

2020 SWBC GUIDANCE MATERIALS

TABLE OF CONTENTS

2020 SWBC Guidance Materials.....	1
Soil Sampling Guidance update.....	3
Chemical storage guidance.....	6
Integrated pest management program.....	14
Generic maintenance program content.....	21
Generic plan or program content.....	25
Templates & Instructions.....	28
Sample Templates for Documentation.....	31
Electricity Consumption Tracker.....	31
Pest & Disease Description.....	32
Pesticide Record: Single Application.....	34
Waste Tracker.....	35
Scheduled Maintenance Template.....	36
Generic Plan Example.....	37
General pesticide application record.....	38
Equipment/Area Maintenance Schedule.....	39

SOIL SAMPLING GUIDANCE UPDATE

Criteria from Vineyard Standard

C.1 Essential Year 0

Growers send soil samples to the lab for analysis at least once every three years, and collected at the same time each year. Laboratory analysis should include at a minimum: organic matter (OM) content or soil organic carbon, pH, cation exchange capacity (CEC.), % base saturation, and macronutrients (N, P, K, Mg, Ca, S) plus principal micronutrients (Zn, Mn, Fe, Cu, B). Additional tests could include chloride and electrical conductivity (EC) especially if soil tests indicate high sodium, or water analysis indicates the potential for accumulation of salts. Soil texture analysis (% sand, silt and clay) and soil water holding capacity estimates are also beneficial to sustainably manage vineyard irrigation.

How to Measure/Quantify:

Here is a BC Ministry of Agriculture link with general instructions on soil sampling and interpretation.

<https://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agricultural-land-and-environment/soil-nutrients/nutrient-management/what-to-apply/soil-nutrient-testing>

For professional support in interpreting the results, growers also can access reference material from the laboratory conducting the tests. Suppliers of agricultural inputs may assist their customers with analysis interpretation and recommendations, potentially additional with sample collection and submission.

Here is a list of laboratories know to conduct agricultural soil analyses for growers in British Columbia. Some additionally offer tissue, water, and compost/manure testing.

https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/agricultural-land-and-environment/soil-nutrients/600-series/631500-8_nutrient_testing_labs_factsheetno1_may2015.pdf

Sustainable Guidebook 2016 - Soil Chapter - Update

(updated by Lisa Wambold on Oct 30th, 2020)

4.7. Soil Sampling and Analysis Soil tests provide reliable information relating to organic matter content, pH, degree of salinity, and relative quantities of available plant food. Soil sampling and analysis should be done every 3 years or every 2-3 years if undergoing an intensive soil amendment program such as adjusting soil pH, adding compost/mulch and cover crops. Fall (post-harvest) is an excellent time to sample soils. Soil tests alone are not reliable for determining fertilizer requirements because of the volume of soil that grapevines can mine, differences in nutrient uptake rates among rootstocks, soil variability, root health, nutrient interactions, and other factors. Soil testing is useful in identifying nutrient imbalances, deciding the form of fertilizer to apply, and tracking soil changes in your vineyard over time. A complete nutrition program would also factor in tissue analysis, visual observations and yield goals.

CHAPTER 4 SOIL AND NUTRITION MANAGEMENT | Page 4-11 Make a map of your vineyard that separates varieties and indicates areas that are different from each other (e.g. slope, surface soil colour, drainage, soil texture). Add these characteristics to the soil management map you began creating in section 4.5. Contact the lab in advance to discuss sample packaging, how quickly you should deliver the sample to the lab after taking it, and when to expect results. Avoid contamination of the samples. Make sure to store the samples in a cool place and mail or deliver them to the lab as soon as possible.

Interpreting Soil Test Results Some of the most important soil parameters are described in Table 4-3. Table 4-3: A description of important soil parameters and guidelines for interpreting lab results

Parameter	Description/ Importance
pH	Measure of acidity (low pH) or alkalinity (high pH) of the soil
Nutrients	<ul style="list-style-type: none"> Potassium (K), nitrogen (N), phosphorus (P), calcium (Ca) and magnesium (Mg) - macronutrients in order to greatest to lowest need by vines Essential micronutrients commonly tested are manganese (Mn), zinc (Zn), iron (Fe), boron (B) and copper (Cu) Amount needed dependent on vine/soil healthy, rootstock/variety, yield target Interactions between nutrients can influence plant uptake -high K can limit Mg availability; high P can limit Zn uptake; high Ca can limit P availability
Organic Matter (OM)	<ul style="list-style-type: none"> OM improves soil structure/stability, moisture retention and fertility. It is a reservoir of nutrients to be released to soil. <1 to 2.5% most common in Interior vineyards with mineral soils; >4% in Coastal soils. OM releases nitrogen at roughly 22 kg/ha per year for each 1% of OM.

· Influences the plant availability of macronutrients and micronutrients

6.4 to 7.5 is ideal since nutrients are widely available at this pH · Vines can grow in soil that is pH 4.0 to 8.5 · pH greater than 8.0 indicates high calcium carbonate and salts · pH greater than 9.0 indicates high levels of salinity · Low pH can be caused by years of fertilizer and sulphur use and may induce aluminum toxicity · Low pH can also create fungi problems · High pH can be accompanied by deficiencies in phosphorus, iron, manganese, zinc, boron, and copper. **Cation Exchange Capacity (CEC)** · Cation Exchange Capacity (CEC) · Also known as the buffer index · Measure of the electrical charge of the soil · Measure is used to calculate the amount of lime needed to raise the pH · CEC can be altered with soil organic matter · Varies widely with soil type · The more negative the charge of the soil, the greater its ability to attract and hold positively charged nutrient ions (cations) including (magnesium (Mg⁺⁺), calcium (Ca⁺⁺) and potassium (K⁺)) · As the amount of base cations increases, so does the pH **Base Saturation** · Indicates the ratio of base cations in the soil to total cation exchange capacity · For all alkaline soils, base saturation will typically be greater than 50% and many will approach 100% **Electroconductivity (EC)** · Measure of soil salinity · Values < 0.7 mmho/cm indicate no salinity present · 0.7 to 2.0 mmho/cm indicate minor salts present, potentially problematic · 2.0 to 4.0 mmho/cm indicate moderate salinity that will affect plant growth and fruit yield · over 4.0 mmho/ cm can result in major yield reductions.

