LODI RULES Management Plans & Requirements to Pass

Management Plan List:

LR 1.1	Sustainable Management Vision Plan & Vision Statement
LR 1.2	Succession Plan
LR 1.4	Risk Management Plan
LR 2.1	Human Resources Plan (Fail Chapter, required)
LR 3.3	Ecosystem Management Plan (Fail Chapter, required)
LR 3.14	Livestock Grazing Plan
LR 4.1	Nutrient Management Plan (Fail Chapter, required)
LR 4.2	Soil Erosion: Soil Conservation Plan
LR 5.1	Water Management Plan
LR 6.1	Insect and Mite Pest Management Plan
LR 6.11	Powdery Mildew Management Plan
LR 6.17	Soil Borne Pest Management Plan
LR 6.19	Weed Management Plan
LR 6.21	Vertebrate Management Plan
LR 6.24	Sprayer/Duster Maintenance Plan
LR 6.27	Spray/Dust Drift Management Plan

Additional <u>Requirements</u> for Certification:

LR 3.2, 3.3	Environmental survey (Fail Chapter)
LR 4.1	Soil analysis (Fail Chapter, also useful for LR 4.4, 4.6, 4.10)
LR 4.1	Plant tissue analysis (Fail Chapter, also useful for LR 4.11, 4.12.1)
LR 4.1	Water analysis (Fail Chapter, also useful for LR 4.9, 4.12.1, 5.1, 5.3)
LR 5.6	Back flow prevention (Fail Chapter)
LR 5.7.1-4	Irrigation system maintenance (Fail Chapter)
LR 5.9	Distribution uniformity report (Fail Chapter)
LR Ch 6	Monitoring records/scouting reports for insects and mites (LR 6.2, 6.4 Fail Chapter), leafhoppers (LR 6.3 Fail Chapter), weeds (LR 6.20 Fail Chapter), vertebrate pests (LR 6.22 Fail Chapter)
LR 6.25	Calibration numbers for sprayer/duster within the last year (Fail Chapter)

PEAS points per acre (required, see Tab 7 in binder for detailed info)

General Tips for Management Plan Writing:

- If this is your first year in the LODI RULES program, keep your plans simple.
- Add the corresponding LR Standard and Title at the top for easy filing.
- List visions and goals, describe the current situation in detail, then list overall management strategies.
- Use the headings given in the LR Standard and organize the plan around those.
- If you haven't written anything longer than an email for years, don't worry - bullet points work too!
- Always include a section at the end for "plan review and update" with lines for dates and signatures.
- Review Management Plans at your annual Manager's Meeting (LR 1.3).
- Every year, focus on one area to improve for each plan OR a few plans to improve.
- Share your plans with employees and ask for input - retention is EXTREMELY difficult and important these days, and you will be surprised at how effective creating a teamwork environment is at employee satisfaction!

General Tips for a LODI RULES audit:

- Be prepared and organized!
- The auditor is looking for documentation and evidence to support the answers that you provide in the self-assessment.
- There are a number of different organizational strategies that growers use: these vary from fully digital to only paper… choose the structure that works best for you.
- Have the people involved present at the audit.
- Review the Audit Prep Checklist (LODI RULES Binder Tab 10) beforehand.
- Create a notebook, organized by Chapter and Standard, with verification documents.
- Photos are recommended – these can be organized onto a flash drive by Chapter and Standard too!
- Remember that this is not an inspection where the Auditor is out to "get" you or is trying to find mistakes – this is a respectful visit to verify all of the wonderful sustainable practices you are proud of implementing, which ultimately adds to the merit of the program!

2.1 Human Resources Plan

The farming operation has a written and implemented **human resources plan** containing the following components: company mission, vision, and values; company strategy for human resources; staffing and recruiting procedures; training and development protocols; employee performance management and employee relations strategies; compensation and benefits; record keeping policies; and a plan review and update schedule.	**YES = 6** **NO = Fail Chapter**

General Example:

LR 2.1: Human Resources Plan
Written 5.23.2011, Updated 3.1.2017

MISSION: To demonstrate environmental stewardship through efficient resource utilization and attentive management of agro-ecological processes in vineyards, to promote social equity, and to enhance long-term viability through increased crop value and reduced risk.

VISION: To be the preeminent sustainable winegrape certification program and to promote sustainable vineyard practices, informed consumer decision making, and economic viability for winegrape growers.

VALUES: Vineyard management competency, operational efficiency, sustained profitability, environmental stewardship.

HUMAN RESOURCES STRATEGY: We strive to foster a true teamwork effort utilizing the Lodi Winegrape Commission Staff, the volunteer LODI RULES Committee, and the LODI RULES Winegrowing Community.

STAFFING & RECRUITING: We seek to create a positive, supportive working environment for all Lodi Winegrape Commission Staff with exceptional leadership coming from the Board of Directors and from the LODI RULES Committee. The Sustainable Winegrowing Director should possess strong leadership and communication skills, as well as general viticulture knowledge, and efforts will be made to retain the Director in place long-term. LODI RULES Committee Chairperson and Members are chosen on the basis of dedication to sustainability, history with the program, farming intelligence, and innovative leadership.

