environmental farm plan
sustainably farmed

INFOSHEET #23

CLIMATE CHANGE ADAPTATION

How to address concerns identified in Environmental Farm Plan Worksheet #23

Based on Environmental Farm Plan Workbook, 5th ed. 2025

This infosheet outlines options to address concerns identified in your Environmental Farm Plan (EFP) as they relate to climate change adaptation.

For help with technical terms, please see the full glossary in your EFP Workbook.

All options in this infosheet are classed as **Actions, Compensating Factors,** or **Monitoring**.

- **Actions** address the identified concern, and will change the EFP rating to (3) or (4) Best.
- **Compensating Factors** are alternatives that will adequately address the concern, but will not change the rating in the EFP worksheet.
- **Monitoring** is an alternative in special circumstances only. When and how monitoring can be used is explained in the infosheet.

In most cases, you'll need more information before choosing and implementing options. Sources for more information are noted at the end of this infosheet.

Sustainable Canadian Agricultural Partnership
OSCIA
Ontario
Canada

GREENHOUSE GAS ASSESSMENT

23-1. Assessment of greenhouse gas emissions

BACKGROUND

Greenhouse gas (GHG) emissions from agriculture are a significant contributor to global climate change. Farms produce GHGs through various activities, including livestock management, manure handling, fertilizer application, and the use of fossil fuels. As a result, there is increasing pressure on farmers to assess and mitigate their GHG emissions.

Effective management of GHG emissions on farms requires regular assessment and the implementation of targeted mitigation practices. Tools like **OMAFA's AgriSuite GHG Decision Support Tool** help a farmer to estimate their emissions and identify areas where reductions can be made. However, without consistent follow-up, it is challenging to make meaningful progress in reducing a farm's greenhouse gas emissions.

Refer to Greenhouse Gas Reduction in Livestock Production Systems for more information on management strategies to reduce greenhouse gas emissions.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Perform a formal diagnosis of GHG emissions annually using tools such as the AgriSuite GHG Decision Support Tool or other industry-recognized assessment tools. Ensure that the assessment covers all aspects of farm operations, including energy use, livestock management, manure handling, and crop production.

Implement the recommended mitigation strategies identified in the GHG assessment. These may include practices like optimizing fertilizer use, improving manure management, adopting renewable energy sources, or enhancing soil carbon sequestration.

23-2. Ventilation in barns

BACKGROUND

Heat stress in livestock and poultry can reduce feed intake, lower productivity and increase morbidity and mortality. As summer temperatures and extreme heat events increase, prioritizing heat management in livestock and poultry facilities becomes increasingly important to ensure animal welfare and success of the farm business.

During periods of high temperatures, air-based and water-based cooling systems are needed to reduce the heat effects on livestock and poultry.

Increasing the air exchange rate in the barn using ventilation helps reduce the impacts of increased temperature on livestock and poultry.

At a certain ambient temperature, further increases in the ventilation rate are not effective in helping animals lose heat, resulting in decreases in production as the animal's experience heat stress. In these cases, water-based cooling systems may be best. Water-based cooling systems use water to absorb excess heat energy from the barn air space and lower the ambient temperature. These systems include sprinklers, drippers, misters or evaporative cooling pads (in combination with tunnel ventilation). While they may be effective at reducing temperatures or cooling the animals, water-based cooling systems also increase the relative humidity in the facility. To ensure acceptable humidity levels in the housing, water-based cooling is best used when the outside ambient relative humidity is less than 70%.

Tunnel exhaust fan bank in broiler barn.

Evaporative cooling pad.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Implement air-based cooling systems using large volume, high speed air movement to provide a cooling effect, such as tunnel ventilation. Typical air speeds of 200 to 500 feet per minute (1-2.5 metre/sec) are achieved in tunnel ventilation systems.

OPTION 2 – ACTION

Implement water-based cooling, where appropriate for the type of livestock.

Close-up of water trickling down the outside of the pad surface.

23–3. Monitoring of livestock and poultry health for heat stress

BACKGROUND

Monitoring livestock health for heat stress is a crucial practice to ensure animal welfare and maintain productivity, especially during periods of high temperatures.

