

Land Management Code of Practice

Irrigation Water from Rookwood Weir

Sunwater Doc No.: RWW-SUN-LAN-RP-0019
Version 3

28/02/2024

Document Control

Document Number		RWW-SUN-LAN-RP-0019	
Version	Date	Description	Prepared By
3	28/02/2024	Update following additional DCCEEW comments for final submission	Michael Dixon
2	29/01/2024	Update following additional DCCEEW comments for final submission	Michael Dixon
1	27/11/2023	Update following DCCEEW comments for final submission	Michael Dixon
0	02/06/2022	Update based on DCCEEW comments and transition to Sunwater template	Michael Dixon
B	02/08/2022	Final for Sunwater submission draft SLR Consulting (Ref: 620.30120.00000-R01-v2.0)	Lee Benson
A	17/03/2022	Initial draft SLR Consulting (Ref: 620.30120.00000-R01-v1.0)	Lee Benson, Fleur McPherson

Review and Approval

Role	Position	Name	Signature	Date
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1. Outline of the Land Management Code of Practice

1.1. Background

An environmental impact statement (EIS), including an addendum (AEIS) for the Lower Fitzroy River Infrastructure Project (LFRIP) was approved by the Queensland Government's Coordinator General (CoG) in December 2016 (CoG 2016) and the Federal Minister for Environment in February 2017 (*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) 2009/5173), subject to conditions. The conditions were varied on 27 May 2020 and again on 27 July 2021. Specifically, these conditions require a Land Management Code of Practice (EPBC Condition 2, LMCP or the "Code") to be prepared and approved by the Minister prior to the use of water for irrigation from either the raising of Eden Bann Weir or construction of Rookwood Weir. This Code relates only to Rookwood Weir.

This Code was developed to specifically address the EPBC Act condition of approval and has been structured to align with Commonwealth regulatory or advisory instruments, primarily the Reef 2050 Water Quality Risk Frameworks (<https://www.reefplan.qld.gov.au/tracking-progress/paddock-to-reef/management-practices>). Risk frameworks have been developed for several types of agriculture including grains, horticulture, sugarcane, bananas and grazing.

The definition of horticulture (as used in the risk frameworks) includes annual and perennial fruit and vegetable crops so includes tree crops such as macadamia, citrus, pecans, lychees as well as table grapes, soybeans, peanuts and other crops.

1.2. Scope of the Code

The Code applies to:

- each purchaser of water from Rookwood Weir who proposes to use water for the purpose of irrigated agriculture (called Irrigators);
- new Irrigators as well as existing Irrigators purchasing extra allocation;
- all types of irrigated agriculture and all scales that purchase Rookwood Weir water; and
- to the irrigated agriculture on a property irrespective of the availability of other sources of water or the proportion of total water supply afforded by the water purchased from Rookwood Weir on that property.

The Code does not apply to:

- existing unsupplemented allocations and water users in the Fitzroy River sub-catchment that are not purchasing additional water,
- farming operations that are not irrigated agriculture e.g. cattle grazing or feedlot unless graziers irrigate supplementary feed areas.

If an Irrigator grows more than one type of irrigated crop (such as in rotation) then they will need to comply with the management practices applicable to each crop.

The Code is to be attached as a condition of sale of water for irrigated agriculture and will include a requirement for Irrigators to provide annual notification of compliance. If non-compliant, Sunwater will undertake steps whereby water may cease being sold to that entity (elaborated upon in **Section 8**).

Compliance with the Code does not replace the need to comply with State-based Reef Protection Regulations or any other Commonwealth or State obligations, which may relate to the activity.

The Code provides objectives to be achieved and nominates the issues which must be managed in order to achieve the required water quality objectives. It acknowledges existing approaches, which are recognised as best practice in terms of management of the nominated issues. It is based on an existing framework in order to minimise the implementation burden on Irrigators.

Should farming practices be able to be accredited against an existing scheme, which is recognised as industry best practice (**Section 7**), the practices will be considered to have satisfied the requirements of the Code.

The Code is focussed on land management practices and does not include specific water quality monitoring. Condition 1 of the *EPBC Approval* for the Lower Fitzroy River Infrastructure Program (LFRIP) refers to a “Water Quality Monitoring Program” (WQMP) and specifically targets detection of actual impacts on the Great Barrier Reef World Heritage Area and National Heritage Place that may arise from agricultural development facilitated by the action. Outcomes of that program will be used as part of compliance assessment (**Section 8**) and the process to review the effectiveness of the Code (**Section 8**).

1.3. Development of the Code

The Code was developed through the following processes:

- Commonwealth and State agencies nominated in the *EPBC Approval* Condition 2 were invited to participate in a working group. They were:
 - Great Barrier Reef Marine Park Authority;
 - Queensland Department of Agriculture and Fisheries;
 - Queensland Department of Environment and Science (formerly Department of Environment and Heritage); and
 - Queensland Department of Regional Development, Manufacturing and Water (formerly Department of Natural Resources and Mines).
- Stakeholders comprising community and agricultural industry representatives were also invited to participate and those who accepted were:
 - Fitzroy Basin Association;
 - Advance Rockhampton;
 - Capricornia Catchments;
 - Queensland Conservation Council;
 - Queensland Farmers Federation;
 - AgForce;
 - Growcom;
 - Australian Macadamia Society;
 - Irrigation Australia;
 - Australian Cane Farmers Association; and
 - Australian Banana Growers Council.

The initial structure of the Code was developed after clarification from DAWE (Department of Agriculture, Water and the Environment, now the Department of Climate Change, Energy, the Environment and Water (DCCEEW)) and then reviewed by the agency working group.



A draft of the Code, including the land management practices, was developed and then reviewed by the agency working group. The revised draft Code was then presented to the community and agricultural industry stakeholders who provided comments and recommendations. The draft Code was revised and sent to all stakeholders and DAWE. A final Code was produced in response to comments received. The Code was approved by the Minister prior to the use of water for irrigated agriculture.

Detailed descriptions of the stakeholder engagement process and its outcomes are provided in a separate report (*Rookwood Weir Land Management Code of Practice*; LMCOP Industry Feedback Response. Sunwater 2022).

1.4. Structure of the Code

The Code is structured around the following sections:

- Outline – This provides an overview of the reasons for the Code and how it relates to other conditions of approval or broader scale actions related to water quality improvement.
- Objectives of the Code:
 - relationship to the Reef Water Quality Improvement Plan (WQIP) – These objectives are the key “goal posts” for the Code and are closely linked to the Condition of approval and to various plans and targets that have been derived for the Reef.
 - catchment and sub-catchment water quality objectives for sediment, nutrients and farm chemicals – This section outlines the Water Quality Objectives for improving water quality from the sub-catchment (related to the Project) and to achieve Reef Plan End of System water quality targets.
- Farm Plan – Regardless of which agricultural practice/s the enterprise may be, a Farm Plan will be required, and this section outlines the key requirements.
- Land management practices – These outline the elements of the relevant Reef Water Quality Risk Framework that are the current best practice standard for agricultural activities using water from Rookwood Weir. The following agricultural activities are covered separately by the Code:
 - Grains and improved pasture;
 - Sugarcane;
 - Bananas; and
 - Horticulture.
- Record keeping – This section outlines the documentation requirements to ensure that compliance with the Code can be demonstrated.
- Accreditation schemes – Where suitable existing accreditation schemes exist, they can be recognised as meeting the requirements of this Code.
- Compliance and Auditing – Describes the process by which implementation of the Code will be confirmed.
- Review and Amendment – This document will be subject to regular review and update to ensure the objectives and targets are being achieved.
- Definitions – Key definitions for terms used through this document.
- Documents reviewed – This outlines the documents, which informed the development of this Code.
- Supporting information – Links to State grower support services and resources.
- Appendices:



- Farm checklists;
- Incident response procedure;
- List of useful support tools for irrigators.

1.5. Condition of Approval

Condition 2 of the *EPBC Approval 2009/5173* (as of 27 July 2021) relates to the Code. The six sub-conditions are detailed in Table 1 along with a cross reference to the section of the Code in which the response can be found. (Note that some of the names of Queensland Government Departments have changed in the interim).