TRAINING & DEVELOPMENT: Opportunities abound for Lodi Winegrape Commission Staff, LODI RULES Committee Members, and the LODI RULES Winegrowing Community to receive training and education to foster professional development. All entities are strongly encouraged to seek relevant educational experiences and to take ownership of their lifelong learning in sustainable viticulture. The Lodi Winegrape Commission is committed to aiding in that process.

EMPLOYEE PERFORMANCE MANAGEMENT: New employees receive a formal performance review after 6 months. Thereafter, all employees receive performance reviews on an annual basis. These performance reviews are conducted to provide supervisors and employees the opportunity to discuss job-related tasks, to identify and correct weaknesses in a positive manner, to encourage and recognize strengths, and to discuss positive approaches for meeting employment goals.

EMPLOYEE RELATIONS STRATEGIES: There should be an open, respectful line of constant communication between the Sustainable Winegrowing Director and the LODI RULES Committee Chairperson and Members, as well as the LODI RULES Winegrowing Community. LODI RULES growers should be able to easily get in touch with the correct contact person, and all communications between Lodi Rules Program Management (Lodi Winegrape Commission, Protected Harvest, SureHarvest, Muser Consulting - Auditing) and growers should be polite, friendly, and encouraging.

COMPENSATION & BENEFITS: Salaries are commensurate with training, education and experience, as well as industry standards as verified through appropriate channels. The importance of employee retention to the success of the program is acknowledged, and the Lodi Winegrape Commission strives to maintain quality leadership, a healthy workplace culture, and a competitive salary & benefits program.

RECORD KEEPING: The Bookkeeper will maintain organized employee records and stay current on federal, state, & local employment regulations.

PLAN REVIEW & UPDATE SCHEDULE: This plan will be reviewed and updated annually at the January LODI RULES Committee Meeting, prior to the Year-End Recap Event.

Review Date: _____

Signatures and Written Names of All Present:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

3.3 Ecosystem Management Plan

The farming operation has a written and implemented **ecosystem management plan** based on the findings of the environmental survey (Standard **3.2**), which includes consideration of vegetation, wildlife, soil, surface waters, adjacent infrastructure (roads, etc.), adjacent neighboring properties, and other environmental features. The plan is organized into the following components: ecosystem management goals, challenges, and strategies, as well as a plan review and update schedule.	**YES = 6** **NO = Fail Chapter**

3.2 Environmental Survey

The farming operation uses a written **environmental survey and monitoring program** to determine and document the presence of environmental features (vernal pools and swales, trees, woodlands, drainages, and riparian areas) that affect farming and farmable acres.	**YES = 4** **NO = 0**

General Example:

LR 3.3: Ecosystem Management Plan

Written 2.24.2008, Updated 3.14.2017

ENVIRONMENTAL SURVEY: The following environmental survey was conducted during the summer of 2007 and is still relevant to the current farming operation. Include environmental survey results (photos from Google Earth or aerial images, etc.) and state who conducted the survey. Use cardinal directions in descriptions.

{include a photo map from Google Earth and draw in boundaries,
owl boxes, water, habitat for other wildlife or beneficial
insects, etc. – the Lodi public library computer lab
volunteers can help you with Google Earth if needed}

DESCRIPTION OF VINEYARD BLOCK:

VEGETATION: Include a brief description of any riparian habitats (or lack thereof), cover crops, trees and woodlands, landscaped plants, buffers for roads, grasses, etc.

WILDLIFE: Include relevant birds, squirrels, moles, deer, coyotes, beavers, bears, sheep if used for grazing, etc.

SOIL: Describe soil types and erosion potential (water, wind, slope).

SURFACE WATERS: Include a description of any wetlands (or lack thereof), ditches, groundwater recharge basins, rivers, streams, creeks.

ADJACENT INFRASTRUCTURE: Include very brief descriptions of any sheds, homes, shops, wineries or other businesses, power lines, pumps, and roads.

ADJACENT NEIGHBORING PROPERTIES: Briefly describe the number and types of neighboring properties - residences, schools, daycares, other agricultural land, etc. Possibly list contact information if known.

OTHER ENVIRONMENTAL FEATURES: Anything relevant to the farming operation not described above (weather stations, owl/bird/bat boxes, aquifer, etc.).

GOALS:

- To create an optimal environment for premium, sustainable viticulture while remaining profitable
- To consider and conserve natural resources to the best of our ability, educating our children to respect the environment and be proud of how we farm
- To improve the local ecosystem, including soils, air, living organisms, and water sources, through our farming practices
- To create a healthy, vibrant vineyard block which is visually appealing to both growers and the general public

CHALLENGES:

- Maintaining riparian areas near vineyards
- Neighbor relations
- Erosion
- Rodent control

MANAGEMENT STRATEGIES:

- Enhance the biodiversity of the vineyard block by maintaining healthy trees, cover crops, and riparian areas
- Test the soil profile as-needed to promote active beneficial microbes
- Get vertebrate populations under control so that owl boxes are effective alone
- Attend local watershed stewardship meetings to stay informed
- Educate employees on reasons ecosystem management is important to us

PLAN REVIEW & UPDATE SCHEDULE: This plan will be reviewed and updated annually at the January Management Meeting, with input from all relevant employees.

