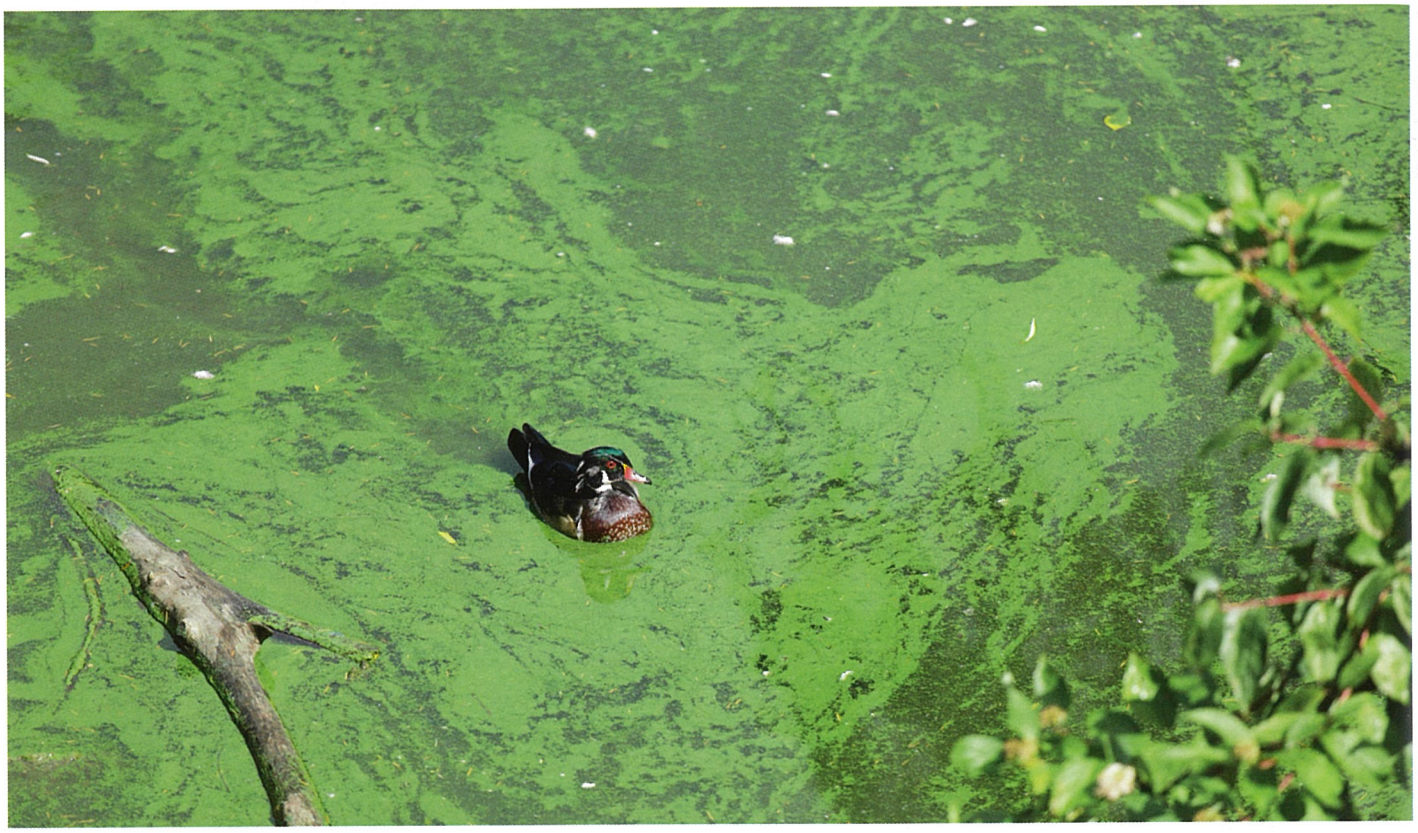
TomatoesNZ
HELEN BARNES
Business Manager
TomatoesNZ Inc.