Table 1 – EPBC Act approval condition 2 addressed as part of this Land Management Code of Practice

Condition No.	Condition	Relevant Section
2a	<p>The approval holder must develop a separate land management Code of practice (the Code), for each weir that is to be constructed or raised in consultation with the Great Barrier Reef Marine Park Authority and the following Queensland Government departments and stakeholders:</p> <ol style="list-style-type: none"> i. Department of Agriculture and Fisheries; ii. Department of Environment and Science; iii. Department of Natural Resources Mines and Energy; and iv. community and relevant agricultural industry bodies. 	Section 1.3
2b	<p>Prior to inundation of the impoundment from the construction or raising of a weir, the approval holder must submit the code for that weir for approval by the Minister in writing. No water from the raising of Eden Bann Weir or Rookwood Weir respectively may be used for the purpose of irrigated agriculture until the code for that weir has been approved by the Minister. The approved code(s) must be implemented.</p>	Section 1.3
2c	<p>The Code for each weir must:</p> <ol style="list-style-type: none"> i. include water quality objectives for nutrients, sediments and farm chemicals for the sub-catchment. Those objectives must include sediment, water column concentration and flow weighted total pollutant loading objectives and targets; ii. demonstrate how the water quality objectives will meet the targets of the Reef 2050 Plan and the Reef Water Quality Protection Plan as updated from time to time; iii. include land and water management practices that will be implemented by the purchaser of the water to ensure water quality objectives are achieved, accounting for seasonal variability, and the types of agriculture and water uses undertaken; iv. include a process for: <ol style="list-style-type: none"> a. reviewing the effectiveness of the code with respect to achieving and maintaining water quality objectives; and 	<p>Section 2.2</p> <p>Section 2.1.1</p> <p>Section 4</p> <p>Section 8</p>



Condition No.	Condition	Relevant Section
	b. amending the code if water quality objectives are not met;	
2d	The Code for each weir may include an accreditation scheme for individual Irrigators that may reduce any monitoring and compliance obligations.	Section 7
2e	The approval holder must require each purchaser, proposing to use water in a manner that may impact on the quality of the water entering the Great Barrier Reef World Heritage Area and National Heritage place, to comply with the approved Code for the relevant weir.	Section 1.2, evidenced by Section 6 and Section 7
2f	The approval holder must require the purchaser to provide annual notification of compliance with the approved Code for the relevant weir, as it applies to land management practices on their property, or require the purchaser to participate in the accreditation scheme under condition 2d).	Section 1.2, evidenced by Section 6


1.6. Declaration of Accuracy

In making this declaration, I:

am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (EPBC Regulations). The offence is punishable on conviction imprisonment or a fine, or both.

am authorised to bind Sunwater to this declaration and have no knowledge of that authorisation being revoked at the time of making this declaration.

Signature



Chris Delamont (Feb 29, 2024 11:14 GMT+10)

Full name (please print)

Chris Delamont

Organisation (please print)

Sunwater Ltd

Date: 29/02/2024

2. Objectives

2.1. Objectives of the Code

The direct objectives for the Code are drawn from Condition 2 of the *EPBC Approval* for the project and are:

- Establish standard Land Management Practices for a range of crop types to be implemented by Irrigators who purchase water from the project;
- Meet the targets of the *Reef 2050 Long-Term Sustainability Plan* (“Reef 2050 Plan”, updated December 2021) and the *Reef Water Quality Improvement Plan (WQIP)*;
- Ensure water quality objectives are achieved through the implementation of the land and water management practices; and
- Establish mechanisms for ongoing compliance with the Code by water purchasers and for the effectiveness of the Code with respect to achieving and maintaining water quality objectives.

The broader objective of the Reef WQIP of direct relevance to the Code is:

- **Improved land management** – activities on agricultural lands should be such that they are at least compliant with what is agreed as current best management practices for the agricultural land practice.

Achievement of these objectives will ensure that agricultural enterprises that utilise water from Rookwood Weir for the purpose of irrigation are appropriately managed to protect water quality discharging to the Great Barrier Reef. Implementation of the code will contribute to achieving the above objectives as far as practicable for activities that come under its application. Water quality within the Lower Fitzroy River catchment will be monitored through the Sunwater Water Quality Monitoring and Reporting Program that has been developed in conjunction with this document. This will ensure that the objectives stated above are closely monitored for the duration of the operation of the weir. The Code includes compliance requirements and how non-compliances are managed with respect to water quality.

2.1.1. Reef 2050 Plan and Reef Water Quality Improvement Plan (WQIP) Targets

This Code has been structured to directly align with the management practices established to meet the targets of the *Reef 2050 Plan* and the *Reef WQIP*. The links are explained below.

In 2015, the Australian and Queensland governments released the Reef 2050 Plan. The Reef 2050 Plan identifies seven themes (ecosystem health, biodiversity, heritage, water quality, community benefits, economic benefits and governance) for managing the Great Barrier Reef World Heritage Area.

The five-year Reef WQIP is included as an action within the water quality theme of the Reef 2050 Plan. Its specific purpose is to identify management and monitoring requirements for all land-based pollution to improve the quality of water flowing from catchments adjacent to the Reef.

Water quality targets define the required reductions in sediment and nutrient loads by 2025 for the catchments discharging to the Reef (**Section 2.2**). Progress towards these targets will be delivered by:

- applying minimum practice standards across all industries and land uses;
- supporting industries and communities to build a culture of innovation and stewardship that takes them beyond minimum standards;
- restoring catchments through works to improve or repair streambanks, gullies, riparian vegetation and wetlands.

A 2025 Catchment and Land Management Target within the *Reef WQIP* relating to applying minimum practice standards is “90% of land in priority areas under grazing, horticulture, bananas, sugarcane and other broad-acre cropping are managed using best management practice systems for water quality outcomes (soil, nutrient and pesticides)”. Implementation will assist in meeting the targeted reduction in end-of-catchment loads.

The Paddock to Reef Integrated Monitoring, Modelling and Reporting Program (Paddock to Reef program) provides the framework for evaluating and reporting progress towards *Reef WQIP* targets through the Reef Water Quality Report Card.

Monitoring and modelling occur across a range of attributes, from paddock scale through to sub-catchment, catchment, regional and Great Barrier Reef-wide.

In line with the Reef 2050 WQIP framework, the Paddock to Reef program evaluates management practice adoption and effectiveness, catchment condition, pollutant runoff and marine condition.

The management practice adoption component of the Paddock to Reef program develops rigorous estimates of management practice benchmarks and change for the major agricultural industries of the Reef catchments—sugarcane, grazing, horticulture, grains and bananas.

The adoption of improved management practices is reported using industry and regional specific management practice frameworks (water quality risk frameworks).

The water quality risk frameworks form the foundation of this Code and as such, assist in meeting:

- the Catchment and Land Management Target of the Reef WQIP; and
- the reef wide (Reef 2050) water quality targets for pollution loads.

Success can be measured using the Paddock to Reef program and as reported in the *Great Barrier Reef Water Quality Report Card* as required by the WQIP.

2.2. Catchment and Sub-catchment Water Quality objectives

To meet the above objectives, the *Reef WQIP* has set specific reef-wide water quality targets to be achieved by 2025. These include:

- A 60% reduction in end-of-catchment dissolved inorganic nitrogen loads from human sources.
- A 20% reduction in end-of-catchment particulate nutrient loads from human sources.
- A 25% reduction in end-of-catchment fine sediment loads from human sources.
- Reductions in pesticide use to achieve protection of at least 99% of aquatic species at the end-of-catchments.

The *Reef WQIP* targets have been translated into specific load reductions for each of the six major reef regions (Cape York, Wet Tropics, Burdekin Dry Tropics, Mackay-Whitsundays, Fitzroy and Burnett-Mary). These were determined by understanding the water quality required to reduce impacts from catchment runoff of specific rivers in the near shore and outer reef environments.

In the Fitzroy NRM region, there are a number of major sub-catchments that contribute to the runoff that reaches the Great Barrier Reef. Specific targets have been determined for each of these sub-catchments as outlined in the table below (from Table 2 of the Reef WQIP). Rookwood Weir is within the Fitzroy River sub-catchment and the targets that this Code is aiming to help achieve are highlighted in Table 2.

Table 2 ranks spatial management priorities for water quality improvement for each relevant parameter in accordance with the colour scheme below.

Management priority					
	Very high		Moderate		Minimal
	High		Low		Not assessed

Table 2 – End-of-sub-catchment 2025 anthropogenic water quality targets for sub-catchments in the Fitzroy region

Sub-catchment	Area (ha)	Targets								Pesticide target to protect min 99% of aquatic species at end-of-catchment	
		Dissolved Inorganic Nitrogen		Fine sediment		Particulate Phosphorus		Particulate Nitrogen			
		Tonnes	% reduction	Kilo-tonnes	% reduction	Tonnes	% reduction	Tonnes	% reduction		
Styx River	301,340	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	Not assessed
Shoalwater Creek	360,180	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	Not assessed
Waterpark Creek	183,650	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	Not assessed
Fitzroy River	14,254,470	MCL	MCL	390	30	380	30	640	30		Low
Calliope River	224,060	MCL	MCL	15	30	54	30	107	30		Not assessed
Boyne River	249,630	MCL	MCL	6	40	5	40	9	40		Not assessed

MCL = maintain current load.

Of key note here is that there are currently minimal agricultural activities that contribute dissolved inorganic nitrogen to the Fitzroy, so the target here is to maintain the current load of this pollutant. The Reef WQIP p17 states, “Catchments with an MCL (Maintain Current Load) target have minimal anthropogenic pollutant loads”.

Fine sediment is the key pollutant to be managed in the Fitzroy Natural Resource Management (NRM) region and therefore in the Fitzroy sub-catchment. The Fitzroy WQIP (Fitzroy Basin Association 2015) states, “The suspended sediment of most risk to the Reef is the fine fraction. This is the component that contains most of the nitrogen and phosphorus content and other contaminants.”

