



PINEGROVE FEEDLOT

Consolidated Site-Based Management Plan

21,100 SCU – EXPANDED SITE

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Version Final

Incorporating Appendices A to E

Document control

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1. INTRODUCTION

This Consolidated Site-Based Management Plan (CSBMP) outlines the environmental management framework for the Pinegrove Feedlot 21,100 Standard Cattle Units (SCU). It consolidates all requirements identified by:

- **Toowoomba Regional Council (TRC) Pre-lodgement Meeting Minutes – 26 March 2026**
- **Environmental Authority F10081 (ERA 2 – Intensive Animal Feedlotting)**
- **National Guidelines for Beef Cattle Feedlots in Australia (2023)**
- **Queensland Environmental Protection Act 1994**
- **Premise (2019) – Water Assessment & Management Report**

The plan ensures Pinegrove operates in a manner that protects environmental values, maintains regulatory compliance, and supports sustainable feedlot operations.

2. PURPOSE AND OBJECTIVES

The CSBMP provides TRC with a clear, consolidated environmental management framework that:

Demonstrates compliance with EA F10081
Ensures all contaminated water is contained within the Controlled Drainage Area (CDA)
Establishes clear procedures for stormwater, wastewater, and nutrient management
Identifies environmental risks and defines mitigation measures
Provides monitoring, reporting, and corrective action pathways
Aligns Pinegrove's operations with recognised industry practice

3. REGULATORY FRAMEWORK

3.1 Environmental Authority

Pinegrove Feedlot operates under **EA F10081**, authorising ERA 2 – Intensive Animal Feedlotting.

Key EA requirements addressed in this CSBMP include:

1. Containment of all contaminated water within the Controlled Drainage Area (CDA)
2. No release of contaminated water to the environment
3. Management of odour, dust, noise, and waste
4. Monitoring of soils, groundwater, and receiving environments
5. Incident reporting under the EP Act

3.2 Development Approval MCUI/1996/11155

Governs land use, infrastructure, and operational footprint.

3.3 Relevant Documents relating to this CSBMP

Includes:

Stormwater Management Statement
Daily Water Supply Demand Water Balance
Drinking Water Management Plan

Daily Wastewater Management Plan Balance
 Odour Dispersion Modelling
 Site-Based Management Plan
 Irrigation Management Plan
 Biosolids Management Plan
 Receiving Environmental Management Plan

3.4 Procedures Referenced in this CSBMP

Procedure Code	Procedure Name	Purpose / Application in CSBMP
ENPR0001	General Waste Storage & Disposal	Management of non-manure, non-effluent waste, compliant storage, segregation, and disposal.
ENPR0002	Pen Cleaning & Surface Maintenance	Routine pen cleaning to maintain pad integrity, reduce odour, dust, and improve drainage.
ENPR0003	Drains & Sedimentation Basin Cleaning & Maintenance	Cleaning drains and sediment ponds, manure removal, maintaining drainage function; recording loads in ENFR0006.
ENPR0004	Manure Storage & Disposal	Stockpile management, windrowing, composting, farm stockpile siting, spreading rules, neighbour notification, nutrient control.
ENPR0005	Liquid Effluent Storage & Disposal	Operation of sediment ponds, effluent pond, irrigation scheduling, freeboard management.
ENPR0006	Spoilt Feed Cleaning & Disposal	Collection, scraping, transport, stockpiling of spoilt feed; integration into manure composting; recording loads in ENFR0006.
ENPR0007	Dead Stock Disposal	Composting, burial (mass events), carcass handling, biosecurity compliance.
ENPR0008	Odour & Dust Management	Controls for odour sources, dust suppression, road watering, pen moisture management.
ENPR0009	Noise & Visual Impact Management	Heavy vehicle scheduling, construction noise controls, visual screening.
ENPR0010	Pest & Vermin Management	Fly baiting, mouse baiting, fox/cat/pig control, chemical compliance.
ENPR0011	Weeds Management	Identification, chemical control, SDS compliance, record keeping.
ENPR0012	Environmental Monitoring & Reporting	Annual returns, licence compliance, environmental sampling, reporting.
ENPR0013	Environmental Complaints & Management	Complaint intake, investigation, corrective actions, follow-up.
ENPR0014	Environmental Incidents	Incident response, non-compliance reporting, containment, corrective actions.
ENPR0015	Off-Site Manure Sales & Disposal	Contracting, buyer responsibilities, monitoring of off-site manure use.
ENPR0018	Contingency Plan — Effluent Dam Spillage	Spill response, regulator notification, sampling, diversion, corrective actions.
ENPR0020	Stormwater Management Plan — Ned's Pit	Stormwater controls, erosion prevention, rehabilitation, inspections.

AFPR0001	Laboratory Analysis Procedure	Nutritional, food safety, environmental, agronomic, and spill-event sampling.
AFRF0006	Laboratory Analysis Sample Preparation	Detailed sampling methodology for feed, effluent, manure, soil, water.
ENFR0003	Manure Spreading Record	Documentation of manure application area, tonnage, crop, operator; linked to ENPR0004.
ENFR0004	Irrigation Record	Effluent/freshwater irrigation volumes, paddock ID, rate, operator.
ENFR0005	Environmental Complaints Record	Formal record of complaints, investigation, actions, follow-up.
ENFR0006	Pen Cleaning & General Maintenance Record	Daily record of manure removal, loads, weights, disposal location; used by ENPR0003 & ENPR0006.
LSFR0003	Dead Reason & Autopsy Record	Autopsy findings, cause of death, diagnosis, NLIS reporting.
LSPR0021	Emergency Disease & Death Reporting	Trigger levels, vet notification, ALFA reporting, emergency disease response.

