming
 - CSWA



Basic Requirements

- ✓ Enroll *DEADLINE: JULY 31, 2018*
- ✓ Develop Farm Plan AND have Farm Plan verified by Third Party Program – Farm Plan stays on property/with grower
- ✓ Implement Farm Plan to achieve Performance Standards
- Report annually on progress towards achieving Performance Standards
- ✓ Photo-monitor your property
- Participate in group monitoring program (contribute \$\$)

Farm Plan

- Inventory vineyards, roads, reservoirs, waterways, etc.
- Document conservation practices in place
- Mapping
- Plan & timeline for implementing new practices to meet
 Performance Standards by Permit deadlines



Performance Standards for EXISTING VINEYARDS

- Soil erosion in the farm area
- Pesticide management
- Nutrient management
- Sediment delivery from existing unpaved roads HILLSIDE VINEYARD
- Sediment delivery from new unpaved roads HILLSIDE VINEYARD
- Storm runoff from existing HILLSIDE VINEYARD



Timeline for Existing Vineyards

*Properties in fire perimeter have extra year to comply

July 31, 2018*-- Enroll in Permit (Water Board website)

Dec 15, 2018*-- Submit first Monitoring Report

?January 2020? – Pay first fees to Water Board

July 31, 2020^{*}-- Verify Farm Plan & meet Performance Standards for Vineyard Erosion, Nutrients, and Pathogens

July 31, 2023*-- Meet Performance Standards for Storm Runoff/Channel Erosion

July 31, 2027*-- Meet Performance Standards for Unpaved Roads



Monitoring

Tiers Dictate Monitoring Fees

- Tier 1 Farm achieves all Performance Standards, and have fully protected stream corridors
- Tier 2 Farm Plan complete, have not yet met Performance Standards or do not have fully protection stream corridors
- Tier 3 Farm Plan without Third Party Program (submit Plan directly to Water Board), have not yet met Performance Standards or do not have fully protected stream corridors



LandSmart[®] Verification

- Two Options
 - Compliance with Waste Discharge Requirements
 - Napa Green Land Certification
- By third-party resource professionals
- Every 3 5 years depending on your Plan



LandSmart Vineyard Plan Contents

- Summary Implementation Table
- Property Description
- Maps
- Agrichemicals
- Erosion in Vineyard
- Waterways, Ditches and Spillways
- Roads and Crossings

Photomonitoring



LandSmart Vineyard Plan Contents Napa Green Components

- Summary Implementation Table
- Property Description
- Maps
- Agrichemicals
- Erosion in Vineyard
- Waterways, Ditches and Spillways
- Roads and Crossings
- Water Management
- Photomonitoring
- Social Equity Section



LandSmart for Vineyards Reference Guide On-Line

LandSmart[™] for Vineyards Reference Guide

> Version 1.0 July 2014





- Program basics
- Mapping aids & references
- Natural resources information
- BMP Fact Sheets
 - ✓ Agrichemical handling
 - ✓ Integrated Pest Management.
 - ✓ Treating common pests
 - ✓ Nutrient management / composting
 - ✓ Erosion & runoff control
 - ✓ Streamside practices
 - Road treatment options & typical drawings
 - ✓ Water management
- Monitoring Protocols

Frequently Asked Questions

- What are next few steps to develop a LandSmart Plan?
 - Download Word doc version of Plan Template from LandSmart.org
 - Review Map Requirements, determine if you need help, ask RCD for help if you need it
 - Contact RCD to indicate your interest
 - ➢ Fill out template
 - Share with RCD staff and schedule site visit

Frequently Asked Questions

- How much does it cost?
 - Fees collected by
 - ➢ Water Board,
 - Monitoring group,
 - Third Party
 - Currently, Farm Planning costs with Napa RCD are 85% covered with grants – growers pay the remaining 15% of costs
 - Program materials are available at LandSmart.org







Purpose

 Assist land managers in accomplishing their natural resource goals and meeting or exceeding environmental regulations

 Provide technical assistance, training, and financial support to plan and implement resource conservation practices

• Deliver opportunities for youth to be actively engaged in stewarding local resources



Maps





Prompts & Suggestions

V2. Mulch and/or vegetative cover is maintained in vineyard blocks (between vine rows) during rainy months.

All Blocks (Describe your current practice(s))

Some Blocks (Describe your current practice(s). Consider a combination of practices # 2 through 12, listed in Table V1 below)

No Blocks (Consider a combination of practices # 2 through 12, listed in Table V1 below)

Describe as needed:

A10. Fertilizer(s) are applied and timed to reduce runoff and leaching.