The addition of a significant area of intensive cropping in the lower Fitzroy has the potential to also add to pesticide load in the catchment, in the area location much closer to the end of system than where the existing cropping is located. The actions outlined in this Code therefore seek to manage the potential future generation of dissolved inorganic nitrogen and pesticides, and also to reduce the loads of fine sediment.

If fine sediment is managed, then many of those same actions will also reduce particulate nitrogen and phosphorus as they are all particulates of varying sizes. The Fitzroy WQIP states, “By controlling the movement of sediment on the land we can manage the load of particulate nutrients being delivered to the Reef.”.

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Flow weighted loads for key pollutants are currently calculated by QLD DESI for the Fitzroy catchment as an end of catchment load prior to discharge to the GBRMP. This location is at Fitzroy River Water site upstream of the Fitzroy Barrage. The following table shows the approximate load data for the period from 2008 to 2022 and demonstrates the correlation between flow in the river and pollutant loads.

Table 3 – Fitzroy Catchment Loads (approximate)

Year	Flow (GL)	Total Suspended Solids (kt)	Total Suspended Solids (t/km ²)	Total Nitrogen (t)	Total Nitrogen (kg/km ²)	Total Phosphorus (t)	Total Phosphorus (kg/km ²)	Pesticides (% spp affected)
2007-08	12,000	4,900	35	16,000	42	5,800	42	No data
2008-09	2,200	470	3.4	2,100	5.1	710	5.1	No data
2009-10	11,000	3,600	26	13,000	38	5,300	38	No data
2010-11	39,000	7,000	50	36,000	110	15,000	110	No data
2011-12	7,200	1,300	9.5	6,400	19	2,700	19	No data
2012-13	9,500	2,500	18	9,300	27	3,700	27	No data
2013-14	1,600	52	0.37	1,000	1.2	160	1.2	No data
2014-15	2,700	1,900	6.5	3,200	9.2	1,300	9.2	No data
2015-16	2,300	670	4.8	3,300	6.5	910	6.5	1.7
2016-17	7,400	2,200	16	8,300	25	3,500	25	2.0
2017-18	970	410	16	1,400	4.2	590	4.2	3.4
2018-19	1,300	83	2.9	1,100	1.4	200	1.4	2.1
2019-20	2,900	930	6.7	4,200	8.3	1,200	8.3	*TBA
2020-21	390	16	0.11	340	0.48	66	0.48	*TBA
2021-22	3,500	2,000	14	6,100	15	2,100	15	*TBA

Source: Great Barrier Reef Catchment Loads Monitoring Program (QLD Department of Environment, Science and Innovation)

*TBA: Pesticide data collected however no calculation on % species affected currently available on the DESI Pesticide Dashboard

Note: Pesticide data based on the DESI 22 priority pesticides

Following the commencement of the operation of Rookwood Weir monitoring data collected through the WQMRP will be shared with DESI and input into the Great Barrier Reef Catchment Loads Monitoring Program (GBRCLMP) flow weighted modelling. This will assist to validate and calibrate the catchment water quality models that track progress towards the Reef 2050 water quality targets. As this GBRCLMP helps track long term trends in water quality on the GBR, it will be able to give an indication to changes in pollutant loads in the Fitzroy River over the life of the weir.

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The following table shows the Fitzroy Sub-Basin Water Quality Objectives (WQOs) from the DEHP (2011), Australian Default Water Quality Guidelines (2018) for pesticides, and Sunwater Pre-Action Baseline values from the Lower Fitzroy Water Quality Monitoring and Reporting Program.

Table 4 – Fitzroy Sub-Basin Water Quality Objectives

Water quality parameter (measurement unit)	Measurement type	Limit of Analytical Reporting (LOR)	Fitzroy Sub-basin Environmental Values and Water Quality Objectives (WQO)	Pre-Action Baseline (Sunwater WQMP)								
				Mackenzie			Dawson			Fitzroy		
				Combined	Wet	Dry	Combined	Wet	Dry	Combined	Wet	Dry
DO % Saturation (Field) (%) WQO – lower-upper objectives Baseline - lower 25 th %ile	In-situ	n/a	85-110	86	85	102	91	89	92	89	87	94
Electrical Conductivity (µS/cm)	In-situ	n/a	Base flow / high flow): 445/250 (Fitz) 310/210 (Mac) 340/210 (Daw)	285	318	282	238	264	196	269	335	268
pH WQO - lower – upper objectives Baselines – lower 25 th %ile - upper 75 th %ile	In-situ	n/a	6.5-8.5	7.1-8.5	7.1-7.9	7.2-8.9	7.1-8.0	7.2-7.9	7.3-8.3	7.3-8.4	7.3-8.1	7.3-8.7



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Water quality parameter (measurement unit)	Measurement type	Limit of Analytical Reporting (LOR)	Fitzroy Sub-basin Environmental Values and Water Quality Objectives (WQO)	Pre-Action Baseline (Sunwater WQMP)								
				Mackenzie			Dawson			Fitzroy		
				Combined	Wet	Dry	Combined	Wet	Dry	Combined	Wet	Dry
Turbidity (NTU) (FPRH Historical Dataset)	In-situ	n/a	50							190.5**		
Ammonia as N (mg/L)	Lab	0.01	0.02	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.02	0.03
Chlorophyll-a (mg/L)	Lab	0.001	0.005	0.008	0.010	0.006	0.004	0.007	0.002	0.004	0.004	0.004
Nitrite + Nitrate as N (mg/L) (Dissolved inorganic N, DIN)	Lab	0.01	0.06	0.21	0.26	0.06	0.26	0.29	0.25	0.29	0.33	0.26
Total Suspended Solids (Lab) (mg/L) (FPRH Historical Dataset)	Lab	5	85 (Fitz) 110 (Mac) 110 (Daw)							109.75**		
Total Nitrogen (mg/L) (TN)	Lab	0.1	0.5 (Fitz) 0.775 (Mac) 0.5 (Daw)	1.00	1.53	0.07	1.40	1.42	1.38	1.25	1.35	1.05
Total Phosphorus as P (mg/L) (TP)	Lab	0.01	0.05 (Fitz)	0.18	0.30	0.12	0.39	0.35	0.39	0.28	0.34	0.20



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Water quality parameter (measurement unit)	Measurement type	Limit of Analytical Reporting (LOR)	Fitzroy Sub-basin Environmental Values and Water Quality Objectives (WQO)	Pre-Action Baseline (Sunwater WQMP)								
				Mackenzie			Dawson			Fitzroy		
				Combined	Wet	Dry	Combined	Wet	Dry	Combined	Wet	Dry
			0.16 (Mac) 0.05 (Daw)									
Phosphorous Reactive (as P) (mg/L) (FRP, dissolved inorganic P, DIP)	Lab	0.01	0.02	0.04	0.06	0.03	0.13	0.13	0.10	0.05	0.07	0.05

Table 5 – Fitzroy Sub-Basin Water Quality Objectives - Pesticides

Water quality parameter (measurement unit)	Measurement type	Limit of Analytical Reporting (LOR)	ANZECC Default Guideline Values	Mackenzie	Dawson	Fitzroy
Pesticide – Priority Pesticides						
Imazapic (µg/L)	Lab	0.01	NA	0.005	0.005	0.005
Isoxaflutole (µg/L)	Lab	0.01	NA	0.005	0.005	0.005
Atrazine (µg/L)	Lab	0.01	13	0.02	0.03	0.04
Diuron (µg/L)	Lab	0.02	0.2	0.01	0.01	0.01
Hexazinone (µg/L)	Lab	0.02	NA	0.01	0.03	0.01

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Water quality parameter (measurement unit)	Measurement type	Limit of Analytical Reporting (LOR)	ANZECC Default Guideline Values	Mackenzie	Dawson	Fitzroy
Metolachlor (µg/L)	Lab	0.1	0.46	0.05	0.05	0.05
Imidacloprid (µg/L)	Lab	0.01	NA	0.005	0.005	0.005
Simazine (µg/L)	Lab	0.01	3.2	0.01	0.01	0.01
Tebuthiuron (µg/L)	Lab	0.02	2.2	0.57	1.44	1.67
Tebutylazine (µg/L)	Lab	0.01	NA	0.02	0.05	0.02
Chlorpyrifos (µg/L)	Lab	0.02	0.01	ND	ND	ND
2,4-D (µg/L)	Lab	0.01	280	ND	ND	ND
MCPA (µg/L)	Lab	10	1.4	ND	ND	ND
Metasulfuron-methyl (µg/L)	Lab	5	0.018	ND	ND	ND
Fipronil (µg/L)	Lab	0.01	0.018	ND	ND	ND
Haloxyfop (µg/L)	Lab	0.1	NA	ND	ND	ND
Pendimethalin (µg/L)	Lab	0.05	NA	ND	ND	ND
Ametryn (µg/L)	Lab	0.01	NA	ND	ND	ND
Terbutryn (µg/L)	Lab	0.01	NA	ND	ND	ND
Metribuzin (µg/L)	Lab	0.02	NA	ND	ND	ND
Fluroxypyr (µg/L)	Lab	10	NA	ND	ND	ND



