

MANAGING WATER USE FOR IRRIGATION AND FROST PROTECTION (LEVEL II CERT)

Background: Efficient irrigation management maximizes crop production and quality, while minimizing water losses caused by leakage, runoff, evaporation, and deep percolation. It applies enough water to meet essential plant needs, but no more. Water applied during irrigation benefits crop growth by providing moisture for plant respiration and metabolism, preventing the build-up of salts in the root zone, and in some cases moderating the air temperature around the crop. Irrigation that causes water to run off or percolate beyond the root zone wastes water and energy, increases greenhouse gas emissions, and may contribute to surface water or groundwater pollution.

See chapter 9 of the Resource Guide for more information on managing water use for irrigation and frost protection, including BMP descriptions, irrigation evaluation information, and information related to frost protection technology.

Purpose: Identify practices, currently in use or intended for implementation, to ensure that water is used efficiently.

Water Sources and Management

I1. Check all sources of water and infrastructure that are utilized.

- Surface Water (If yes, describe below whether you have a water right or where you are in the process of obtaining a water right.)
- Ground Water
- Municipal Water
- Mutual Water Company Water (from off-site)
- Reclaimed / Recycled Water (from off-site)
- Reclaimed / Recycled Water (from site)
- Harvested Rainwater
- Pond
- Storage Tank
- Other (list)

Describe as needed:

12. If surface water is diverted from waterways, a fish screen is in place, as required by National Marine Fisheries Service and California Department of Fish and Wildlife?

- Yes
- No (Practice # 34 listed in Table I1 below may be required)
- N/A (No surface water diversion on-site OR surface water diverted only from off-stream pond)

Describe as needed:

13. Check all systems that are utilized.

- Drip/micro irrigation system
- Sprinkler for irrigation (Implement practice # 2, listed in Table I1 below)
- Sprinkler for frost protection
- Wind Machine
- Cold air drain
- Other (list)

Describe as needed:

14. Irrigation and/or frost protection systems were designed by an agricultural engineer, irrigation system designer, irrigation consultant, or other professional.

- Yes
- No (Consider practices # 1 and 33 listed in Table I1 below)

Describe as needed:

15. How old is the irrigation system?

16. Irrigation is scheduled and applied according to plant needs as determined by soil water and plant stress monitoring and management tools (e.g., gypsum blocks, neutron probes, tensiometers, volumetric and capacitance soil probes, leaf pressure bombs, porometers, CIMIS, weather stations, other ET monitoring systems, etc.) and visual observations.

- Yes (Describe which tools are used)
- No (Consider practices # 6 and 7 listed in Table I1 below)

Describe as needed:

I7. Water management techniques such as delayed onset of irrigation, dry farming, regulated deficit irrigation, and partial root-zone drying are considered and used to meet viticultural and conservation goals.

- Yes (Describe which techniques are used)
- No (Consider practices # 5, 6 and 8 listed in Table I1 below)

Describe as needed:

I8. Professional services for water, plant stress and ET monitoring are utilized?

- Yes (Describe services utilized)
- No (Consider practices #1 listed in Table I1 below)

Describe which services are utilized:

I9. Irrigation and frost protection (if applicable) systems are monitored for leaks and performance, and maintained regularly.

- Yes (Describe how often and briefly describe your monitoring protocol)
- No (Consider practices #4, 10, 12 through 16, and 24 listed in Table I1 below)

Describe, as needed:

I10. On a scale of 1-10, 10 being the best, how would you rate the performance of your system?

Rate and describe why you selected the performance rating:

I11. If there are noticeable issues with the irrigation system, are irrigation evaluations conducted? For example: distribution uniformity, pump capacity or well production test, or similar evaluations.

- Yes (Describe evaluations conducted)
- No (Consider practices #1, 3, and 16 listed in Table I1 below)

Describe as needed:

I12. Irrigation emitters are checked and replaced before and during irrigation season?