Vegetables NEW ZEALAND
JOHN SEYMOUR
Senior Business Manager
Vegetables NZ Inc.



Greenhouse nutrient discharge – getting your ducks lined up

Ten years ago I was conducting a series of grower workshops on greenhouse nutrient discharges. I set the scene with a picture of a green algae filled lake.

Unfortunately, not really noticed by me, there was a duck sitting amongst the algae. Boy did that duck cop it from the growers; right there was the source of the problem! My workshop didn't really get off to the start that I had envisaged.

Minimising the impact on the environment of greenhouse nutrient discharges has been an industry and grower focus for a long time, putting aside the poor old duck. Back in 2007 a Code of Practice (CoP) was developed that built on growers' good management practices and formalised the management of nutrient solution associated with the soilless production of vegetable crops in modern greenhouses. While this laid the foundations, it was recognised that a 51-page CoP was tough going. It was decided at the time that a shorter grower guide was needed. The resulting 11- page guide focused on three key elements: minimising nutrient discharges, storage, and land application. In reality there are now probably 62 pages that very few people have read.

Fast forward to now and the industry has just completed a project to benchmark current nutrient discharge rates, and in collaboration with Auckland Council created a checklist and flowchart for meeting Auckland Council's permitted activity rules. For those operations over 1 ha, that aren't

already consented, a case study and discharge management plan were developed to help them through the process.

Mark Twain said: "I didn't have time to write a short letter, so I wrote a long one instead." I learnt my lesson and the checklist is just three pages - it was two but Auckland Council got hold of it – the checklist is better as a result) - and the decision tree process is two pages. These two documents are now available from TomatoesNZ and Vegetables New Zealand Inc. and I planned to discuss them at the national conference in Nelson.

The reference values in the decision tree cover both run-to-waste and recirculating systems. Without any question those with run-to-waste systems need considerably more infrastructure to meet the permitted activity rules or consent conditions, both in terms of storage and disposal area.

While these resources have been developed for the whole country, we started in Auckland as that is where the majority of operations are and consequently where most of the council and community applied pressure has come from. The philosophy is "get it right there" and when other parts of the country start adding it into their plans they can pull the industry developed guidelines straight off the shelf.

In Auckland greenhouse operations under one hectare are permitted activities, subject to meeting certain conditions. We can thank the work of Ken Robertson, formerly of Vegfed, for that. The conditions include ensuring your irrigation discharge system complies with council rules at all times, regardless of the time of year, weather conditions, breakdown or staff issues; ensuring your staff responsible for the discharge system's operation are competent in its operation and maintenance; and keeping good records. The checklist works growers through the permitted rule criteria to ensure they understand all the compliance requirements. Where these aren't met, growers can work through the decision tree process and associated reference values to get them started on determining their requirements.

FIVE KEY ELEMENTS OF SUCCESS

1. Winter storage

Sufficient storage is essential for successfully managing your nutrient discharges.

Calculating the required storage needs to take into account the period when the soil cannot be irrigated, the discharge rates over this time, the soil type, and for uncovered storage ponds rainfall (rain falling directly on the pond increases the storage requirement). The dairy industry has some excellent resources on effluent disposal that can be modified and used to provide guidance for growers. In particular they have a Dairy Effluent Storage Calculator http://www.dairynz.co.nz/environment/effluent/effluent-storage/ that can be used to determine storage requirements right around the country. The table below gives some guidance for those soils which are classified as high risk. The decision tree has the same values for low risk soils, which must be free draining soils, typically sandy/silt loam soils, without any preferential or overland flow and have a slope of less than 7 degrees.