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Water quality parameter (measurement unit)	Measurement type	Limit of Analytical Reporting (LOR)	ANZECC Default Guideline Values	Mackenzie	Dawson	Fitzroy
Triclopyr (µg/L)	Lab	0.01	NA	ND	ND	ND
Other Pesticides						
Diketoneitrile (µg/L)	Lab	0.01	NA	0.005	0.005	0.02
Diazinon (µg/L)	Lab	0.01	0.01	0.005	0.005	0.005
Fluprofonate (µg/L)	Lab	0.1	NA	0.2	0.05	0.05
Thiamethoxam (µg/L)	Lab	0.02	NA	0.01	0.01	0.01
Propazine (µg/L)	Lab	0.01	NA	0.005	0.005	0.005
Propiconazole (µg/L)	Lab	0.05	NA	0.025	0.025	0.025
Tebuconazole (µg/L)	Lab	0.01	NA	0.005	0.005	0.005
Atrazine-desethyl (µg/L)	Lab	0.1	NA	0.05	0.05	0.05
Chlorantraniliprole (µg/L)	Lab	0.1	NA	0.05	0.05	0.05

** The Pre-action Baseline values for turbidity and total suspended solids (TSS) were taken from the FPRH historical dataset instead of the Sunwater dataset to remove the potential influence on construction activities on these parameters. Refer to the Lower Fitzroy Water Quality Monitoring and Reporting Program for further detail.

In addition to the above concentrations for the 22 priority pesticides the data will also be fed into the DESI catchment loads monitoring Pesticide Risk Metric in the form of multi-substance potentially affected fraction (msPAF) (Warne et al. 2020). The Pesticide Risk Metric is the estimate of the proportion of the aquatic ecosystem that is protected from the direct effect of pesticides calculated over a standardised wet season. This relates to the GBRCLMP modelling above.



3. Farm Plan

Each irrigator must develop a Farm Plan prior to the use of the water allocation on the property. This includes water users who irrigate grains, sugarcane, bananas and horticulture as well as graziers who irrigate supplementary feed areas. The Farm Plan must include the following information:

- The name of the entity which owns the property and the water allocation;
- The nominal volume of allocation;
- The crop/s irrigated and their respective areas (e.g., 10 ha of avocado, or annual crops, which vary with the market but may include cereals, chick peas, etc); and
- The primary methods of irrigation employed (e.g., drip, overhead spray, centre pivot, furrow).

The Farm Plan must include a map at an appropriate scale, which shows all features relative to management of irrigation practices and the quality of any water discharged from irrigation areas in compliance with this Code and include as a minimum:

- a. The lot/plan on which the irrigation will take place;
- b. General farm layout;
- c. Offtake point /s for irrigation supply;
- d. Irrigation water storage areas on farm;
- e. Water distribution channels/pipes;
- f. Area used for irrigated cropping;
- g. Drainage lines and structures (such as tailwater capture and recycling structures);
- h. All erosion and sediment control structures;
- i. Receiving waters and discharge locations; and
- j. Receiving water buffers.

The Farm Plan must be updated whenever any of the above are altered. An agronomist or otherwise suitably qualified person (SQP) should assist with development of the Farm Plan. If the plan of the farm as it exists at the time of purchase of irrigation water does not support the requirements of best practice as nominated in the Code, a staged approach through a Best Practice Transition Plan must be developed. The timeframe to transition must be as short as possible within the financial constraints of the business but cannot be longer than 3 years. New farm ventures will be expected to immediately employ best practice and be able to produce an appropriate farm plan.

Sunwater will engage a suitably qualified person (e.g. agronomist) to review all Farm Plans and “transition to best practice” Best Practice Transition Plans for suitability. This will ensure that appropriate farm planning has been undertaken by the irrigator. E.g. soil surveys to define the associated application rates of irrigated water, fertilizer and farm chemicals.

4. Land Management Practices

The intention of the LMCOP is to provide best management practices for agricultural operations whereby “Management Practices” as defined in the EPBC conditions of approval “*are best management practices in reef catchments illustrated, for example, by the SmartCane Best Management Practice.*” Also, a 2025 Catchment and Land Management Target within the Reef WQIP is, “*90% of land in priority areas under grazing, horticulture, bananas, sugarcane and other broad-acre cropping are managed using best management practice systems for water quality outcomes (soil, nutrient and pesticides)*”. As that target is now short-term, it is appropriate to apply best management practices to Irrigators associated with Rookwood Weir.

To comply with this Code, in addition to the Farm Plan a response must be provided by the water customer (via the applicable check list in [Appendix 1](#)) to each area of land and water management nominated below and relevant to the property. These management practices are based on the *Reef Water Quality Risk Frameworks 2017-2022*. (<https://www.reefplan.qld.gov.au/tracking-progress/paddock-to-reef/management-practices>)

Evidence of each requirement of the checklist to show current compliance must be provided with the initial response and annually thereafter. Evidence must include:

- Property specific reports/plans (ie Farm Plan, Best Practice Transition Plan) produced by suitably qualified agricultural advisors;
- Any water quality testing undertaken (refer to Section 5 below)
- Purchase receipts for the chemicals utilised and register of chemicals stored onsite;
- Annual Returns from the landholder to Queensland Department of Environment, Science and Innovation (DESI) for Agricultural Environmentally Relevant Activities (ERA) approvals.

Such reports must refer to the use of appropriate methods and scales of data collection to support the planning and implementation of management practices and use the most recent version of applicable advisory documents such as the *Queensland Soil Conservation Guidelines*. The key principles of these guidelines include:

- Utilising land in a way that does not exceed its capabilities. Where these are exceeded damage to land may occur causing adverse impacts offsite such as polluting water resources and degrading aquatic habitats;
- Understanding characteristics inherent to land, such as its slope, fertility, drainage, or rockiness determine its capability for different uses;
- Undertake soil conservation planning which involves mapping characteristics of land to identify the capability of different areas and to determine which uses the land can safely be put to. This also includes identifying areas that are vulnerable to damage so that special precautions can be put in place to prevent erosion. These special precautions include actions such as establishing groundcover vegetation, reforming the land surface or constructing contour banks;
- Undertake soil conservation planning that is coordinated across the whole landscape. This includes considering the source and destination of run-off with respect to neighbouring properties.

(<https://www.publications.qld.gov.au/dataset/soil-conservation-guidelines/resource/b262206a-beed-42a3-ae02-dc44c8255301>)

In order to account for the different types of agriculture and water uses undertaken (*EPBC Condition 2ciii*), particularly within the grains and horticulture categories, and the current stage of development of different farms, a suitably qualified agricultural advisor may recommend a “transition to best practice” pathway. The timeframe to transition must be as short as possible within the financial constraints of the business but cannot be longer than 3 years.

Should the farm practices be currently certified as meeting equivalent requirements of an accredited best practice scheme, then the response can note such and provide evidence of the compliance (**Section 7**).

Consistent with the *Reef Water Quality Risk Frameworks*, the Code outlines best practice management actions to be undertaken in specific management areas (soils, nutrients, pesticides, irrigation and farm chemicals). These are described in the sections 4.1 to 4.4 below and should be applied as appropriate to suit the type of agricultural operation being undertaken. The key item is to ensure the management actions in the approved farm plan sufficiently address the level risk to water quality in the Fitzroy River to minimise impacts on the Great Barrier Reef. For some operations the meeting of a minimum standard as outlined in Reef Water Quality Risk Frameworks may be appropriate to address the risk. Where this is the case this should be described in the Farm Plan.

There are a number of resources available to water users to assist with developing best practice Farm Plans. Refer to Section 12 - Supporting Information and Appendix 3 – List of Useful Support Tools below.

4.1. Grains and Improved Pasture

This section of the Code applies to all water users who propose to use water for the purpose of cropping where the primary product is grain (wheat, sorghum, barley etc). This also applies to graziers who irrigate supplementary feed areas (hay).

The following tables outline the best practice management actions which must be applied when associated with grain and improved pasture farming. Refer to the current Grains Water Quality Risk Framework.

4.1.1. Soil Management

Table 6 – Management actions for soil management associated with grain and improved pasture farming

#	Category	Best practice management action
1.1	Use of tillage	Crops must be planted into standing stubble from the previous crop/s. Tillage must only be used when required to deal with severe compaction (including for first tillage of the field), nutrient stratification, as part of a strategy to manage certain difficult weeds (which may involve occasional zonal or ‘patch’ tillage) or to destroy an existing crop type and replace with an alternative. Fertiliser must be applied using zero-till machinery.
1.2	Crop selection	Maintaining >30% stubble cover must be a high priority when choosing crops. Successive low stubble crops are avoided. Back-to-back pulse crops must not occur. Grain crops may be planted into marginal soil moisture for the purpose of increasing ground cover.
1.3	Wheel traffic	A controlled traffic system is in place with all tractors and implements, headers and mobile grain bins operating on the same set of wheel tracks. All machines must operate under GPS guidance of at least 4 cm pass to pass accuracy.
1.4	Erosion control	Contour and diversion banks must be present and regularly maintained. The placement and design of banks must be informed by a skilled third party. Secondary forms of sediment control, such as sediment traps, must be in place including for first tillage of a field or when destroying a crop.