- Yes (Describe your protocol)
- No (Consider practices #4 and 1, listed in Table I1 below)

Describe as needed:

I13. Water use is monitored with a flow meter and documented.

- Yes (Indicate type of meter and how often you check and log readings)
- No (Consider practice # 17 listed in Table I1 below)

Describe as needed:

I14. Water use is estimated by tracking pump hours and multiplying by flow rate, or other method?

- Yes
- No (Consider practice # 17 listed in Table I1 below)

Describe as needed:

I15. Reclaimed, recycled and harvested water are utilized to the extent practicable.

- Yes (Describe roughly what percent and any issues you have with the water)
- No (Consider practices #18 through 20 listed in Table I1 below)

Describe as needed:

I16. If there are pond(s) on the property, are they maintained to reduce leaking and evaporation?

- Yes (Describe what practices you use)
- No (Consider practices #21 and 22 listed in Table I1 below)
- N/A (no ponds on property)

Describe as needed:

I17. If a pump is used in your irrigation or frost protection system, does the pump have a Variable Frequency Drive (VFD)?

- Yes (Describe your VFD system)
- No (Consider practice #11 listed in Table I1 below)
- N/A (no irrigation pumps are used)

Describe as needed:

I18. Would it benefit the operation if more irrigation blocks could be run at the same time?

- Yes
- No

Describe as needed:

I19. Are the block manifold valves controlled by electric valves and timers?

- Yes (Consider practice #10 listed in table I1 below)
- Some (Consider practice #9 listed in table I1 below)
- No (Consider practice #9 listed in table I1 below)

Describe as needed:

I20. Do you use automated communication devices (telemetry) to assist with your scheduling and irrigation?

- Yes (Describe your system)
- No (Consider practice #9 listed in table I1 below)

Describe as needed:

I21. Are there clogging and plugging issues at the filter or within the emitters?

- Yes (Describe the issues) (Consider practices # 14, 15, and 24 through 26 listed in Table I1 below)
- No

Describe as needed:

I22. Are the ends of drip hoses flushed at least annually?

- Yes (Describe how long it takes for the water to run clear and what types of materials (e.g., sediment/organics) are discharged from the flush)
- No (Consider practices # 14 and 15 listed in Table I1 below)

Describe as needed:

I23. Irrigation water quality is tested regularly?

- Yes (Describe how often, when was it last tested, and list any constituents of concern)
- No (Consider practice # 27 listed in Table I1 below)

Describe as needed:

I24. How old is your filtration system?

I25. Irrigation filter systems are cleaned regularly?

- Yes (Describe how often)
- No (Consider practice # 24 listed in Table I1 below)

Describe as needed:

I26. Does the main filter at the pump have an automatic back-flushing system?

- Yes
- No (Consider practice # 26 listed in Table I1 below)

I27. Are you implementing any practices to infiltrate more water into the soil or retain more onsite?

- Yes (Describe practices)
- No (Consider practices #29 and 30 listed in Table I1 below)

Describe as needed:

I28. Do you manage water in the soil through the use of cover crops?

- Yes
- No (Consider practices #28 and 31 listed in Table I1 below)

Describe as needed:

I29. Do you utilize practices that reduce compaction from heavy equipment?

- Yes (Describe practices)
- No (Consider practice # 32 listed in Table I1 below)

Describe as needed:

I30. Do you have replanting plans that might allow for irrigation system redesign or improvement?

- Yes (Consider practice #33 listed in Table I1 below)
- No

Describe as needed:

I31. Do replanting plans include soil analysis for selecting site appropriate and or drought-tolerant rootstock?

- Yes (If information is known, describe below)
- No (Consider practice #23 listed in Table I1 below)
- N/A (no replant planned)

Describe as needed:

I32. Are there other water management issues you would like to address?

Describe as needed:

Table I1: Conservation Practices for Managing Irrigation

The following table provides an assortment of management practices that are used to improve and maximize water use efficiency. Implementation of all practices is not necessary or required. Selection of practices must be done on a site-specific basis. An assortment of practices to suit your circumstance should be selected. NRCS Practice Titles are provided for your reference and you should consider contacting your local NRCS or RCD field office for technical and/or possible financial assistance.