4. SITE DETAILS

4.1 Property Identification

Address: 1677 Millmerran–Cecil Plains Road, Millmerran, QLD 4357

Area: 1,581.423 ha

Zoning: Rural

Overlays: Environmental Significance, Waterways & Wetlands, Bushfire, Flood Hazard, Agricultural Land

4.2 Existing Approvals

- **Licensed Capacity:** 21,100 SCU

4.3 Key Infrastructure

- Feedlot pens (Stage 1 & 2)
- Four proposed 500 m × 40 m covered barns
- Feedmill and commodity shed
- Silage pits
- Hospital pens
- Induction yards
- Administration building & weighbridge
- Water storages (4,089 ML)
- Controlled Drainage Area (CDA)
- Sedimentation basins
- Effluent holding pond (HDPE-lined)
- Compost and biosolids pads
- 19 ha centre pivot
- 419 ha flood irrigation

5. ENVIRONMENTAL RISK MANAGEMENT SUMMARY

Environmental risks have been assessed using a structure consistent with industry practice. Controls are designed to prevent, minimise, or mitigate environmental impacts.

Environmental Risk	Primary Controls	Procedure Reference
Contaminated water discharge	CDA, sediment ponds, effluent pond, 1-in-10 wet year water balance	ENPR0005
Nutrient overload	Annual nutrient budget, soil testing, P-limited application	ENFR0004
Odour	Covered barns, pond aeration, compost management	ENPR0008
Dust	Road watering, pen moisture management, vegetation buffers	ENPR0008
Noise	Separation distance (3.3 km), low-impact operations	ENPR0009
Chemical spills	Bunding, spill kits, SDS register	ENPR0001
Flooding	All effluent infrastructure above Q100	ENPR0005
Groundwater impacts	Annual monitoring	REMP

6. WATER SUPPLY MANAGEMENT

Reference: Drinking Water management Plan

Reference: Daily Water Supply Demand Water Balance

6.1 Water Sources

Pinegrove Feedlot has multiple high-reliability water sources, consistent with the Premise (2019) Water Assessment & Management Report and updated entitlements acquired since 2019:

- 385 ML/year groundwater
- 660 ML/year surface water
- 3,025 ML/year maximum annual take
- 37 ML/year roof runoff
- 4,089 ML on-farm storage

6.2 Daily Water Balance

6.2.1 Daily Water Demand (21,100 SCU)

Total: **1.13 ML/day**

6.2.2 Daily Water Supply

Total: **9.446 ML/day**

Surplus: **8.32 ML/day**

6.2.3 Storage Requirements

Required (30 days): 47.4 ML

Available: 4,089 ML

Outcome: **86× more storage than required.**

7. WASTEWATER MANAGEMENT

Reference: Daily Wastewater Management Plan Balance – Existing Site

7.1 Design Basis

1-in-10 wet-year water balance
ARR 10-year ARI storm modelling
CDA = 60 ha
Effluent pond = 60 ML
Evaporation = 8 mm/day

7.2 ARR Storm Runoff (24 hr, 109 mm)

Runoff = **52.32 ML**
SB outflow = **28.257 ML**
Pond rainfall = **1.809 ML**
Total storm inflow = **29.933 ML**

7.3 Procedural Controls

Sedimentation basin operation: **ENPR0005**
Effluent pond management: **ENPR0005**
Irrigation scheduling: **ENFR0004**
Pen & drain cleaning: **ENPR0002, ENPR0003**

Reference: Daily Wastewater Management Plan Balance – Expanded Site

7.4 Design Basis

1-in-10 wet-year water balance
ARR 10-year ARI storm modelling
CDA = 51 ha
Roofed Barns (clean water) = 8ha
Effluent pond = 89 ML
Evaporation = 8 mm/day

7.5 ARR Storm Runoff (24 hr, 109 mm)

Runoff = **37.496 ML**
SB outflow = **36.5586 ML**
Pond rainfall = **3.16 ML**
Total storm inflow = **39.487 ML**

7.6 Procedural Controls

Sedimentation basin operation: **ENPR0005**
Effluent pond management: **ENPR0005**
Irrigation scheduling: **ENFR0004**
Pen & drain cleaning: **ENPR0002, ENPR0003**

8. STORMWATER MANAGEMENT

8.1 Clean Water

Roof runoff (37 ML/year) diverted away from CDA
Reduces wet-year inflow by ~20%
Prevents unnecessary loading of SB1/SB2 and effluent pond

8.2 Dirty Water

All contaminated water captured within CDA
Conveyed to sedimentation ponds
No pond overflow under 1-in-10 wet-year conditions
Sedimentation ponds sized to remove solids under peak wet-year inflows

8.3 Flood Hazard Controls

All effluent infrastructure located above Q100
Wet-year modelling confirms no overtopping
Bunds designed for controlled overtopping without structural failure
Emergency freeboard maintained throughout wet-year cycle

Procedural Controls

Drain cleaning: **ENPR0003**
Sedimentation basin maintenance: **ENPR0003**
Effluent pond operation: **ENPR0005**