Source: Grains Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0033/78864/grains-water-quality-risk-framework-2017-22.pdf)

4.1.2. Nutrient Management

Table 7 – Management actions for nutrient management associated with grain and improved pasture farming

#	Category	Best practice management action
2.1	Determining nitrogen requirements	Yield mapping data informs precise variable fertiliser rate control for specific management zones. Pulse crops must be regularly included in the crop rotation to reduce the need for N fertiliser.

#	Category	Best practice management action
2.2	Influence of stored soil moisture on yield and N fertiliser decisions	Stored soil moisture must be monitored throughout the fallow and decision support tools must be used to indicate yield potential when selecting fertiliser application rates.
2.3	Application timing to minimise potential losses and maximise uptake of N fertiliser	N fertiliser is applied early in a fallow to minimise probability of losses. Fertiliser may be applied as split applications (e.g., during the fallow, at planting and/or in crop).

Source: Grains Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0033/78864/grains-water-quality-risk-framework-2017-22.pdf)

4.1.3. Farm Chemicals Management

Table 8 – Management actions for farm chemicals management associated with grain and improved pasture farming

#	Category	Best practice management action
3.1	Targeting herbicide application	Farmer must bandspray residual herbicides, and/or target specific zones within paddocks rather than apply to 100% of the paddock.
3.2	Use of residual herbicides	Residual herbicide use must be confined to paddocks, parts of paddocks and seasons when weed pressure is high. Application of multiple below-label rates of residual herbicides through the year is preferred to full label rates.
3.3	Efficient herbicide application	Boomspray must operate under machine guidance of at least 10 cm pass to pass accuracy in a controlled traffic system. Boom must have automated section and individual nozzle controls to further minimise overlap.
3.4	Pesticide selection	Pesticide choice must be informed by assessment of control efficacy AND environmental risk, and lower toxicity products must be selected wherever feasible. Product choice must consider the amount of active ingredient applied, its relative toxicity, half-life, solubility, and soil adsorption properties and their interaction with the soils on the farm.

Source: Grains Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0033/78864/grains-water-quality-risk-framework-2017-22.pdf)

4.1.4. Irrigation Management

Table 9 – Management actions for irrigation management associated with grains and improved pasture farming

#	Category	Best practice management action
4.1	Irrigation scheduling	Objective tools must be used regularly to modify irrigation applications.
4.2	Matching irrigation interval and volume	Must have an automated irrigation system and application rate must be suited to crop stages and soil type.

#	Category	Best practice management action
	to crop requirements and soil limitations	
4.3	Water reuse	Must have full water reuse. Water quality tests of recycled water must be completed at least twice during the irrigation season unless there is no opportunity to test. Tests must include Total N, Total P and TSS.

Source: Horticulture Water Quality Risk Framework

(https://www.reefplan.qld.gov.au/___data/assets/pdf_file/0035/78866/horticulture-water-quality-risk-framework-2017-22.pdf)

4.2. Sugarcane

This section of the Code applies to all water users who propose to use water for the purpose of sugarcane farming. The following tables outline the best practice management actions which must be applied when associated with sugarcane farming. Refer to the current Sugarcane Water Quality Risk Framework.

4.2.1. Soil Management

Table 10 – Management actions for soil management associated with sugarcane farming

#	Category	Best practice management action
1.1	Crop residue cover	Cane trash blanket must be retained, including as fallow cover after final ratoon.
1.2	Controlled machinery traffic	Machinery must traffic less than 36% of the field every year. All machinery wheel spacings must be matched to row spacing for all operations including harvesters and haul-outs. GPS guidance must be used for all field operations, including harvesters and haul-outs.
1.3	Land management during sugarcane fallow	Legume or cover crops must be planted on all fallow land, without tillage. Crop residues must be maintained.
1.4	Preparing land for planting	Minimum tillage only including zonal tillage. Only the row area must be cultivated, inter-rows must be left uncultivated. Plant cane must be established after fallow using 1 tillage operation or less.

Source: Sugarcane Water Quality Risk Framework (https://www.reefplan.qld.gov.au/___data/assets/pdf_file/0036/78867/sugarcane-water-quality-risk-framework-2017-22.pdf)

4.2.2. Nutrient Management

Table 11 – Management actions for nutrient management associated with sugarcane farming

#	Category	Best practice management action
2.1	Matching nitrogen (N) supply to crop	The Six Easy Steps Nutrient Management program must be employed, which includes developing a whole farm nutrient management plan.

#	Category	Best practice management action
	nitrogen requirements	Nutrient management plans must include consideration of yield history and trends in order to estimate optimal amounts of nitrogen required for each major soil type and/or management zone.
2.2	Matching phosphorus (P) supply to crop phosphorus requirements	P fertiliser requirements must be determined through soil testing and extractable phosphorus and the P buffer index must be considered. P must not be applied unless testing indicates it is necessary.
2.3	Application of mill mud or mud/ash	Mill mud or ash must not be applied. OR Mill mud/ash must be deep banded at <50 wet tonnes per hectare.

Source: Sugarcane Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0036/78867/sugarcane-water-quality-risk-framework-2017-22.pdf)

4.2.3. Farm Chemicals Management

Table 12 – Management actions for farm chemicals management associated with sugarcane farming

#	Category	Best practice management action
3.1	Use of residual herbicides in ratoons	Residual herbicides must not be used in ratoons.
3.2	Targeting herbicide application	Residual herbicides must be applied in a directed band over the row only. Inter-row spaces must be managed with knockdown herbicides. Must use precise weed mapping to inform zonal residual herbicide applications. Application must only occur where weed pressure is expected.
3.3	Timing of application	Residual herbicides must be applied more than 3 weeks prior to a significant runoff event.
3.4	Pesticide selection	Pesticide choice must be informed by assessment of control efficacy AND environmental risk, and lower toxicity products must be selected wherever feasible. Product choice must consider the amount of active ingredient applied, its relative toxicity, half-life, solubility, and soil adsorption properties and their interaction with the soils on the farm.
3.5	Managing canegrub	Control of canegrub must be based on monitoring plant damage and risk assessments of likely pressure. An integrated pest management approach and participation in a district monitoring program must inform grub management plans. No more than one application per crop cycle is allowed unless monitoring indicates economic thresholds are likely to be exceeded. For liquid formulations, coulter slots must be completely closed or covered in.

Source: Sugarcane Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0036/78867/sugarcane-water-quality-risk-framework-2017-22.pdf)

4.2.4. Irrigation Management

Table 13 – Management actions for irrigation management associated with sugarcane farming

#	Category	Best practice management action
4.1	Calculating the timing of irrigation	Irrigation schedule must be informed by the use of in-field indicator tools in the majority of blocks, and the use of crop growth models to optimise timing.
4.2	Calculating the volume of irrigation to apply	Irrigation applications must aim to replace a measured or modelled soil water deficit.
4.3	Minimising irrigation losses	Irrigation must be monitored closely (manual or with in-field advance sensors) and furrows must be turned off as they reach completion. Inflow rates must be increased in remaining furrows to ensure all/majority of furrows get through.
4.4	Irrigation tail water capture and re-use	No irrigation tailwater must leave the farm (tailwater from 100% of farm area must be captured). Storages must be equipped with adequate pumping capacity and captured tailwater must be rapidly re-used in the short term (days/weeks).
4.5	Production indicator ¹	Must be more than 9 tonnes of cane per megalitre per hectare.

Source: Sugarcane Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0036/78867/sugarcane-water-quality-risk-framework-2017-22.pdf)

4.3. Bananas

This section of the Code applies to all water users who propose to use water for the purpose of banana farming. The following tables outline the best practice management actions which must be applied when associated with banana farming. Refer to the current Banana Water Quality Risk Framework.

4.3.1. Soil Management

Table 14 – Management actions for soil management associated with banana farming

#	Category	Best practice management action
1.1	Ground cover during banana fallow	A deliberate break crop must be planted between banana crop cycles, with no tillage during the wet season.
1.2	Tillage prior to plant crop	The banana crop must be planted into permanent beds. The row area must only receive minimum tillage necessary for establishment. The rest of the block must receive no tillage.
1.3	Maintaining covered ground	Inter-rows and headlands must be maintained with living vegetation. Vegetation must be managed through slashing/mulching.
1.4	Controlling runoff	If the farm has areas under banana production with a gradient of 3% or more, ALL blocks in these areas must be planted along the contour and designed to

¹ This is the Estimated Crop Water Use Efficiency. $CWUE = TCH / (\text{gross irrigation} + \text{effective rainfall})$. This assumed 450 mm average effective rainfall.