CHEMICAL STORAGE GUIDANCE

This document contains general guidance for chemical substance storage. It is applicable to storage facilities for fertilizers, pesticides, hazardous substances, fuels (gasoline and diesel), and hazardous waste unless a specific substance is otherwise indicated. It is also applicable to empty hazardous substance and pesticide containers awaiting disposal or recycling unless otherwise indicated.

This guidance does not substitute or supersede specific requirements of the vineyard/winery standard, legal or regulatory requirements, or provincial best practices that are linked to workplace regulations and insurance, such as WorkSafeBC.

The guidance focuses on liquid substances because these are the most subject to spills, creating noxious vapors and fumes, can easily splash onto skin and into eyes, and present contention and clean up challenges. The guidance also applies to solid-granular, powders, dusts, and similar-substances.

Storage Construction

Location. Do not build or locate exterior facilities near areas at risk of flooding, land movements (slides), or fires, or ideally near areas frequented by people: housing, customer areas, eating facilities, and similar. Avoid locations near rivers, creeks, ponds, wetlands, and other water bodies to reduce the risk that accidental spills contaminate these ecosystems and their water. Keep the surrounding vegetation mowed to avoid conflagrations.

For facilities located inside other buildings or installations, be sure that they do not represent a health and safety hazard to nearby employees. Avoid locating storage areas on floors directly below or next to offices or similar spaces where fumes and vapors may penetrate. Any ventilation exhaust to the exterior to avoid the introduction of noxious fumes into the interior of buildings.

Walls. These should not permit unauthorized access; for example, corrugated sheets simply attached with nails would be too easy to pry off. Cement or prefabricated metal sheds are preferred. In general, wood structures should be avoided because of the increased fire hazard associated with stored materials. If wood or corrugated zinc walls are used, these should be well fastened (screws) to the wall frames.

Floors. Floors should be impermeable to contain accidental spills and facilitate cleaning. Dirt or gravel over dirt floors are not acceptable. Cement is the best option. Cement floors can be painted with an oil-based paint to increase impermeability.

Internal drainage. Floors should slope internally from all sides so that large spills do not extend out of the storage area.

If there is an internal drain, it should be connected to some type of storage tank or vault, or to a plastic-lined collection pit to collect any chemical

spills and wash water. Spilled liquids and wash water that accumulate in these storage and collection devices should be removed by an licensed transporter to an authorized disposal site and not be discarded directly to the environment.

If a collection or storage device is not possible, or the storage area is small or small volumes are managed, then any internal drain that connects to a municipal or septic system should be covered to prevent the entry of any spilled hazardous liquids and wash water. Spilled liquids would then need to be collected using a small pump or absorbent material for later disposal as permitted by law.

Doors. Doors should be solid and permit the installation of a strong lock. Door frames should be attached firmly to the walls. Both doors and frames should not have any large gaps that permit the entry of insects or small animals.

Metal is the ideal material for chemical storage area doors and frames. Avoid wood because of the increased fire hazard associated with stored materials. A wood door is also less secure.

Spill retention. Vineyards/wineries storing large volumes of hazardous liquids should consider segregating them and placing them inside a spill retention wall. This is generally made of cement and can be cement blocks with a smooth cement interior face (cement mortar or plaster). The height of the wall should be such that it creates an interior volume 10% greater than the maximum volume of liquids stored at any one time. For example, if up to three 55-gallon drums of liquid are stored within a retention wall, then the area of the floor inside the wall × the height of the wall should be at least 181.5 gallons ($3 \times 55 = 165$ gallons + 10% (16.5 gallons) = 181.5 gallons).

Retention walls are a must for fuel storage installations. It is best that these do not have a floor drain to a collection tank or sump because of the increased risk of fire and explosions. It is better that there is a drainpipe, capped until use, through the lowest point of the retention wall to allow any major spills to be drained, siphoned, or pumped to drums or similar acceptable receptacles.

Small storage areas, including storage lockers, should also have some retention capabilities. A simple way of storing up to a gallon of liquids is inside of a plastic wash basin. A single bottle can fit inside of a plastic bucket.

Ventilation. All hazardous material storage areas should be ventilated to the exterior. For natural ventilation, a good rule of thumb is to have openings sized to 20% of the total floor space. For example, a small storage shed that has 150 square feet of floor space would require about 30 square feet of windows or vents, roughly three by ten feet. This is easily placed along the top of one wall or even under the eaves. It is important to cover openings with screens or mesh to prevent the entry of bats, birds, and small animals. Larger openings might need something to prevent unauthorized or illegal entry.

This guidance also applies to internal storage facilities. If external facing windows are not possible without representing a risk to health and safety,

then some type of corrosion-resistant extractor connected to exhaust ductwork is necessary. Please seek expert advice to determine the best equipment and installation.

Lighting. Storage facilities ideally should have enough light to read labels at all storage levels without having to frequently move containers to better light. Good lighting, as a rule, should allow you to read a normally printed page, like a book or newspaper, placed on the floor between shelves.

Natural lighting—skylights or windows—may be the best option for exterior facilities without electricity. In these cases, ventilation openings can also service as natural light sources.

Make sure that electrical lighting does not interfere with the movement of materials on upper shelves. Avoid hanging lights or wall installations at or below the level of the highest shelves.

Shelves. Shelves should be impermeable. Wood shelves can absorb spills and powder residues over time and can become a fire hazard. If there is no alternative to wood, paint them with an oil-based paint then cover them with plastic.

Plastic and painted cement make the best shelves. They are easily cleaned, although cement shelves are permanent once installed. Metal shelves are suitable, but some are subject to corrosion depending on the substances stored.

Safety and security

Security and access. As mentioned in the construction sections, the storage area must be solidly constructed and not permit the entry of unauthorized persons. Break-ins may be unheard of in your area, but risks cannot be taken, especially with unguarded external storage buildings. It only takes a few curious children to result in a tragedy.