9. IRRIGATION & NUTRIENT MANAGEMENT

9.1 Irrigation Areas

19 ha centre pivot
Combined reuse capacity: **234 ML/year**

9.2 Wet-Year Irrigation Constraints

Irrigation suspended during rainfall >10 mm/day
Irrigation suspended when soil moisture exceeds field capacity
Pivot irrigation provides sufficient reuse capacity to manage wet-year inflows
No risk of pond spill or waterlogging

9.3 Nutrient Management

Wet-year nutrient loading remains below crop removal rates
P-limited application maintained
Annual soil testing confirms sustainable nutrient balance
No risk of plant stress, yield reduction, or soil degradation

Procedural Controls

Irrigation record keeping: **ENFR0004**
Effluent disposal: **ENPR0005**
Soil testing & nutrient management: **ENPR0005 + agronomic advice**

10. BIOSOLIDS & MANURE MANAGEMENT

Reference: Nutrient & Salt Balance Statement

10.1 Storage & Windrowing

Clay-lined pad

Bunded

Graded/contoured to Effluent Holding Pond

Turned every 2–4 weeks

10.2 Manure Disposal

Procedural Controls

Manure storage & disposal: **ENPR0004**

Pen cleaning: **ENPR0002**

Composting & dead stock: **ENPR0007**

Spoilt feed disposal: **ENPR0006**

11. AIR QUALITY & DUST MANAGEMENT

11.1 Odour

Covered barns

Pond aeration

Compost management

11.2 Dust

Road watering

Pen surface management

Vegetation buffers

Procedural Controls

Odour & dust management: **ENPR0008**

Pen moisture management: **ENPR0002**

Pond aeration & turnover: **ENPR0005**

12. NOISE MANAGEMENT

Nearest receptor: **3,358 m**

Predicted noise: **27 dB**

Outcome: No noise report required

Procedural Controls

Heavy vehicle scheduling: **ENPR0009**

Construction noise controls: **ENPR0009**

13. CHEMICAL & HYDROCARBON MANAGEMENT

Bunded fuel tanks

Chemical storage shed

Spill kits

SDS register

Staff training

Chemical storage and spill response comply with:

EP Reg 2019 Schedule 7 (Hazardous Chemicals)

Work Health and Safety Act 2011

EA F10081 E3

Procedural Controls

General waste: **ENPR0001**

Chemical storage: **ENPR0001**

Spill response: **ENPR0001**

14. FLORA & FAUNA MANAGEMENT

Avoid clearing remnant vegetation

Maintain buffers

Pest and weed control program

15. BUSHFIRE MANAGEMENT

Maintain firebreaks

Water cart availability

Staff training

Emergency access routes

16. RECEIVING ENVIRONMENT MONITORING PROGRAM (REMP)

16.1 Soil

Annual soil tests for pH, EC, N, P, K, OM, CEC.

16.2 Groundwater

Annual sampling for EC, nitrate, ammonia.

16.3 Surface Water

Triggered if irrigation occurs within 500 m of Honey Suckle Creek.

16.4 Vegetation

Visual crop/pasture health checks.

Procedural controls

Irrigation monitoring: **ENFR0004**

Soil monitoring: **ENPR0005**

Groundwater monitoring: **EA F10081**

Complaints management: **ENFR0005**

17. COMPLAINTS & INCIDENT MANAGEMENT

Complaints register

Investigation within 24 hours

Corrective action

Incident reporting under EP Act

Procedural Controls

Complaints record: **ENFR0005**

Incident reporting: **EP Act**

Corrective action: **Site Manager**

18. EMERGENCY RESPONSE

Triggers include:

Pond overtopping

Flooding

Chemical spill

Water supply failure

Biosolids runoff

Actions:

Stop source

Contain

Notify Site Manager

Implement corrective action

Record incident

Procedural Controls

Emergency disease: **LSPR0021**

Mass mortality: **ENPR0007**

Chemical spill: **ENPR0001**

Pond overtopping: **ENPR0005**

19. DOCUMENT CONTROL

Version control

Annual review

Review after incidents

Review after audits

APPENDIX A – DAILY WASTEWATER MANAGEMENT PLAN BALANCE (EXISTING SITE)

6. Purpose

This Daily Wastewater Management Plan Balance (DWMPB) demonstrates that the Pinegrove Feedlot wastewater catchment, sedimentation basins, and effluent holding pond are adequately sized to **contain and treat all contaminated water during a 1-in-10 year (10% AEP) wet year**, consistent with:

- **National Guidelines for Beef Cattle Feedlots in Australia (2023)**
- **National Beef Cattle Feedlot Environmental Code of Practice (2012)**
- **Skerman (2000) Reference Manual for the Establishment and Operation of Beef Cattle Feedlots in Queensland**
- **ARR2016 Intensity-Frequency-Duration (IFD) design rainfalls (BoM)**

The DWMPB quantifies:

- Daily wastewater generation under the 1 in 10-year design event
- Daily hydraulic loading to sedimentation ponds and the effluent holding pond
- Daily irrigation reuse capacity
- Daily freeboard performance
- Compliance with the 1-in-10-year design spill frequency requirement (no overtopping more than once in 10 years)

2. Controlled Drainage Area (CDA)

Definition: The CDA is the area from which contaminated runoff (manure, pad runoff, silage leachate, hardstand runoff) is collected and directed to the wastewater treatment system.

