

Greenhouse Discharge Management Plan

Most greenhouse operations over 1 hectare use a recirculating nutrient solution until a water quality or crop performance trigger is reached, and then the solution is discharged into storage before being irrigated to land.

Councils require a range of controls which address the actual and potential environmental risks from the nutrient discharges. A *Greenhouse Discharge Management Plan* (The Plan) is required to enable growers to demonstrate they meet the requirements of the regional planning instruments and that they are managing their risks to the environment.

The objective of The Plan is to address the risks and put into practice tools and processes which manage Council expectations.

Description of the Environment and Activity

Each greenhouse will have its own unique conditions for crop and nutrient management. Each site will also be different in terms of environmental sensitivity to the discharges. This will include areas of special interest in planning documents, depths to groundwater, proximity of streams and overall load to the catchment.

Plan topics include:

- Site description
- Detailed soils information
- Water use for irrigation and nutrient discharges
- Storage
- Nutrient discharge areas
- Outline area of application site(s)
- Buffer zones
- Depth to groundwater

Nutrient Irrigation Methods

The discharges will need to be managed according to the *Code of Practice* for greenhouse operations.

The Plan topics include:

- Risk management and contingency methods
- Pump failure
- Storage tank failure
- Discharge volumes
- Distribution system (pipe, sprinkler or valve) failure
- Loss of access to a dispersal area and alternatives
- Seasonal operation of irrigation and disposal
- Winter weather effects & storage capacity

Maintenance

The greenhouse operator will need to have a maintenance schedule and diary for the key irrigation and disposal infrastructure. Typical maintenance areas will include:

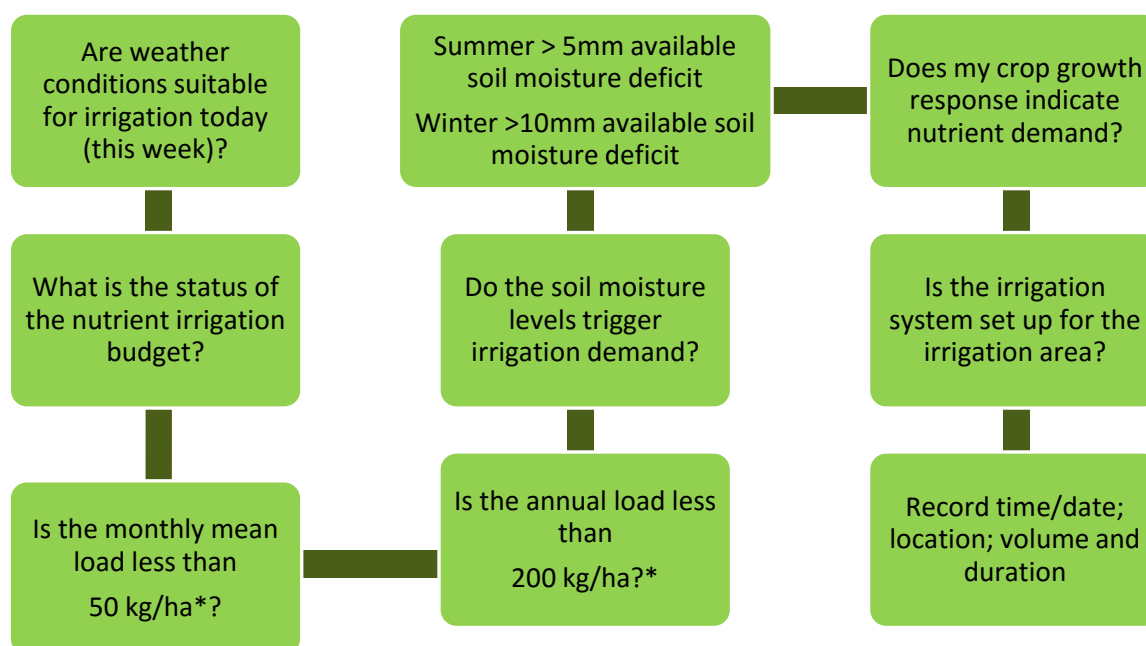
- Tanks
- Pump stations
- Pipe work and fittings
- Irrigator sprinklers/nozzles and lines

Irrigation Assessment Methodology

The *Greenhouse Discharge Management Plan* will need to include a method to record the climate and load based irrigation demand for nutrient discharges. This may include an irrigation demand model or field based tools to determine the suitability for each application of nutrient water.

Nitrogen Application

The Plan will include an operations decision framework for irrigation decisions and an approach to scheduling future irrigations especially in winter conditions. The primary requirement from this section is to detail, how irrigation scheduling will work on the property. The flow chart below provides an outline for the potential decision steps required for each operator.



* Note some locations have lower caps (e.g. 30 kgN/ha/month and 150 kgN/ha/year)

The Plan will detail how the operator will record as a diary or through automation the individual and cumulative discharge loads and how the risks are managed in accordance with the Code of Practice.

Monitoring

An Environmental Management Plan requires a monitoring framework which provides feedback on its effectiveness. This requires the collection of good data to predict effects and avoid operational risks.

The Plan will detail monitoring across the following areas of the greenhouse operation:

- Production and process monitoring
- Water use
- Effluent N P K levels
- Soil quality and condition
- Soil cores and lab analysis
- Soil moisture
- Water quality
- Background assessments for water quality
- Groundwater and surface water quality data
- Pasture management
- Pasture yields
- Nutrient load and loss (OVERSEER) records

Reporting

The Plan performance is a measure of the objectives and monitoring data. The Plan will provide an overview of the performance of the irrigation scheduling and risks to the environment. These indices will provide an indication of the storage and irrigation area requirements in the following year. It can also help drive efficiencies in the management of the discharges and avoid environmental risks or unintended consequences.

A reporting structure in The Plan is recommended as follows:

- Annual reporting:
 - Annual nitrogen loads applied to each irrigation command area
 - OVERSEER records for each irrigation command area and farm performance
 - Total water consumption
 - Total discharge solution irrigated
 - Total harvest as dry matter and nitrogen, phosphorus removal
- Trend Analysis:
 - Changing soil conditions
 - Changing soil chemistry
 - Upstream and downstream water quality
 - Groundwater quality
 - Greenhouse operator will develop over time performance indices as a form of temporal analysis to recognise trends and state assessments in the monitoring.
- Key Performance Indicators
 - Kilograms of nitrogen leached per kilogram of produce
 - Litres of water consumed per kilogram of produce
 - Kilograms of nitrogen discharged per kilogram of produce