- For all personnel who handle (contact) lettuce/leafy greens or supervise those who do so must receive training that includes the following:
  - Principles of food hygiene and safety.
  - The importance of health and personal hygiene for all personnel and visitors including recognizing symptoms of a health condition that is reasonably likely to result in contamination of lettuce/leafy greens or food-contact surfaces with microorganisms of public health significance.
  - The standards established in these best practices that are applicable to the employee's job responsibilities.
- For harvest personnel, the training program must also address the following minimum requirements related to harvesting activities:
  - Recognizing lettuce/leafy greens that must not be harvested, including product that may be contaminated with known or reasonably foreseeable hazards.
  - Inspecting harvest containers, harvest equipment, and packaging materials to ensure that they are functioning properly, clean, and maintained so as not to become a source of contamination of lettuce/leafy greens with known or reasonably foreseeable hazards.
  - Correcting problems with harvest containers, harvest equipment, or packaging materials or reporting such problems to the supervisor (or other responsible party), as appropriate to the person's job responsibilities.
- For personnel conducting environmental hazard and risk assessments, training must be completed, and the training program must address the following minimum requirements:
  - When an environmental hazard or risk assessment should be completed
  - How to conduct an environmental hazard or risk assessment
  - Potential hazard and risk identification
  - Recognizing product that may be contaminated with known or reasonably foreseeable hazards
  - Mitigations and corrective actions
  - When an environmental hazard or risk assessment deems pre-harvest product testing is necessary
- At least one supervisor or responsible party (e.g., the food safety professional) for each producer providing leafy green products must have successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the FDA.
- Establish and keep records of training that document required training of personnel, including the date of training, topics covered, and the person(s) trained. Records must be reviewed, dated, and signed, within a reasonable time per company's SOP after the records are made, by a supervisor or responsible party.

5. Environmental Assessments

This section addresses assessments that shall be completed and documented prior to the first seasonal planting, within one week prior to harvesting and during harvest operations. These environmental assessments are intended to identify any issues related to the produce field, adjacent and nearby land uses, and/or animal hazards that may present a risk to the production block or crop (see Table 6 and Table 0).

The Best Practices Are:

- Prior to the first seasonal planting and within one week prior to harvest, perform and document an environmental risk assessment of the production field and surrounding area. Focus these assessments on

evaluating the production field for possible animal hazards or other sources of human pathogens of concern, assessing adjacent and nearby land uses for possible sources that might contaminate the production field, and evaluating nearby water sources for the potential of past or present flooding. Refer to Issue 4 for training requirements for personnel conducting environmental assessments.

- The pre-season environmental assessment at a minimum must address crop land and water source adjacent and nearby land uses listed in Table 0.÷

  - **Assessment of Produce Field**
    - Evaluate all produce fields for evidence of animal hazards and/or feces prior to the first seasonal planting, within one week prior to harvesting, and during harvest operations. If any evidence is found, follow procedures identified in Issue 15 "Production Locations - Encroachment by Animals and Urban Settings."
    - Evaluate potential environmental sources of contaminants in or near production locations after a change in weather conditions or weather events that could impact the original risk assessment, pre-harvest, or daily harvest of the field or block and follow procedures identified in Issue 14 "Production Locations - Climatic Conditions and Environment".

  - **Assessment of Adjacent and Nearby Land Use**
    - Prior to the first seasonal planting, conduct and document a detailed pre-season environmental risk assessment that evaluates food safety hazards and risk level of all land and water sources adjacent and nearby to all production fields for possible sources of human pathogens of concern. These sources include, but are not limited to manure storage, compost storage and operation, biosolids, CAFO's, AFO's, grazing lands, domestic animals/hobby farms, water storage and conveyance, habitat/riparian area, sanitary facilities, septic systems, and non-leafy green crops (see Table 0 and Appendix H: Risk Assessment Tool-Reserved for further detail). If any possible sources on adjacent or nearby lands that might result in produce contamination are present, consult with the metrics and refer to Appendix Z.
    - At any time prior to planting, during the growing of the crop, or during the period when harvest operations are occurring, if on farm or adjacent and nearby land activities result in a possible higher risk situation, conduct additional environmental risk assessments and perform additional mitigations as necessary.