CDA includes:

Open pens (compacted pad)

Manure handling & compost pads

Silage pads

11 Sedimentation ponds – total surface area 46,250 m²

All bunded and drained areas connected to sedimentation ponds

Total CDA area:

$$A_{CDA} = 60 \text{ ha}$$

3. Design Rainfall – 1:10 Year, 24-Hour Event

From ARR2016 IFD data (Millmerran):

Design storm: 1-in-10 year, 24-hour duration (10% AEP)

Rainfall depth:

$$P = 109 \text{ mm} = 0.109 \text{ m}$$

This satisfies the wet-year operational design requirement.

4. Runoff Coefficients

Given:

Compacted feedlot pad

Clay-lined pads

High runoff potential under wet-year conditions

Adopted runoff coefficient (consistent with National Guidelines):

$$C = 0.8$$

5. Daily Wastewater Generation

5.1 Runoff from CDA

Using:

1 mm over 1 ha = 10,000 L = 0.01 ML

Rainfall = 109 mm

CDA = 60 ha

Runoff coefficient = 0.8

$$\text{Daily wastewater} = (109 \times 0.01) \times 0.8 \times 60 = \mathbf{52.32 \text{ ML/day}}$$

5.2 Total Daily Wastewater Inflow

$$Q_{in} = 52.32 \text{ ML/day}$$

6. Sedimentation Pond Balance

6.1 Inflow

$$Q_{sed,in} = 52.32 \text{ ML/day}$$

6.2 Solids Load

Assume solids content = 5%:

$$0.05 \times 52.32 = \mathbf{2.616 \text{ ML/day solids}}$$

6.3 Solids Capture

Assume 50% settleable solids removal:

$$1.308 \text{ ML/day solids removed}$$

6.4 Daily Evaporation

$$0.008 \text{ m} \times 46,250 \text{ m}^2 = 370 \text{ m}^3 = \mathbf{0.370 \text{ ML/day}}$$

6.5 Sedimentation Ponds Storm Water Storage Buffer

The sedimentation ponds consist of 11 ponds with a total estimated volume of 127 ML and a total surface area of 46,250 m². The original feedlot design used these ponds as evaporation ponds. Following a large storm event that caused the ponds to overflow, emergency irrigation was required to lower the pond levels. This prompted construction of the 60 ML effluent holding pond and the installation of the pivot irrigator, which now irrigates effluent captured in that pond.

The sedimentation ponds are normally operated with approximately 500 mm of freeboard. This freeboard provides an available storage buffer for containing runoff during a 1-in-10 year, 24-hour design storm event:

Storage buffer = freeboard depth x total Pond surface area

$$0.5\text{m} \times 46,250 \text{ m}^2 = 23.125 \text{ ML}$$

6.6 Outflow to Effluent Pond

$$Q_{\text{sed,out}} = 52.32 - (1.308 - 0.37) - 23.125 = \mathbf{28.257 \text{ ML/day}}$$

7. Effluent Pond Daily Balance

Effluent pond characteristics:

Surface area: 16,600 m²

Storage capacity: 60 ML

Clay-lined

7.1 Daily Inflow

$$Q_{\text{pond,in}} = 28.257 \text{ ML/day}$$

7.2 Direct Rainfall on Pond

$$0.109 \text{ m} \times 16,600 \text{ m}^2 = 1,809.4 \text{ m}^3 = \mathbf{1.809 \text{ ML}}$$

7.3 Daily Evaporation

$$0.008 \text{ m} \times 16,600 \text{ m}^2 = 132.8 \text{ m}^3 = \mathbf{0.133 \text{ ML/day}}$$

7.4 Net Storage Change

$$\Delta V = 28.257 + (1.809 - 0.133) = \mathbf{29.933 \text{ ML/day}}$$

7.5 Depth Rise

$$h = 29.933 \text{ ML} \div 16,600 = 1.803 \text{ m} = \mathbf{1,803 \text{ mm}}$$

7.6 Minimum pre-storm freeboard requirement

To avoid the pond over topping during a 1 in 10 storm event the pond minimum freeboard requirement:
2,000 mm

7.7 Site specific minimum freeboard requirement

1,803 mm calculated depth rise < 2,000 mm freeboard → 197 mm margin retain, **compliant**

8. Irrigation Recovery Capacity

Pivot irrigator:

Area: 19 ha

Application depth: 25 mm/irrigation cycle

Pump flow: 198 m³/hr

Operating hours: 24 hr/day

Daily irrigation capacity:

$$Q_{irr} = 0.198 \text{ ML/hr} \times 24 \text{ hr/day/day} = 4,752 \text{ m}^3/\text{day} = 4.752 \text{ ML/day}$$

Time to remove storm volume:

$$t = 29.933 \div 4.752 = 6.3 \text{ days}$$

9. Compliance Statement

This wastewater management system:

Captures all contaminated runoff from the 60 ha CDA

Is sized for a 1-in-10-year wet-year operational rainfall event

Provides 2,000 mm freeboard

Maintains zero discharge and no overtopping

Meets the required spill frequency (1 in 10 years)

Provides rapid storm recovery via high-capacity irrigation reuse

APPENDIX B – DAILY WASTEWATER MANAGEMENT PLAN BALANCE (EXPANDED SITE)

7. Purpose

This Daily Wastewater Management Plan Balance (DWMPB) demonstrates that the Pinegrove Feedlot wastewater catchment, sedimentation basins, and effluent holding pond are adequately sized to **contain and treat all contaminated water during a 1-in-10 year (10% AEP) wet event**, consistent with:

- **National Guidelines for Beef Cattle Feedlots in Australia (2023)**
- **National Beef Cattle Feedlot Environmental Code of Practice (2012)**
- **Skerman (2000) Reference Manual for the Establishment and Operation of Beef Cattle Feedlots in Queensland**
- **ARR2016 Intensity-Frequency-Duration (IFD) design rainfalls (BoM)**

The DWMPB quantifies:

- Daily wastewater generation under the 1 in 10-year design event
- Daily hydraulic loading to sedimentation ponds and the effluent holding pond
- Daily irrigation reuse capacity
- Daily freeboard performance
- Compliance with the 1-in-10-year design spill frequency requirement (no overtopping more than once in 10 years)

2. Controlled Drainage Area (CDA)

Definition: The CDA is the area from which contaminated runoff (manure, pad runoff, silage leachate, hardstand runoff) is collected and directed to the wastewater treatment system.