Yes (Describe timing of application)

No (Consider practices # 6 and 7, listed in Table A3 below)

Describe as needed:

Data Forms: Roads

DATA FORM R1. ROAD STREAM CROSSING DATA FORM

Complete this data form for each place that roads cross a waterway. *The instructions and definitions in the Resource Manual may be helpful.* Make a copy of the form for each crossing. As applicable consider treatment options provided and complete Conservation Practice Tables R1 and R2.

| ROAD STREAM CROSSING DATA FORM (2015) | | | | | | |
|---------------------------------------|---|---------------|-------|--|--|--|
| GENERAL | Site #: | Road ID/Name: | Date: | Site located up-stream of pond/reservoir (Y,N): Yes No | | |
| | Are fill slopes or adjacent stream banks actively eroding (Y, N): Yes No (If yes see treatment option 3, 13, 14, 15 in Table R1) | | | | | |

| STREAM CROSSING TYPE (Circle one) | Bridge, Bottomless Arch, or Box. (If yes, skip down to 'Road Drainage' section) | Culvert (round or oval) (If yes, go to 'Culverted crossing info' section) | | Wet Crossing (Ford, Armored Fill, Fill, or Pulled crossing) (If yes, go to 'Wet crossing' section) | | |
|--|---|---|--|--|--|--|
| Culverted Crossing info | Is rust/silt line at inlet of culvert greater than half the diameter of the culvert (Y, N): Yes No (If yes, see treatment options 4, 5, 8 in Table R1). Is culvert bottom rusted or separated (Y, N): Yes No (If yes, see treatment options 4, 5, 7, 8 in Table R1). | | | Is Inlet of culvert greater than 20% crushed or plugged (Y, N): Yes NO (If yes, see treatment options 3, 7, 8 in Table R1). Does the Culverted stream crossing have diversion potential (Y, N): Yes NO (If yes see treatment options 9, 10 in Table R1) | | |
| Wet crossing info | Is crossing dipped wide enough to keep flows within natural stream channel (Y, N): At Arr prevent prevent prevent prevent option 3 in Table R1) Yes No Y Y (If no see treatment option 3 in Table R1) (If no Does crossing look to be actively eroding (Y, N): Yes (If yes see treatment options 3, 14 in Table R1) Yes Yes | | | nored Fill crossing, is armor adequate enough to nt fill material from eroding (Y, N): es INO see treatment option 14 in Table R1) INO | | |

Conservation Practices

Table V1: Conservation Practices to Reduce Soil Erosion and Runoff Concentration on the Vineyard

The following table provides an assortment of management practices that are intended to protect water quality. Implementation of all practices is not necessary or required. Selection of practices must be done on a site-specific basis. An assortment of practices to protect water quality and to suit your circumstance should be selected. NRCS Practice Titles are provided for your reference and you may contact your local NRCS or RCD field office for technical and/or possible financial assistance. *See Chapter 5 of the Reference Guide for information on these conservation practices*.

| Practices | NRCS Practice Title | Current Practice | Planned Implementation | Location / Notes |
|---|------------------------|---------------------|---------------------------|------------------|
| | | | Date / Status | |
| 1. Consult a Professional | | | | |
| 2. Plant a non-tilled, | Conservation | | | |
| permanent vegetative cover | Cover (327) | | | |
| crop to minimize soil | | | | |
| disturbance | | | | |
| 3. Till every other middle (alternate row cultivation) and ensure that disturbed soil is protected during the rainy season. Avoid tilling in the avenue. | Cover Crop (340) | | | |
| Plant an annually seeded and/or disked cover crop (generally not appropriate for vineyards on slopes >5%) | Cover Crop (340) | | | |

Photo Monitoring

PHOTO MONITORING

Purpose: To document your visual monitoring and site inspections and record your monitoring notes and any actions needed and taken. Monitoring sites should be selected to 1) demonstrate winter readiness, 2) demonstrate annual maintenance and practice implementation, 3) demonstrate condition of outfall (discharge) points and associated receiving waters, and 5) track other areas of interest that you want to watch (e.g., areas of erosion, areas of invasive vegetation, etc.) Monitoring is conducted to document that sediment control practices outlined in the LandSmart[™] Plan are implemented, that the practices are effective, and that they are properly maintained. Monitoring locations should be mapped and numbered. To the extent feasible, photos should be kept with the Farm Plan. In any case, photos should be readily available for reference.

| Label on Map | Purpose Winter readiness; annual maintenance; practice implementation; outfall and receiving water point; other | Date (m/d/y) | Photo Taken? Y or N | Condition (performing properly, needs maintenance, needs consultation) | Actions taken |
|-----------------|---|-----------------|---------------------------|--|---------------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |



Empowering the community to voluntarily conserve, protect, and restore natural resources so that we continue to live in an area that supports agriculture, urban areas, and wild lands

LandSmart[®] Planning

•Opportunities to engage with youth in Napa County



LandSmart[®] Planning Process Options

Most RCD Involvement

Grower contacts RCD/NRCS for individual assistance. RCD/NRCS and grower complete plan together. RCD/NRCS conducts site visits for assessment (e.g., roads and waterways). RCD/NRCS assists grower to select BMPs and finalize plan. *Optional certification.*

Grower attends workshops. Grower works through template and seeks assistance from RCD/NRCS as needed (e.g., maps, road / waterway assessment). Grower finalizes plan. *Optional certification.*

Grower starts the plan independently – seeks help from RCD/NRCS when desirable. *Optional certification.*

Grower completes the plan independent of RCD/NRCS. *Optional certification.*

Least RCD Involvement

Excess sedimentation impairs aquatic habitat



Suffocates fish eggs in spawning bedsLoss of aquatic habitat





Sediment covered spawning gravel





Frequently Asked Questions

• If someone has an existing plan, why would they participate in LandSmart[®]?