<i>Conservation Practice</i>	<i>NRCS Practice Title</i>	<i>Current Practice</i>	<i>Planned Implementation Date / Status</i>	<i>Location / Notes</i>
1. Consult a Professional		<input type="checkbox"/>		
2. Convert to a drip irrigation system	Irrigation System, Micro-irrigation (441)	<input type="checkbox"/>		
3. Conduct a distribution uniformity evaluation and implement system improvements accordingly (every 3-5 years recommended)	Irrigation Water Management (449)	<input type="checkbox"/>		
4. Check and replace or clean broken or dysfunctional emitters on a regular basis	Irrigation System, Micro-irrigation (441)	<input type="checkbox"/>		
5. Determine yearly water budget for vines, integrating regulated deficit irrigation strategy		<input type="checkbox"/>		
6. Install and utilize soil moisture monitoring devices, remote sensing and telemetry devices	Irrigation Water Management (449)	<input type="checkbox"/>		
7. Install and utilize a weather monitoring system or utilize a near-by CIMIS weather station to inform irrigation and frost protection scheduling	Irrigation Water Management (449)	<input type="checkbox"/>		
8. Delay onset of irrigation by observing shoot tips and utilizing soil and plant stress monitoring	Irrigation Water Management (449)	<input type="checkbox"/>		
9. Integrate timers, controllers, and telemetry into the irrigation system	Irrigation Water Management (449)	<input type="checkbox"/>		
<i>Conservation Practice</i>	<i>NRCS Practice Title</i>	<i>Current Practice</i>	<i>Planned Implementation Date / Status</i>	<i>Location / Notes</i>

10. Update controllers and timers throughout season to match actual water needs		<input type="checkbox"/>		
11. Integrate Variable Frequency Drives with your irrigation system	Pumping Plant (533)	<input type="checkbox"/>		
12. Conduct system test annually, prior to frost and/or irrigation season.		<input type="checkbox"/>		
13. Conduct regular monitoring (for leaks and other issues) during the season of use and repair as necessary.		<input type="checkbox"/>		
14. Flush hose lines on a regular basis		<input type="checkbox"/>		
15. Conduct end of season system maintenance to clear lines		<input type="checkbox"/>		
16. Conduct pump efficiency tests and retrofit pumps as needed		<input type="checkbox"/>		
17. Install and utilize flow meters to monitor and record water use	Irrigation Water Management (449)	<input type="checkbox"/>		
18. Consider options for reclaimed / recycled water, including possibility of recycled water from local treatment plants that may be available for trucking		<input type="checkbox"/>		
19. Install bioreactors to manage wastewater and create additional irrigation supplies	Denitrifying Bioreactor (747)	<input type="checkbox"/>		
20. Consider rainwater harvesting (i.e. tanks and ponds) and storage, particularly if there are large buildings on-site	Water Harvesting Catchment (636) Tank – Irrigation Reservoir (436) Underground Outlet (620) Irrigation Pipeline (430)	<input type="checkbox"/>		
21. Install pond liners and covers	Pond Sealing or Lining (521)	<input type="checkbox"/>		
22. Inspect ponds for leaks, clogging and other issues		<input type="checkbox"/>		