CDA includes:

Open pens (compacted pad)

4 x Ridgeback Barns - 4 x 500 m x 40 m = 80,000 m² = 8 ha

Roofed runoff diverted to clean water tanks

Manure handling & compost pads

Silage pads

All bunded and drained areas connected to sedimentation ponds

Total CDA area:

$$A_{CDA} = 51 \text{ ha}$$

CDA rainfall catchment 51 ha – 8 ha = **43 ha**

3. Design Rainfall – 1:10 Year, 24-Hour Event

From ARR2016 IFD data (Millmerran):

Design storm: 1-in-10 year, 24-hour duration (10% AEP)

Rainfall depth:

$$P = 109 \text{ mm} = 0.109 \text{ m}$$

This satisfies the wet-year operational design requirement.

4. Runoff Coefficients

Given:

Compacted feedlot pad

Clay-lined pads

High runoff potential under wet-year conditions

Adopted runoff coefficient (consistent with National Guidelines):

$$C = 0.8$$

5. Daily Wastewater Generation

5.1 Runoff from CDA

Using:

1 mm over 1 ha = 10,000 L = 0.01 ML

Rainfall = 109 mm

CDA = 43 ha

Runoff coefficient = 0.8

$$\text{Daily wastewater} = (109 \times 0.01) \times 0.8 \times 43 = \mathbf{37.496 \text{ ML/day}}$$

5.2 Total Daily Wastewater Inflow

$$Q_{in} = 37.496 \text{ ML/day}$$

6. Sedimentation Pond Balance

6.1 Inflow

$$Q_{\text{sed,in}} = 37.496 \text{ ML/day}$$

6.2 Solids Load

Assumptions:

Solids content = 5%:

$$0.05 \times 37.496 = \mathbf{1.8748 \text{ ML/day solids}}$$

6.3 Solids Capture

Assume 50% settleable solids removal:

$$0.9374 \text{ ML/day solids removed}$$

6.4 Outflow to Effluent Pond

$$Q_{\text{sed,out}} = 37.496 - 0.9374 = \mathbf{36.5586 \text{ ML/day}}$$

7. Effluent Pond Daily Balance

Effluent pond characteristics:

Surface area: 29,000 m²

Storage capacity: 89 ML

Clay-lined

7.1 Daily Inflow

$$Q_{\text{pond,in}} = 36.5586 \text{ ML/day}$$

7.2 Direct Rainfall on Pond

$$0.109 \text{ m} \times 29,000 \text{ m}^2 = 3,161 \text{ m}^3 = \mathbf{3.16 \text{ ML}}$$

7.3 Daily Evaporation

$$0.008 \text{ m} \times 29,000 \text{ m}^2 = 232.0 \text{ m}^3 = \mathbf{0.232 \text{ ML/day}}$$

7.4 Net Storage Change

$$\Delta V = 36.5586 + (3.16 - 0.232) = \mathbf{39.487 \text{ ML/day}}$$

7.5 Depth Rise

$$h = 39.487 \text{ ML/day} \div 29,000 = 1.361 \text{ m} = \mathbf{1,361 \text{ mm}}$$

7.6 Minimum pre-storm freeboard requirement

To avoid the pond over topping during a 1 in 10 storm event the pond minimum freeboard requirement:
1,500 mm

7.7 Site specific minimum freeboard requirement

1,361 mm calculated depth rise < 1,500 mm freeboard → 139 mm margin retain, **compliant**

8. Irrigation Recovery Capacity

Pivot irrigator:

Area: 19 ha

Application depth: 25 mm/irrigation cycle

Pump flow: 198 m³/hr

Operating hours: 24 hr/day

Daily irrigation capacity:

$$Q_{irr} = 0.198 \text{ ML/hr} \times 24 \text{ hr} = 4,752 \text{ m}^3/\text{day} = 4.752 \text{ ML/day}$$

Time to remove storm volume:

$$t = 39.487 \div 4.752 = 8.31 \text{ days}$$

9. Compliance Statement

This wastewater management system:

Captures all contaminated runoff from the 51 ha CDA

Is sized for a 1-in-10-year wet-year operational rainfall event

Provides 1,500 mm freeboard

Maintains zero discharge and no overtopping

Meets the required spill frequency (1 in 10 years)

Provides rapid storm recovery via high-capacity irrigation reuse

APPENDIX C – DAILY WATER SUPPLY DEMAND WATER BALANCE (EXPANDED SITE)

1. PURPOSE

This water balance quantifies:

8. **Daily water demand** for cattle, feedlot operations, dust suppression, and amenities
9. **Daily water supply** from groundwater, surface water, and roof runoff
10. **Storage requirements** to ensure supply reliability in a **20th-percentile dry year**
11. **Peak-day demand vs available pumping and storage capacity**

This assessment integrates:

MLA (2012) National Guidelines for Beef Cattle Feedlots in Australia

Skerman (2000) Reference Manual for the Establishment and Operation of Beef Cattle Feedlots in Queensland

Premise (2019) Water Assessment & Management Report – Pinegrove Feedlot

2. WATER DEMAND COMPONENTS

Daily water demand is calculated for:

- **Cattle drinking water**
- **Feedmill & processing water**
- **Hospital & induction water**
- **Staff amenities**
- **Dust suppression**
- **Miscellaneous operational use**

3. ASSUMPTIONS

Ref: Skerman (2000) – Reference Manual for the Establishment and Operation of Beef Cattle Feedlots in Queensland

MLA (2012) – National Guidelines for Beef Cattle Feedlots in Australia

Parameter	Value	Notes
SCU capacity	21,100 SCU	Proposed expansion
Cattle drinking water	50 L/head/day	Hot season peak; MLA standard
Feedmill water	0.5 L/head/day	Grain tempering, mill dust control
Hospital/induction	0.2 L/head/day	Washdown + animal handling
Staff amenities	500 L/day	15 staff
Dust suppression	50,000 L/day	Summer peak
Miscellaneous	10,000 L/day	Washdown, small leaks, etc.

4. DAILY WATER DEMAND CALCULATION

4.1 Cattle Drinking Water

$$21,100 \text{ head} \times 50 \text{ L/day} = 1,055,000 \text{ L/day}$$

4.2 Feedmill Water

$$21,100 \times 0.5 = 10,550 \text{ L/day}$$

4.3 Hospital & Induction

$$21,100 \times 0.2 = 4,220 \text{ L/day}$$

4.4 Staff Amenities

$$500 \text{ L/day}$$

4.5 Dust Suppression

$$50,000 \text{ L/day}$$

4.6 Miscellaneous

$$10,000 \text{ L/day}$$

5. TOTAL DAILY WATER DEMAND

Component	SCU		Daily Demand (L/day)	ML/day	ML/Year
Cattle drinking	21,100	50 L/Head/day	1,055,000	1.055	385.0
Feedmill water	21,100	0.5 L/head/day	10,550	0.01055	3.85
Hospital/induction	21,100	0.2 L/Head/day	4,220	0.00422	1.54
Staff amenities	21,100	500 L/day	500	0.0005	0.2
Dust suppression	21,100	50,000 L/day	50,000	0.050	18.3
Miscellaneous	21,100	10,000 L/day	10,000	0.010	3.7
TOTAL			1,130,270 L/day	1.130 ML/day	412.5 ML/Yr

Peak daily demand = 1.13 ML/day

6. WATER SUPPLY SOURCES

Pinegrove has:

6.1 Groundwater

- **385 ML/year** high-security groundwater¹
- Equivalent daily yield:

$$385 \div 365 = 1.055 \text{ ML/day}$$

6.2 Surface Water Allocations

660 ML/year unsupplemented allocation

Max annual take: **3,025 ML/year**

Equivalent daily yield (max take): **8.29 ML/day**

$$3,025 \div 365 = 8.29 \text{ ML/day}$$

6.3 Roof Runoff (New Barns)

Four barns:

500 m × 40 m = 20,000 m² each

Total roof area = **80,000 m²**

20th-percentile dry year rainfall (Millmerran): **463 mm/year²**

Annual yield: **37 ML/year**

Daily average: **0.101 ML/day**

$$80,000 \times 0.463 = 37,040 \text{ m}^3/\text{year} = 37 \text{ ML/year}$$

Daily average:

$$37 \div 365 = 0.101 \text{ ML/day}$$

6.4 Total Daily Supply Capacity

Source	ML/day
Groundwater	1.055
Surface water (max take)	8.29
Roof runoff (avg)	0.101
TOTAL SUPPLY	9.446 ML/day

¹ Sales Information Memorandum – page 15

² Percentile-rank method for BOM Station 41069 – Millmerran Post Office

• SUPPLY VS DEMAND

Item	ML/day	ML/year
Total Demand	1.13	412.5
Total Supply Capacity	9.446	3,448
Surplus	8.32 ML/day	3,035.5 ML/year

8. STORAGE REQUIREMENTS

TRC requires demonstration of:

Peak demand buffering

Pump outage resilience

Seasonal variation

Dry year reliability

Existing Storage

4,089 ML total on-farm storage³

Includes ring tanks, storages 1 & 2, and Pine Creek impoundment

Required Storage for 30 Days

$$1.13 \text{ ML/day} \times 30 = 33.9 \text{ ML}$$

Storage Available vs Required

4,089 ML available vs 34 ML required

³ Sales Information Memorandum - page 16

APPENDIX D – DRINKING WATER MANAGEMENT PLAN (EXPANDED SITE)

12. Purpose

The purpose of this Drinking Water Management Plan (DWMP) is to document how Pinegrove Feedlot maintains a **safe, reliable, and adequate potable water supply** for cattle, staff, feed processing, hospital/induction facilities, and emergency firefighting.

The plan ensures compliance with:

- **Environmental Protection Act 1994 (Qld)**
- **Environmental Authority F1-0081** – Queensland DES
- **Australian Drinking Water Guidelines (ADWG 2022)** – National Health and Medical Research
- **National Feedlot Accreditation Scheme (NFAS) Standard (2003)**
- **Toowoomba Regional Council DA requirements**

2. SCOPE

The DWMP applies to all water sources, storage, distribution, monitoring, and operational procedures across the feedlot.