Access should be on an as needed basis and limited to those employees that manage the materials as a regular part of their jobs. These employees should be trained in hazardous material handling procedures, safety good practices, including the use of personal protective equipment, and emergency response. The names of these employees should be recorded and posted along with emergency response numbers and basic procedures next to storage area entrances.

All storage areas must be locked, and the keys available only to authorized employees. It is good practice to keep limited copies of these keys and that they are signed for or kept in a main office.

Signs. Storage facilities of all types should have the following signs:

1. Hazardous materials warning sign on or near the entrance in accordance with the types of materials stored.
2. Emergency response procedures with emphasis on whom to call and what actions to take in the case of spills, fires, or accidental material contact with persons eyes, skin, or ingestion. These are initial actions until trained personnel can take over.

3. Restricted access warning, with the name of the person(s) who have access and manage the keys.

Protective equipment use. No one should enter storage areas or handle materials without using personal protective equipment (PPE). For simply entering the storage areas (inspections, inventories) without touching materials or their containers, a N95 equivalent respirator or mask is sufficient. Neoprene gloves should be used for handling containers.

Employees that open containers, mix or transfer substances, or otherwise may have frequent contact with stored substances during the workday should use the PPE described on the material safety data sheet (MSDS) or the product technical label or literature, whatever is the most strict. These employees should use coveralls or some other type of work clothing that can be left behind and washed at the end of the day. It may be more efficient to schedule the movement and mixing or disposal of chemical substances for early in the morning and at the end of the day, allowing the worker(s) responsible for these activities time to remove exposed clothing and bathe in the interval between handling times.

Safety devices. Storage areas should be equipped with or have nearby the following:

1. **Type A-B-C fire extinguisher.** This should be easily accessible and sized according to the amount of material stored. It is important to inspect the extinguisher frequently be sure it is charged and not blocked by materials or equipment.
2. **Eyewash.** In areas where substances are stored, opened, and mixed or distributed, an emergency eyewash device should be available. For small storage areas, especially external facilities without a water supply, this can be a commercially available portable eyewash bottle (see examples). Larger facilities should have a dedicated station attached to the water supply (see example). Do-it-yourself stations can be made from $\frac{1}{2}$ or $\frac{3}{4}$ inch PVC pipe with upward-facing holes drilled into it, capped on one end, and attached a ball-valve (on/off) on the other. Experiment with hole sizes so that the water does not come out in a high-pressure stream.

Good locations for the eyewash station are where employees open or mix materials. A good location test is if you can find the station with your eyes closed, a simulation of having a substance splashed in the eyes. More than 5 meters from the mixing area is too far.

3. **Emergency shower.** An emergency shower should be located near any area where substances are managed outside of their containers, such as mixing and transfer areas or locations where hazardous materials are frequently used for cleaning or similar activities. Emergency showers can be standalone devices or can be mounted on a wall (see examples). The valves should be the on/off type and connected to an easily grasped handle or pull.

Some emergency showers have an attached eyewash station. See the examples.

External facilities with no water supply are a special challenge. It might be best to establish a mixing or transfer area near a water supply and avoid these activities at the external facilities. If this is not possible, and chemicals are frequently opened, mixed, or transferred to other containers at an external facility, an emergency shower can be rigged with a wide showerhead attached to an elevated barrel or drum of water. This can be fed by rainwater in some areas. There should be sufficient water and flow to provide at least 10 minutes of showering.

As a courtesy, store in a plastic bag nearby a clean towel and some coveralls, a sheet, or some other material to cover workers that need to get out of wet and contaminated clothing after an emergency.

Do not block access to safety devices! The extinguisher, the eyewash station, and the shower should be easily accessible and marked so it does not get blocked by materials. Typical marking is a sign plus a painted area on the floor and/or wall that shows where materials, equipment, waste, or other materials should not be placed or stored because they will block access.

Spill cleanup. The types and quantities of spill cleanup materials and equipment will depend on the types and quantities of stored substances. Some examples are:

1. Absorbent material—sawdust, kitty litter, or similar—a broom, a large dustpan or flat shovel, and a metal or plastic bucket or receptacle. This is the minimum equipment that can handle small liquid and solid (powders) spills.
2. Hand pump, push brooms, large metal drums, and the minimum spill kit mentioned above. This is for much larger spills that cannot be cleaned up with just absorbent materials and is also suitable for winery wastewater spills that contain sludges and solids. Typical cases include fuel tank leaks or large pesticide (55-gallon drum) leaks in which several gallons or more of substances. The substance would be pumped into the metal drums until it is no longer possible to suction materials off the floor, and the rest cleaned with absorbent material. Hand pumps are preferred, particularly for fuel spills, to avoid possible explosions or fires due to contact with electrical sparks or hot motors.

Granular materials and many solids can be swept into piles and collected.

Spill procedure! Vineyards/wineries must have a documented cleanup procedure that indicates how different hazardous material spills are contained and cleaned up, the destination of the cleaning materials used, post-spill area and equipment cleaning, and the safety precautions and protective equipment employed during cleanup.

Washing and bathing. Vineyards/wineries will need handwashing and bathing facilities for employees, preferably near main chemical substance storage areas. Employees that enter storage areas for inspections, inventories, or similar activities, either touching or not touching substance containers, should wash their hands immediately upon exit. Employees that mix or are otherwise exposed to hazardous chemical substances must bathe (shower) at the

vineyard/winery when they are finished with those activities and before leaving work. Aside from the required PPE, these workers should use coveralls or some other type of work clothing that can be left behind and washed. They should not work in these areas or have prolonged exposure to these substances in their street clothing and should not wash exposed clothing at home.

Product storage. As much as possible, products should be stored off the ground and on shelves. Large containers—drums, large sacks of fertilizers or lime, and similar—can be stored on the ground. Fertilizers should be stored on plastic sheets to avoid degradation with moisture, or better still, on pallets covered with plastic. Large drums of liquid substances should be within their own spill retention areas.