#	Category	Best practice management action
		include diversion banks and constructed waterways. Advice must be sought for placing these structures correctly. Annual maintenance must be carried out to ensure these structures are operating correctly. Blocks must be left undeveloped if erosion cannot be managed.
1.5	Managing inter-rows	Cultivation and reshaping to repair inter-rows must usually not be required. Machinery traffic must be carefully managed to avoid rutting. High flotation tyres and tracked vehicles must be used where possible, and/or ladders must be used in preference to bagging machines in wet conditions. Blocks must be maintained in a level state to ensure that run-off is directed safely from inter-rows.
1.6	Sediment trapping	Sediment trapping structures must be professionally designed and effective across as much of the production area as possible.

Source: Banana Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0032/78863/banana-water-quality-risk-framework-2017-22.pdf)

4.3.2. Nutrient Management

Table 15 – Management actions for nutrient management associated with banana farming

#	Category	Best practice management action
2.1	Matching nutrient supply to crop demand	Fertiliser program must be supported by annual soil testing and routine leaf testing to guide application rates. This must be revised frequently to ensure targets are achieved.
2.2	Fertiliser application frequency	The aim must be to apply fortnightly applications of fertiliser during high growth periods such as summer, and potentially reduce this during low growth periods such as winter. Weather conditions may mean this is not always possible.

Source: Banana Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0032/78863/banana-water-quality-risk-framework-2017-22.pdf)

4.3.3. Farm Chemicals Management

Table 16 – Management actions for farm chemicals management associated with banana farming

#	Category	Best practice management action
3.1	Managing foliar disease	Foliar diseases must be monitored on a regular and consistent basis by trained staff or service providers. Treatments must be developed using monitoring information and relevant thresholds for control. Regular and effective cultural control practices and use of paraffinic oils may reduce the need for fungicide applications (<10 fungicide sprays).
3.2	Managing plant parasitic nematodes	Management must incorporate reduced tillage, eradicating bananas from fallows, use of tissue cultured plant material, and non-host fallow crops. Crop must be routinely monitored using the root disease index. Nematicide use must only be considered if economic thresholds are exceeded and impact on IPM program is justified.

#	Category	Best practice management action
3.3	Managing corm and soil-borne insect pests	Management must rely on good crop hygiene and monitoring for pest presence in relation to control thresholds. Control must usually be achieved through stem injection of insecticides.

Source: Banana Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0032/78863/banana-water-quality-risk-framework-2017-22.pdf)

4.3.4. Irrigation Management

Table 17 – Management actions for irrigation management associated with banana farming

#	Category	Best practice management action
4.1	Irrigation method	All irrigation must be automated drop or micro sprinkler system underneath trees. The efficiency of irrigation and evenness of distribution must be checked frequently.
4.2	Irrigation scheduling	Irrigation schedules and volumes applied must be based on capacitance probes in most blocks, must factor in local climate data and must be fully automated.

Source: Banana Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0032/78863/banana-water-quality-risk-framework-2017-22.pdf)

4.4. Horticulture

This section of the Code applies to all water users who propose to use water for the purpose of horticulture. This includes all forms of irrigated agriculture other than grains and improved pastures, sugarcane and bananas. As such it includes fruit, tree crops (including macadamia) and vegetables. The following tables outline the best practice management actions which must be applied when associated with horticulture farming. Refer to the current Horticulture Water Quality Risk Framework.

4.4.1. Soil Management

Table 18 – Management actions for soil management associated with horticulture

#	Category	Best practice management action
1.1	Controlling runoff	Buffers must be in place which provide good protection of waterways and wetlands at all times (or not applicable).
1.2	Fallow management	Fallow cropping/promotion of ground cover must be conducted at all times to provide full protection.
1.3	In-field erosion control	Crops must be planted across slope with regular spaced wide vegetation strip cropping.
1.4	Inter-row management	Inter-rows must be managed with ground cover (selected plants) or not applicable.
1.5	Roadway and headland maintenance	Roadways and headlands are strategically designed, constructed and maintained to minimise erosion.
1.6	Sediment traps	Not applicable.

Source: Horticulture Water Quality Risk Framework

(https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0035/78866/horticulture-water-quality-risk-framework-2017-22.pdf)

4.4.2. Nutrient Management

Table 19 – Management actions for nutrient management associated with horticulture

#	Category	Best practice management action
2.1	Soil testing	Soil tests must be completed frequently (more than once per year) to fulfill nutrient budgeting requirement across the entire farm.
2.2	Leaf testing	Leaf tests must be conducted at strategic crop stages in line with nutrient budgeting across entire farm.
2.3	Nutrient budgeting and recording	If available, must have industry recognised software package (e.g., Avoman), at paddock scale, based on soil tests, yield data and other sources of nutrient.
2.4	Fertiliser application method	Various fertiliser application methods must be used (fertigation, incorporation and/or foliar) with automated fertigation being dominant.

#	Category	Best practice management action
2.5	Calculating fertiliser rates	Application rates must be based on frequent soil and leaf testing using a nutrient budget on a block-by-block basis.

Source: Horticulture Water Quality Risk Framework
 (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0035/78866/horticulture-water-quality-risk-framework-2017-22.pdf)

4.4.3. Farm Chemicals Management

Table 20 – Management actions for farm chemicals management associated with horticulture

#	Category	Best practice management action
3.1	Calculating pest and crop chemical requirements	Calculations of pest and crop chemical requirements must be done using own recorded crop monitoring results, action thresholds and labelled rates in line with crop monitoring consultant recommendations/implementation of Integrated Pest Management Practices.
3.2	Reducing chemical loss to runoff and drift	Must be applied at times of low risk using low drift nozzles and low volume applicators in conjunction with wind breaks and recorded weather data.
3.3	Integrated pest management	A full complement of Integrated Pest Management practices must be implemented with minimal pesticide usage.

Source: Horticulture Water Quality Risk Framework
 (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0035/78866/horticulture-water-quality-risk-framework-2017-22.pdf)

4.4.4. Irrigation Management

Table 21 – Management actions for irrigation management associated with horticulture

#	Category	Best practice management action
4.1	Irrigation scheduling	Objective tools must be used regularly to modify irrigation applications.
4.2	Matching irrigation interval and volume to crop requirements and soil limitations	Must have an automated irrigation system and application rate must be suited to crop stages and soil type.
4.3	Water reuse	Must include onsite water reuse opportunities. Where practicable water from site shall be collected and reused for irrigation.

Source: Horticulture Water Quality Risk Framework
 (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0035/78866/horticulture-water-quality-risk-framework-2017-22.pdf)

5. Water Quality Monitoring

Water quality monitoring may be required as part of the implementation of a Farm Plan and to assist ongoing compliance. Monitoring may be conducted by the water user to manage onsite water storages used on irrigation and optimisation of their operations. Additionally monitoring on the water user's property will be conducted in the following circumstances:

- Where it is described in a Farm Plan or Best Practice Transition Plan;
- In response to an incident;
- As directed by Sunwater.

Where sampling is conducted it will be as per the methods and standards of the Queensland Water Quality Monitoring and Sampling Manual (DES, 2018) and be performed by a person with appropriate training, competency and experience. Any data from sampling that is conducted will be included in the review of any Farm Plan.

Sunwater will be responsible for all offsite monitoring in surrounding waterways as per the requirements of the Lower Fitzroy Water Quality Monitoring and Reporting Program.

6. Record Keeping

Records need to be kept to demonstrate activities which are being undertaken on the property in accordance with the minimum practice agricultural standards. This Code uses the existing State-based record keeping processes as a suitable approach in the absence of specific Commonwealth requirements.

The LMCOP Compliance Checklists provided in [Appendix 1](#) are the basic form of record keeping for the Code. The "Additional information (supporting evidence)" section should include cross reference to the record types nominated below.

Under current State Reef protection regulations, there are three types of records that need to be kept by producers which can be found at the following link - [Reef protection regulations in the Great Barrier Reef regions - Compliance records checklist \(www.qld.gov.au\)](http://www.qld.gov.au):

- general records
- minimum standard records (which vary across the crop types; here called Best Practice records)
- primary documents.

There is no specific format these records need to be kept in and many producers will already be recording this information using industry developed forms.

6.1. General Records

- Records must be kept about the person carrying out the activity (i.e. commercial cropping, and/or sugarcane and/or banana cultivation) and the property it is being carried out on.

- Records must be kept about irrigation water, agricultural chemicals, fertiliser and mill mud/mill ash applied to the property as part of carrying out the activity. The term 'agricultural chemicals' includes any herbicides, insecticides or fungicides applied to land or crops.
- Specifically for farm chemicals this includes a record of all chemicals stored onsite and the areas, quantities and timing of application.
- Water quality sampling records including locations (map/coordinates), sampling person, and results.

6.2. Best Practice Records

- Best practice records are notes about the actions taken to meet the standards. These records are different, depending on the industry (horticulture, sugarcane or bananas).
- They build on the general records and must be supported by primary documents.

6.3. Primary Documents

- Primary documents are documents that relate to the record, for example:
 - water charges that nominate a volume taken,
 - a leaf or soil test report,
 - fertiliser contractor print-out,
 - a fertiliser or agricultural chemical invoice, or
 - works related to the Farm Plan.

Records must be kept and may be requested by an authorised person such as a Queensland Government compliance officer or Sunwater representative. Records must be made within three days of the activity or action. They must be kept electronically for the duration of the Rookwood Weir EPBC approval ie 2046, or up to six years after the cessation of irrigated agriculture operations.