If the plan is working well, meets pending regulatory requirements, and implementation is being carried out, then LandSmart On-the-Ground, LandSmart for Kids or hiring a contractor trained through LandSmart might be more useful.

• Will LandSmart[®] provide compliance with upcoming Vineyard Waste Discharge Requirements?

- At this point no program can claim compliance because the requirements are not fully known.
- Region 2 Water Board funded large parts of developing the Vineyard Farm Plan Program and believes that the template and program are consistent with the regulatory program they envision.
Frequently Asked Questions

 How does LandSmart[®] relate to the Code of Sustainable Winegrowing Workbook and Certification Program?

- Completion of a LandSmart Plan can help you achieve "Category 3 and 4" practices identified in many sections of the workbook and may help you toward certification.
- How much does it cost?
 - Currently, program costs are primarily covered with grants (and more have been sought).
 - NRCS is a partner in the program and can assist with or without grants.
 - Program materials are also available on-line to minimize participant costs in the case that grant funds are unavailable.

Property Description

Operations and Land Use (Page 6)

| Land Use Activity | Area/Length | | |
|--|-------------|-------------|--|
| Vineyard Blocks and Avenues | | Acres | |
| Grazing/Rangeland | | Acres | |
| Grape Processing Facilities | | Acres | |
| Roads (paved) | | Feet/ Miles | |
| Roads (unpaved) | | Feet/ Miles | |
| Other paved areas and buildings | | Acres | |
| Forest/Woodland/Chaparral | | Acres | |
| Open Space/Fallow/Undeveloped | | Acres | |
| Reservoir/Pond (footprint) | | Acres | |
| Stream/River/Creek/Riparian (delineated as blue-line on USGS | | Feet/ Miles | |
| topographic maps) | | | |
| Stream/River/Creek/Riparian (not delineated as blue-line on USGS | | Foot/Milos | |
| topographic maps) | | | |
| Drainage Ditch/Canal | | Feet/ Miles | |
| Other Vineyard/Farming Facilities | | Acres | |
| Other Land uses | | Acres | |

Property Description

Existing Plans, Permits, & Certifications (Page 7)

Optional, but helpful

| Plan Type |
|--|
| Napa County Erosion Control Plan |
| Sonoma County Erosion Control Plan (VESCO) |
| NRCS Conservation Plan |
| Fire Management Plan |
| Grazing/Rangeland Management Plan |
| Grazing Lands Water Quality Plan |
| Organic Certification (indicate if in transition) |
| Timber Harvest Management Plan |
| Napa Green Land/Fish Friendly Farming Certification |
| The Code of Sustainable Winegrowing (note if Self-Assessment or Certified) |
| Industrial Stormwater Permit for Wineries |
| Sustainability in Practice (SIP) |
| Engineered pond including water rights (if applicable) |
| Permits for stream-related projects: Department of Fish and Wildlife, Corps of Engineers, etc. |
| Other: |
| |

Other:

- Existing maps may be adequate

 Include (or reference) existing maps in your Farm Plan
- Topographic or aerial photograph background
- Minimum scale of 1:6,000 (1 inch = 500 feet)
- Multiple maps for different features
- Include legend, labels, north arrow, scale bar





Features to Include (Pages 9-10)

- Boundaries
- Buildings/Facilities
- Vineyards
- Soil and Erosion
- Waterways
- Roads
- Monitoring Points





Vineyards APN w/ >5 acres: 034-060 APN w/<5 acres: 034-060



N





Roads

Key Vineyard block Blue-line Stream ---- Concentrated Flow Maps prepared for informational purposes only. Image depicts publicly available data and needs to be considered with on the ground conditions and more accurate site-specific data that may exist. No liability is assumed for the accuracy of the information or data displayed.

Map Date: 8/9/2017 Data Sources: NRCS Soils and Erosion Risk Slope - LIDAR (2005) Napa County Parcels (2016) Napa RCD Hydrography (2015) Napa County BDR Hydrography (2005)





Vineyards

N

0 200 400 600 800 1,000 1,200 1,400 1,600 Feet

Key Parcels Blue-line Stream

Maps prepared for informational purposes only. Image depicts publicly available data and needs to be considered with on-the-ground conditions and more accurate site-specific data that may exist. No fability is assumed for the accuracy of the information or data displayed.