Group similar materials together; for example, herbicides separate from fungicides; paint and cleaning materials in different areas. This reduces the risk of cross contamination and facilitates cleanup in case of spills or other emergencies. Do not store liquids, like bottles of foliar fertilizer, over solids, such as bags of urea. Once again, this eliminates the risk of contamination in case of spills, especially if the spill is not detected before using the solid material.

Portable eyewash examples



Eyewash station



Emergency shower examples



INTEGRATED PEST MANAGEMENT PROGRAM

Vineyard standard Essential Criteria D.1 through D.4 require that vineyards develop and implement an integrated pest management (IPM) plan that includes integrated weed management, the selection and focused use of less toxic agrochemicals, and keeping records of all pesticide applications.

The objective of this guidance is to provide a general outline of an IPM plan and a brief description of its main contents. It does not replace the technical guidance found in Chapter 5 of Best Practices Guide for Grapes for British Columbia Growers (BCWGC 2010) which is a thorough treatment of pest and disease identification, monitoring, prevention, and control. You may eventually find that some topics in this SWBC guidance document are not applicable to your vineyard or that you need to add topics or content.

Important! Please be sure to review the standard and the cross-referenced guidance to identify all related IPM and pest management requirements and content. Some criteria may contain specific requirements that are not covered in this outline. Vineyard operators are responsible for compliance with standard requirements, and SWBC cannot guarantee that all requirements that apply to your vineyard/winery are covered in guidance.

Notes:

- All explanatory and descriptive text and examples are in cursive and should be substituted by your vineyard/winery specific content.
- This guidance refers to “pests and diseases”. For simplicity sake, “pests” refer to all insects, animals, and plants (weeds) that cause economic damage to vineyards. Clearly some guidance will not apply to all categories of pests, and vineyards should adapt content as they feel is necessary.

Introduction

The introduction should provide the general background on the objectives, focus, and need for an IPM plan and activities.

General description/justification. Describe the general plan focus and contents. Explain why the plan is being implemented from a sustainability standpoint (and not just that the standard requires it).

Scope. Describe the scope of this plan, what it covers: standard criteria and requirements, operational processes, if it covers just one vineyard or a group of vineyards, and any other general aspect of vineyard operations that is affected by or involved in this plan.

Management/oversight. Indicate the names and/or positions that have overall responsibility for and supervision of this plan, as well as the person(s) that approve the plan to obtain needed resources (plan “sponsor”). Please

also indicate the name or names of the person or persons that provide recommendations for or approve pesticide applications.

Issue/review date/version. Indicate when the plan was first published within the operation (original issue date). If it has been reviewed, when was the reviewed and updated version published, and the version number. Usually this information can be placed in a standard document header and can be indicated in a version tracking table in the appendix.

Pests and diseases

This section should be a description of the pests and diseases that have occurred in the vineyard or could possibly occur (have occurred in nearby vineyards or in the region). This information should be as technical as the vineyard feels necessary to make daily decisions, and to explain to others the decisions made, keeping in mind that more technical or specialized information is available from other sources. It is essentially the vineyard's pest and disease catalogue. While it should contain basic information at the start about common pests and diseases encountered or managed on the property, more detail can be collected and added over time from other sources or from the vineyard's own experience.

SWBC has created a generic information template for each pest or disease. Vineyards can use this template and adapt it to their needs, or they can create their own templates if they have not already done so. Vineyards can also photocopy or print webpages, such as from the Best Practices Guide with pest and disease descriptions, thresholds, and management methods if this information is up-to-date and reflects current best practices. In any case, this collection of descriptive and technical information should include:

- Pest/disease common name and scientific name.
- Drawings or photographs of the pest and disease in different stages (if available).
- Grape varieties and vineyard areas susceptible.
- Prevalent time of year or conditions for occurrence.
- Describe what the pests and diseases, the infestation, and damage looks like at different stages to facilitate monitoring and evaluation. Provide photographs if available. Examples could be:
 - Insects at nymph and adult stages and the damage approaching threshold level for each stage.
 - Invasive plants and weeds after first leave emerge and just before flowering or seed set when they should be removed.
 - Powdery mildew infections: early season on leaves; affected fruit, etc.

- Pest and disease prevention and control methods linked to thresholds; see **Pest Prevention and Control** section below.

Monitoring, evaluation, and reporting

Vineyards need to document both the informal and formal methods they use to detect and monitor pest and diseases. Informal methods can be as simple as a walk through the vineyards or sightings by field workers. More formal methods include transects, counts, using drones, and other methods that quantify the level of pests and disease in the vineyard.

This section should include the following information:

- Monitoring methods descriptions. This is for both informal and formal methods and should include for each method:
 - The methodology employed, such as visual observation, transect counts, sampling, trapping, or similar.
 - The monitoring frequency.
 - The area covered (hectares or percent of vineyard or variety area). Indicate on the vineyard site plan, if applicable.
 - Results tabulation and forms used.
 - Special considerations, such as a method is only used during a certain time of the year, on certain soils, or in a specific grape variety.
- The personnel responsible for carrying out each type of monitoring as well as the overall responsible person for monitoring and IPM.
- Explain how results are calculated, evaluated, and reported. Describe who does this, and how decisions are taken, including if the vineyard uses any special software or applications.

SWBC does not have a generic template for field monitoring because of the many types of monitoring techniques and vineyard conditions; however, the Best Practices Guide does offer some general guidance:

“For various pest and disease monitoring activities, record the date, block/variety, pest/disease name, number found, sample size or unit, and any observations that could be useful when the pest management programs are evaluated.”

Pest prevention and control

Prevention. These are the physical or cultural techniques used to avoid or prevent pest and disease infestations. Most of these are normal vineyard maintenance operations (see section 5.1 of Best Practices Guide for Grapes for British Columbia Growers), such as good plant nutrition, vine pruning, and maintaining soil health. Instead of repeating those practices here, use

this section to describe additional practices that go beyond normal operations, such as:

- Varieties selected for disease resistance, especially for local soil and climate conditions.
- Establishing vegetated areas, including ground covers, using species that host natural predators or have allelopathic properties.
- Use of pheromone or other insect traps (beyond use for monitoring).
- Removal of plant debris or other organic materials proven to propagate diseases.
- Special sanitation practices for workers or vehicles entering vineyards.