3. WATER SOURCES

Pinegrove operates a **multi-source water supply system** to ensure reliability and redundancy.

3.1 Groundwater

- 385 ML/year high-security groundwater licences
- Drawn from Surat Hutton and Central Condamine Alluvium
- Primary potable supply

3.2 Surface Water

660 ML/year unsupplemented allocation

Maximum annual take: 3,025 ML

Used for cattle drinking, Feedmill, and dust suppression

3.3 Roof Runoff (Covered Barns)

80,000 m² roof area

Captured into Water Storage tanks 1 to 4

Supplementary potable supply after filtration

4. WATER STORAGE & DISTRIBUTION

4.1 Storage Infrastructure

Total on-farm storage: **4,089 ML**

Includes ring tanks, storages 1 to 4 and Pine Creek impoundment

Potable storages isolated from effluent systems

4.2 Distribution Network

Pressurised reticulation to all pens

Dedicated lines for troughs, feedmill, hospital/induction, staff amenities

Backflow prevention installed at all risk points

4.3 Trough Infrastructure

One trough per pen

Float-valve controlled

Concrete aprons

Daily inspection and cleaning

5. WATER QUALITY MANAGEMENT

5.1 Water Quality Standards

Pinegrove adopts the **Australian Drinking Water Guidelines (ADWG)** for:

Turbidity

pH

Salinity (EC)

Microbiological safety (E. coli)

5.3 Monitoring Schedule

Parameter	Frequency	Method
Trough cleanliness	Daily	Visual
Flow rate	Weekly	Manual check
Microbial (E. coli)	Quarterly	Lab test
Full chemistry	Annually	NATA lab

5.4 Corrective Actions

Isolate contaminated source

Switch to alternate supply

Flush lines

Re-test water

Record corrective action

6. WATER SUPPLY RELIABILITY

6.1 Daily Water Demand

Peak demand: 1.13 ML/day (CSBMP)

6.2 Supply Capacity

Available: 9.45 ML/day available

6.3 Storage Buffer

30-day requirement:	47.4 ML
Available:	4,089 ML
6x supply redundancy	
86x storage redundancy	

7. RISK ASSESSMENT

7.1 Key Risks

Pump failure
Bore outage
Contamination
Line break
Algal bloom
Trough fouling
Drought

7.2 Controls

Dual-pump redundancy
Backup generator
Multi-source supply
Daily trough inspections
Quarterly microbial testing
Emergency water carting
30-day potable reserve

8. EMERGENCY RESPONSE

Triggers: Water contamination, Pump failure, Storage contamination, Trough failure

Actions

Switch to alternate water source
Isolate contaminated storage
Notify Site Manager
Implement corrective treatment
Provide temporary water
Record incident and corrective actions

9. STAFF TRAINING

Staff are trained annually in:

Water hygiene
Trough maintenance
Water quality monitoring
Emergency response
Record keeping

10. RECORD KEEPING

Records retained for **5 years**:

Water test results
Trough inspection logs
Pump maintenance logs
Incident reports
Corrective actions
Training records

11. REVIEW & IMPROVEMENT

The DWMP is reviewed:

Annually
After any water-related incident
After audit findings
When infrastructure changes

APPENDIX E – NUTRIENT & SALT BALANCE STATEMENT

13. Purpose

This document provides a full nutrient and salt balance assessment for manure generated by the 21,100 SCU covered feedlot located at 1677 Millmerran-Cecil Plains Road, Queensland.

It demonstrates compliance with National Beef Cattle Feedlot Environmental Code confirming that compost application rates are agronomically sustainable and do not pose a risk of nutrient or salt accumulation.

2. Annual Manure/compost Production

- Standard cattle units: **21,100 SCU**
- Raw manure generated annually: 1.8t/SCU (wet manure)⁴
- Convert wet manure to Total solids: TS fraction = 50-60%
- Total solids (TS) produced:

$$1.8 \text{ t/SCU/year} \times 0.55 \text{ TS fraction} = 0.99 \text{ t TS/SCU/year}$$

$$\text{Rounded: } 1,000 \text{ kg TS/SCU/year}$$

$$21,100 \text{ SCU} \times 1,000 \text{ kg} = \mathbf{21,100,000 \text{ kg TS/year}} \text{ (21,100 t TS/year)}$$

Mass loss during composting

During the composting process microbial decompositions of organic matter and nitrogen volatilisation results in a reduction of manure volume and density of around 40-65%.

Using a loss factor of 40% DM loss:

$$21,100 \text{ t TS/year raw manure} \times (1 - 0.4) = 12,660 \text{ t TS/year finished compost}$$

Finished compost, wet (as-spread) tonnage

MLA Manure Handbook Appendix 4, Table A4.5 gives finished compost dry matter content = 74% (compost is drier than fresh manure):

$$12,660 \text{ t TS/year} \div 0.74 = 17,108 \text{ t wet compost/year (as-spread)}$$

Quantity	Value
Raw manure TS (dry matter)	21,100 t TS/year
Finished compost (after 40% composting DM loss)	12,660 t TS/year
Finished compost, wet/as spread	17,100 t/year

⁴ MLA Report B.FLT.5018 (2024), p19

3. Compost Nutrient Content

Source: MLA Manure Handbook (Appendix 4, table A4.5) – value of nutrients in feedlot compost (dry-basis analysis)

Parameter	Compost analysis (%dry basis)
Dry matter	74%
Total nitrogen	2.11% TS
Nitrogen (after ammonia losses)	1.58% TS
Phosphorus	1.31% TS
Potassium	2.49% TS

