



PROCEDURE FOR IRRIGATION DROUIN WWTP

Document title	Procedure for irrigation Drouin WWTP
File Location	TRIM – COR/05/19660
Total Pages	8
WHEN PRINTED DOCUMENT WILL BECOME UNCONTROLLED	

1 PURPOSE

This procedure forms part of the Environmental Management System (EMS) and Agribusiness Irrigation Process Management Plan. It describes how Gippsland Water will manage the reclaimed water irrigation system at Drouin to comply with EPA Amalgamated Licence 74253 and EPA *Guidelines for Environmental Management-Use of Reclaimed Water*.

2 BACKGROUND

The EPA requires irrigation systems to be designed to contain all reclaimed water in at least the decile 90 wet year (the wettest year in 10). An important effect of this rule is that, unlike conventional irrigation design, the water supply is not necessarily intended to meet the peak irrigation demand in a dry year. Instead, there is likely to be a shortage of water in years drier than the wettest year in 10 if no other water supply is available.

Management and operations for reclaimed water irrigation are different from conventional irrigation practice. Fencing, soil, pasture and livestock management need to be adapted to a variable water supply.

The irrigation season is the period during which evaporation and water uptake by growing plants (evapotranspiration) is greater than rainfall. At Drouin, the irrigation 'season' is nominally from late November to early March.

The aim of irrigation is to supply the correct amount of water at the right time for best plant growth. The irrigation requirement may vary between less than 2 ML/ha up to 3 ML/ha from year to year at Drouin, depending on rainfall and evaporation.

Reclaimed water should be applied at regular intervals, as determined by soil moisture and/or rainfall and evaporation measurements.

Irrigation should commence in spring or early summer as soon as there is a measurable water loss from the soil (section 4). Deferring the start of irrigation increases the risk of having to carry water over at the end of the irrigation season with subsequent 'emergency' off-site discharges. Maximising irrigation early in the season is preferable to later when falling temperature and heavy rain can suddenly end the irrigation season.

A storage volume graph is appended to this procedure so the volume of reclaimed water in storage can be tracked against expected volumes for average and wet seasons. This is designed to minimize the risk of emergency discharges at times of high environmental risk. The storage volume graph should be updated according to changes in the volume of reclaimed water to be irrigated. Storage volume graphs are explained in a Gippsland Water report, COR/03/19783, titled: *Estimating Reclaimed Water Irrigation Storage Requirements* (M. Thomas 2002).

3 ACCESS TO THE IRRIGATION AREA

- 3.1 Vehicles are permitted within the irrigation area only at the discretion of the WWTP Operator.
- 3.2 Authorised personnel are permitted within the irrigation area at the discretion of the WWTP Operator, provided that irrigation is not in progress or scheduled while they are within the area.
- 3.3 Authorised personnel should not enter the irrigation area within 4 hours after irrigation or until the pasture is dry, except with the permission of the WWTP Operator.

4 IRRIGATION SCHEDULING

- 4.1 There is no environmental benefit in putting too much water on the land. Over-irrigation eventually degrades the land causing poor quality runoff and excessive drainage down through the subsoil (leaching). It also makes farm operations e.g. access and livestock management more risky and difficult. In other words, poor irrigation management can harm the land and cause pollution of both surface water and ground water. The volume of reclaimed water released to the environment outside of the irrigation season depends on rainfall during the irrigation season. If summer rainfall is above average, more reclaimed water will have to be released to Shillinglaw Creek.
- 4.2 The aim is to draw down the reclaimed water storage lagoon to the lowest working level before the end of each irrigation season. Appendix B indicates the volume of reclaimed water that is expected to be in the storage lagoon at the end of each month during the irrigation season. The heavy top line shows the expected volume for the wettest season in ten years; the heavy bottom line shows the expected volume for a season with average rainfall. To follow the average line, it may be necessary to irrigate the maximum area available in a wet season or to conserve water for irrigation of a 'core' irrigation area late in a dry season.
- 4.3 As an approximate guide, irrigation is due when evaporation minus rainfall x 70% is 20 mm or more since the last irrigation.