  - **Assessment of CAFOs**
    - Conduct and document a rigorous pre-season environmental assessment of any Concentrated Animal Feeding Operation that may impact your operation. Include, to the degree possible, communication with the CAFO operator and/or third-party operator to document Best Management Practices (BMPs) within the facility, examination of the CAFO for locations and risk associated with composting, storage, sick pens, dead piles and other internal operations, examination of traffic routes associated with the CAFO and examine settling and manure ponds for any signs of leakage. Note if the CAFO drainage or discharge is a possible source of contamination. Record the approximate number of animals within the CAFO and the method used to determine. Refer to Appendix G: Considerations for Evaluating Potential Contamination Risk Related to CAFOs. [1]

[1] Following the conclusion of the Southwest Agricultural Region Environmental Microbiology Study (2019-2024) the metrics will be re-evaluated again prior to the 2025-26 season and additional changes could be recommended.

- Conduct and document a pre-harvest assessment that confirms no changes in pre-season conditions. Note if any discharge events that may impact your crop or operations; changes in weather condition or weather events occurred during the production period.
- Water sources that are proximate to a CAFO may pose additional risk and should be closely evaluated. Refer to Appendix A: Agricultural Water System Assessment.
- Growing operations >1.5miles from an 80,000+ head CAFO *AND* have identified an additional risk, develop a risk assessment SOP that addresses any additional mitigation measures deemed necessary. More intensive mitigation measures that could be employed include:
  - Pre- harvest product testing
  - Die-Off period from last water or significant wind event to harvest.
  - Expanded water treatment for overhead applications i.e. throughout the growing season post germination.
  - Dust Abatement
  - Increased monitoring during production period

- **Assessment of Historical Land Use**
  - To the degree practical, determine and document the historical land uses for production fields and any potential issues from these uses that might impact food safety (i.e., hazardous waste sites, landfills, etc.).
- **Assessment of Flooding**
  - Evaluate all produce fields for evidence of flooding. If any evidence is found, follow procedures identified in Issue 13 “Flooding”.

TABLE 0. CROP LAND AND WATER SOURCE ADJACENT AND NEARBY LAND USE

Adjacent and Nearby Land Uses Hazards		Current Metric	Considerations for Risk Analysis	
			Factors to consider when assessing severity and likelihood of a hazard	Risk Mitigating Factors
Animal operations	**AFOs**	30 feet (no composting) 400 feet (with composting)	Distance, topography, water runoff, number of animal units, wind direction, history	Pre-harvest pathogen testing, water treatment, vegetative buffers, barriers, increased buffers, animal and insect monitoring
	CAFO	1200 feet (1,000 - 80,000 animals)	Distance, topography, water runoff, number of animal units, wind direction, history	Pre-harvest pathogen testing, water treatment, vegetative buffers, barriers, increased buffers, animal and insect monitoring
	CAFO	1.5 mile (80,000+ animals)	Distance, topography, water runoff, number of animal units, wind direction, history	Pre-harvest pathogen testing, water treatment, vegetative buffers, barriers, increased buffers, animal and insect monitoring, dust abatement, die-off period, and additional monitoring.
	Grazing Lands	30 feet	Distance, topography, water runoff, number of animal units, wind direction, history	Pre-harvest pathogen testing, water treatment, vegetative buffers, barriers, increased buffers, animal and insect monitoring
	Domestic Animals/Hobby Farms	30 feet	Distance, topography, water runoff, number of animal units, wind direction, history	Pre-harvest pathogen testing, water treatment, vegetative buffers, barriers, increased buffers, animal and insect monitoring
Compost/Soil Amendment Operations	**Compost Operations** (Manure or Animal Products)	400 feet	Distance, Timing of production, Production Process, Volume of production, Topography, Water runoff, Wind direction, History	Preventive barriers, Pre-harvest pathogen testing, Knowledge of process, Water Treatment
	Non-synthetic Soil Amendment Pile (containing manure or animal products)	400 feet	Distance, Timing of production, Production Process, Volume of production, Topography, Water runoff, Wind direction, History	Preventive barriers, Pre-harvest pathogen testing, Knowledge of process, Water Treatment
	Non-synthetic Soil Amendment Pile (not containing manure or animal products)	400 feet	Distance, Timing of production, Production Process, Volume of production, Topography, Water runoff, Wind direction, History	Preventive barriers, Pre-harvest pathogen testing, Knowledge of process
	Biosolids	400 Feet	Distance, Timing of production, Production Process, Volume of production, Topography, Water runoff, Wind direction, History	Preventive barriers, Pre-harvest pathogen testing, Knowledge of process