<i>Conservation Practice</i>	<i>NRCS Practice Title</i>	<i>Current Practice</i>	<i>Planned Implementation Date / Status</i>	<i>Location / Notes</i>
23. Upon replant, consider rootstocks and varieties that are more drought tolerant		<input type="checkbox"/>		
24. Regularly clean and inspect filters		<input type="checkbox"/>		
25. Replace or upgrade filtration equipment	Irrigation System, Micro-irrigation (441)	<input type="checkbox"/>		
26. Install and utilize an auto backflush system at the filter near the pump	Irrigation System, Micro-Irrigation (441)	<input type="checkbox"/>		
27. Test water quality at a lab every 2-3 years	Well Water Testing (355)	<input type="checkbox"/>		
28. Build organic matter in soil with cover crops and/or compost applications	Cover Crop (340)	<input type="checkbox"/>		
29. Increase infiltration with swales, infiltration trenches, catchment basins, and other means	Grassed Waterway (412) Sediment Basin (350)	<input type="checkbox"/>		
30. Investigate opportunities to catch surface waters and tile drain water in ponds, and divert to infiltration zones	Water and Sediment Control Basin (638)	<input type="checkbox"/>		
31. Manage water in soil through use of a cover crop	Cover Crop (340)	<input type="checkbox"/>		
32. Reduce soil compaction by limiting use of heavy equipment and repetitive passes		<input type="checkbox"/>		
33. Redesign and improve irrigation system when replanting		<input type="checkbox"/>		
34. Install a fish screen where natural surface waters are diverted	Structure for Water Control (587)	<input type="checkbox"/>		
Other:		<input type="checkbox"/>		

Water Management for Frost Protection

I33. Water is used for frost protection.

- Yes (Describe approximately how much is used per frost event, consider practices # 5 or 6 in Table I2 below)
- No (If frost damage is an issue you wish to manage, consider practices # 2 through 6, 8, and 10 in table I2 below. Skip the remainder of section)

Describe as needed:

I34. Passive frost protection methods (e.g. timed mowing of cover crops, creating air barriers, planting varieties and rootstocks with later budbreak) are utilized.

- Yes (Describe what passive methods are used)
- No (Consider practices # 3, 4, 8, and 10 in table I2 below)

Describe as needed:

I35. Water, as a frost management tool, is utilized only in areas where alternative practices are not feasible.

- Yes (Identify on a map, or describe below, where water is the only feasible frost protection method)
- No (Consider practices # 3, 4 and 7 through 10 in table I2 below).

Describe as needed:

I36. The frost protection system is turned on based upon the factors of temperature and humidity (wet-bulb temperature or forecast dew point) and turned off as soon as danger has passed.

- Yes
- No (Consider practice # 9 and 11 in table I2 below).

Describe as needed:

Table I2: Conservation Practices for Frost Protection

The following table provides an assortment of management practices that are intended to improve water use efficiency. Implementation of all practices is not necessary or required. Selection of practices must be done on a site-specific basis. An assortment of practices to suit your circumstance should be selected. NRCS Practice Titles are provided for your reference and you may contact your local NRCS or RCD field office for technical and/or possible financial assistance.

<i>Conservation Practice</i>	<i>NRCS Practice Title</i>	<i>Current Practice</i>	<i>Planned Implementation Date / Status</i>	<i>Location / Notes</i>
1. Consult a Professional		<input type="checkbox"/>		
2. Identify potential frost hazard areas		<input type="checkbox"/>		
3. If feasible, mow cover crop and keep it short during the frost season		<input type="checkbox"/>		
4. Install or remove "air barriers" to optimize air drainage and prevent pooling of cold air in vineyard areas		<input type="checkbox"/>		
5. Install wind machines in areas where noise pollution is not a consideration		<input type="checkbox"/>		
6. Install cold air drains in frost pockets where wind machines are not an option		<input type="checkbox"/>		
7. Convert to a system of microsprayers		<input type="checkbox"/>		
8. Upon replant, consider alternative frost protection methods, including planting varieties and rootstocks with later bud-break, to shorten frost hazard period		<input type="checkbox"/>		
9. Use available weather, temperature, and humidity information to make informed decision about the timing of frost protection.	Irrigation Water Management (449)	<input type="checkbox"/>		
10. Delay pruning, and/or prune in two stages, to delay vine growth and shorten frost hazard period		<input type="checkbox"/>		
11. Use professional services to monitor weather and frost events		<input type="checkbox"/>		
Other:		<input type="checkbox"/>		