Review Date: _____

Signatures and Written Names of All Present:

_____

_____

_____

4.1 Nutrient Management Plan

The farming operation has a written and implemented comprehensive **nutrient management plan** containing the following components: field parameters and vineyard design specifications; vine nutrient demand considerations (growth, recent yields, and target yield); mineral nutrient supply considerations (soil analysis, water analysis); planned mineral nutrient applications (form, rate, timing, placement); monitoring activities (visual observations, tissue analysis); and a plan review and update schedule.	**YES = 6** **NO = Fail Chapter**

General Example:

LR 4.1: Nutrient Management Plan

Written 4.12.2011, Updated 2.4.2017

FIELD PARAMETERS & VINEYARD DESIGN SPECIFICATIONS: This vineyard block is 235 acres on San Joaquin Loam, a soil type with moderately well drained soils formed in alluvium derived granitic rock sources. The land is nearly flat with 0-1% slope. The wind direction is generally W/NW and the block is on a drip irrigation system. Leaching potential is low while run-off potential is moderate. Fertilization management is a blend of nutrient replacement and needs-based.

GOALS:

- Balanced vine growth and high quality fruit production
- Right source, right rate, right time, and right place

VINE NUTRIENT DEMAND CONSIDERATIONS.

GROWTH: Nutrient needs are calculated based on the removal of 3 lbs. nitrogen and 6 lbs. potassium per ton of grapes harvested. Vigor is generally high for this block.
RECENT YIELDS: 11 tons/acre (2016), 8 tons/acre (2015)
TARGET YIELD: 10 tons/acre

MINERAL NUTRIENT SUPPLY CONSIDERATIONS.

SOIL ANALYSIS:

- Nitrogen, potassium, sulfur, and boron are deficient
- pH is suitable
- Nitrogen is 12.4# / acre ft
- Base saturation in acceptable range

WATER ANALYSIS:

- Nitrogen contribution = 7.67#/acre ft
- No toxic issues with salinity, EC, chlorides, or boron
- Bicarbonates will require treatment to prevent emitter clogging
- The amount of nitrogen added through irrigation is calculated and deducted from total nitrogen added throughout the season

MINERAL NUTRIENT APPLICATIONS.

FORM: Nutrients are applied as a blend of liquefied urea, ammonium thiosulfate, and potassium chloride. Boric acid is blended with nitrogen and potassium.

RATE: Low rates are used for pre-harvest and moderate rates are used post-harvest.

TIMING: About 2/3 of the seasonal requirements are applied in three equal applications between May and July, then the last 1/3 is applied post-harvest. Applications are made during a 6-8 hour window.

PLACEMENT: Nutrients are applied through the drip irrigation system with back-flow prevention and check valves in place.

MONITORING ACTIVITIES.

VISUAL OBSERVATIONS: Canopy leaves will be monitored by trained employees for typical nutrient deficiencies.

TISSUE ANALYSIS: Occurs at least twice per year. Petiole analysis (taken at early veraison & full bloom) indicates that nitrogen, potassium, and sulfur levels are low.

PLAN REVIEW & UPDATE SCHEDULE: This plan will be reviewed and updated annually at the January Management Meeting, with input from all relevant employees.

Review Date: _____

Signatures and Written Names of All Present:

_____

_____

_____

_____

4.2 Soil Erosion: Soil Conservation Plan

The farming operation is aware of the erosion risks of the vineyard soils and has a written and implemented **soil conservation plan** which addresses these risks and includes the following components: site and soil factors contributing to soil erosion by water and air, best management practices to minimize soil erosion, and a plan review and update schedule.	**YES = 6**
	NO = 0

General Example:

LR 4.2: Soil Conservation Plan

Written 5.23.2011, Updated 3.21.2017

GOALS: We value soil as an important resource for our vineyard operation and are committed to managing our soils appropriately and effectively, practicing proactive soil erosion control and actively regenerating the soil.

Field specifics are described in the Ecosystem Management & Nutrient Management Plans.

SITE & SOIL FACTORS CONTRIBUTING TO EROSION BY WIND & WATER:

- What is/are the soil types? Are any of these soil types prone to erosion?
- What is the slope and does it lead to a greater erosion risk?
- Does the vineyard site experience strong winds, rains, or storms?
- Is the irrigation method a factor in erosion?

Soil maps can be downloaded for free from the USDA - NRCS - Web Soil Survey.

BEST MANAGEMENT PRACTICES TO MINIMIZE SOIL EROSION:

- Describe your cover crop use - what types of cover crops are used and are they in place year-round?
- Do you sometimes need to till the soil for certain reasons (frost protection, soil aeration, vigor control, etc)?
- Do you use special equipment such as a ring roller to follow the tilling tractor to lightly compress the soil, minimizing wind erosion?