Map Date: 8/9/2017 Data Sources: NRCS Solits and Erosion Risk Slope - LIDAR (2005) Napa County Parcels (2016) Napa RCD Hydrography (2015) Napa County BDR Hydrography (2005)





Vineyards



0 200 400 600 800 1,000 1,200 1,400 1,600 Feet

Soil Erosion Risk



Key Parcels Vineyard block Blue-line Stream Concentrated Flow

Maps prepared for informational purposes only. Image depicts publicly available data and needs to be considered with on-the-ground conditions and more accurate site-specific data that may exist. No liability is assured for the accuracy of the information or data displayed. Map Date: 8/9/2017 Data Sources: NRCS Solis and Erosion Risk Slope - LIDAR (2005) Napa County Parcels (2016) Napa RCD Hydrography (2015) Napa County BDR Hydrography (2005)





Vineyards



0 200 400 600 800 1,000 1,200 1,400 1,600 Feet

1:7,000

< 5% slope
 5.1 - 15% slope
 15.1 - 30% slope
 >30% slope

Contour interval 20 feet

Key
Parcels
Vineyard block
Blue-line Stream
Concentrated Flow

Maps prepared for informational purposes only. Image depicts publicly available data and needs to be considered with on-the-ground conditions and more accurate site-specific data that may exist. No liability is assumed for the accuracy of the information or data displayed. Map Date: 8/9/2017 Data Sources: NRCS Solis and Erosion Risk Slope - LIDAR (2005) Napa County Parcels (2016) Napa RCD Hydrography (2015) Napa County BDR Hydrography (2005)





Vineyards APN w/ >5 acres: 034-060 APN w/<5 acres: 034-060



Productive lands. Thriving streams.

Online Mapping Resources Google Earth Pro

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Online Mapping Resources Web Soil Survey

https://websoilsurvey.sc.egov.usda.gov



Online Mapping Resources Web Soil Survey

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| National Park Servi | ce | |
| Hydrologic Unit | | |

Online Mapping Resources Web Soil Survey

| Area of Interest (AOI) Soil Soil Data Map Explorer Soil | vnload s Data | Shopping Cart (Free) | | | | | |
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| Rating | Tables — Erosion Hazard (Off-Road, Off-Trail) — Summary By Map Unit | | | | | | |
| Rating Options Detailed Description | Summary by Map Unit – Sonoma County, California (CA097) | | | | | | |
| Advanced Options | symbol | Map unit name | Rating | (percent) | (numeric values) | in AOI | of AOI |
| View Description View Rating | BoG | Boomer loam, 50 to 75 percent slopes | Very severe | Boomer (85%) | Slope/erodibility (0.95) | 37.8 | 57.6% |
| Fencing | мьс | Manzanita gravelly silt loam, 0 to 9 percent slopes | Slight | Manzanita (85%) | nestedőr. | 4.9 | 7.4% |
| Fencing, Post Depth 24 Inches or Less | | | 12 | | | | |

Managing Natural Waterways, Ditches, and Spillways

Identify all waterways on or adjacent to vineyard (Page 26)



- Provide basic description of each waterway (Pages 27-28)
- Divide streams into shorter reaches as needed



- Identify flooding and erosion areas (W2)
- Determine existing vineyard setbacks (W3)



- Identify "unconfined alluvial reaches" (W4)
- Calculate Tier 1 setbacks (optional W7)



Document "active" and "passive" restoration efforts (W5, W6)



Document "active" and "passive" restoration efforts (W5-6)



Managing Natural Waterways Store agricultural equipment and supplies away from floodprone areas (W8)



Channel Characteristics (Table W5, Pages 29-30)



Channel Condition

Headcut



Channel Condition



Channel Condition





Fish Passage

- Steelhead, Salmon, Lamprey
- Adults: Winter / Spring
- Juveniles: Spring / Summer





Fish Passage – Restoration Opportunity



Riparian Functions

- Shade
- Erosion control
- Filtration
- Organic matter
 - Wood, leaves, etc.
- Wildlife habitat
- Migration corridors









- Native vegetation
- Variety grasses, forbs, shrubs, trees





Riparian Problems

- Exotic, invasive vegetation
- Exposed canopy
- Eroding banks





In-stream Habitat

- Large wood (fallen trees)
- Boulders
- Overhanging roots / banks



Channel Features

- Riffles: shallow, swift water
- Pools: deep, slow water
- Gravel bars
- Channel bends





Managing Ditches

- Provide basic description of each ditch (Table W6, Page 33)
- Divide ditches into shorter reaches as needed



Huichica Creek



Huichica Creek



Managing Spillways

• Describe farm pond/basin spillways (Page 36)


Managing Spillways

- Spillway size and alignment
- Energy dissipation





Managing Erosion in Vineyard Blocks and Avenues



Preventing Erosion and Concentrated Flow







Performance Standards for Soil Loss

1. In the farm area, soil loss rate is less than or equal to tolerable soil loss rate (t)

2. <u>Storm Runoff from an existing Hillslope Vineyard</u> shall not cause or contribute to downstream increases in bed and/or bank erosion

- 3. <u>Storm Runoff from a new Hillslope Vineyard</u> (slope > 5%.):
 - a) peak storm runoff in 2, 10, 50 and 100 year,
 24hr rainfall events shall not be greater than
 pre-development peak storm runoff.
 - b) Runoff shall not contribute to downstream increases in bed and bank erosion.