First-year plant availability factors (compost)

Nutrient	Total nutrient content	Availability factor	Available kg/year
N	1.58 % TS	15 %	0.237% TS
P	1.31 % TS	30 %	0.393% TS
K	2.49 % TS	31 %	0.772% TS

4. Annual Nutrient Load (kg/year)

Nitrogen

$$12,660,000 \text{ kg TS} \times 0.00237 = \mathbf{30,000 \text{ kg N/year}}$$

Phosphorus

$$12,660,000 \text{ kg TS} \times 0.00393 = \mathbf{49,800 \text{ kg P/year}}$$

Potassium

$$12,660,000 \text{ kg TS} \times 0.00772 = \mathbf{97,700 \text{ kg K/year}}$$

5. Application Rates and Area

Nitrogen	Ha	Rate (t/ha)	N applied (kg/Ha)	N removal range (kg/ha)	Result
Irrigation area	436	8	19.0	150-220	Deficit – supplemental N may be required
Dryland cultivation	446	3	7.1	60-115	Deficit – supplemental N may be required
Improved pastures	331	4	9.5	50-150	Deficit – supplemental N may be required
Grazing	200	2.5	5.9	50-150	Deficit – no risk

Phosphorous	Ha	Rate (t/ha)	P applied (kg/Ha)	P removal range (kg/ha)	Result
Irrigation area	436	8	31.4	25-40	Within range
Dryland cultivation	446	3	11.8	10-20	Within range
Improved pastures	331	4	15.7	10-20	Within range
Grazing	200	2.5	9.8	5-15	Within range

Potassium	Ha	Rate (t/ha)	K applied (kg/Ha)	K removal range (kg/ha)	Result
Irrigation area	436	8	61.8	150-220	Deficit – supplemental K may be required
Dryland cultivation	446	3	23.2	15-30	Within range
Improved pastures	331	4	30.9	40-80	Deficit – no risk
Grazing	200	2.5	19.3	30-80	Deficit – no risk

6. Compost Utilisation vs Production

Total compost applied at the agronomically matched rates above:

Land use	Ha	Rate (t/ha)	Tonnes applied
Irrigation area	436	8	3,488
Dryland cultivation	446	3	1,338
Improved pastures	331	4	1,324
Grazing	200	2.5	500
Total	1,413		6,650

	Tonnes t TS/year)	% of annual production
Compost produced	12,660	100%
Compost applied at safe agronomic rates	6,650	52.5%
Surplus	6,010	47.5%

7. Crop/Pasture Nutrient Removal

Land use	Crop/Pasture type	N (kg/ha/yr)	P (kg/ha/yr)	K (kg/ha/yr)
Irrigation area	Sorghum (irrigated)	150-220	25-40	150-220
Dryland cultivation	Wheat/sorghum (dryland)	60-115	10-20	15-30
Improved pastures	Sown grass/legume (grazed)	50-150	10-20	40-80
Grazing	Native/dryland pasture	50-150	5-15	30-80

8. Nutrient Balance

Land use	Nutrient	Applied (kg/ha)	Removal range (kg/ha)	Result
Irrigation area	N	19.0	150-220	No accumulation risk
	P	31.4	25-40	No accumulation risk - within range
	K	61.8	150-220	No accumulation risk
Dryland cultivation	N	7.1	60-115	No accumulation risk
	P	11.8	10-20	No accumulation risk - within range
	K	23.2	15-30	No accumulation risk - within range
Improved pastures	N	9.5	50-150	No accumulation risk
	P	15.7	10-20	No accumulation risk - within range
	K	30.9	40-80	No accumulation risk
Grazing	N	5.9	50-150	No accumulation risk
	P	9.8	5-15	No accumulation risk - within range
	K	19.3	30-80	No accumulation risk

Conclusion

The nutrient balance demonstrates:

- Manure application is **within agronomic limits**
- No nutrient accumulation will occur

9. Salt Balance

Assumptions:

Manure EC: **8.3 dS/m** for aged manure⁵

Aged manure TS fraction: **60%**

Application rates: 8 / 3 / 4 / 2.5 t/ha (TS basis) — Section 5/6, per land use, not a single blended average

Convert EC to a salt concentration:

EC (1:5) = 8.3 dS/m for aged manure

Assuming 1 dS/m = 640 mg/L salt

Applying this to manure:

8.3 dS/m x 640 mg/L = 5,312 mg/L salt or **5.3 g salt per litre**

Convert to a TS basis

Using TS fraction of 60% industry adopts TS-basis salt content **8 g salt per kg TS**

Salt load per land use

Salt load (kg/ha/yr) = Application rate (t TS/ha) x 1,000 x 8 g/kg ÷ 1,000

Land use	Rate (t TS/ha)	Salt load (kg/ha/yr)	Ha	Total salt (kg/yr)
Irrigation area	8	64.0	436	27,904
Dryland cultivation	3	24.0	446	10,704
Improved pastures	4	32.0	331	10,592
Grazing	2.5	20.0	200	4,000
Total			1,413	53,200 kg (53.2 t) salt/year

Conclusion

Salt loading is highest on the irrigation area (64 kg/ha/yr). All four land uses fall well within what well-drained soils under 650 mm rainfall would typically be expected to handle without accumulation, provided the soil EC monitoring programme continues and confirms this.

⁵ MLA Manure Handbook – Appendix 4 (Table A4.1)