Review Date: _____

Signatures and Written Names of All Present:

_____

_____

_____

5.1 Water Management Plan

The farming operation has a written and implemented **water management plan** containing the following components: soil moisture management goals and strategies; soil water holding capacity, water intake rate, and water permeability; irrigation suitability* analysis of applied water; irrigation system design and performance; and a plan review and update schedule.	**YES = 6**
	NO = 0

*See standards **4.9** and **5.3** for more information on *irrigation suitability*.

Irrigation suitability refers to a water panel analysis available from most agricultural laboratories in California, which typically includes pH, electrical conductivity, sodium adsorption ratio, calcium, magnesium, bicarbonate, iron, manganese, sodium, chloride, boron, nitrate-nitrogen, sulfate-sulfur, and/or bacterial counts.

General Example:

LR 5.1: Water Management Plan

Written 1.24.2014, Updated 4.2.2017

SOIL MOISTURE MANAGEMENT GOALS & STRATEGIES: To make the best use of our water resources through careful management and attention to detail. We strive for continuous improvement using annual metrics while optimizing water conservation and using deficit irrigation. Irrigation events are closely monitored and systems are maintained and repaired as needed. Cover crops are maintained year-round. Attention is paid to developing grapevines throughout the season, noting any water stress (visual observations, water potential measurement, ET) and any corrective action is based on vine needs. Daily weather forecasts are also taken into consideration.

You may also want to list any challenges here and how you plan to overcome them.

MANAGEMENT CHALLENGES: This field has some water purity issues which can lead to decreased water penetration over time. Gypsum is added when necessary.

WATER RESOURCE & USE INVENTORY: The sources of irrigation water are a private groundwater well and surface water through the Woodbridge Irrigation District. All pumps have a back-flow device and time of use meters.

SOIL WATER HOLDING CAPACITY: The root zone moisture holding capacity when full for our sandy loam soil, with root depths at 4 ft, ranges from approximately 5-6 in/ft = 20-24 in.

For more information on this topic (including a table), see Stan Grant's blog post at: http://www.lodigrowers.com/comprehensive-vineyard-water-management/.
Also, soil available water capacity maps can be downloaded for free from the USDA - NRCS - Web Soil Survey.

SOIL WATER INTAKE RATE: Except in the case of excessive rains, water does not collect on the surface and soil water intake rate is adequate.

SOIL WATER PERMEABILITY: Deep tillage was performed prior to planting to improve water storage capacity and conductance, in the hopes to promote deep roots. No problems with permeability exist at this time.

IRRIGATION SUITABILITY ANALYSIS OF APPLIED WATER: Irrigation suitability analyses are performed at least every two years and actions are taken to adjust the water qualities based on the results of the analysis. The last analysis was performed in May of 2016 and the results are attached as part of LR 4.9 & LR 5.3.

IRRIGATION SYSTEM DESIGN, SCHEDULING & PERFORMANCE: Irrigation is applied through a drip system, and irrigation system flow and pressure are monitored at every irrigation. Action to repair the system, if needed, is taken immediately and spare parts for the irrigation system are kept on-hand. At least every three years, irrigation distribution uniformity is measured professionally.

PLAN REVIEW & UPDATE SCHEDULE: This plan will be reviewed and updated annually at the January Management Meeting, with input from all relevant employees.

Review Date: _____

Signatures and Written Names of All Present:

_____

_____

_____

_____

6.1 Insect and Mite Pest Management Plan

The farming operation has a written and implemented **insect and mite pest management plan** containing the following components: goals; guidelines for written monitoring records; frequency and location of monitoring; action and economic thresholds for each pest based on pest numbers, natural enemy type/number considerations, amount of leaf and/or fruit damage present, time of year, canopy vigor, winegrape variety; timing of treatments; and a plan review and update schedule.	**YES = 6** **NO = 0**

General Example:

LR 6.1: Insect & Mite Pest Management Plan

Written 1.13.2014, Updated 3.10.2017

GOALS: We strive to make wise, environmentally conscious, socially responsible, and economically feasible pest treatment decisions that our operation is proud of. We utilize integrated pest management tools such as biocontrol, dust control, and sanitation in conjunction with plant protectants, and annually evaluate pest management decisions and new options for pest control. We pay close attention to emerging and invasive pests, follow label instructions, rotate chemistries, and employ non-chemical control as efforts to reduce resistance build up in pathogen populations. Employees are trained in recognition of both pests and beneficial insects. When possible, spot treatments are used.

GUIDELINES FOR WRITTEN MONITORING RECORDS including FREQUENCY & LOCATION:
The PCA monitors the vineyard for insect and mite pests at least once every 10 days during the growing season (May - Harvest) and keeps written records, which are then transferred to us via email upon request (LR 6.2). Vineyards are monitored in a systematic way to include the edges as well as several different locations within the block. Pacific Spider mites and leafhoppers are occasionally an issue, as are vine mealybugs.