Please explain if these practices apply to specific vineyard areas, grape varieties, or times of the year.

Control and intervention. These are the actions taken when a pest or disease is found in the vineyard and can include:

- Infestation or population observation and monitoring, usually when the pest is first observed.
- Physical actions, such as leaf or vine removal.
- Chemical interventions, from organic agriculture suitable substances to synthetic pesticides.

These actions take place when infestations reach certain thresholds, that is, the population level or extension where the economic damage, including impacts on quality, is greater than the cost of the intervention. For some pests and diseases, vineyards also need to consider the immediate possibility of further extension or infestation, or the effects on neighboring vineyards, as part of the threshold calculation.

Many pest thresholds are described in technical documents, including Chapter 5 of the Best Practice Guide. The grower should take these into account, but also determine and describe the threshold for each pest and disease in terms of impacts on the vineyard, as dictated by vineyard and financial conditions. The actions should be described in a stepwise fashion: what happens first and at what threshold, then the next threshold and action, and so on right on up to the threshold in which agrochemicals are applied. As stated in Chapter 5 of Best Practice Guide:

“Insecticides remain an essential component of an IPM program, but they are applied as a last resort only when monitoring has shown that pest numbers are likely to exceed the economic threshold.”

All pest control and intervention actions must be recorded (Essential Criterion D.4.). SWBC has created two versions of pesticide application

templates that can also be adapted for other types of controls. SWBC strongly recommends that vineyards also record all prevention activities in a way that will allow vineyards to evaluate their effectiveness in preventing or avoiding pests and diseases.

Other information sources

As mentioned in this document, there are many other sources of technical information about pests, diseases, IPM, and prevention and control methods. Vineyards can list in this section publications; websites; provincial or national support agencies; local, regional, national, or international experts; or other sources of information. Vineyards should review and develop this section over time so that it contains up-to-date and relevant information.

Training and education

Vineyards need to ensure that the personnel responsible for and involved in IPM activities, especially field monitoring and identification, have the necessary knowledge and skills. Vineyards should develop an IPM training plan for employees that will carry out IPM training activities. Possible plan contents include:

- Pest and disease identification.
- Infestation evaluation.
- Monitoring techniques and tabulations.
- Results calculation and reporting.
- Prevention, intervention, and control techniques (non-pesticide).
- Best practices for agrochemical handling and application, including health and safety practices, for all those involved in applying agrochemicals.

For larger vineyards with many workers, it is probably worth while training field workers on how to identify and report the most common pests and diseases. Their presence in the field provides another type of monitoring at no extra cost.

Once the training and knowledge requirements are known, they should be incorporated into the job descriptions and training plans for these personnel and positions.

Recordkeeping, review, and evaluation

A good IPM program will generate considerable data from monitoring, prevention and control activities, and pesticide applications, during a season. By keeping data records well organized, vineyards can periodically analyze data and information to determine:

- If preventions were effective in avoiding or reducing pests and diseases.
- The most cost-effective methods to control pest and disease infestations.
- The total cost of pest and disease management, and where future efforts can help reduce costs.
- Necessary varietal changes or modifications to operations to improve soil and plant health.
- The impacts of ground cover, natural ecosystems, vegetated buffer strips, and other biodiversity infrastructure on pest and disease control.

Vineyards should review IPM program data and information at least each year, ideally together with soil and nutrient management program data and information, to identify those trends, results, costs, and knowledge and

implementation gaps, and to plan the necessary changes and improvements. At the very least, vineyards will have a much clearer idea of where they need help and support.

Appendices. Possible appendices include maps, budgets, monitoring timelines, job descriptions, or anything else that orients or supports the plan implementation.

GENERIC MAINTENANCE PROGRAM CONTENT

This is an outline of a generic maintenance program. It can be adapted to your vineyard/winery and its equipment, infrastructure, machinery, and processes and activities. It includes what SWBC believes are the minimum topics and information that should be covered, although you may find eventually that some topics are not applicable to your vineyard/winery or that you need to add topics or content.

For small vineyards/wineries, this example guidance can be used to cover an entire maintenance program or group processes together. For larger operations, this outline can be a template for an individual process or specific equipment or infrastructure area or type, such as grape receiving and crushing areas; tractors and sprayers; heating, ventilating, and air conditioning (HVAC) systems; or outdoor lighting. If this template is used for an individual process, equipment, or infrastructure, then the maintenance program is the collection of all these completed templates. In this case, be sure to include a list or table of contents of the operations the program contains.

Important! Please be sure to review the standard to identify all requirements for inspection and maintenance programs. Some criteria may contain specific requirements that are not covered in this generic outline. Vineyard and winery operators are responsible for compliance with standard requirements, and SWBC cannot guarantee that all requirements that apply to your vineyard/winery are covered in guidance.

Note. All explanatory and descriptive text and examples are in cursive and should be substituted by your vineyard/winery specific content.

1. Introduction

1.1. **Process or area.** Describe the vineyard/winery process or processes, operational areas, or physical areas covered in this section, for example, HVAC system, glycol cooling equipment, tractor fleet, and similar,

1.2. **Equipment or infrastructure.** Describe or list the equipment covered by this document. For example, it may only cover furnace, air conditioning and similar filters, or only Kubota tractors.

2. **Responsible team member(s).** Name the person(s) responsible for inspecting and maintaining the described equipment, and who will review and approve maintenance and repair records and follow-up activities.