A = R * K * LS * C * P

- A = potential mean annual soil loss
- **R** FACTOR = rainfall factor
- K FACTOR = soil erodibility factor
- **LS** FACTOR = topographic factor
- **C** FACTOR = land cover factor
- **P** FACTOR = conservation practices (terracing)

A = R * K * LS * C * P

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- **LS** FACTOR = topographic factor
- **C** FACTOR = land cover factor
- **P** FACTOR = conservation practices (terracing)

T= Expected soil loss A<T

Preventing Erosion and Concentrated Flow





Managing Storm Runoff and Sediment Delivery from Hillslope Vineyards

Importance of Managing Erosion and Concentrated Flow

Reduce and mitigate sedimentation to streams

- Improve and Maintain Fish and aquatic habitat
- Maintain a clean and thriving municipal water supply
- Water Quality
- Reduce and mitigate increased flow velocities of storm water runoff
- Protect soil health and the ecology of the farm/land
 - The most valuable resource on your land is your soil

> Improve water infiltration and ground water recharge.

Waste Discharge Requirements

➢ Vineyard Mapping

- Engineered Vineyard drainage infrastructure
 - Subsurface drainage systems, storm drain pipe inlets and outlets, diversion ditches, line waterways, surface ditches, basins, large dissipation features, etc.
- Vineyard Block Map
 - Vineyard row direction
 - Existing vineyard blocks
 - Planned development

> Erosional Features associated in and around the vineyard.

Engineering Maps from Existing Erosion Control Plans



Evaluating drainage and erosion to comply with the SF Regional Water Boards Requirements

Performance Standards for Drainage

Performance standards for soil loss and storm runoff will be evaluated as follows:

- Field Evaluation of erosional processes, ground cover condition, protection against erosional processes from storm drainage
- Conduct soil loss and hydrology modeling

 Existing ECP for hillside vineyard most likely will have soil loss & hydrology modeling completed.

Evaluating drainage and erosion to comply with the SF Regional Water Boards Requirements

Monitoring

Annual Winter Photo Monitoring

- Inlets
- Outlets specially those discharging into waterways
- Typical Cover Crop and vineyard ground cover
- Typical vineyard avenue ground cover
- Existing erosional issues

PREVENTING EROSION AND CONTENTRATED FLOW

Fundamental Approach and Methodology

SLOW IT! SPREAD IT! SINK IT! Managing Concentrated Storm Runoff and Sediment Delivery from Vineyards

- Prevent Concentrated Flow
- Convey concentrated flow in way that prevents erosion
- Release and dissipate concentrated flow from basin, pond, or spreader into a rock, vegetated, and stable location.

What is Concentrated Flow?

Concentrated flow - water, usually storm runoff, flowing in a confined feature such as a channel, ditch, swale, tire rut, etc.



Analyzing Potential areas of natural concentrated flow

Identify Locations of:

- Out letting storm drains/ culverts
- Drop inlets throughout the vineyard
- Stream crossing and other points of potential stream delivery
- Potential sources of erosion
- Locations for attenuation and sediment basins



Understanding the dynamics of concentered flow through vineyard Blocks, avenues and the delivery point.



 Prevent increased flow velocities and accelerated erosion in and around the vineyard!

Engineered and Accelerated Concentrated Flow

Road side ditches

Mid slope diversion ditches





Avenues versus Roads



- Majority of erosion issues in vineyards are associated with perimeter avenues and roads.
- Prevent and mitigate concentrated flow.
- Consider rocking and reshaping surface if the road is used year round.



 Down slope, sediments delivered to storm drain.

Reduce Tillage Non-Tilled or Alternate-Tillage Soil Management

The key to erosion control is excellent vegetated ground cover and healthy soil structure

- Promote soil qualities resilient to erosion
 - Reduce tillage or adopt non-tillage practices
 - Improve Soil Structure
 - Reduce storm rain compaction and run-off
 - Improve infiltration of storm water
 - Improve root growth

Maintain coverage throughout vineyard block and avenues with vegetation cover or mulch



Photo monitoring

Question V2 & V5.

Describe current practices in detail

Example Questions in the LandSmart Plan

V2. Mulch and/or vegetative cover is maintained in vineyard blocks (between vine rows) during rainy months. *Recommended photo monitoring point.*

```
□ All Blocks (Describe your current practice(s))
```

□ Some Blocks (Describe your current practice(s). Consider a combination of practices # 2 through 12, listed in Table V1 below)

 \Box No Blocks (Consider a combination of practices # 2 through 12, listed in Table V1 below)

Describe as needed:

V5. Mulch and/or vegetative cover is maintained on unsurfaced vineyard avenues during rainy months. *Recommended photo monitoring point.*

□ All avenues (Describe your current practice(s))

□ Some avenues (Describe current practice(s). Consider practices # 4, 9 – 14 listed in Table V1 below)

□ No avenues (Consider practices # 4, 9 through 14, listed in Table V1 below)

Describe as needed:

Maximizing Vineyard Ground Coverage

- Vegetation Growth under the vine row
 - Herbicide usage? Types of herbicide
 - Strip spray widths?
 - Mulching under vines





Question V3

Maximizing Vineyard Ground Coverage Keep Spray Strips Narrow



Winterization

- Inspection ranch after major storm events
- Use Photo monitoring points to evaluate condition of sensitive areas after large storms





 Emergency erosion control materials are stage and readily available

Winterization

Taking Action!