Heat stress can reduce productivity, weaken the immune system, and negatively affect reproduction. Farms can employ different levels of monitoring and response strategies, ranging from highly automated systems to basic visual assessments.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Monitor conditions, performance and respond proactively:

- install sensors and automated systems to monitor key environmental factors like temperature, humidity and weather conditions, as well as animal performance indicators such as body temperature, feed intake, and water consumption
- set up a centralized system that integrates data from various sensors and provides real-time alerts
- collaborate with a nutritionist to develop feed and water protocols that include the automatic addition of electrolytes or changes in feed composition when heat stress is predicted
- train staff to use and maintain these systems effectively, including regularly checks and calibration of equipment to ensure accurate data collection and system reliability are maintained

Avoiding Production Losses in Swine Due to Heat Stress

Room temp.	Relative humidity												
	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
35°C	Heat stress emergency												
34°C													
33°C													
32°C													
31°C													
30°C													
29°C													
28°C	Heat stress danger												
27°C													
26°C	Heat stress alert												
25°C													
24°C													
23°C	No heat stress												
22°C													
21°C													

Monitoring and responding to relative humidity and temperature is important for maintaining animal productivity.
Adapted from H. Xin and J. Harmon. 1998.

23–4. Shade for livestock

BACKGROUND

Outdoor livestock and poultry can be exposed to periods of extreme temperatures. Implementing constructed shade structures or trees into pastures or outdoor confinement areas is one approach for reducing the risk of heat stress in animals.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Increase the permanent shade areas available for outdoor animals. This includes trees or constructed shade shelters.

OPTION 2 – ACTION

Provide temporary (mobile) shade structures to increase shade area for animals.

Using shade structures, such as trees, is one approach for reducing the risk of heat stress in animals.

LIVESTOCK – FEED AVAILABILITY

23-5. Feed availability and adverse weather

BACKGROUND

Extended dry weather and drought can affect livestock feed supplies. Knowing your feed supplies and needs, and making timely decisions is important. Over-harvesting of dry or damaged crops can impact both animal productivity, and the long-term health of perennial forage crops.

Feed budgeting involves knowing your planned feed production, anticipating how much feed is needed, and having sufficient feed storage. Extreme weather can impact many aspects of your feed system. Have contingency plans in place for each element of your feed budget.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Establish a yearly feed budget outlining feed production, storage and use.

Monitor feed production compared to planned use throughout the season to facilitate early decision-making.

Proactively consider feasibility of alternative feedstuffs, use of different plant species and changes to animal management strategies in response to feed shortfalls.

Knowing your alternative feed options can provide feeding solutions when one source of feed is not available.

23-6. Location of structures adjacent to flood-prone zones

BACKGROUND

Extreme rainfall events increase the vulnerability of farms, especially those located in or near flood-prone areas.

When farm infrastructure is in regulatory floodplains, the likelihood of being affected by rising waters increases.

Impacts from flooding can include structural damage, loss or damage to equipment, and contamination of stored feed or crops.

Regarding climate change adaptation, it is important for farmers to take proactive steps to plan for and mitigate flood risks. By integrating climate change adaptation into their farm management strategies, farmers can better protect their infrastructure and maintain operational continuity in the face of increasing flood risks.

Extreme weather events can result in flooding which impacts farm infrastructure.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Be aware of flooding risk:

- work with the local conservation authority, municipality or other government agencies to stay informed about floodplain regulations and changes to flood maps
- participate in community planning efforts that address flood risks and seek out any available resources or funding for flood mitigation projects
- hire a professional to evaluate the farm's current flood risk, considering both the regulatory floodplain maps and potential future risks due to climate change or changes in land use
- create a detailed emergency response plan for potential flooding event

OPTION 2 – ACTION

Protect your infrastructure and equipment from flooding risks:

- construct new buildings structures outside of known regulatory floodplains and areas that experience frequent flooding
- construct berms, levees or other physical barriers around existing structures to protect structures and equipment from floodwaters
- design and install a comprehensive drainage system around the farm that can quickly and efficiently divert excess water away from buildings and other infrastructure

23-7. Adapting energy systems and use for disruption from adverse weather conditions

BACKGROUND

Adverse weather conditions such as storms can cause power outages on farms, disrupting essential operations like feed delivery, ventilation, milking, product cooling, and water pumping. To protect their operations, farmers need to invest in reliable stand-by power systems, secure fuel supplies, and develop energy management plans. These measures contribute to farm resilience and ensuring the welfare of livestock during power outages.

WHAT CAN YOU DO?