ACTION & ECONOMIC THRESHOLDS: LEAFHOPPERS

<2 nymphs per leaf and no leaf damage	between 2-5 nymphs per leaf, low leaf damage, low adult population present	moderate-heavy leaf damage and moderate-heavy adult population present	>5 nymphs per leaf
NO TREATMENT	**MONITOR (watch low vigor varieties more closely since they have less leaves)**	**TREAT**	**TREAT**

(Examples only, do not use as pest control guidance)

ACTION & ECONOMIC THRESHOLDS: SPIDER MITES

<50% of leaves infested with mites	**50-70% of leaves infested with mites**	**>70% of leaves infested with mites**
Release predatory mites to keep the population under control.	If predatory mite populations are on the rise, MONITOR; if not, TREAT with a biocontrol-friendly product (avoid Fujimite and Nexter; use Acromite or Nealta)	TREAT with a biocontrol-friendly product (avoid Fujimite and Nexter; use Acromite or Nealta)

(Examples only, do not use as pest control guidance)

ACTION & ECONOMIC THRESHOLDS: VINE MEALYBUGS

Mealybugs and Argentine or Gray ants are present but sparsely and in low numbers	**Mealybugs and Argentine or Gray ants are present in moderate-high numbers on trunk and leaves**
Release *Anagyrus* wasps, TREAT for ants (Esteem), use pheromone disruption, and MONITOR.	TREAT with Movento, TREAT for ants (Esteem), and MONITOR populations (including parasitized MBs)

(Examples only, do not use as pest control guidance)

TIMING of TREATMENTS:

Treatments are timed to provide maximum levels of control - for example, at the more vulnerable life stages of the pest and in a proactive manner to prevent a high population rather than attempt to decrease a large, damaging pest population once it has grown out of control. As harvest approaches, moderate pest levels are more tolerated than earlier in the season. Earlier ripening varieties (Chardonnay) can sometimes avoid treatment. Old Vine Zinfandel ripens later and thus needs to be more closely monitored and treated earlier.

HISTORY OF INSECTS & PESTS IN THIS BLOCK:

2013		**2014**		**2015**		**2016**		**2017**	
mites	LOW	mites	HIGH	mites	MOD	mites	HIGH	mites	
leafhoppers	LOW	leafhoppers	LOW	leafhoppers	LOW	leafhoppers	LOW	leafhoppers	
VMB	LOW	VMB	MOD	VMB	HIGH	VMB	HIGH	VMB	
predatory mites		Fujimite, Movento		predatory mites, Fujimite, Movento		Nealta, Movento, ant control			

This plan will be reviewed on an annual basis in February. Review Date: _____

Signatures and Written Names of All Present:

_____

_____

_____

General Example:

LR CH. 6: Monitoring Records/Scouting Reports

Work with your PCA or vineyard scout to get the records in an organized, easy to use format that works for you and for verification purposes.

What monitoring records are needed for the LODI RULES verifications?

- Any insects and mites listed in your Insect & Mite Pest Management Plan (LR 6.1-6.4; at least leafhoppers and mites)
- Powdery Mildew (LR 6.11)
- Weeds (LR 6.19-6.20)
- Vertebrates (LR 6.21-6.22)

It is okay to include "extra" columns for things like rots, viruses, etc. **BE SURE TO EXPLAIN YOUR SCORING OR RATING SYSTEM, INCLUDING ANY SYMBOLS OR ABBREVIATIONS USED.** If you use LOW - MODERATE - HIGH, be sure to repeat those explanations from your plans into a footnote in your monitoring records submitted for verification to the auditor (what does "LOW" mean? less than 3/10 vines affected?). Pretend that a stranger is going to read the table and be sure that everything needed for it to make sense is included.

LUNA VINEYARD - BLOCK A. Scouted every 7 days from April - Harvest.

DATE	WEEDS	PACIFIC SPIDER MITE	LEAFHOPPER [ADULT (A) & NYMPH (N)]	VINE MEALYBUG	SHARPSHOOTER	POWDERY MILDEW	LEAFROLL VIRUS	GOPHERS
4.3.17	10%	0%	A = 0, N = 0	0/15	0/15	0%	-	2/10
4.10.17	5%	0%	A = 0, N = 0	1/15	0/15	0%	-	3/10
4.17.17	5%	0%	A = 0, N = 0	2/15	0/15	0%	-	2/10
4.24.17	15%	0%	A = 0, N = 0	3/15	0/15	0%	-	1/10
…								

Any % score indicates the estimated vineyard block percentage affected. For the leafhoppers, the score is an average per leaf of 10 randomly selected healthy leaves. For the vine mealybugs and sharpshooters, the score is the number of vines where mealybugs or sharpshooters are present out of 15 randomly selected vines. For gophers, the score is the number of areas where gopher holes can be spotted out of 10 random spots in the block. Any block with a dash indicates that the timing is not ideal for the pathogen or its symptoms to appear.

