environmental farm plan
sustainably farmed

INFOSHEET #13

WATER EFFICIENCY

How to address concerns identified in Environmental Farm Plan Worksheet #13

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 water efficiency.

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

MANAGEMENT

13–1. Knowledge of water use and supply system

BACKGROUND

Water is a precious and limited resource. Using water more efficiently not only conserves water, but energy as well. It also generates less wastewater and lowers the potential for contaminants to move off your farm in surface water or groundwater.

A good way to start is by monitoring your water use patterns to identify activities that use the most water, and then compare these to industry standards.

Understanding peak water uses and times can be helpful in the event of a water shortage and also help identify any areas where water is being lost. Identify priority water uses and develop emergency plans to handle any potential water shortages.

Regularly monitoring water usage and comparing to industry standards is helpful in finding opportunities to reduce water use.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Regularly monitor water usage (by type of usage) and compare to industry practices:

- calculate the volume of water used in your operation by measuring pump capacity and running time or by installing a water meter for each type of water use
- log (record) volumes of water used for future comparisons and detection of leaks in the system
- log volumes of water used for comparisons against industry practices
- know the location of water lines and record them

Pumps have flow characteristics that vary with pump rpm and operating pressure. A proper match of pump and motor will save dollars on maintenance and operation. For more information, see BMP Irrigation Management.

These BMP publications (Water Management and Irrigation Management) address water use in farm settings and offer practical options to protect this valuable resource.

13–2. Impact of water use on other water users (especially during periods of low water)

BACKGROUND

Water is a shared resource and it is important that we manage it to respect future users and natural systems. If you use more than your fair share of water, you risk diminishing the quantity of water available for users downstream or in the same aquifer.

If your water taking requires you to obtain a Permit to Take Water, its terms and conditions will be determined based on your water needs, the available supply, and the needs of downstream users.

Using water inefficiently in your household or barn may also affect water quality for other users, since more wastewater would be generated.

WHAT CAN YOU DO?

OPTION 1 – ACTION – GROUNDWATER

Ensure your operation's use of water is not adversely affecting water quantity for other users, including natural systems:

- if your water-taking requires a Permit to Take Water, obtain a permit and ensure you comply with its terms and conditions, as well as the regulation that requires reporting of actual water-taking
- determine whether your pumping reduces the groundwater supply to the point that it affects water levels in neighbouring wells, by monitoring water level in a nearby well
- speak with your neighbours to know if there are times when your water-taking reduces their water sources or natural systems on their property such as streams, ponds or wetlands
- consider changing to a more sustainable water source and/or creating farm water storage in order to take water from groundwater source when supply is abundant
- investigate the potential to access a sustainable water supply from off your farm, e.g., communal pipelines or sharing of water storage supplies
- adjust your demand to existing supply (adopt efficient practices or technologies)

OPTION 2 – ACTION – SURFACE WATER

Ensure your operation's use of water is not adversely affecting water quantity for other users, including natural systems:

- if your water-taking requires a Permit to Take Water, do so and then ensure you comply with its terms and conditions, as well as the regulation that requires reporting of actual water-taking
- adjust your demand to existing supply (adopt efficient practices or technologies)
- verify if your pumping reduces the surface water supply to the point that it affects water levels in creeks, rivers or ponds (see lower textbox on next page for tips)
- speak with your local Conservation Authority about water levels in streams and potential periods of low water when it would be harmful to pump large amounts of water
- install a staff gauge (a ruler) in the stream to see if the water levels decrease when you begin pumping – speak with your local Conservation Authority about installing a staff gauge
- monitor flow data in your stream from your Conservation Authority website or **Environment and Climate Change Canada's Real-Time Hydrometric Data website**
- consider changing to a more sustainable water source and/or creating farm water storage in order to take water from surface water source when supply is abundant
- use a pond (not connected to a stream) to store water for use when conditions are dry and usual water source is low or unavailable
- investigate the potential to access a sustainable water supply from off your farm, e.g., communal pipelines or sharing of water storage supplies