OPTION 1 – ACTION

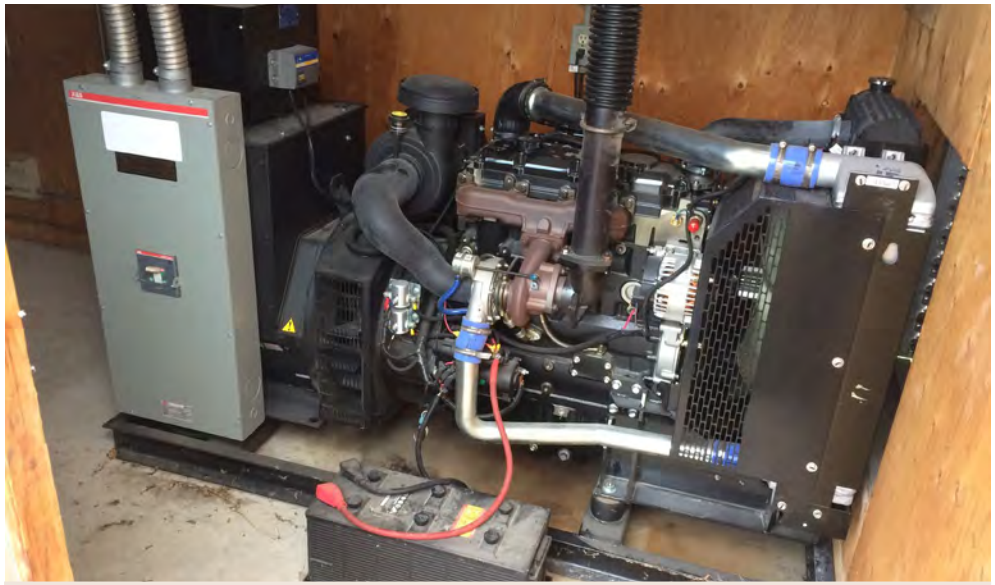
Plan for and put in place systems to address energy challenges during disruptions caused by extreme weather:

- create a plan that prioritizes specific energy use during disruptions, including strategies for rationing fuel and managing non-essential systems
- invest in an appropriately sized generator that can power all essential farm operations for several days (e.g., 3 days), and ensure you have sufficient fuel storage to sustain farm energy demands
- train farm staff on this plan and conduct regular drills to ensure everyone knows how to respond effectively during an outage

Refer to OMAFA factsheets:

On-farm generators: operating safely

On-farm generators for emergency use



Size stand-by generators to meet the minimum requirements to keep the farm operating during adverse weather events.

23-8. Water storage or supply

BACKGROUND

Water security is important for farms, especially with increasing climate variability. Farms depend on reliable water supply for irrigation, livestock watering, etc. Water supply disruptions caused by droughts can reduce productivity. Relying solely on direct water sources, such as wells or surface water, leaves farms more vulnerable during dry periods.

To mitigate these risks, farmers need to invest in good water supply and storage systems and effective management plans. Consult with your conservation authority regarding the need for permits before constructing a storage pond.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Perform a detailed assessment of current and future water needs, including for livestock, irrigation, cleaning and emergencies.

Invest in building large reservoirs, ponds, or installing high-capacity tanks that can store enough water to meet the farm's needs during periods of low supply. Permits may be required for certain storage systems.

Construct multiple storage facilities to diversify storage and reduce risk.

If available, connect the farm to a communal water pipeline or other reliable water sources.

Constructing water storages can increase resilience during drought.

Refer to the BMPs, Irrigation Management and Water Management for information on irrigation and drainage management.

CROP PRODUCTION UNDER CHANGING LOCAL CONDITIONS

23–9. Selecting crop types and varieties in response to changing local conditions

BACKGROUND

Changing weather patterns are creating challenges for crop production. Frequent drought and more intense rainfall are making traditional productions practices less effective.

To stay productive, farmers need to adapt by choosing crop varieties that can withstand these changes. This includes selecting drought-tolerant crops, pest-resistant varieties, and adjusting crop rotations.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Develop and modify cropping plans to account for changes in local conditions:

- stay informed on local climate data to understand shifts in heat, drought patterns and moisture levels, and use this information to inform planting and rotation decisions
- diversify your crop rotation with a mix of species that can withstand varying conditions
- convert high-risk field areas to perennial crops, pasture or conservation buffers to better manage water flow and protect soil health
- introduce new selections and rotations of annual crops and cover crops that are better equipped to handle extreme weather events like drought and heavy rainfall

Introducing new cover crop varieties into your operation can reduce risks like soil erosion.

WATER – MANAGING EXTREME PRECIPITATION AND OVERLAND WATER FLOW

23-10. Integration of landscape and constructed features for runoff and overland water management

BACKGROUND

Managing extreme precipitation and overland water flow is increasingly important as climate change brings more intense weather. Heavy rains can lead to soil erosion, flooding, water contamination, damaged crops and reduced soil fertility. Basic drainage systems often can't handle these extremes, leaving farms vulnerable.