TABLE 0. CROP LAND AND WATER SOURCE ADJACENT AND NEARBY LAND USE				
Non-leafy green crops	**Cannabis/hemp, cover crops, dates, flowers, grapes, other non-leafy green crops**	The approximate safe distance depends on risk and mitigation factors	History of risk identification, Distance from adjacent operation, Topography, Crop production timeline, Foreign object, Animal/Bird attractant, Grazing animals, Harvest practices.	Physical barriers, Pre-harvest pathogen testing, Increased monitoring, Knowledge of process
Water Source and Systems	**Well Head distance from Untreated Manure**	200 feet	History of risk identification, Distance from adjacent operation, Topography, Opportunity for water run off through or from untreated manure, or composting operations, Soil leaching	Adjacent operation management practices, Increased monitoring, Preventive barriers, Type of system (Closed vs Open), Water treatment
	Surface Water Distance from Untreated Manure	100-300 feet	History of risk identification, Distance from adjacent operation, Topography, Opportunity for water run off through or from untreated manure or composting operations, Flooding, Soil Leaching	Adjacent operation management practices, Increased monitoring, Preventive Barriers, Water Treatment
	Water Storage and Conveyance systems	30-300 feet	History of risk identification, Distance from adjacent operation of concern, Topography, Flooding, Animal Intrusion, Trash and debris, Excessive vegetation, Integrity of water storage, Conveyance and distribution History of risk identification, Distance from adjacent operation of concern, Topography, Flooding, Animal Intrusion, Trash and debris, Excessive vegetation, Integrity of water storage, Conveyance and distribution system	Adjacent operation management practices, Increased monitoring, Type of System (Closed vs Open), Water Treatment
Urban Settings	**Homes or other building with a septic leach field**	30 feet	History of risk identification, Distance, Topography, Leach field status (active vs inactive), Runoff	Preventive barriers, Knowledge of septic field
Other Environmental Considerations	**Habitat/Riparian Area**	The approximate safe distance depends on risk and mitigation factors.	History of risk identification, Distance from potential risk, Topography, Potential for animal intrusion, Physical hazards	Preventive barriers, Increased Monitoring

Producers should check for local, state, and federal laws and regulations that protect riparian habitat and wildlife, restrict removal of vegetation or habitat, or restrict the use of wildlife deterrents or construction of wildlife deterrent fences in riparian areas or wildlife corridors. Producers may want to contact the relevant agencies (e.g., Game & Fish Department, USDA APHIS Wildlife Services – Arizona Division, U.S. Fish and Wildlife Services) to confirm the details of these requirements.

6. ISSUE: WATER

The safety of whole fresh and fresh-cut (e.g., bagged salad) leafy greens is a longstanding issue. Leafy greens are mostly consumed raw without cooking or processing steps to eliminate microbial hazards. Therefore, the way they are grown, harvested, packed, held, processed, and distributed is crucial to ensuring that the risk of human pathogen contamination is minimized. LGMA recognizes that different crop characteristics may impact susceptibility to adhesion and internalization of hazards. These metrics are intended to prioritize risk by classifying agricultural water systems for specific uses within leafy greens operations. Remedial actions follow a "find and fix" structure to identify and correct both system nonconformities and more serious failures. These metrics should be considered the minimum controls necessary to assess agricultural water systems for fitness of use.