For the purposes of this Code, reports or records of advice provided by suitably qualified agricultural advisors are regarded as Best Practice records.

7. Accreditation Schemes

Irrigators who are appropriately accredited under a recognised best practice scheme do not have to separately be accredited under this Code.

The Queensland Reef Water Quality Program administered through the Office of the Great Barrier Reef, has recognised accreditation programs and recognised producers. To become a recognised accreditation program under this scheme the program must include:

- Modules that are consistent with, or better than, the minimum practice agricultural standards;
- Accreditation of producers who comply with the program's requirements;
- Maintenance of a register of producers who have been accredited;
- Collection and reporting of information about the operation of the program;
- A process for reviewing decisions and resolving disputes regarding the program; and
- Regular review and evaluation of the program.

7.1. Currently Accredited Programs

Currently under the Queensland *Environmental Protection Act (1994)*, two accreditation programs have achieved accreditation:

- the Smartcane Best Management Practice (BMP) program for commercial sugar cane operations; and
- the Freshcare Environmental Program for commercial banana cultivation in the Reef regions.

Any programs accredited through this process in the future will be recognised under this Code. If the accreditation of a program lapses, the Irrigator must be accredited under this Code. Each Irrigator purchasing allocation from Rookwood Weir must either become accredited under this Code or provide evidence of current accreditation with a currently accredited program.

7.2. The Land Management Code of Practice (the Code)

To become accredited under the Code through compliance with an accredited scheme, the Irrigator must show evidence of such accreditation, including or in addition to the following (as outlined in this Code):

- Produce a Farm Plan as outlined in **Section 3**.
- Ensure that the best practice standard for each land management practice as outlined in **Section 4** is met. This is applicable for each irrigation type undertaken on the property (i.e., grains and irrigated pasture, sugarcane, bananas and/or horticulture).
- [Appendix 1](#) contains a checklist for each land management practice for each irrigation type to assist in showing compliance. If the standard achieved under an accredited scheme does not meet the best practice standard nominated in this Code, the standard in the Code must be met.
- Keep necessary records as outlined in **Section 6**.

Initial accreditation of a farm against the Code will be by on-farm inspection by a suitably qualified person.

Land Management Code of Practice

Following accreditation, each Irrigator must provide annual notification of compliance with the Code (via the checklist in [Appendix 1](#)) or a validly accredited scheme. The annual notification of compliance will include the following documents:

- Relevant compliance checklists for each land management practice in Appendix 1;
- Records as listed in Section 6 above;
- Declaration by the irrigator that the self-assessment is true and accurate.

8. Compliance and Corrective Action

Compliance with the Code will be audited at two levels:

- a. On-farm compliance with land management practice implementation; and
- b. Water quality monitoring in the receiving waters via the WQMP developed in response to Condition 1 of the *EPBC Act approval*.

8.1. On-farm Compliance with Land Management Practice Implementation

On-farm compliance checks will be undertaken by a suitably qualified person (SQP) on an annual basis. This will include an initial review of the Farm Plan, checklists and the progress of the transition to best practice plans. Checklists are provided in [Appendix 1](#).

The annual review will include an assessment of progress toward implementation of best practice where a transitional pathway has been agreed, such as with respect to construction of new/revised infrastructure in accordance with the Farm Plan.

Once a property achieves compliance with best management practice as nominated in the Code (as confirmed by a suitably qualified person), it will be accredited against the Code and the independent on-farm audit will no longer be required, but will be replaced by annual notification by the landholder.

However, Sunwater may reinstate the on-farm audit if it becomes aware of circumstances that indicate a possible failure to comply with the Code, in circumstances where the failure was potentially related to the on-farm practices ([Appendix 2](#)).

This may include:

- failure to achieve a relevant water quality objective in the WQMP (ie operational greater than pre-action baseline) which is attributed to the agricultural operation;
- any incident that occurs with actual or potential environmental harm; or
- any action taken by Federal or State regulator due to a breach of environmental legislation.

Additionally Sunwater may reinstate the on-farm audit due to:

- a change in ownership for the operation; or
- a change in agricultural practices, e.g. new crop type.

If a property is found to be non-compliant, or fails to achieve the transition to best practice in the agreed timeframe, it will be allowed no longer than 6 months to achieve compliance or its contract for water supply will be suspended until such time as compliance is achieved ([Appendix 2](#)). Sunwater may, at its discretion, cancel the contract for water supply if compliance is not achieved within a further 6 months ([Appendix 2](#)). Achievement of compliance must be confirmed by a suitably qualified person.

8.2. Water Quality Monitoring (WQMP) Highlights a Non-compliance

If a property is found to be non-compliant, or fails to achieve the transition to best practice in the agreed timeframe, it will be allowed no longer than 6 months to achieve compliance or its contract for water supply will be suspended until such time as compliance is achieved. Sunwater may at its discretion cancel the contract for water supply if compliance is not achieved within the allowed 6 months. Achievement of compliance must be confirmed by a suitably qualified person.

Where there is a failure to achieve a relevant water quality objective in the WQMP and that program reports that the failure was potentially related to the on-farm practices, Sunwater will undertake enquiries of irrigation customers and on-farm audits (if required) with the aim of identifying the cause of the failure. If a non-compliance with the Code is detected, the process nominated above will be followed.

However, Sunwater may reinstate the on-farm audit if it becomes aware of circumstances that indicate a possible failure to comply with the Code, such as failure to achieve a relevant water quality objective in the WQMP (established in response to Condition 1 of the *EPBC Act approval*) in circumstances where the failure was potentially related to the on-farm practices. The WQMP uses both specific WQO compliance measures and pre-action baseline and operational comparisons represented by the samples program. The operational condition should not be worse than the pre-action baseline.

Results of the WQMP will be presented and discussed at an annual stakeholder meeting (**Section 9**).

8.3. Best Practice Transition Plan

Where farm operations are shown through an audit or incident not to be meeting best practices, a Best Practice Transition Plan will be developed by the irrigator. This plan will detail:

- Consultation to be undertaken with industry experts (e.g. land management groups);
- Identification of areas of improvement and subsequent actions;
- Timeframes for implementation of actions and responsibility; and
- Timeframe for overall attainment of best practice standard.

The Best Practice Transition Plan will be reviewed by Sunwater's SQP at the start of the transition period. The timeframe to transition must be as short as possible within the financial constraints of the business but must start to be implemented within 6 months and cannot be longer than 3 years. Once the agreed period has lapsed an audit of the property will be conducted to determine if the plan has been successful in attaining best practice. If a property is found to be non-compliant or fails to achieve the transition to best practice in the agreed timeframe, it will be allowed no longer than 6 months to achieve compliance or its contract for water supply may be suspended until such time as compliance is achieved.

8.4. Non-Compliance Reporting

Where an irrigator has become aware of a potential non-conformance incident they must notify Sunwater within 24hrs. Sunwater will undertake an investigation and if a non-conformance is identified, Sunwater will report this to DCCEEW as per the approval conditions.

Condition 19 requires that Sunwater:

must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in approved plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify:

- *any condition which is or may be in breach;*
- *a short description of the incident and/or non-compliance; and*
- *the location (including co-ordinates), date, and time of the incident and/or non-compliance. In the event the exact information cannot be provided, provide the best information available.*

Condition 20 requires that Sunwater:

must provide to the Department the details of any incident or non-compliance with the conditions or commitments made in an approved plan as soon as practicable and no later than 10 business days after becoming aware of the incident or non-compliance, specifying:

- *any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future;*
- *the potential impacts of the incident or non-compliance; and*
- *the method and timing of any remedial action that will be undertaken by the approval holder.*

The *Sunwater – Rookwood Weir: Land Management Compliance and Incident Response Procedure* (refer to Appendix 2) has been developed to provide a procedure for reporting non-compliances under Condition 19 and 20 of the approval.

9. Review and Amendment

The Code may be reviewed at any time should information become available suggesting it was not achieving the objectives or targets.

Table B4 of the Reef WQIP *Evaluating Performance*, ensures progress towards the targets is tracked and activities are evaluated to feed into adaptive management. In particular the process nominated here is based on the following hierarchical steps:

Intermediate outcome: Program and project designs are modified to build on lessons learned from implementation.

Pathway to Outcomes: Relevant data and information are made available to inform managers and decision-makers.

Actions: 7.5 Report progress towards targets, objectives and outcomes;

7.6 Communicate regionally relevant information for management decisions and local communities.

7.7 Make data and information publicly available through a range of communication products.

Some of the above will be achieved by the WQMP developed in response to condition 1 of the *EPBC Approval* which will be making data available for the Report Card (Reef and Fitzroy) and P2R modelling.

Specifically in relation to the Code and implementation of best practice land management, the above process will be achieved through conduct of an annual benchmarking process and workshop including input from a range of stakeholders and managers such as Irrigators, catchment management groups, agricultural advisors (including Government agency staff such as the Department of Agriculture and Fisheries (DAF) Management Practice Adoption team who measure results of land management practice implementation) and Sunwater.

