EPA Guidelines for Lower Murray Reclaimed Irrigation Areas

Second edition

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Disclaimer

This publication is a guide only and does not necessarily provide adequate information in relation to every situation. This publication seeks to explain your possible obligations in a helpful and accessible way. In doing so, however, some detail may not be captured. It is important, therefore, that you seek information from the EPA itself regarding your possible obligations and, where appropriate, that you seek your own legal advice.

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Summary

The guidelines have been prepared for use by irrigators in the Lower Murray Reclaimed Irrigated Area (LMRIA).

The area was rehabilitated between 2006 and 2008 and the water use, capture and reuse measures described are designed specifically for this area, and flood irrigated land generally.

The guidelines are based on best management practices developed by agricultural consultants, irrigation engineers and the Environment Protection Authority, with extensive consultation with the irrigators.

All current aspects of floodplain management are covered. It is up to each irrigator to assess the risks that apply to their property and modify their use accordingly.

1 Introduction

There are approximately 5,200 ha of irrigated area on the former floodplain of the Murray River in South Australia known collectively as the Lower Murray Reclaimed Irrigation Area (LMRIA). Environmental management on irrigated farms in the LMRIA can impact on the water quality of the River Murray.

Historically, drainage discharges from surface irrigation in the LMRIA have contained elevated levels of nutrients, particularly nitrogen and phosphorus, and E coli bacteria, which is an indicator of other bacteria that can be harmful to humans. These discharges cause water quality in the river to deteriorate which impacts on aquatic ecosystem health and creates risks to the health of recreational users and drinking water supplies.

A major rehabilitation and restructuring program has been completed in the LMRIA to reduce water use and pollutant loads returned to the river. A range of infrastructure improvements undertaken in the rehabilitation project include:

- new water delivery infrastructure (eg siphons/sluices, meters, inlet channels)
- water metering
- laser levelling of paddock surfaces
- construction of surface irrigation and stormwater runoff capture and reuse systems to recycle excess surface irrigation runoff water and pollutants back onto the farm.

When completed this rehabilitation project should greatly reduce drainage volumes and pollutant loads returned to the river (EPA 2008). However, ongoing environmental management and maintenance of infrastructure will be required to ensure this objective is achieved.

These environmental guidelines have been produced to help irrigators continue to meet their general environmental duty of care (section 25 of the *Environment Protection Act 1993*) by managing their farm enterprises responsibly and minimising the impacts of their activity on the river. The *Environment Protection (Water Quality) Policy 2003* describes the obligations of the irrigator to meet their environmental duty of care and these specific guidelines should be used to help irrigators meet those obligations.

Four types of best management practices (BMPs) are listed here, examples of how they reduce impacts on the river, whether from dairying, or other livestock or cropping enterprises. Not all BMPs will apply to each farm, and other BMPs may be applicable or are still to be developed. Each irrigator will need to continually assess the pollution risk potential of all farm activities and identify the BMPs that will reduce or minimise their risks in order to meet the objectives and targets of the environmental guidelines.

2 Water management

Use best available management practices to:

- optimise the volume of water applied
- minimise the volume of drainage water generated while meeting the water requirements of the crop and not exceeding the property's water allocation.

Target: It has been shown that volumes of approximately 0.7 ML/ha/watering can be achieved through careful irrigation on rehabilitated areas.

Why: Surface irrigation drainage water contains relatively high levels of nutrients and bacteria. Inefficient irrigation generates large volumes of excess drainage water which, if disposed of to the river, degrades water quality. Irrigators who are water efficient will also improve their ability to cope during times of drought.

2.1 Key water best management practices

2.1.1 Water delivery

- Provide a uniform paddock surface of suitable slope to significantly improve water application efficiency, and reduce runoff and environmental contamination (laser levelling of better than 1:800).
- Ensure bay outlets do not leak.
- Ensure water meter is operational and calibrated.
- Maintain irrigation infrastructure, particularly keeping drains and channels free of weeds and obstructions to flow.
- Fence off infrastructure, including channels, drains and storage areas to prevent damage by stock.
- Keep side banks intact to prevent surface water entering the side drain.
- Replace side drains with check banks during laser levelling to keep water on the paddock and direct runoff into the reuse system.