3. **Inspections.** Describe here the routine inspection process to identify maintenance and repair needs. This can simply be an inspection list that includes the following information:

- 3.1. **What needs to be inspected.** The equipment or infrastructure points that need to be checked.
- 3.2. **Inspection frequency.** How often should this take place? This may be different for different types of equipment or infrastructure, or even for different parts of the same equipment or infrastructure. It may be better to have more frequent inspections covering all aspects, erring to the aspect that has the shortest inspection intervals, than to divide the inspection into multiple events at different times for different aspects.
- 3.3. **Recording and reporting findings.** Describe (name) the template, form, or document used to record inspection dates and findings. (See SWBC Generic Inspection/Maintenance template).
- 3.4. **Follow up.** Describe the process for deciding on any follow-up maintenance, repairs, or program adjustments: who received the reports, how decisions are made.
4. **Maintenance.** In this section describe the routine programmed maintenance for the process, equipment, or infrastructure indicated in this document, including the following information:
 - 4.1. **Sources of information about routine maintenance.** These include the equipment and parts owners' manuals or instructions, URLs of online demonstrations or instructions, in-house guidance or manuals, expert or repair person telephone numbers, or other information sources about how to maintain the equipment or infrastructure in question. (It may be easier to combine this section into section 4.2; see Do not forget to include team members with related experience.
 - 4.2. **List and description of maintenance activities, technical references, and frequencies.** List and describe all the related maintenance activities and the frequency in which they must be carried out. (Note: To facilitate maintenance, information sources from 4.1 can be cross-referenced to the procedures or the two sections can be combined.)
 - 4.3. **Related environmental and health and safety procedures.** It is important to name and/or describe all related environmental and health and safety safeguards or procedures, such as lock outs for electrical equipment, precautions for tank cleaning, storage and disposal of used lubricants or hazardous waste, and similar.
 - 4.4. **Recording and reporting findings.** Describe (name) the template, form, or document used to record maintenance dates and findings. (See SWBC Generic Inspection/Maintenance template).
 - 4.5. **Follow up.** Describe the process for deciding on any follow-up maintenance, repairs, or program adjustments: who received the reports, how decisions are made.
5. **Repairs.** This section is optional but could also guide your team to make decisions about repairs. Repair records can also provide valuable information about processes, equipment, or areas that need different or more frequent inspections and maintenance or need larger repairs or replacement. Consider including the content described below.

- 5.1. **Repair process.** This may be covered in sections 3.4 and 4.5, but it is an opportunity to describe the flow of information and decision making when a repair is needed: forms that need to be completed, requisitions made, team members to be informed, and similar.
- 5.2. **Contact information for repairs.** These are the persons or services to contact when a repair is needed. They could be in-house service personnel or outside repair services or experts. Remember that more than one might be needed; for example, you may need a different person for a fan motor than other repairs to the HVAC system.
 - 5.2.1. In-house team member(s).
 - 5.2.2. External, including at other corporate locations.
- 5.3. **Related environmental and health and safety procedures.** This is similar to section 4.3 for repairs handled by in-house personnel. For external repair services, these are the procedures that they will need to follow while making on-site repairs. In some cases this may be a combination: external service providers need to take the necessary safety precautions and use the correct personal protective equipment that they supply, while someone from the vineyard/winery will need to clean up, dispose of parts packaging or other waste, and ensure that the work is done in a safe environment (electrical equipment lock out, no conflicting work being done, etc.).
- 5.4. **Recording and reporting findings.** Describe (name) the template, form, or document used to record the repair and the results, if one is used. (See SWBC Generic Inspection/Maintenance template). Your vineyard/winery may decide that a simple repair report and invoice is enough to record work done by outside services. In this case, be sure to access those records when a maintenance program review is carried out.
- 5.5. **Follow up.** Describe the process for deciding on any follow-up maintenance, repairs, or program adjustments: who received the reports, how decisions are made.
6. **Periodic review and analysis.** Reviewing inspection, maintenance, and repair records and results are crucial to achieving cost savings, reducing resource use and waste generation, and avoiding environmental and worker impacts. The vineyard/winery management team and those responsible for maintenance should review these records and the inspection and maintenance program at least annually, preferably after each peak season, to identify and decide on changes or additions that will improve maintenance and head off or reduce costly repairs. This section describes the elements of the review and analysis process for an entire maintenance program.
 - 6.1. **Description of review process, review frequency and documentation.** Describe how this process is carried out, how often it is carried out, and what documents—records, service reports, invoices, utility and fuel bills, and other relevant materials—should be on hand for review.

- 6.2. **Responsible team members.** Names of team members and/or positions that carry out the review and who signs off on or approves the review (owner or general manager, for example).
- 6.3. **Analysis.** Description of what needs to be reviewed and how the information and data are analyzed to make decisions and recommendations. For example, an increase in oil consumption coupled with maintenance or repair reports indicating fouled sparkplugs may indicate that a vehicle needs an overhaul, a valve job, or new rings.
- 6.4. **Recording results and recommendations for follow up.** Describe the results of the review and analysis. This can be very brief for each finding: what was found and how it will be addressed. This latter can include changes to the program, policies, procedures, responsible personnel, additional equipment or infrastructure repairs or replacement, and other actions. Think in terms of improvements that will save you money and increase sustainability.
7. **Appendices.** This is the place to attach or name templates, provide links to policies and procedures in a corporate operations manual, and similar information that will be referred to when reading this program description.

GENERIC PLAN OR PROGRAM CONTENT

There are various vineyard/winery standard criteria that require plans and programs for conservation, soil management, erosion control, wastewater management, energy conservation, and emergency response, among others. SWBC and BCWGC guidance materials cover much of the content needed for these plans and programs, but in some cases the guidance is not organized in a way that the content can easily be converted into a documented plan or program.

This is an outline of a generic plan or program program. It can be adapted to your vineyard/winery and its operations and context. It includes what SWBC believes are the minimum topics and information that should be covered, although you may find eventually that some topics are not applicable to your vineyard/winery or that you need to add topics or content.

The vineyard/winery standard defines a **plan** as:

A document or a set of documents, including a diagram or a list of intended actions, used to define and achieve an objective or goal. For the purposes of this standard, a plan contains objectives, quantitative targets and parameters, timebound management actions, resources and responsible personnel.

In a few cases, the standard uses the term “program” instead of plan. A program is a project or plan with no end date, something that repeats year after year. Health and safety activities and integrated pest management are two sets of activities that could be considered programs, but their descriptions in the standard are similar to plans. Guidance will refer to both plans and programs as “plans” pending further definition of the terms in the standards.