6.11 Powdery Mildew Management Plan

The farming operation has a written and implemented **powdery mildew management plan** which contains the following components: goals, preventative measures, varietal susceptibility, canopy characteristics, treatment decision factors, treatment measures, and a plan review and update schedule.	**YES = 4**
	NO = 0

General Example:

LR 6.11: Powdery Mildew Management Plan

Written 6.22.2012, Updated 3.4.2017

GOALS: We seek to proactively manage powdery mildew risk by early season detection and treatment, as well as canopy management for maximum air flow (shoot thinning, leaf pulling, crop thinning, and gibberellin sprays where needed depending on the grape variety and vigor). Fungicides with different modes of action are rotated along with sulfur to reduce the potential for resistance to develop in the pathogen population.

PREVENTATIVE MEASURES: Starting in April, the vineyard is monitored for powdery mildew and the weather is closely watched (daily emails from Western Weather). Powdery mildew online forecasting tools are used as needed. Regular sulfur treatments have historically been sufficient in controlling powdery mildew, although with this year being so wet we will have to be extra watchful for pathogen development. All vineyards are on a drip irrigation system which minimizes pathogen spread.

VARIETAL SUSCEPTIBILITY:

Susceptible	Bacchus, Cabernet Franc, Cabernet Sauvignon, Chancellor, Chardonnay, Chasselas, Gamay, Gewurztraminer, Grenache, Himrod, Madeleine Angevine, Madeleine Sylvaner, Malbec, Muller Thurgau, Pearl of Csaba, Petit Verdot, Rkatzeteli, Riesling, Sauvignon blanc, Schonburger, Siegerebe, Syrah, Viognier
Intermediate	Chelois, Chenin Blanc, Concord, Foch, Pinot blanc, Malbec, Merlot, Ortega, Pinot Noir, Perlett, Sheridan, Vidal Blanc, Weissburgunder
Least Susceptible	Auxerrois, Malvoisie, Melon, Pinot Gris, Semillon

The above table is from a British Columbia Powdery Mildew guidance document available at: http://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/animal-and-crops/plant-health/grape_powdery_mildew.pdf. You can use it to determine your varietal susceptibility to powdery mildew.

This vineyard is planted to Cabernet Sauvignon, which is susceptible to powdery mildew, and Merlot, which is somewhat susceptible to it.

CANOPY CHARACTERISTICS:

The canopy is managed for maximum air flow by employing shoot thinning, leaf pulling, crop thinning (when needed), gibberellin sprays (Cabernet only), and a trellis design which opens the canopy.

TREATMENT DECISION FACTORS & MEASURES:

Fungicides are applied when the new shoot growth (which is highly vulnerable) is between 2-4 inches long and at regular intervals based on disease pressure levels, as determined by risk models and weather conditions. When mildew is present in greater than 30% of the vineyard, eradicant and/or systemic fungicides are considered. Effectiveness of treatments is noted on an annual basis - including whether or not the mildew pressure decreased, remained the same, or increased, and the total costs of the treatments is also calculated.

This plan will be reviewed on an annual basis in February. Review Date:

_____

Signatures and Written Names of All Present:

_____

_____

_____

6.17 Soil Borne Pest Management Plan

The farming operation has a written and implemented **soil borne pest management plan**, focusing on nematodes and *Phylloxera*, which contains the following components: management goals, a post-planting soil sampling program, site-specific control measures, and a plan review and update schedule.	**YES = 4**
	NO = 0

General Example:

LR 6.17: Soil Borne Pest Management Plan

Written 6.22.2012, Updated 3.4.2017

GOALS: To efficiently reduce soil borne pests to a manageable level while maintaining balanced, microbially active and nutrient-available soils. In addition to nematodes and *Phylloxera*, we look out for atypical soil pathogens such as *Phytopthora* which may be an indication of a hardpan.

SOIL SAMPLING PROGRAM: Before planting, soil samples were taken and analyzed by a professional laboratory to determine varietal and rootstock choices. We believe that choosing the correct rootstock and variety for a given soil type is an important step in defending the grapevines against soil borne and other pests.

After planting, soils are sampled for nutrients and pests (*Phylloxera*, nematodes, *Phytopthora*) every three years or as recommended by our PCA. If any soil borne pathogens are present, appropriate actions will be taken. So far, soil borne pathogens have not been an issue in the 5-yr old vineyard.

SITE-SPECIFIC CONTROL MEASURES: Vine health and balance is maintained in order to provide a strong defense against soil borne pests. Drip irrigation is applied such that it never pools in any areas of the vineyard, and the soils are well-drained. Cover crops which add organic matter back to the soil are used year-round.

This plan will be reviewed on an annual basis in February. Review Date:

_____

Signatures and Written Names of All Present:

_____

_____

6.19 Weed Management Plan

The farming operation has a written and implemented **weed management plan** containing the following components: management goals, monitoring techniques and record keeping, control measures, herbicide resistance avoidance strategies, and a plan review and update schedule.	**YES = 4**
	NO = 0

General Example:

LR 6.19: Weed Management Plan

Written 4.20.2012, Updated 2.5.2016

GOALS: We strive to make wise, environmentally conscious, socially responsible, and economically feasible weed management decisions based on current technologies. We pay close attention to emerging and invasive weeds, follow label instructions on herbicides, rotate chemistries, and employ non-chemical control as efforts to reduce resistance build up in pathogen populations when possible. Employees are trained in recognition of weeds. When possible, spot treatments are used.