High risk soil – average discharge of 2.7m3/day when the soil is saturated (cannot irrigate) >

FIVE KEY ELEMENTS OF SUCCESS

1. Sufficient winter storage
2. Know the soil moisture to determine when and how much discharged solution to irrigate
3. Know and track nitrogen application rates
4. Ensure even irrigation
5. Record keeping

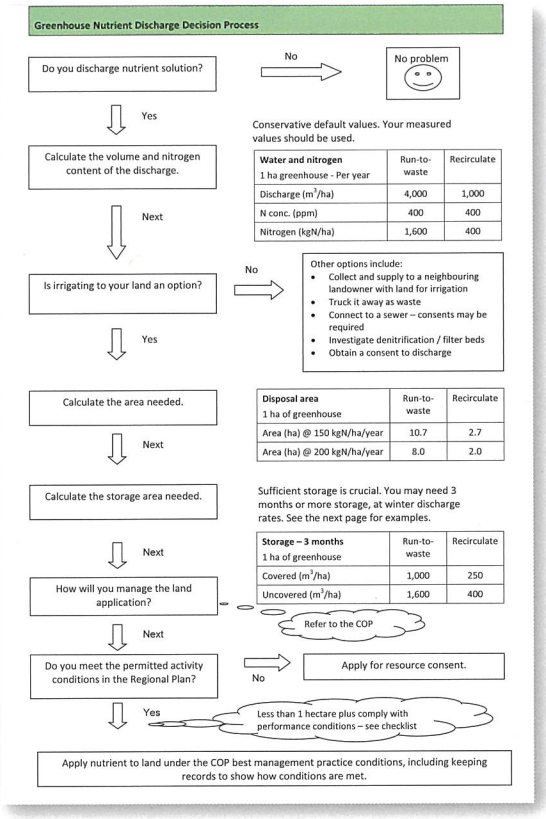
HIGH RISK SOIL – AVERAGE DISCHARGE OF 2.7M3/DAY WHEN THE SOIL IS SATURATED (CANNOT IRRIGATE)

	Covered storage	
	vol. (m3)	days of storage
Warkworth	290	107
Pukekohe	387	143
Palmerston North	360	133
Lincoln	200	73

Uncovered storage (includes direct rainfall)				
Vol. (m3)	Length (m)	Width (m)	Depth (m)	Batter (slope)
493	20	17	4.0	1.5 : 1
623	20	20	4.0	1.5 : 1
467	149	17	4.0	1.5 : 1
230	15	14	4	1.5 : 1

HELEN BARNES
Business Manager
TomatoesNZ Inc.

JOHN SEYMOUR
Senior Business Manager
Vegetables NZ Inc.



2. Know when and how much to apply

There is a wealth of information on irrigation management. You need to be able to answer the question of when and how much to apply. How tightly this needs to be managed will also depend on the volume of storage. Getting the disposal of solution right in summer is considerably easier than making these decisions in spring and autumn. The checklist points to 2 possible soil moisture probes to aid in this decision making process.

3. Know and track nitrogen

From our grower survey it became apparent that there was a wide range of practices and knowledge about the quantity of nitrogen in the discharge nutrient solution. Knowing this is essential for determining the quantity of nitrogen being applied to the land, and remaining below the input cap (Auckland) or output/leaching limit (Canterbury). This will dictate how much land is required to irrigate the discharged nutrient solution across. This could be two to ten times the area of your greenhouse.

4. Ensure even irrigation

Just like knowing how much to apply, applying that solution evenly across your disposal area is essential for success. Again there is a wealth of information on the internet about getting this right.

5. Record keeping

As you cannot manage what you don't monitor, having records are essential for both management and as proof to councils that you are complying and using good management practices.

In Auckland for those operations over 1 ha, a resource consent is needed and the level of proof and investment in systems is at an even higher level. For these operations we prepared a case study based on Southern Paprika going through their resource consenting process. The case study sheds light on the process that they went through for others to learn from. A template was developed for a Greenhouse Discharge Management Plan. This can be used to not only show what needs to be included in a plan and the consent process, but also how Southern Paprika addressed each of the requirements.

If you would like a copy of the case study, discharge management plan, checklist, or decision tree process, these are available on tomatoesnz.co.nz member's research page, and freshvegetables.co.nz research reports page, or please contact Lynda Banks on Lynda.Banks@hortnz.co.nz or 04 494 9972.

Prepared by Andrew Barber, Agrilink New Zealand and Nic Conland, Awa