Important! Please be sure to review the standard and the cross-referenced guidance to identify all requirements and content for plans. Some criteria may contain specific requirements that are not covered in this generic outline. Vineyard/winery operators are responsible for compliance with standard requirements, and SWBC cannot guarantee that all requirements that apply to your vineyard/winery are covered in guidance.

Note. All explanatory and descriptive text and examples are in cursive and should be substituted by your vineyard/winery specific content.

8. Introduction

- 8.1. **General description/justification.** Describe the general focus of the plan and its overall achievement. Explain why the plan is being implemented from a sustainability standpoint (and not just that the standard requires it).
- 8.2. **Scope.** Describe the scope of this plan. What does it cover: standard criteria and requirements, operational processes, what parts of the vineyard/winery property or infrastructure, types of tasks or

activities, or any other general aspect of vineyard/winery operations that is affected by or involved in this plan.

8.3. **Management/oversight.** Indicate the names and/or positions that have overall responsibility for and supervision of this plan, as well as the person(s) that approve the plan to obtain needed resources (plan “sponsor”).

8.4. **Issue/review date/version.** Indicate when the plan was first published within the operation (original issue date). If it has been reviewed, when was the reviewed and updated version published, and the version number. Usually this information can be placed in a standard document header and can be indicated in a version tracking table in the appendix.

9. **Goals and targets.** Describe the goals and targets of the plan at the time of issue. These should be concrete, measurable results. Examples are:

Unrecycled packing material waste is less than 100 kg/year or 10% of the total amount generated per year, whichever is less, by the end of the year.

All winery floor drains will be connected to the wastewater pre-treatment system by June 30, YYYY.

Synthetic nitrogen fertilizers comprise less than 50% of our overall nitrogen applications by weight (elemental weight) by the end of harvest.

There will be a 10-meter vegetated protection zone around the wetland between blocks C and D by April of YYYY.

10. **Plan and timeline.** The plan is the meat of the meat of the document and describes the following. See the end of this document for a table that is an easy way to present the plan and can be converted or accompany a GANTT chart or timeline.

10.1. **Outcomes.** The tangible results of each activity as described in the goals. For example, “200 meters of 10-meter protection zone that completely surrounds the wetland in blocks C and D.”

10.2. **Activities.** What will be done to achieve the outcomes. Break this down as much as needed to be able to plan and execute the activities. Each activity should indicate/describe:

10.2.1. Start and end dates

10.2.2. Identified person(s) who will be responsible for implementing each activity. This person may not actually carry out the activity, but is responsible for getting it done.

10.2.3. Progress indicators (KPIs or key performance/progress indicators), or the intermediate results that enable the plan manager or supervisor to determine if activities are progressing

as planned. The KPIs, like the outcomes and goals, should be concrete and measurable.

10.2.4. Resources that are needed to carry out the activities, including people, services, equipment, materials, and financial resources (budget).

11. **Related policies and procedures.** Name any policies and procedures that are related to this plan; for example, specific health and safety policies or procedures related to equipment use, policies on waste management, or other relevant operational documents.
12. **Reporting, monitoring, evaluation, and review.** Describe here how management and those responsible for plan and activity execution will report, monitor, evaluate and review progress over time, and make any modification or adjustments to the plan to achieve the desired results. All of this can cover not only progress towards goals and outcomes, but crucial aspects such as budget expenditures and materials consumption. Responsibilities and procedures for reporting should be clearly described, and decisions on plan modifications should be documented and a new version of the plan issued as needed.
13. **Appendices.** Possible appendices include maps, infrastructure plans or diagrams, timelines, full budgets, material or work specifications, photographs or diagrams of desired outcomes (or interim results if this is a later version of the plan), or anything else that orients the plan outcome.

See example plan summary table in template spreadsheets

TEMPLATES & INSTRUCTIONS

These worksheets contains recordkeeping, tracking, and other templates and forms (templates, for simplicity) for documentation required by the SWBC Sustainable Wineries Standard and Sustainable Vineyard Standard. For each form or template, SWBC has tried to cover the requirements for the related criteria; nevertheless, wineries and vineyards should carefully review the related critieria and add or modify the forms and templates to ensure full compliance.

The templates are generic, that is, they are not designed to any particular type, size, ownership, or

This workbook contains the following templates as indicated by the worksheet names:

Maintenance-general	This is a scheduled maintenance tracking form for all types of maintenance and on all types of equipment. It can be used for a particular area or operation in a vineyard/winery. It can also be used as a maintenance schedule by eliminating the tracking columns.
Maintenance-specific	This form is for recording maintenance in a specific area or on specific equipment or infrastructure, for example the HVAC system or a particular tractor or sprayer.(Not for calibration, which should use another form.) These records can be maintained in binders or files as part of the overall maintenance program.
Electricity use	The electricity use tracker is for tracking and calculating purchased electricity consumption over time. It can be adapated for recording electricity generation from solar and other on-site devices, and also for electricity consumption for metered processes, equipment, or infrastructure. This form can also be adapted for fuel use, adapting columns for operating hours or kilometers and the amount of fuel added to the vehicle or machinery; for purchased water used based on meter readings; or for irrigation water use based on flowmeter or weir calculations.
Waste tracking	This form can be adapted for different types of waste generated by the vineyard/winery. It has an additional column for waste recycled or reused, which gives a net result of disposed waste. It can be modified to track only recycled or reused waste, or it can be used to track generated solar power by changing the columns to indicate power produced, power used, and power sold back to the power company, if appropriate.