Question V8 & V9.

Example Questions in the Landsmart Plan

V12. Runoff from the vineyard blocks is collected into a drainage system. Concentrated flow is conveyed in a way that is not causing erosion. *Recommended photo monitoring point to show stability of areas below outlet(s)*.

□ Yes, all blocks (Map drainage features or reference your ECP)

□ Yes, in some blocks (Map drainage features or reference your ECP)



Example Questions in the Landsmart Plan

V10. Runoff within the vineyard is primarily dispersed as sheet flow. No drainage system (diversion ditch(s), drop inlets, tile drains, etc.) exists within the vineyard block(s).

- Yes, all blocks. Skip to question V12 (Describe any modeling that was done, and dispersal/infiltration methods)
- □ Yes, some blocks (Describe which blocks, modeling, and dispersal/infiltration methods. Consider practices # 1 through 7 and #11, listed in Table V2 below for areas with drainage systems)
 - No (Consider practices # 1 through 7 and #11, listed in Table V2 below)

Describe as needed:

V12. Runoff from the vineyard blocks is collected into a drainage system. Concentrated flow is conveyed in a way that is not causing erosion. *Recommended photo monitoring point to show stability of areas below outlet(s)*.

□ Yes, all blocks (Map drainage features or reference your ECP)

□ Yes, in some blocks (Map drainage features or reference your ECP)

□ No (Consider practices # 2 through 9 and # 11 through 13, listed in Table V2 below)

Describe as needed:

Aggregate Stability-Better Water Infiltration Fungal-produced glomalin helps bind aggregates



Ability of soil aggregates to resist disintegration when disruptive

disintegration when disruptive forces associated with water or wind erosion are applied



Figure 1. A diagrammatic representation of well structure and poorly structured soils. Source: Victorian Department of Agriculture.



a) aggregated soil



b) soil seals and crusts after aggregates break down

Slake Test – Aggregate Stability Test





ROADS AND CROSSINGS




Napa River TMDL for Sediment Identifies Roads as Significant Source

 Road-related erosion is the largest sediment source associated with land-use activities in the Napa River watershed, and perhaps the most cost effective source to treat.







ROAD WDR Requirements (5+ acre vineyard):

FARM PLAN

All roads must be mapped showing surface type and stream crossing type

PERFORMANCE STANDARD FOR UNPAVED ROADS <u>- HILLSIDE VINEYARDS ONLY</u>

- 1. By 2027, no more that 25% of unpaved road mileage drains to stream system
- 2. By 2027, culverted stream crossings have
 - reduced plug potential at culvert inlet
 - reduced diversion potential



ROAD DATA FORM

| ROAD DATA FORM (2017) | | | | | | | |
|--|--|-----------------|------------------------|--|--|---|--|
| | Site #: | Date: | Map ID/name: | | | Site located up-stream of pond/reservoir? Yes No | |
| | Does the site look to be actively eroding? | | | | Photo point(s)? | | |
| GENERAL | □ Yes □ No | | | | Yes No | | |
| | Is this section of road necessary and utilized? | | | | Site type: | | |
| | □ Yes | □ No | | | | | |
| | (If no see Road Closure (654) options in Table R1 & R2) | | | Š. | (If not a Stream Crossing then skip to 'Road Drainage' section) | | |
| STREAM | Bridge Bottomless Culvert | | | Wet Crossing | | | |
| CROSSING | Arch or 🗌 | Box. | (round or ova | al) | (Ford, Armored Fill, Fill, or Pulled | | |
| TYPE | (If yes, skip to 'Road (If yes, go to 'Culverted | | | ed | crossing) | | |
| (Check one) | Drainage' se | ection) | crossing info' section | (If yes, go to 'Wet crossing' section) | | | |
| | Trash deflector above inlet? Yes No (If no, see treatment options 3 or 4 in Table R1) | | | | Elbow present along length of culvert? Yes No (If yes, then do not install trash rack) Is such a fight of sulvert greater than half the | | |
| Culverted | Does the stream crossing have diversion potential? | | | | diameter of the culvert? | | |
| Crossing | (If yes see treatment options 5 or 6 in Table R1) | | | | Yes No | | |
| info | | | | | (If yes, see treatment options 9 - 13 in Table R1) | | |
| | Is Inlet of culvert greater than 20% crushed or | | | | Is culvert bottom rusted through or separated? | | |
| | plugged? | | | | 🗆 Yes 🗆 No | | |
| | 🗆 Yes 🗆 No | | | | (If yes, see treatment options 9 – 13 in Table R1) | | |
| | (If yes, see treatment options 9 - 10 in Table R1) | | | | | | |
| Wet | Is crossing d | ipped wide enou | igh to keep flows | IS C | crossing armor (native or placed) adequate to prevent fill | | |
| crossing | | | | | | | |
| inio | (If no see treatment option 11 or 12 in Table P1) | | | | If no see treatment options 7 or 11 in Table R1) | | |
| | Left road/Avenue length(s) draining to site (ft): | | | (1 | Road Surface Left road length ends at: | | |
| ROAD | (If > 150ft see treatments options 3 – 5 in Table R2) | | | | (paved or unpaved): | (break in slope, rolling dip, waterbar) | |
| (to site) | Right road/avenue length(s) draining to site (ft): | | | | Road Surface (paved or unpaved): | Right road length ends at: (break in slope, rolling dip, waterbar) | |
| | (If > 150ft see treatments options 3 - 5 in Table R2) | | | | | | |
| COMMENT ON SITE AND ASSOCIATED ROAD LENGTH(S): | | | | | | | |