To address this, farmers can integrate landscape features like wetlands and buffers along with constructed solutions such as erosion control structures and grassed waterways to manage high water flows. Consult with your conservation authority regarding the need for permits before modifying, enlarging, redesigning, or re-establishing wetlands and ponds.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Implement landscape and constructed landscape features to manage extreme overland flows:

- build erosion control structures, such as terraces or retention basins, to manage water flow and prevent soil loss
- install grassed waterways to channel excess water safely across fields, reducing the risk of erosion and flooding
- enhance and protect natural landscape elements like wetlands, riparian buffers, and forested areas
- expand and optimize existing landscape and constructed features to improve their effectiveness
- regularly inspect all landscape and constructed features to ensure they are functioning as intended

Landscape and constructed features, such as grassed waterways, are an important part of a strategy to manage extreme overland flows of water.

Refer to Erosion Control Structures for information on managing runoff from intense storm events.

23-11. Design of constructed drainage features for runoff and overland water management
(e.g., culverts, erosion control structures, grassed waterways, drains)

BACKGROUND

Managing extreme precipitation and overland water flow is increasingly important as climate change brings more intense weather. Heavy rains can lead to soil erosion, damage to farm laneways, flooding, and water contamination, damaged crops and reduced soil fertility. Existing constructed drainage features on the farm may not have sufficient capacity for the extreme precipitation events we are already experiencing, and for future increases in precipitation.

To address this, farmers should continue to anticipate an increase in the intensity, duration and frequency of extreme weather when designing infrastructure.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Plan for and construct drainage infrastructure with the future in mind:

- inspect constructed drainage features during heavy rainfall events to observe how well they are currently working
- when working with designers/contractors sizing drainage structures such as culverts, erosion control structures, terraces or retention basins, discuss building in excess capacity into the design
- expand existing constructed features to improve their effectiveness (e.g., select larger diameter culverts when completing repairs)

Refer to the OMAFA factsheet Grassed waterways to properly size and construct, grassed waterways to safely transport water through farm fields.

Constructed drainage infrastructure such as culverts may need to be enlarged to support current and future heavy rainfall events.

23-12. Monitoring, data sharing, and education

BACKGROUND

New and emerging pests and diseases are challenging for farmers. To combat these threats, farmers must adopt proactive strategies, including advanced monitoring systems, real-time data sharing, and continuous education. By staying informed and prepared, farmers can effectively manage these evolving risks.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Monitor and record data, and keep yourself and your staff educated:

- use sensors, drones, and regular field inspections to detect pests and diseases early
- work with regional agricultural networks or pest management groups to share data on pest and disease occurrences
- regularly participate in training programs on pest and disease management and ensure all farm staff are kept up to date
- create detailed plans for responding to new pest or disease detections, including steps for containment, treatment, and communication with relevant authorities
- implement IPM strategies that use a mix of biological, physical and chemical methods for sustainable pest control

Collecting data on pest presence in your fields is one way to maintain awareness of emerging pest pressures.

FOR MORE INFORMATION

ONTARIO MINISTRY OF AGRICULTURE, FOOD AND AGRIBUSINESS (OMAFA)

- Agricultural Information Contact Centre (AICC)
  Toll free: 1-877-424-1300 | e-mail: ag.info.omafa@ontario.ca

  Find most of the resources listed below at www.ontario.ca

Factsheets

- On-farm generators: operating safely
- On-farm generators for emergency use
- Managing heat stress in fed beef cattle
- Tunnel ventilation in livestock barns, with and without evaporative cooling
- Avoid production losses in swine due to heat stress
- Design, construction and maintenance of irrigation reservoirs
- Grassed waterways

Publications

- Ventilation for Livestock and Poultry Barns, Pub 833
- Agricultural Erosion Control Structures: A Design and Construction Manual, Pub 832
- Agronomy Guide for Field Crops, Pub 811
  - Chapter 15: Insects and Pests of Field Crops

ONTARIO MINISTRY OF AGRICULTURE, FOOD AND AGRIBUSINESS (OMAFA), *continued*

Best Management Practices Series

- Soil Management
- Irrigation Management
- Field Crop Production
- A Phosphorus Primer
- Water Management
- Manure Management
- Controlling Soil Erosion on the Farm
- Pesticide Storage, Handling and Application
- Streamside Grazing

AgriSuite

- AgErosion tool
- Greenhouse Gas (GHG) tool

OTHER RESOURCES

- Challenges and Opportunities to Managing Flood Risk
- Ontario Provincial Climate Change Impact Assessment Technical Report 2023
- Climate Atlas of Canada: Agriculture and Climate Change

LEGISLATION/ACTS

- Nutrient Management Act, 2002
- Ontario Water Resources Act, 1990