Example: Evaporation = 40 mm
 Rainfall = 10 mm
 (40 - 10) x 70% = 21 mm

In practice, irrigation is scheduled using the Irrigation scheduling record. This uses rainfall and evaporation data to calculate effective rainfall (Pe) and potential evapotranspiration (PET), using variable crop co-efficients for each month. Irrigate when PET minus Pe is 20 mm or more.

Notes:

- Evaporation in summer can be more than 5 mm per day so with no rain, irrigation would be about weekly.
- Soil moisture and pasture conditions should always be taken into account.
- The first irrigation of the season depends on assessment of soil and pasture conditions and the weather outlook.

- Irrigation should not commence or continue during weather conditions that may reasonably be expected to cause surface runoff or spray drift beyond the boundaries of the irrigation area.

5 IRRIGATION

- Select the pivot circle to irrigate using irrigation scheduling records.
- Check that spray drift will not cause nuisance.
- Set the pump running time.
- Set the irrigation controller as necessary.
- Open valves as shown on the irrigation plan.
- Check that sprays are operating.
- After irrigation, shut down the pump and close valves.
- Record irrigation details using the irrigation scheduling record spreadsheet template.

6 MAINTENANCE OF THE IRRIGATION SYSTEM

6.1 General

- Refer to the irrigation plan.
- All instrument readings and other observations must be recorded in the irrigation scheduling record.
- Turn off the irrigation pump and isolate power before making adjustments or repairs, as necessary.

6.2 Start of Irrigation Season

- Check wheel tracks and top up with rock if necessary.
- Check growth of trees in plantation within reach of end gun.
- Slash grass through rifle range where pipe line runs to factory farm.
- Exercise valves.
- Raise a work order for Transfield to check and test run electric pump.
- Check and repair warning signs.
- Prime the irrigation pump.
- Check the irrigation system for leaks and other faults.
- Maintenance Check to be completed.
- Service diesel motors on pivot 4 and 5.
- Test electric motors on pivots 12 and 3.
- Check safety shut down switches for oil and water.
- Check all pivots are running in line with end guns running.
- Check for oil leaks.
- Check wheel hubs and tyres.
- Remove end plugs and flush lines.
- Trial wet and dry run all pivots.

6.3 Daily (When irrigating)

- Record rainfall, wind and evaporation readings.
- Record flow meter readings.
- Record pump hour meter readings.
- Record pivot running hours.
- Record storage lagoon level.
- Check for oil leaks.
- Check and clear screen on pump suction line.
- Start and stop next pivot or pivots.
- Check water, oil and diesel if pivots are running.
- Check hydraulic fluid tank level.
- Check for any irrigation water run off.
- Fill out the irrigation record sheet.

6.4 Weekly

- Check Wheel tracks for soft spots.
- Check for oil leaks in motor and lines.
- Clear blocked sprinklers.
- Check paddock conditions.
- Remove end plug and flush boom.

6.5 Monthly

- Check all pipes and valves for leaks and correct operation, repair as necessary.
- The Agribusiness Officer enters irrigated water volume data in the current WWTG inflow-outflow summary in TRIM container 03/17/16/04.

6.6 End of Irrigation Season

- Turn solenoid valves to the manual setting.
- Turn off the irrigation controller.
- Arrange for the irrigation pump/s and control equipment to be serviced.

7 BLUE GREEN ALGAE

- Blue Green Algae (BGA) is likely to be present in the lagoons. Some species of BGA can be toxic to humans, live stock and other animals. These include *Anabaena*, *Anabaenopsis*, *Pseudoanabaena*, *Aphanizomenon*, *Planktolyngbya*, *Trichodesmium* and *Nodularia*.
- BGA levels in lagoons are monitored monthly by the Wastewater group and stored in TRIM Container "CORPORATE – Reporting and Monitoring – Analytical and Environmental Services (was SGS Environmental Services) – [current year] Sampling & Monitoring Schedules".
- Operators should take care with skin contamination if BGA levels exceed 5000 cells per millilitre.
- To prevent toxic contamination to livestock, lagoons are fenced, and as a precaution a withholding period of 3 days is maintained following irrigation to minimise beef livestock ingestion.

