

Reducing drainage costs and impacts

Why drain?

Drainage is recognised as one of the most important aspects of maintaining a productive and sustainable irrigation system in the Lower Murray Reclaimed Irrigation areas. Without drainage, waterlogging and the build up of salt and other elements would lead to a significant loss of productive capacity.

EPA guidelines for management of drainage in the LMRIA have distinguished between surface drainage (runoff) and subsurface drainage with each having different requirements for management.

Surface drainage (Runoff)

Surface drainage (runoff) is water that leaves the paddock as a surface flow after an irrigation or rainfall event. The EPA guidelines require LMRIA irrigators to have a surface water reuse system with the ability to capture and reuse 5ML/100ha of irrigable land.

Sub-surface drainage

Sub-surface drainage includes irrigation water that travels through the soil profile into the deep drains and regional groundwater and potentially river water that travels through the soil into the deep drains on the reclaimed irrigation areas. The EPA requires that the deep drains are not pumped out to the river if they contain irrigation runoff water, but permits them to be used to return groundwater and runoff following extreme rainfall events.

Why reduce drainage?

There are many good reasons for looking at how you can reduce irrigation drainage on the Lower Murray, some include:

- The need to reduce all costs associated with production and improve gross margins
- Responsible management in regard to protecting the river
- Keeping your hard earned fertiliser dollars working for you in the paddock
- Increasing or maintaining profit margins.

But regardless of any of the above reasons, farming is all about becoming more efficient at what you do, getting satisfaction out of being a farmer and, above all, achieving a profit which ensures the protection of your lifestyle and the future of farming and the river for future generations.

What are the costs of excess drainage?

The costs of drainage can be divided into two areas— direct and indirect costs. Direct costs include the cost of operating reuse systems, drainage pumps and the penalty cost of going over your irrigation allocation or returning irrigation runoff to the river. Indirect costs include the loss of fertiliser washed from paddocks in excess irrigation drainage and loss of production due to extended periods of water-logging of soils.



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What are the impacts of excess drainage?

Drainage impacts on the river in three main ways—nutrients in drainage can add to the burden of nutrients in the river. These nutrients can lead to excess algae growth, including blue green algae, under the right environmental conditions. These nutrients are transported throughout the lower river and lakes and become incorporated into river and lake sediments building up over time. Algal outbreaks can occur now or in the future, impacting on other river users and the ecology of the river itself. The nutrients can cause severe imbalances in the production of the natural river ecosystem leading to an “un-healthy” river.

The second impact is through bacteria transported into the river from manure in paddocks. These bacteria are potentially harmful to the health of river users.

The third impact is from the transport of acidic water and associated heavy metals to the river system from the sub-soil and water table. This impacts on river ecology and also on potable water supply. Damage to infrastructure can also occur through corrosion.

How can I reduce drainage costs?

There are many ways to reduce the costs of drainage from farms on the Lower Murray—this information sheet is not going to cover all of the possible ways you can achieve reduced costs, but will look at some simple and effective ways of making major savings.

This factsheet looks at two main areas of your farm operation:

- *Reducing the volume of drainage*
- *Keeping fertiliser, bacteria and acidity out of drains.*

Reducing the volume of drainage

Reducing the running time of drainage pumps to remove excess irrigation significantly reduces the cost of irrigation and drainage. With irrigation operations on the Lower Murray at full cost recovery, the cost of running pumps has become very important where in the past it has been overlooked by most farmers.

Minimise the volume of irrigation water that enters the reuse system

Improving irrigation efficiency is one way of reducing drainage and therefore drainage costs and is dealt with in information sheets on laser levelling and scheduling. There are some other basic rules to follow to reduce drainage and drainage costs:

- **Find and repair all leaks in drain channel banks**
Leaks in drain channel banks slow irrigation times and increase the total volume of water applied per irrigation, cutting efficiency and increasing costs. Any water which leaks into a drain through a channel bank is lost to the pasture and must be pumped away increasing pump run times and costs and lost fertiliser. When this occurs in combination with poorly maintained channels—increased costs are magnified further.
- **Double fence all drains to keep stock off banks**
One of the major causes of channel damage and leaks is livestock. This occurs through animals walking along banks, trying to drink from, and falling into drains. This causes local collapses in side walls of channels, reduction in bank height (allowing water to “over-top” the bank) and drains which become wide and shallow over time—this reduces flow, increases drainage volume and reduces pasture quality and tonnage. All of this combines to dramatically increase costs.
- **Re-develop paddocks damaged by the drought**
Many paddocks were damaged by the drought with severe cracking and slumping of soils and structures. These paddocks are now difficult to water and can generate excess drainage. These paddocks will need to be re-developed to be able to be watered efficiently and with reduced drainage. Many of these paddocks may take several seasons to ‘come good’. Re-development may include: ripping, rotary hoeing, laser levelling. Some may need treatment with soil amendments such as composted manure/s, especially at the drain ends. Inlets, check banks and side drains may also need repairs.
- **Ensure that drains are well maintained—clean and free flowing**
Drains that are restricted by weeds, slumped soil, tree roots and silt flow at a much slower rate than clean and unobstructed drains. Pumps can end up running for much longer times and lower efficiencies to remove drainage. Also, water tables are held up too high under paddocks reducing the growth and quality of pasture, effectively increasing the cost per tonne and per unit of energy of pasture grazed by livestock.



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The water flow in these drain is severely limited by thick weed growth. Drainage pumps will run for longer to de-water the paddocks increasing costs and less pasture will be produced due to the water table being held up under the paddock—also increasing the cost of pasture produced.



Maintain clean, leak free, double fenced side drains. Excess drainage also means increased fertiliser costs through wasted fertiliser lost in drainage and pollution of the drains by nutrients, bacteria and acidity.

Keeping fertiliser, bacteria and acidity out of the drains

Fertiliser

Apart from drain maintenance and correct use of the farm reuse system, keeping fertiliser out of the drains is best achieved by looking at your total fertiliser strategy. This can also lead to you achieving lower fertiliser costs, better pasture quality and production and less environmental impact.

There is no value in applying fertiliser in excess of what your pasture needs. Lower Murray soils are very fertile and usually only need phosphorous and to a lesser extent potassium, at maintenance levels—that is replacing only what you remove in product. This will help minimise the risk of excess fertiliser getting into drains.

Maintenance levels will vary from farm to farm depending upon stocking rate, pasture type, bought in feed and history of the paddock. See the Nitrogen and Phosphorus information sheets for further detail. Nitrogen is the main nutrient limiting pasture production on the Lower Murray.

Tailor your fertiliser applications to match your pasture requirements—excess fertiliser does not put “money in the bank” on Lower Murray soils but can put nutrients in the drains and off your farm. Use soil and tissue testing to fine tune your fertiliser program.

Trials by PIRSA at Cowirra and Tatura Research Centre in Victoria have shown that 17% or more of fertiliser can be washed from the paddock by surface runoff from irrigation after the fertiliser is spread. To keep the fertiliser in the paddock and out of the drains it is vital that you minimise or eliminate surface runoff in the irrigation after fertiliser application. As fertiliser is usually applied at times of the year when pastures are not under water or heat stress, even if you end up under watering the paddock—the water not reaching the end of the paddock—this is not as critical as having too much water and losing fertiliser into the drains.

At most this means one or perhaps two irrigations of the season must be carefully watched so the sluice gate is turned off at the right time to prevent or minimise runoff. If you can not limit your surface runoff—on non-lasered paddocks for example—then only apply fertiliser onto wet or damp soils as soon as you can get on the paddock after irrigation. Trials have shown that both phosphorous and nitrogen fertilisers will diffuse down through wet soil so that by the time you next irrigate there will be little loss in runoff.

Make sure that you have as little surface runoff as possible in the irrigation immediately following fertiliser application. If this is not possible, then only apply fertiliser to wet or damp soils as soon as you can get on the paddock after irrigation

Bacteria

Let the manure sit in the sun before watering—hold off watering for 3 days if you can after grazing

Acidity

Keep the main drain water level around 750mm below paddock level if possible, or a minimum of at least 500mm. All drains and channels should be kept clean and free flowing

Follow these simple guidelines and you will reduce drainage volume, drainage costs and potential impacts on the river. More of your hard earned dollars will stay in your pocket where they belong. By reducing nutrient loss, by default you can also reduce bacteria and acidity impacts.

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