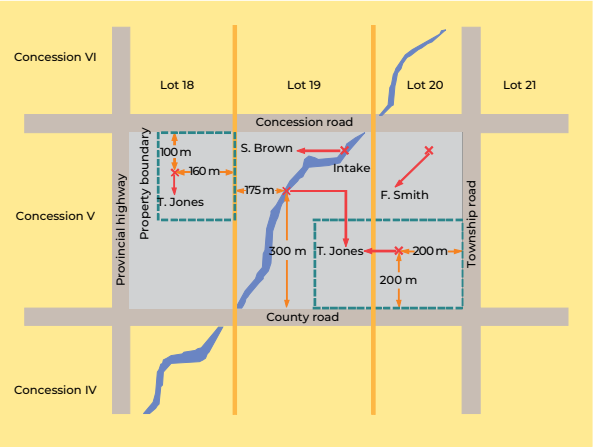
13–3. Permit to Take Water

BACKGROUND

To withdraw more than 50,000 L of water a day (for irrigation or other farm uses such as washing produce or equipment), you are required to have a Permit to Take Water under the Ontario Water Resources Act. You must meet certain requirements to obtain and keep a permit. You are required to know the estimated daily rate of water used and the volume required.

Most new permit applications must be accompanied by a study demonstrating the proposed water-taking will not impact other water users or the natural environment.

It is also important to keep detailed records of your water use to identify areas where you can improve your efficiency and ensure you are operating within the parameters of your permit.



Location maps for Permits to Take Water require location information (lot, concession, direction) as well as water supplies and wells within 0.5 km of your source of water. The map, together with estimates of water-taking and supply, will help in the assessment of potential impacts on neighbouring users.

For more information about the Permit to Take Water and to download applications forms:

- **see https://www.ontario.ca/page/permits-take-water**
- **or call Client Services and Permissions Branch at 416-314-8001 or 1-800-461-6290, or e-mail at enviropermissions@ontario.ca**

WHAT CAN YOU DO?

OPTION 1 – ACTION

Obtain all required permits, keep an up-to-date record of daily water use, and submit records:

- for all water-taking exceeding 50,000 L/day, the Ontario Water Resources Act requires you to obtain a Permit to Take Water from the Ontario Ministry of the Environment, Conservation and Parks (MECP)
- use a record of all water use to verify against any permit issued
- daily records of water-taking must be submitted annually to MECP

The 2015 amendments to the Water Taking Regulation (O. Reg. 387/04) added new regulations on water withdrawals of more than 379,000 litres of water per day where water is transferred from one Great Lakes watershed to another.

For such transfers, existing or new water takers are required to establish a baseline of water-taking with MECP as part of the permitting process.

Large water withdrawals (more than 19 million litres per day) are subject to additional legislative and environmental requirements.

For details, see: https://www.ontario.ca/page/permits-take-water.

To find out whether your pumping ever reduces surface or ground water supplies to the point that levels in neighbouring wells, streams, creeks, ponds or wetlands are adversely affected:

- **monitor water levels in local creeks, ponds or wetlands and wells**
- **test your use over a long period (e.g., 72 hours), and periodically measure the water levels in the nearby water sources**
- **talk to your neighbours**
- **consider hiring a hydrologist or hydrogeologist to determine the impact of your water-taking**

13-4. Low water condition readiness

BACKGROUND

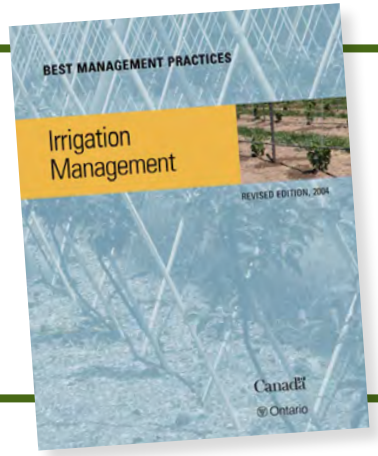
The Ontario Low Water Program webpage contains information on Ontario's current low water conditions which influences provincial and local authorities response in the event of a drought. Being aware of current conditions helps you be prepared for periods of low water.

The severity of low water conditions is classified based on precipitation and stream flow indicators.

These are used to determine the condition level for watersheds:

- **Level 1:** Conservation – early indication of a potential drought condition
- **Level 2:** Conservation, Restriction – increased likelihood of drought conditions
- **Level 3:** Conservation, Restriction, Regulation – high likelihood of drought conditions (does not imply an emergency)

By taking steps to make more efficient use of water, you are helping to build up the resilience of your operation, and this will help to see you through periods of drought.