2.1.2 Irrigation scheduling

- Apply water at the appropriate intervals to match the crop's requirements. Use an evaporation gauge, or similar device, to schedule irrigation to best meet the crop's demand for water.
- Delay irrigation after grazing for at least three days to allow sunlight to disinfect manure and kill bacteria, and reduce the potential for fresh manure to 'wash off' the paddock.
- Water individual bays rather than many bays at one time to allow better water management if bays water at different rates.

2.1.3 Irrigation management

- Apply the correct flow rate and volume of water to minimise water use and prevent runoff.
- Water short as the last portion of the bay accumulates fertiliser and manure and consequently has very high nutrient levels.
- Use a marker to indicate when water should be turned off to prevent generating runoff.

2.1.4 Drainage recovery and reuse

The simple philosophy behind the capture and reuse systems is to keep non-saline surface flows carrying fertiliser, manure and bacteria separate from saline groundwater seepage which can be returned to the river. By keeping this in mind when managing water on a property, EPA requirements built into the rehabilitation scheme will be adhere to.

- Design tail water drains to capture excess water during irrigation, in particular after rainfall events rather than for every irrigation event.
- Capture all surface irrigation and stormwater runoff in a tail water and/or main salt drain reuse system, and reuse on the floodplain or adjacent highland areas.
- Retain and reuse the first 5 ML/100 ha (50 kL/ha) of stormwater from the flood irrigated areas. During large rainfall events, where the storage capacity is exceeded, excess can be drained from the system.
- Reuse water as soon as possible (preferably during the irrigation cycle) to maintain the storage capacity of the system and minimise seepage losses.
- Keep surface water flows (from irrigation or stormwater) separate from saline groundwater flows.
- Maintain the reuse pumps and pipe work regularly to ensure reliable operation
- Maximise the land area used to irrigate with recycled drainage water.
- Monitor salinity levels in the reuse water to determine if diluting ('shandying') with river water is necessary to prevent crop damage, particularly from main drain reuse systems.
- Rotate saline water with freshwater from the river to prevent damage to crops and pastures.
- Allow manure to dry out for three days before irrigating even though the capture system will prevent any excess from returning to the river. The bacteria in the manure will stay alive if kept moist and by using this water on other paddocks without allowing sufficient time for desiccation; the bacteria could reinfect other stock during grazing.

2.1.5 Salt drain management

For where salt drain reuse systems are in use:

- The salt drain is not to be pumped out to the river when it contains any irrigation runoff water (which is required to be reused on farm), even if it accumulates saline seepage.
- Water can be used from the salt drain for irrigation, subject to metering requirements by Department of Water, Land and Biodiversity Conservation.

For all shared salt drain management:

- No blocks are allowed in the salt drain, except where approval has been given by the Environment Protection Authority as part of main drain reuse systems and rehabilitation.
- Seepage water (high salinity) accumulating in the salt drain can be pumped out when required.
- Salt drain water levels should be kept as low as possible to maximise storage capacity for rainfall events.
- During large rainfall events, the capacity of the reuse system may be exceeded and overflow into the salt drain. The salt drain can then be pumped out when the water level starts to affect the water table in the paddock by artificially raising the ground water. The remaining water should be held for a minimum of two weeks before release or irrigation elsewhere.
- Check salinity levels to manage damage to crops and pastures.
- All water in the salt drain must be allowed to freely flow between neighbours to the river.

Summary

- Where runoff water is to be reused this should happen immediately.
- Where runoff is to be pumped to the river (only following large rainfall events) — it should be held for two weeks (where practical).

3 Land management

Use best available management practices to optimise the crop uptake of nutrients being applied to paddocks, and reduce or minimise nutrients and chemicals contaminating the drainage system from any source on the farm.

Target: To minimise nutrients leaving the farm in drainage, reduce or minimise the risk of any chemical runoff or contamination, and maximise plant uptake.