Culverts fail for several reasons Furniss et al. 1998

Failure mechanisms for <12 year storm events in Northwest CA





Woody debris plugging culvert inlet







Culverted Crossing Info

Trash deflector above inlet (Y/N)





If no, see treatment options 3 or 4 in Table R1

| Practices | NRCS Practice Title | Current Practice | Recommended Practice |
|--|---|-----------------------|---------------------------|
| (at stream crossing) | | | |
| The following practices may nee | d to be implemented to me | eet WDR compliance. | |
| 1. No treatment at site | | | |
| 2.Consult a Professional | | | |
| 3. Remove screen from culvert inlet* | Access Road (560) | | |
| 4. Install trash rack (See typical drawing 3) | Access Road (560) | | |
| 5. Construct critical dip (See typical drawing 1c) | Access Road (560) | | |
| 6. Install critical culvert | Access Road (560) | | |
| The following practices are addi protect water quality. | tional treatments to improv | ve road drainage, red | uce road maintenance, and |
| 7. Armor fill face (See typical drawing 1b, 4) | Lined Waterway or Outlet (468) and Rock Riprap (907) | | |
| 8. Armor below outlet of culvert (See typical drawing 1b) | Lined Waterway or Outlet (468) and Rock Riprap (907) | | |
| 1 | | | |
| 9. Repair culvert | Access Road (560) | | |
| 9. Repair culvert 10. Install or replace culvert (See typical drawing 2, 4) | Access Road (560) Access Road (560) | | |
| 9. Repair culvert 10. Install or replace culvert (See typical drawing 2, 4) 11. Construct armored-fill crossing** (See typical drawings 5a, 5b, 6, 7) | Access Road (560) Access Road (560) Stream Crossing (578) | | |
| 9. Repair culvert 10. Install or replace culvert (See typical drawing 2, 4) 11. Construct armored-fill crossing** (See typical drawings 5a, 5b, 6, 7) 12. Install bridge** | Access Road (560) Access Road (560) Stream Crossing (578) Stream Crossing (578) | | |
| 9. Repair culvert 10. Install or replace culvert (<i>See typical drawing 2, 4</i>) 11. Construct armored-fill crossing** (<i>See typical drawings 5a, 5b, 6, 7</i>) 12. Install bridge** 13. Construct ford crossing** (<i>See typical drawing 5a</i>) | Access Road (560) Access Road (560) Stream Crossing (578) Stream Crossing (578) Stream Crossing (578) | | |
| 9. Repair culvert 10. Install or replace culvert (See typical drawing 2, 4) 11. Construct armored-fill crossing** (See typical drawings 5a, 5b, 6, 7) 12. Install bridge** 13. Construct ford crossing** (See typical drawing 5a) 14. Excavate soil to decommission crossing** | Access Road (560) Access Road (560) Stream Crossing (578) Stream Crossing (578) Stream Crossing (578) Road Closure (654) or Earthfill (903) | | |

and 'diversion potential' requirements stated in the WDR.



Is there an elbow or turn along length of culvert?







While you're down there...







• Does the Culverted stream crossing have diversion potential (Y/N)





Diverted Streams











- 1. Critical dip will be constructed on the lower side of crossing.
- 2. Critical dip will extend from the cutbank to the outside edge of the road surface. Be sure to fill inboard ditch, if present.
- 3. Critical dip will have a reverse grade (A) from cutbank to outside edge of road to ensure flow will not divert outside of crossing.
- 4. The rise in the reverse grade will be carried for about 10 to 20 feet and then return to original slope.
- 5. The transition from axis of bottom, through rising grade, to falling grade, will be in the road distance of at least 15 to 30 feet.
- 6. Critical dips are usually built perpendicular to the road surface to ensure that flow is directed back into the stream channel.

Napa County Resource Conservation District

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Failsafe Mechanisms





Road Drainage to Site (Stream Crossing)

- Left/Right road length draining down to site (ft)
- Road surface (paved, rocked, native):
- Road lengths ends at...