Water efficiency in irrigation systems has never been more important. Get information on scheduling strategies, the pros and cons of sprinkler, drip and subirrigation systems, water-saving tips, and special applications from this comprehensive BMP publication.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Familiarize yourself with the Ontario Low Water Program website and current conditions map as it can provide you with advance indication of the potential for drought conditions.

You may wish to contact your local Conservation Authority or MNR district/work centre if you are not serviced by a conservation authority.

Find your CA on **Conservation Ontario's website** or your MNR work centre on **www.ontario.ca**.

In cases of extreme water shortages, your local municipality is responsible for response actions to help people in the community.

OPTION 2 – ACTION

Prepare a written contingency plan, including the use of best management practices, to deal with potential periods of low water.

A written plan for reducing water use will help your business manage during times of shortage.

Read the OMAFA factsheet:

Prepare for irrigation during water shortages

13–5. Maintenance of livestock watering equipment

BACKGROUND

A reliable supply of water is one of the most essential components in a livestock feeding program. Livestock's demand for water will depend on many factors including time of day, temperature, species of animal, etc.

Since the distribution system will tend to be the limiting factor, it is important to ensure the watering equipment has no leaks. Leaks and spills will waste water and money, reduce available water for livestock, and create more potentially contaminated wastewater.

Water leaks can cause a variety of issues including wet and muddy yards, livestock and poultry foot problems from standing in wet conditions, reduced capacity for liquid manure systems, and wet litter resulting in fly issues.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Monitor and maintain watering equipment regularly:

- inspect systems regularly and repair any leaks as soon as they are discovered
- ensure watering equipment is in good working order, and floats and seals prevent spillage and overflows

Ensure watering equipment is in good working order to prevent overflow and waste.

13–6. Efficient use of washing/processing water

BACKGROUND

Improving water use efficiency in on-farm processing can reduce farm water demand while achieving the same or better level of production. This will reduce the handling, storage and disposal costs associated with washing/processing water.

Recycling water may be an option in some circumstances, but the food safety risks must be carefully managed.

It is an offence under the Ontario Water Resources Act to have washwater negatively impact surface or groundwater. Washwaters can negatively impact stream water quality if the water has elevated levels of nutrients or organic matter.

Properly managed washing/processing water is part of a good business plan and will help protect water quality around your farm.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Analyze your operation or hire a qualified professional to identify where water losses can be eliminated or reduced:

- systematically review where all water is used in the process
- implement all upgrades/improvements identified in the review process
- look for opportunities to treat and recycle washwater where possible to reduce the overall amount used

Improving water use efficiency in on-farm processing will save water and money.

13–7. Irrigation scheduling

BACKGROUND

Irrigation may be a cost-effective technique to ensure there is sufficient available water to meet the crop's needs when natural rainfall is inadequate. Base the water application on specific crop recommendations as well as personal knowledge and experience. Adjust application according to climate, soil texture, daily weather, and crop needs – this ensures that water is not wasted and crops will be of the highest quality and yield.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Use irrigation scheduling methods to maximize crop benefits and conserve water use:

- develop a plan for irrigation using recommendations for a specific crop's water needs, considering factors such as rainfall, evapotranspiration, stage of crop development, and soil moisture (use a soil moisture meter to measure)
- implement the plan

Review the OMAFA factsheet:

Monitoring soil moisture to improve irrigation decisions

Soil moisture levels are an important factor in assessing current conditions to determine when irrigation is needed to meet a crop's water requirements.

13–8. Water application

BACKGROUND

It is important that the irrigation system is delivering water at the appropriate rate for infiltration.

Observe cropland to ensure there is no irrigation-related ponding, runoff or tile drain flow, as these are signs that your application rate is exceeding the infiltration rate.

To lower the application rate, reduce the density of sprinklers or change the sprinklers or nozzles for lower flow rates. Hilly areas of the field require greater attention for runoff management.

Use rain gauges or catch cans located strategically across the field to measure the actual depth (and volume) of water applied to the crop and the evenness of the application.

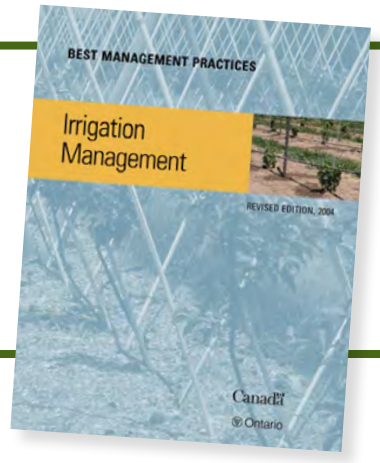
WHAT CAN YOU DO?