8 LIVESTOCK

Currently Gippsland Water graze beef cattle on irrigated pasture, should other live stock be considered these other precautions should be followed:

- Dairy cattle must not be allowed to graze pasture irrigated with Class C reclaimed water for at least 5 days after irrigation.
- Pigs are not to be kept at the Drouin farm or fed anything that has been produced by irrigation with reclaimed water.
- Other livestock must be kept off irrigated pasture until the pasture is dry and has recovered, preferably at least 3 days after irrigation.
- To minimise soil damage, try to avoid stocking wet areas.

9 MONITORING

9.1 Soil Monitoring

Sample irrigated surface soils and suitable reference areas according to the following:

Year 1: N, P, K, pH, EC, Na, Ca, Mg, ESP.

Year 2: Surface soil tests as shown in 06/19/02/01

Year 3: As in year 2 plus matching subsoils.

Samples should be collected in late Winter or early Spring before the irrigation season. The irrigated soils and suitable reference areas should be sampled annually and tested in accordance with the EMS, EPA Publication 464.2 Use of reclaimed water and EPA Publication 441A Guide to the sampling and analysis of waters, wastewaters, soils and wastes.

9.2 Reclaimed Water Monitoring

The reclaimed water supply for irrigation is sampled and tested in accordance with the EMS. In the event that reclaimed water quality does not comply with EPA licence criteria, the Waste Water Treatment Operator instructs the Irrigation Operator to cease irrigation and/or supply of reclaimed water for re-use by another party until further notice.

10 SUPPLY OF RECLAIMED WATER TO OTHER PARTIES

The supply of reclaimed water for use by others is permitted only according to an *Agreement for the Sale of Reclaimed Water* between Gippsland Water and the other party or parties. Treated wastewater from Drouin WWTP is not supplied to other parties.

11 STORAGE VOLUME AND GAUGE HEIGHTS

The Table below shows expected storage volumes with corresponding lagoon gauge heights for a series of 20 years. Note that the storage levels for Drouin assume that water is discharged from the DAFF Plant to Shillinglaw Creek as required to maintain freeboard level in the final storage lagoon.

The volume in storage at the end of each month, the corresponding gauge height and decile are to be recorded on the irrigation scheduling record and saved into TRIM Container 06/19/06/01.

The Table and Appendix B need to be updated when flows increase and if seasonal rainfall distribution changes (refer TRIM COR/03/19783).

Megalitres	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
average	0.00	79	126	127	107	74	86	0	0
min	0.00	49	67	36	13	0	0	0	0
max	0.00	100	167	185	176	156	183	0	0
decile 10	0.00	56	75	57	24	17	23	61	120
decile 20	0.00	68	89	85	52	35	39	88	139
decile 30	0.00	70	115	93	88	44	64	99	154
decile 40	0.00	81	119	128	101	58	70	110	170
decile 50	0.00	83	123	136	105	66	94	127	189
decile 60	0.00	85	136	144	125	73	98	138	196
decile 70	0.00	88	147	151	133	105	114	146	210
decile 80	0.00	89	152	166	155	107	123	168	225
decile 90	0.00	90	158	176	164	122	150	184	242
Gauge	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
decile 10	0.00	0.26	0.45	0.27	0.00	0.00	0.00	0.30	0.81
decile 20	0.00	0.36	0.57	0.54	0.22	0.00	0.08	0.56	0.97
decile 30	0.00	0.38	0.76	0.58	0.53	0.16	0.33	0.63	1.10
decile 40	0.00	0.47	0.80	0.88	0.64	0.27	0.38	0.72	1.24
decile 50	0.00	0.49	0.84	0.94	0.68	0.35	0.58	0.87	1.40
decile 60	0.00	0.51	0.95	1.01	0.85	0.40	0.62	0.96	1.46
decile 70	0.00	0.53	1.04	1.08	0.92	0.68	0.76	1.03	1.58
decile 80	0.00	0.54	1.09	1.21	1.11	0.70	0.84	1.22	1.71
decile 90	0.00	0.55	1.13	1.29	1.18	0.83	1.07	1.36	1.86

APPENDIX B RECLAIMED WATER STORAGE VOLUME TARGETS