GENERAL AGRICULTURAL WATER MANAGEMENT - THE BEST PRACTICES ARE:

- Agricultural water systems are a function of the source, storage, and conveyance. Each component of an agricultural water system that is within your control must be evaluated to ensure that the quality of agricultural water used in leafy green operations is known (i.e., the required parameters are measured and conform to the prescribed standards) and adequate for its intended use.
- It's prudent to evaluate and make a good faith effort to address the food safety hazards proximate to your agricultural water systems that may not be under your control.
- NEVER use water from any water source that has not been microbially characterized and assessed as described below.
- Prior to annual use of the water in agricultural operations a written ~~Perform an~~ Agricultural Water Assessment, as described in Appendix A, ~~prior to use of water in agricultural operations. An agricultural water system description~~ shall be prepared. The water assessment must identify conditions that are reasonably likely to introduce known or reasonably foreseeable hazards into or onto leafy greens. The assessment must address the following elements:
    - ~~This~~ A description (including the location and nature) of the agricultural water source (for example, whether it is ground water or surface water) and the type of distribution system shall be created. Information in the description shall include permanent fixtures such as wells, gates, reservoirs, valves, returns and other permanent above ground fixtures that make up a complete agricultural water system. This could be achieved by using maps, photographs, drawings, or other means to communicate the location of permanent fixtures and the flow of the water system (including any water captured for re-use or other natural or managed features which prevent environmental runoff from entering the water system).
        - The description could also include non-permanent features such as tanks, drip stations, gas powered pumps, pipes, water treatment systems, etc. that make up a complete agricultural water system. ~~can use maps, photographs, drawings or other means to communicate the location of permanent fixtures and the flow of the water system (including any water captured for re-use or other natural or managed features which prevent environmental runoff from entering the water system). Permanent fixtures include wells, gates, reservoirs, valves, returns and other permanent above ground fixtures that make up a complete irrigation system should be documented in such a manner as to enable location in the field. Water sources and the production blocks they may serve should be documented.~~
    - The degree of protection from possible sources of contamination (refer to Table 0), including:
        - other water users of the water system;

- animal impacts (for example, animal intrusion, grazing or commercial animal feeding operations of any size);
- adjacent and nearby land uses related to animal activity, application of biological soil amendment(s) of animal origin (BSAAOs), or presence of untreated or improperly treated human waste.

- Manage and maintain ~~A~~all components of your agricultural water system that are within your control including the water source and the on-ranch (farm) distribution /conveyance system(s) ~~must be managed and maintained~~ in a manner that minimizes human pathogen contamination.
- Testing water at the end of the delivery system (e.g., the last sprinkler head) or the point-of-use is essential for ensuring water that contacts the crop is of adequate microbial quality.
- For surface water sources, consider the impact of storm events on irrigation practices. Bacterial loads in surface water are generally much higher after a storm than normal, and caution shall be exercised when using these waters for irrigation.
- Water systems that convey untreated human or animal waste are never suitable for use in leafy greens operations in any manner and must be separated from conveyances utilized to deliver agricultural water.
- Water records must be reviewed, dated, and signed, within a week after the records are made, by a supervisor or responsible party.

HAZARD ANALYSIS - STEP 1: ASSESSMENT OF AGRICULTURAL WATER SYSTEMS

Evaluating food safety hazards from agricultural water applications in leafy green operations must take into account the quality of the agricultural water system, how the agricultural water will be applied, and when it will be applied. Prior to using water in any leafy green operation, conduct an agricultural water system assessment (including source, storage, and conveyance as described in Appendix A) and determine the agricultural water system type.

There are two types of agricultural water systems used in leafy green operations:

- **Type A:** Agricultural water that is unlikely to contain indicators of fecal contamination either due to natural hydrogeologic filtration or through controlled USEPA and state regulated treatment regime as demonstrated by an agricultural water system assessment as outlined in Appendix A, microbial testing, and when applicable, treatment verification.
- **Type B:** All other agricultural water systems.

1) **Source**: Evaluate each agricultural water source used in your leafy green operations and determine its type.
   a) Some agricultural water sources are supplied by a third-party provider that certifies the water is of adequate microbial quality (i.e., unlikely to contain indicators of fecal contamination). Example of these sources are:
      - Public (e.g., municipal) or private providers that deliver certified potable water achieved through treatment or some other process
   b) Some agricultural water sources deliver water of appropriate microbial quality due to natural physical, chemical, and biological processes that filter water as it passes through the soil. Examples of these sources for Type A agricultural water systems are:
      - Wells constructed in a manner such that contamination from outside sources (e.g., surface water or other surface chemical or biological influences / effects) is unlikely (e.g., well heads are