OPTION 1 – ACTION

Verify the irrigation system is delivering the volume of water needed at the appropriate rate. Adjust the system and the system's operation to match the water needs:

- use rain gauges or catch cans located strategically across the field to measure and then log the actual depth (and volume) of water applied to the crop and the evenness of application
- improve uniformity of water application by:
  - changing the type of equipment
  - choosing to irrigate when winds are low
  - modifying the operating pressure
  - improving maintenance
- reduce water depth (volume) applied or the frequency of irrigation if tile drains flow as a result of the irrigation applications
- reduce application rate to avoid ponding and/or runoff – match application rate to infiltration ability of the soil

For more information about scheduling and verifying rates, review the Irrigation Management BMP book.



13–9. Type of equipment

BACKGROUND

Irrigation systems vary in efficiency of volume of water used, energy required to operate, potential for contaminated runoff, and potential for water erosion.

The goal is to maintain plant transpiration (natural plant water use) and to decrease evaporation from plant and soil surfaces. Applying water directly to the plant roots results in less water and inputs needed to meet plant requirements and the runoff potential from the crop is lower (including fertilizer and pesticide loss).

Not all irrigation is intended to satisfy plant transpiration. Applications such as frost protection, wind erosion prevention, and evaporative cooling require equipment that sprays water evenly over the crop and soil surface. Although this allows for evaporation, it serves to protect the crop and is considered a beneficial use of water.

Management is your most important tool to increase your water efficiency, regardless of your system type.

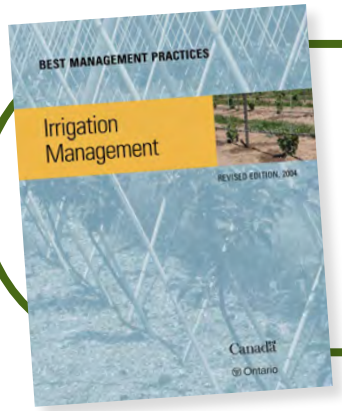
Not all irrigation is intended to satisfy plant transpiration, such as this application for frost protection.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Select the most water-efficient irrigation system possible:

- depending on the crop grown, select drip irrigation or capillary mat systems to further reduce volume of water going to non-beneficial evaporation
- replace fixed gun, mid-level and travelling gun systems with low-level sprinklers, travelling boom systems with low-pressure spray nozzles, or centre pivot (lateral move) systems with drop tubes and low-pressure spray nozzles:
  - fixed guns must be moved by hand – without good management and ample labour, they can be left in one position too long, which leads to over-watering
  - all guns and mid-level sprinklers shoot water high in the air allowing for non-beneficial evaporation, whereas low-level sprinklers apply water more directly to the plant and require less pressure (reducing pumping costs)
  - travelling booms are a good option as they can apply water closer to the plant/soil surface – however, their rapid speeds (as compared to centre pivots) means that application rates are somewhat high, which can lead to runoff
  - systems with lower application rates generally produce little excess water, and contaminated runoff and water erosion are eliminated



Irrigation of crops can be expensive and the right choice of equipment will be essential in maximizing profits. The correct equipment can provide significant financial savings with respect to energy and water consumption, while providing sufficient water when needed.

For information on the design and per acre costs of various irrigation systems, review the Irrigation Management BMP book.

13–10. Timing of overhead irrigation

BACKGROUND

Wind will reduce the uniformity of an irrigation application. Some of the water applied in a non-uniform way is wasted. Some sections of the crop may receive too little water, leading to poor crop yields. Other sections of the crop may receive more water than can be used. This excess water can promote root disease if soils remain too wet for too long. It might also percolate below the root zone, reducing the nutrients in the soil and potentially contaminating groundwater.

Water that evaporates into the air is lost. The expense of pumping cannot be recovered as the water is not going to benefit the crop. Avoiding irrigation on hot sunny days or windy days may significantly improve the efficiency of an overhead irrigation application.