<p>Generic plan</p>	<p>SWBC has produced a separate MS Word document of a generic plan outline and contents description that can be used for conservation plans, soil management plans, waste management plans, and similar. The template included here is a plan or project work plan, with an illustrative example.</p>
<p>Pesticide app. FullPesticide app. Single</p>	<p>Two pesticide application record templates are included. The full template contains all of the needed information in columns, and is suitable for vineyards that want to track all applications in one tracking form. Modifications will be necessary to be able to print the form in on one sheet of paper in landscape profile. The single template is for those operations that one to record each application separately. General information is included on the top for easy reference. It can be printed on one sheet of paper in portrait profile.</p>
<p>Pest & disease description</p>	<p>SWBC is providing a separate IPM plan outline and content descriptions. The plan requires that the vineyard has a description of the different pests (insects and weeds) and diseases that have occurred or could occur, and their prevention and control methods based on established thresholds. The form in this workbook is a pest and disease information form, essentially a layout to fill in information if needed as part of a "pest and disease catalogue" for the vineyard.</p>

General instructions and comments

All templates are made to be used electronically or printed, and can be sent to you in excel format. Some of the templates contain formulas. If you want to print templates with formulas and continue to use them electronically, save a different version for printing and erase the formulas so zeros do not show on the printed versions.

Templates are formatted to some degree to be printed, but adjustments will be necessary depending on your printer and the paper size to be used.

All templates have information in the header and footer, including space to put the vineyard/winery name. You decide if you want to use these, and change it accordingly in Page Layout>Page Setup>Header/Footer.

Please record all information in metric units. Conversions are easy to find. For this program:

- Lengths in centimeters (cm), meters (m), or kilometers (km)
- Area in square meters (m²), square centimeters (cm²), hectares (ha), or square kilometers (km²) depending on the scale
- Volumes in liters (L), or milliliters (ml) for smaller volumes

Guidance Materials



- Mass in grams (g), kilograms (kg), or metric tons or tonnes (t = 1000 kg) for larger masses

SWBC is identifying common sustainability metrics. One of these is energy, but a standardized unit, probably the Kilojoule, is likely. For the time being, please record electrical use in kilowatt-hours (kWh) as it appears on your electricity bill, and record all fuel use as volumes.

SAMPLE TEMPLATES FOR DOCUMENTATION

ELECTRICITY CONSUMPTION TRACKER

	Power source	{Power company or in-house generation}		
	Period covered (dates)	Start:		
		End:		
	Area(s) and/or process(es) included:			
Date	Reported meter reading	Units	Consumption	Consumption since start date
		KW		0
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0
				0
			Final Balance	0
		Total consumption	0	

PEST & DISEASE DESCRIPTION

Please use metric units (liters, grams, kilograms, hectares) for all measurements

All text in cursive/italics can be eliminated.

Please attach supporting or descriptive photos, drawings, or documents at the end of the form.

Pest/weed/disease background	
Common name(s):	
General description:	
Common infestation conditions	
Grape varieties:	
Soils or vineyard areas:	
Weather or climate:	
Time of year:	

Pest/weed/disease descriptions

{Describe below what the pest and its infestation appears like in the different stages in which it is identifiable and begins causing damage in the vineyard. Examples can include # nymphs and/or eggs per leaf, or % cutworm feeding damage on buds, or % clusters with botrytis. Refer or link to photos if possible.}

Stage(s)	Pest/weed/disease descriptions	Infestation description

Prevention information

{For this pest, describe the prevention methods recently used, currently in use, or under consideration.}

Method	Description

Control & Intervention Descriptions

Describe here the following information:

- **Thresholds:** the level of the infestation at which the vineyard takes action. Try to describe this in a standard or quantitative manner related to monitoring results, such as X% of sample points with affected leaves.
- **Action:** the name of the action taken, such as leaf removal, biological control, trapping, or insecticide application
- **Technical details:** describe what exactly is done, what pesticides are used, application rates, and other similar details.

Threshold	Action	Technical details

PESTICIDE RECORD: SINGLE APPLICATION

Please use metric units (liters, grams, kilograms, hectares) for all measurements

Application Information	
Applicator name	
Date	
Start time	
End time	
Weather	
Target pest(s)	
Crop stage	
Estimated harvest date	
Who recommended product/application?	
Pesticide information	
Product commercial name	
Active Ingredient	
PCP#	
Re-entry interval	
Pre-harvest interval (PHI)	
Block(s)	
Area applied (hectares)	
Mix Quantities	
Label rate (ie. L/ha, g/ha)	
A: Product used	
B:Water (if applicable)	
Product/area (A: Qty Product ÷ hectares)	
Application type	
Equipment ID	

GENERIC PLAN EXAMPLE

Plan name	{Overall plan name, such as "Ecosystem conservation and protection"}
Plan manager	Name of plan manager

Replace all text with plan or program text.
 Insert additional rows and columns as needed.
 You can extend this template (more rows) to include all outcomes for any plan or program.
 Hint: Be sure the KPIs are clear and can be measured to determine achievements & performance.

Ref.	Outcomes	Activities	Responsible	Start	End	KPIs	Resources
1	Block C-D wetland protection zone (PZ) established		Marcia Bogwell (mngr)	1-Feb	30-Sep	PZ established around wetland	See plan budget and resource list
1.1		Protection zone demarcation & area measurement	Rod Rocking	8-Feb	10-Feb	10-meter PZ marked in field PZ area calculated in sq. ft.	Tape measure Wooden stakes (150 approx.); mallet Plastic flagging Field assistant
1.2		Calculation & ordering of native plant materials (seeds, seedlings)	Marcia Bogwell	12-Feb	18-Feb	Calculate quantity & cost of plant materials 3 quotes from nurseries Purchase order placed	BCWGC plant material guidance and source list Purchase orders (from Accounting)
1.3		Soil preparation	Joe Kubota	8-Mar	12-Mar	PZ area lightly disked	N° 3 tractor with fuel Small green rotary harrower
1.4		Seeding and tree seedling planting	Katie Pine	15-Mar	31-Mar	Native vegetation planted, including selected tree seedlings	Purchased plant materials Tape measure 100 feet of cotton string 16 wooden stakes; mallet Planting crew (5) Drain spades (5) N° 3 tractor with fuel & operator Seed spreader
1.5		PZ Maintenance	Katie Pine	15-Mar	30-Sep	Vegetation established with minimal non-native species invasion Trees ready to survive winter; less than 5% mortality	4 elevated sprinkler heads Flexible irrigation pipe or hose (1"), length to be determined Equipment & crew transport Irrigation crew (2) Drain spade & grub how Maintenance crew (2-3)