Why: Irrigation runoff generated after applying fertiliser, and to a lesser extent grazing, can account for a significant proportion of the total nutrient load being discharged into the river which, in turn, increases the risk of blue-green algae growth. Other sources of nutrients and chemicals, including leakage from silage pits, chemical storage and mixing areas, and farm dumps, can also contribute significant pollution to the river.

Fertiliser and manure leaving the farm via runoff is also a financial loss of inputs which are better retained on farm.

3.1 Key land best management practices

3.1.1 Pasture and soil management

- Minimise cultivation. Only cultivate prior to laser levelling, otherwise use direct drilling.
- Maintain irrigation as much as possible to prevent cracking.
- Re-compact over rip line after mole ploughing.
- Minimise construction of structures that may alter the water table, eg drains, channels, bores.
- Minimise works that artificially raise or lower the water table as this can cause acid sulfate soil conditions.
- Do not irrigate for three days after harrowing, scarifying or fertilising.
- Investigate cut and carry pasture management to reduce stock numbers on the floodplain.

3.1.2 Fertiliser management

- Match fertiliser application with crop demand and herd requirements (eg use a balance sheet approach).
- Leave an unfertilised zone or ‘buffer strip’ at the drain end of the bay of between 20−50 m (to reduce the quantity of nutrient in the irrigation runoff). This strip traditionally has the highest level of fertility on the bay.
- Do not irrigate for three days after applying fertiliser.
- Fertilise paddocks when they are trafficable after irrigating.
- Apply fertiliser in smaller amounts more often to match plant use and minimise leaching.
- Use slow release nitrogen fertiliser.

3.1.3 Grazing management

- Use grazing management strategies to optimise the growth of the pasture, and maximise plant water use and nutrient uptake. Use 6-inch (stock in) and 2-inch (stock out) rules.
- Do not irrigate for three days after grazing. This allows bacteria to dry out and die. Continual moisture will enable the bacteria to survive and possibly reinfect stock when next grazing.
- Move water troughs into bays. This reduces the distance stock move for water and keeps manure in the bays, rather than on laneways.
- Maintain stocking rates equal to pasture production.

- Consider feed out areas for stock to reduce grazing pressure on floodplain (subject to EPA assessment and Development Application approval).

3.1.4 Riparian (river access) management

- Fence off the river, riparian zones, all drains and channels, native vegetation areas and salt affected areas.
- No livestock are allowed direct access to the river or drains leading to the river.
- Consider replacing willows with native vegetation (eg reeds, indigenous trees and shrubs) to protect the levees which draw less water and banks, contribute no pollution and sustain native fish and birds.

3.1.5 Runoff management

- Plant buffer strips around and/or between laneways, walkways, channels and roads to minimise contamination of runoff and the receiving environment.
- Manage runoff from dairy and calf rearing areas to not enter drains leading to the river.
- Manage runoff and leaching from farm dumps and chemical (including fuel) storage, and mixing/use areas by adhering to legislative guidelines. For example, use bunds or banks to confine runoff in case of accidental spillage, dispose of containers appropriately and do not dispose of chemical or fuel containers in farm dumps).
- Where bunded runoff areas are used for excess water, plant appropriate species for the conditions.

3.1.6 Managing contamination

- Do not construct silage pits or bunkers on the floodplain (swamp) to prevent leakage into drains and channels.
- Do not bury carcasses within the floodplain to prevent contamination of the groundwater.

4 Effluent management

Use best available management practices to minimise the effluent generated and prevent contamination of the drainage system. Where possible, use all effluent on-farm.

Target: To adhere to the *Code of Practice for Milking Shed Effluent* (2003) and the Environment Protection (Water Quality) Policy 2003.

Why: Effluent from dairy surrounds, hard stand areas and laneways is a significant potential pollution source containing high levels of nutrients and bacteria. This pollution may find its way to the river, particularly during wet years and increase the risk of bacterial contamination of the domestic water supply. Manure from other livestock types could also contaminate the drainage system and the River Murray.