Sometimes daytime irrigation is required due to conditions such as evaporative cooling, disease prevention, neighbour relations (sharing water or alternate water-taking during low water conditions), pumping noise, etc. In these cases, understand the benefits and costs of irrigating under non-ideal conditions.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Irrigate when the wind is calm or low and the sun is not shining brightly:

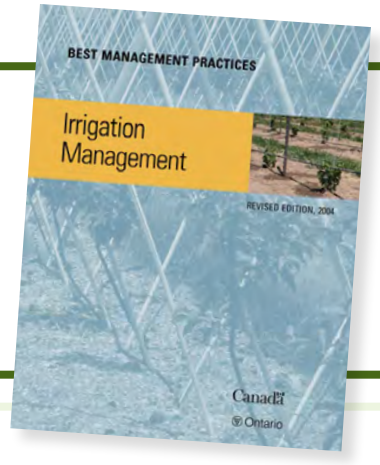
- irrigate only during no or low wind conditions
- irrigate overnight or in the early morning to reduce evaporation from sunshine

OPTION 2 – MONITORING

Use rain gauges or catch cans to calculate the ratio of the volume of water that benefitted the plant to the volume of water pumped:

- calculate your cost of pumping ($/inch applied) to understand the cost of uneven applications or excessive evaporation

For more information about overhead sprinkler systems and timing tips, review the Irrigation Management BMP book.



Review the OMAFA factsheet:

Prepare for irrigation during water shortages

13–11. Design of system

BACKGROUND

It is important the irrigation system is well-suited to the specific crop's water needs and the area in production. If an irrigation system is too large for the crop area, you will be wasting water and energy. If an irrigation system is too small, you will not have enough time to run through the complete irrigation cycle to meet crop needs.

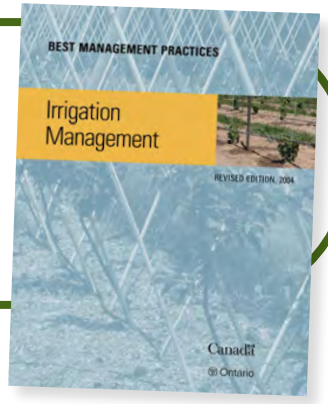
WHAT CAN YOU DO?

OPTION 1 – ACTION

Use an irrigation system that is sized for your operation:

- use low-pressure systems of less than 50 psi wherever possible to reduce the risks associated with blown lines and guns flipping in high-pressure systems of more than 80 psi
- consult a qualified irrigation designer on the system design
- apply water only to the target crop and not any of the surrounding area
- avoid different sprinkler heads in the same zone where you want to have a uniform application

There are many factors to consider when choosing a system. Use this BMP publication to help you compare options.



Watering non-cropped areas is a waste of water and energy.

Inspect the sprinkler nozzles yearly. Measure the opening of the nozzle to check if it is worn down. If it is out of tolerance, replace it.

13–12. Maintenance of system

BACKGROUND

Monitoring and maintenance are key for operational efficiency. Visually inspect the system regularly and frequently to ensure there are no leaks and water is not being wasted.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Check regularly for leaks by doing a visual inspection:

- repair leaks as soon as they are discovered to ensure operational efficiency and minimize loss of water and runoff problems
- inspect the sprinkler nozzles yearly by measuring the opening of the nozzle to check if it has worn larger – use calipers or a drill bit and replace if worn
- use pressure tests and flow meters to ensure system is operating as designed
- follow manufacturer's manual/maintenance schedule where necessary, consult with professional designer

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

- Prepare for irrigation during water shortages
- Irrigation scheduling for tomatoes
- Irrigation scheduling for fruit crops
- Monitoring soil moisture to improve irrigation decisions
- Water efficiency and conservation practices
- Conserving pasture production during dry conditions

Best Management Practices Series

- Water Management
- Irrigation Management
- Water Wells
- Controlling Soil Erosion on the Farm
- Cropland Drainage
- Field Crop Production
- No-Till: Making it Work
- Soil Management
- Streamside Grazing

ONTARIO MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS

- Permit To Take Water (PTTW) program
- Guide for applying for approval of permit to take water form
- Managing your water well in times of shortage

CONSERVATION AUTHORITY

- Visit Conservation Ontario to find your local conservation authority
  - Local low water conditions, reports and information on water availability

ONTARIO MINISTRY OF NATURAL RESOURCES

- Surface Water Monitoring
- Ontario Low Water Program
- Drought

ONTARIO SOIL AND CROP IMPROVEMENT ASSOCIATION

- Rotational Grazing in Extensive Pastures

LEGISLATION/ACTS

- Ontario Water Resources Act, 1990
- Ontario Regulation 387/04 Water Taking and Transfer
- Fisheries Act, 1985