MONITORING TECHNIQUES and RECORD KEEPING:
The PCA visually monitors the vineyard for weeds at least once every 10 days during the growing season (May - Harvest), and keeps written records, which are then transferred to us via email upon request (LR 6.20). Weed monitoring occurs both within the vineyard block and around the edges. We also train all employees on weed recognition, as they spend a lot of time in the vineyard and may spot a weed issue before the PCA. Our own employees monitor the vineyards for weeds at least once per month during the winter, and we keep written records in our files from those months.

In general, we try to follow these **UC IPM Weed Monitoring Guidelines**:

- Survey the vineyard in late winter to identify winter annuals and again in summer after perennials and summer annuals have germinated.
- Pay particular attention to perennials. Sketch a diagram of the vineyard and mark areas where perennials are found. A handheld GPS unit also works well for recording locations of perennials. Check for re-growth of perennials a few weeks after cultivation.
- Pay attention to low-lying areas or where water tends to accumulate. These are usually problem areas for weed growth.
- Survey areas around the vineyards as potential sources for wind disseminated weed seeds such as marestail, fleabane etc.
- Keep records of your survey results (including species) and control techniques used.

CONTROL MEASURES:
We maintain a healthy cover crop between every vineyard row, which naturally outcompetes some of the weeds for space. Underneath the vines, we use a pre-emergent herbicide mix once per year in the early Spring. In some cases we also mechanically remove the weeds.

2012	2013	2014	2015	2016	2017
Summer: Winter: Herbicides:	Summer: Winter: Herbicides:	Summer: Winter: Herbicides:	Summer: Winter: Herbicides:	Summer: Winter: Herbicides:	Summer: Winter: Herbicides:

HERBICIDE RESISTANCE AVOIDANCE STRATEGIES: We rotate the mode of action for these herbicides according to HRAC and follow some of their Best Management Practices for preventing herbicide resistance: employing cultural, mechanical, and chemical controls and mixing at least three herbicide chemistries in one application.

http://hracglobal.com/files/Management-of-Herbicide-Resistance.pdf

This plan will be reviewed on an annual basis with management and field workers in February.

Review Date: _____

Signatures and Written Names of All Present:

_____

_____

_____

_____

6.21 Vertebrate Management Plan

The farming operation has a written and implemented **vertebrate management plan** containing the following components: management goals, species of concern, monitoring strategies, control strategies, and a plan review and update schedule.	**YES = 4**
	NO = 0

General Example:

LR 6.21: Vertebrate Management Plan

Written 4.25.2017, updated 1.2.2018

GOALS: We seek to minimize the impact of vertebrate pests on the economic value of our vineyard operation. Employees are trained in recognition of vertebrate pests and their symptoms/presence indicators. When possible, cultural means of control and biocontrol are used.

SPECIES of CONCERN: Ground squirrels, pocket gophers, meadow voles

MONITORING STRATEGIES:
The PCA visually monitors the vineyard for vertebrates at least once every 10 days during the growing season (May - Harvest), and keeps written records, which are then transferred to us via email upon request (LR 6.22). Vertebrate monitoring occurs both within the vineyard block and around the edges. We also train all employees on vertebrate identification, as they spend a lot of time in the vineyard and may spot an issue before the PCA.

<u>Clues we train employees to look for:</u>

- Holes in the ground
- Chewing of drip irrigation lines
- Soil mounds

From "Vertebrate Pests" by Desley A. Whisson and Gregory A. Giusti, http://www.iv.ucdavis.edu/files/24450.pdf:

Table 11-1. Vertebrate pest species, damage, and control recommendations for vineyards where cover cropping is practiced

Species	Signs	Cover crop management	Alternate controls
Pocket gopher	Plugged burrow systems; earth mounds; girdling of vines below ground; stunted vines; damage to irrigation lines	Species selection (grass rather than legumes); mowing to reduce cover and facilitate early detection of mounds	Flood irrigation; toxic baits; trapping
Meadow vole	Runways and open burrow entrances; presence of scats; girdling of vines above ground	Species selection (erect bunch-type growth or short plants, avoid high-moisture plants); maintenance of a cover-free strip around bases of vines; mowing to reduce cover	Vine guards; toxic baits
Rabbits and hares	Feeding on foliage and fruit; girdling or complete cutting of vines above ground; observation of activity	In morning and evening delay planting cover crop until vines are approximately 1 year old	Exclusion fence; vine guards; shooting; toxic baits (black-tailed jackrabbit)
Ground squirrel	Girdling of vines above ground; feeding on foliage and fruit; gnawing on irrigation lines; observation of day activity; burrow systems, especially on perimeter of vineyard	None	Toxic baits; burrow fumigation

CONTROL STRATEGIES:

- In our large vineyard blocks (>50 acres), we have one wooden owl box for every 25 acres (LR 6.23). In the small vineyard blocks (<50 acres), we have one wooden owl box per 15 acres. These boxes are mounted on metal poles to prevent predation of the owls and cleaned following manufacturer instructions once per year when they are empty.
- Only when absolutely necessary will we use toxic baits.
- For larger, rare vertebrate issues we will use trapping and removal from the area into an appropriate habitat.