Wet Crossing Info

- Is crossing dipped wide enough to keep flows within natural channel (Y/N)
- At armored fill crossing is armor adequate enough to prevent fill material from eroding (Y/N)









Waterbar construction







Rolling dip instructions:

- A rolling dip is a long, permanent dip constructed into native soils. The dip can be constructed to drain the inboard ditch or just the road surface.
- On existing roads the cut of the dip should start 30-50 feet upslope of the trough, with an outslope of 2-4%.
- Dip axis should be skewed down road at 30 degree off of centerline of road length this will facilitate in efficiently draining the road without buildup of sediments in trough and makes the dip more drivable (i.e. the "roll" of the dip)
- The trough of the dip should be outsloped 3-5% with a flat reach of 2 feet.
- The reverse grade of the dip shall generally be sloped 5% for a minimum of 15 feet to form a minimum 6 inch deep dip. Road surface, where fill material will be placed, should be ripped first to ensure fill material interlocks with existing tread.
- The crest of the reverse grade should be a 2 foot long flat reach and the fill material should continue for a minimum of 30-50 feet before tapering to original grade.
- On roads steeper than 15% a steeper/shorter reverse-grade dip may be required.
- Dips shall be placed as specified in the plans. If not specified, then dips shall be placed at maximum 150-200 foot spacings.



Rolling dip construction

Insloped road, inboard ditch, and berm



Outsloped road, removed berm & ditch, with cross drains





Rolling dip frequency











Photo Monitoring





Monitoring

- WDRs require annual photomonitoring (*BMP Implementation Monitoring*)
- Photopoints shall be numbered and depicted on a map
- Photopoints shall be kept with Farm Plan
- Document current condition of best management practices and track changes over time







Why Photo Monitor?

1) Demonstrate winter readiness







Why Photo Monitor?

2) Demonstrate annual maintenance and practice implementation







Why Photo Monitor?

 To demonstrate condition of outfall (discharge) points and associated receiving waters







Why Photo Monitor?

4) To track other areas of interest that you want to watch (e.g. areas of erosion, invasive plants, etc)



Streambank Erosion

Invasive plants (Arundo)



Why Photo Monitor?

Soil erosion in the Farm Area: soil loss rate ≤ tolerable soil loss rate.





Photo Monitoring Table

| Photopoint ID | Мар | Description E.g. winter readiness; annual maintenance; practice implementation; outfall and receiving water point; other | Date Taken (m/d/y) | Condition (performing properly, needs maintenance, needs consultation) | Actions needed or taken |
|------------------|-----|---|------------------------------|--|-------------------------|
| | | | | | |
| | | | | | |
| | | | | | |
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| | | | | | |
| | | | | | |
| | | | | | |



Photo Monitoring Table

| Photopoint ID | Мар | Description E.g. winter readiness; annual maintenance; practice implementation; outfall and receiving water point; other | Date Taken (m/d/y) | Condition (performing properly, needs maintenance, needs consultation) | Actions needed or taken |
|---------------|-------|---|------------------------------|--|--|
| Block A ditch | Map 1 | Receiving waters point | 8/15/17 | needs maintenance | Stop using herbicide spray. Plan to plant the area with native grasses in 2018 |
| Block B ditch | Map 1 | Receiving waters point | 11/23/17 | needs maintenance | Establish permanent grass cover in waterways by 2020 |







Photo Monitoring Table

| Photopoint ID | Мар | Description E.g. winter readiness; annual maintenance; practice implementation; outfall and receiving water point; other | Date Taken (m/d/y) | Condition (performing properly, needs maintenance, needs consultation) | Actions needed or taken |
|--------------------|-------|--|-----------------------|--|--|
| Spillway before | Map 2 | Maintenance needed | 7/21/17 | Eroding banks | Oversteepened bank at outlet of spillway |
| Spillway after | Map 2 | Practice implemented | 10/15/17 | Bank stabilization | Banks layed back to 2:1 and armored with 1-2' rock |







Points to Monitor: Summary

- 1) Demonstrate winter readiness
- 2) Demonstrate annual maintenance and practice implementation
- 3) demonstrate condition of outfall (discharge) points and associated receiving waters
- 4) To track other areas of interest that you want to watch (e.g. areas of erosion, invasive weeds, etc)

One photo point might cover multiple purposes

 e.g., a photo point can demonstrate a practice that was implemented (replaced culvert) and also demonstrate the condition at a discharge point



1) Photo Quality

- In shaded areas choose days that are overcast to reduce contrast.
- Best to take photos during the Fall/Winter vs. the Spring/Summer months





Poor lighting

Good (flat) lighting



2) Photo Scale

Having an object in your photo can help the viewer to see the scale of the feature



3) Take photos during storm events

- To determine whether or not structures are functioning properly.
- To see erosional processes in action and identify erosional features and potential causes.





4) Before and After photos

- Establish at least one reference point in your 'Before' photo to help <u>frame</u> future photos.
- Use the same framing (vertical vs. horizontal) with consecutive photos.
- Bring a print or electronic copy of previous years photo to the field.
- Provide a good description of the photo point location in your Photo Monitoring Table.






Photo Monitoring Tips

5) How often to take photos

- At a minimum, annual photomonitoring is required
- Shortly before any treatments are implemented.
- During the first winter after implementation.
- Any large storm events during the following winters.



Photo Monitoring Tips

6) Map Photo Point Locations

- Use a 'large enough' scale map to identify individual photo points. You can use one map for multiple needs.
- Use flagging, pins, stakes, or GPS to mark photo point locations.