Calves produce very high levels of Cryptosporidium (100 times greater than adult cattle) so no calf manure can be allowed to enter the river, drains or channels.

4.1 Key effluent best management practices

4.1.1 Using effluent

- Follow the requirements of the Environment Protection (Water Quality) Policy 2003.
- The Code of Practice for Milking Shed Effluent must also be followed and these guidelines do not override any information in the code of practice
- It is preferred to use manure and effluent to build up highland soils rather than on the flood irrigated area.
- Do not apply fresh manure or effluent on the flood irrigated area and within 50 m of drains or channels.
- Use banks and/or cut-off drains to prevent manure entering drains or channels.
- Do not use manure from calf rearing sheds/areas on the flood irrigated area (use only on highland soils and remove regularly).

4.1.2 Managing effluent

- Adhere to local council requirements for scraping manure from public roadways and disposing/using appropriately.
- Regularly scrape stock access areas (eg laneways, yards, watering points, other gathering areas) to prevent build-up of manure and use/dispose appropriately. Keep less than 50 mm thick.
- Use bunding (soil, rubber, plastic, sleepers or other material) and contouring of bridges and paddocks to divert faecal material and contaminated stormwater runoff from entering drainage channels.
- Calf rearing sheds/areas should be located on the highland and well above any drains or channels leading to the river. Runoff from these areas is not allowed to enter the drainage system. If such areas need to be located near drains or channels they must have cut-off banks or bunds to prevent runoff from entering drains and channels.

5 Monitoring and reporting

Keep accurate records of water, land and effluent management practices as required for compliance with these environmental guidelines.

Target: To ensure all irrigators adequately report their compliance with the guidelines.

Why: Adequate monitoring and reporting will ensure that all irrigators are treated equally and fairly in meeting the requirements of the guidelines and that water quality impacts in the river are reduced. Good records will determine highest feed producing paddocks, and which need renovating. It also allows correlation between the water meter and paddock waterings to calculate your water efficiencies.

5.1 Key monitoring and reporting best management practices

- Develop an environmental management system that specifies best management practices to be implemented on the farm over a specific timeframe.
- Use an environmental management system that incorporates all farm management into a logical prioritised system.
- Continually assess the farm to ensure the highest standards are maintained in water efficiencies and environmental impacts.
- Use a simple self-assessment annual reporting procedure (such as a daily dairy diary).
- Use a farm management record folder that can be easily updated.
- Good records will enable you to determine highest feed producing paddocks, and which need renovating.
- Records should show a three-day break between grazing, fertilising or harrowing activities and irrigation.

6 Further information

For more information on specific best management practices refer to the Code of Practice for Milking Shed Effluent (2003) and the Environment Protection (Water Quality) Policy 2003 [available from <www.epa.sa.gov.au> or telephone (08) 8204 2004].

Be familiar with the following existing requirements:

- *Manual for spreading nutrient rich waste on agricultural land* (available from PIRSA on CD-ROM only—Freecall 1800 652 483.
- Farm chemical user course and legislative requirements call TAFE or the PIRSA Rural Chemicals Program, (08) 8226 0549 for details.
- *Occupational Health, Safety and Welfare Act 1986* and its requirements available from <www.workcover.com> or call 13 18 55.
- Development regulations on earthworks, dam construction, dredging and building work contact your local council.
- *EPA Guideline Wastewater Lagoon Construction* (2002) —available from <www.epa.sa.gov.au> or call (08) 8204 2004.
- Environment Protection Act 1993 requirements such as section 25, General Environmental Duty of Care. Copies of legislation are available from <www.legislation.sa.gov.au> or call Service SA Government Legislation Outlet—call 13 23 24.

Legislation

Legislation may be viewed on the internet at: <www.legislation.sa.gov.au>. Copies of legislation are available for purchase from**:**

Service SA Government Legislation Outlet	Telephone:	13 23 24
101 Grenfell Street	Facsimile:	(08) 8204 1909
Adelaide SA 5000	Internet:	<shop.service.sa.gov.au>

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