This plan will be reviewed on an annual basis with management and field workers in February.

Review Date: _____

Signatures and Written Names of All Present:

_____

_____

_____

_____

6.24 Sprayer/Duster Maintenance Plan

The farming operation or the custom applicator has a written and implemented **sprayer/duster maintenance plan** containing a cleaning and maintenance regime for filters, pumps, control units, pressure gauges, nozzles, hoses, the power take off (PTO), booms, and tanks, and a plan review and update schedule.	**YES = 4** **NO = 0**

General Example:

LR 6.24: Sprayer/Duster Maintenance Plan

Written 4.26.2017, updated 12.15.17

GOALS:

- To ensure proper working order of all sprayers and dusters
- To train employees on the importance of properly working machines
- To properly calibrate our machines before every use

CLEANING AND MAINTENANCE REGIME:

- Cleaning happens after each use (water flushing)
- We keep extra parts on hand for timely repairs (filters, valves, hoses, nozzles, etc.)
- Filters are removed and visually inspected for damage and wear (and replaced as needed)
- Valves on pumps are inspected and repaired as needed
- Control units are tested for leaks and kept lubricated for proper functioning
- Pressure gauges are checked when new nozzles are installed by measuring flow rate and comparing it with a manufacturer's nozzle table
- Nozzles are checked by visual observation before and during applications and worn nozzles are replaced as needed. Applicators are trained on the importance of proper nozzle function.
- Hoses/booms are checked frequently for wear and replaced as needed; hose clamps are tightened before each use
- The PTO shaft is lubricated and the safety guard is checked before each use
- Tanks are checked for cracks and leaks before each use; tanks are emptied and rinsed after each use by spraying out the rinse water in the treated vineyard block
- All metal parts are protected with rust prevention oil
- We have good communication with our applicators on all cleaning and maintenance

This plan will be reviewed on an annual basis in February. Review Date:
_____

Signatures and Written Names of All Present:

_____

_____

_____

6.27 Spray/Dust Drift Management Plan

The farming operation has a written and implemented **spray/dust drift management plan** containing the following components: spray/dust drift management goals, identified sensitive areas, good neighbor policies, established buffers, pesticide rate selection guidelines, equipment operation, weather condition considerations, timing of applications, drift reduction adjuvants, and a plan review and update schedule.	**YES = 4**
	NO = 0

General Example:

LR 6.27: Spray/Dust Drift Management Plan

Written 1.12.2011, Updated 7.26.2016

GOALS:

- To use the minimum number of pesticide applications per year while maintaining effective, cost-efficient disease prevention and control
- To optimize the physical application of pesticides (maximizing the amount of active ingredient applied to the target location)
- To prevent drift incidents (both stemming from our vineyards and into our vineyards)
- To stay informed of current spray technologies which may improve application and reduce drift

IDENTIFIED SENSITIVE AREAS:

- Neighbor's home located east of the Cabernet Sauvignon block on Lester Road.

GOOD NEIGHBOR POLICIES: We maintain personal, friendly communication with our neighbors and the community at large in regards to pesticide applications. We visited our neighbors (mentioned above) and let them know that we need to use pesticides to stay in business but that we carefully manage the applications to reduce drift and if they have any questions or concerns, we are open to communication. We also invite the neighbors to our annual Harvest Dinner in the vineyard. In the community, we attend local grower meetings where drift issues are discussed and represent responsible use of pesticides.

ESTABLISHED BUFFERS: There is at least a 30-foot buffer present along all roadways.

PESTICIDE RATE SELECTION GUIDELINES: We follow label recommendations and apply only the amount needed for effective control, based upon years of experience, canopy vigor, and talking with our PCA and other growers.

EQUIPMENT OPERATION: Sprayers are properly maintained and calibrated (see the Sprayer/Duster Maintenance Plan, LR 6.24). Sprayers and dusters are turned off at the ends of the vineyard rows as appropriate. All applicators are licensed and trained above and beyond what is required by law. We trust the applicators to make wise decisions regarding pesticide applications (for example, if they determine that a spray needs to be delayed to reduce drift then we support

that decision) and have a system of checks and balances in place for added safety and risk reduction.

WEATHER CONDITION CONSIDERATIONS: Weather conditions are monitored before and during applications. As a company policy, we do not apply pesticides when wind speeds are over 8 mph, when air pollution risk levels are high (the AQI is greater than 201), or when there is an inversion layer.

TIMING OF APPLICATIONS: When possible, we apply pesticides during the night or in the early morning hours.

DRIFT REDUCTION ADJUVANTS: The use of drift reduction adjuvants is considered, as recommended by our PCA.

This plan will be reviewed on an annual basis in February. Review Date:
_____

Signatures and Written Names of All Present:

_____

_____

_____

_____

_____