Sunwater will support the meeting in conjunction with Fitzroy Partnership for River Health where the results of all relevant auditing (including achievement of accreditation under the Code and transitioning to best practice), monitoring and reporting (including that obtained by the WQMP developed under Condition 1 of the *EPBC Approval*) will be presented to the stakeholders and discussed in terms of progress toward achieving the water quality objectives and the targets of *Reef 2050*. The role of the Code and the effectiveness of practices included within the Code will be discussed in terms of recognising current best practice and practicality and achievability for the water user.

Where it is agreed through this process that a land management practice can be added to the Code as a suitable practice or replace an existing practice withing the Code, the Code will be amended.

Any changes which have recently occurred in the relevant management plans, risk frameworks or monitoring and reporting arrangements (WQIP, Reef 2050, P2R etc) will be identified and the Code updated if need be.

At its discretion, Sunwater may amend the Code if the amendment will achieve a better water quality outcome.

Any amendment to the Code will be in accordance with Condition 12 of the *EPBC Approval* for the project or otherwise will be submitted for approval in accordance Section 143 of the *EPBC Act*.

10. Definitions

Table 22 – Glossary of Terms

Term	Definition
AEIS	Addendum Environmental Impact Statement
BMP	Best Management Practice
CoG	(Queensland Government’s) Coordinator General
DAF	Department of Agriculture and Fisheries
DEHP	Department of Environment and Heritage Protection
DESI	Department of Environment, Science and Innovation
EIS	Environmental Impact Statement
EPBC / EPBC Act	Environment Protection and Biodiversity Conservation / Act1999
GBR	Great Barrier Reef
GBRMP	Great Barrier Reef Marine Park
GBRCLMP	Great Barrier Reef Catchment Loads Monitoring Program
ha	Hectare
Irrigated agriculture	Method in which a controlled amount of water is supplied to plants at regular intervals to supplement rainfall in agricultural production.
LFRIP	Lower Fitzroy River Infrastructure Project
LMCP	Land Management Code of Practice
LOR	Limit of Analytical Reporting
Management Practices	Are best management practices in reef catchments illustrated, for example, by the SmartCane Best Management Practice
MCL	Maintain Current Load
Minister	The Minister administering the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) and includes a delegate of the Minister.
NRM	Natural Resource Management
P2R	Paddock to Reef Integrated Monitoring, Modelling and Reporting Program

Term	Definition
Reef 2050 Plan	Reef 2050 Long-Term Sustainability Plan. Commonwealth of Australia, 2015
Reef Water Quality Improvement Plan	Reef Water Quality Improvement Plan, State of Queensland, 2017
Sub-catchment	Sub-catchment within the Fitzroy Basin water catchment within which the water use is occurring.
Suitably qualified persons (SQP)	Means a person who has professional qualifications, training or skills or experience relevant to the nominated subject matters and can give authoritative assessment, advice and analysis about performance relevant to the subject matter using relevant protocols, standards, methods and/or literature
Water quality	Levels of pesticides and farm chemicals, nutrients such as phosphorus and nitrogen, sediments and other suspended solids. A detrimental impact to water quality will be an increase in any of these parameters above established baselines.
WQIP	Water Quality Improvement Plan
WQMP	Water Quality Management Plan

11. Related Documents

The following documents were reviewed for the preparation of this outline:

- EPBC Approval 2009/5173 dated 27 May 2020
- Rookwood Weir Water Allocation Sales – Information Memorandum May 2020
- Commercial cropping and horticulture in the Great Barrier Reef catchment: ERA standard for commercial cropping and horticulture – draft for consultation
- Explanatory Guide - Code of Practice for the release of stored water from privately owned farm storages to receiving waters in the Queensland Murray-Darling Basin (December 2016)
- Fitzroy Water Quality Improvement Plan (Fitzroy Basin Association 2015)
- General environmental duty Code of practice for the release of stored water from privately owned farm storages to receiving waters in the Queensland Murray-Darling Basin (December 2016)
- Queensland Government, Agriculture, Sustainable Farming, Reef Regulations, For Producers <https://www.qld.gov.au/environment/agriculture/sustainable-farming/reef/reef-regulations/producers>
- Hort360 and Hort360 Reef Certification <https://www.hort360.com.au/> and https://www.hort360.com.au/?page_id=1481
- SmartCane BMP <https://smartcane.com.au/>
- Water Quality Risk Frameworks 2017-2022 (Grains, Horticulture, Grazing, Sugarcane and Bananas), Reef Plan, Queensland and Australian Government, <https://www.reefplan.qld.gov.au/tracking-progress/paddock-to-reef/management-practices>
- Reef 2050 Long Term Sustainability Plan (Commonwealth of Australia 2018)
- Reef Water Quality Improvement Plan (State of Queensland 2018)
- Queensland Soil Conservation Guidelines. <https://www.publications.qld.gov.au/dataset/soil-conservation-guidelines>
- Fitzroy Sub-Basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Fitzroy River Sub-basin (DEHP 2011)
- Queensland Water Quality Monitoring and Sampling Manual (Department of Environment and Science 2018)
- Warne MStJ, Neelamraju C, Turner RDR, Mann RM. 2020. Determining the Current Pesticide Condition of Waterways that Discharge to the Great Barrier Reef: Reef 2050 Water Quality Improvement Plan. Brisbane: Department of Environment and Science, Queensland Government

12. Supporting Information

Substantial assistance is available to Irrigators via their industry bodies and the Queensland Government. The information presented and linked here is from a State source but the technical information is directly relevant and will also assist Irrigators to meet their State obligations. The following is extracted from <https://www.qld.gov.au/environment/agriculture/sustainable-farming/reef/reef-regulations>

What support is available for agricultural producers?

Programs and support tools are provided by the Australian and Queensland governments and industry organisations to help producers identify opportunities to improve farming practices.

The Queensland Reef Water Quality Program funds three Best Management Practice (BMP) programs, and a number of other projects and initiatives to support the agricultural industry.

These include:

- [Smartcane BMP](#), delivered by CANEGROWERS;
- [Banana BMP](#), delivered by the Australian Banana Growers' Council;
- [Hort360 GBR program](#), delivered by Growcom;
- [Grazing Resilience and Sustainable Solutions \(GRASS\) program](#), delivered by the Department of Agriculture and Fisheries, Burnett Mary Regional Group, Fitzroy Basin Association and NQ Dry Tropics.

Extension services

The Department of Agriculture and Fisheries offers a range of [extension services](#) to support growers and graziers adopt better business and farming practices within Reef regions. Specialist extension staff and agricultural economists can provide:

- hands-on technical assistance;
- economic support;
- on-farm assistance to trial new practices;
- information resources;
- economic decision support tools;
- participation at field days and other events; and
- research into improved farming systems.

Please contact DAF on 13 25 23 to be put in touch with your local extension officer.

Farming in Reef Catchments Rebate Scheme

The Farming in Reef Catchments Rebate Scheme provides a one-off rebate of up to \$1,000 to eligible commercial agricultural producers in Reef regions. The rebate is to help offset the costs of obtaining professional and agronomic advice for nutrient and sediment management to meet the [minimum practice agricultural standards](#).

Who is eligible for the rebate?

If you are a commercial grazier, sugarcane or banana grower in the Wet Tropics, Burdekin, Mackay Whitsunday, Fitzroy or Burnett Mary regions and have sought advice from an Accredited Agricultural Adviser, you may be eligible to claim the rebate.

You are not eligible if you have already received assistance to manage nutrient and sediment from the Queensland or Australian government. Producers undertaking new cropping or horticulture activities are also not eligible for the rebate.

You can find more detailed information about the [Farming in Reef Catchments Rebate Scheme](#), including specific details around eligibility and how to claim the rebate, on the [Queensland Rural and Industry Development Authority website](#).

Additionally grants and funding may be available from time to time to support irrigators to achieve the Reef 2050 targets and the Water Quality Improvement Plan.

More support

Visit the [sugarcane](#), [grazing](#), [bananas](#) and [grains and horticulture](#) support programs pages for links to a range of support programs and tools. Support information for irrigators include:

- [Best practice farming in Great Barrier Reef catchments | Business Queensland](#)
- [Land management for graziers | Business Queensland](#)
- [Grazing resilience and sustainable solutions program \(GRASS\)](#)
- [Cost-effective erosion control methods](#)

Additionally refer to *Appendix 3 – List of useful support tools for irrigators* for more information.

Appendix 1: LMCOP Compliance Checklists



LMCOP Compliance Checklist - Grains and Improved Pasture

This checklist should be read in conjunction with the Farm Plan for the Irrigator and the Water Quality Objectives of the LMCOP.

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence.
Soil Management (LMCOP Reference: Section 4.1.1)					
1.1	<p>Use of tillage</p> <p>Crops must be planted into standing stubble from the previous crop/s. Tillage must only be used when required to deal with severe compaction (including for first tillage of the field), nutrient stratification, as part of a strategy to manage certain difficult weeds (which may involve occasional zonal or 'patch' tillage) or to destroy an existing crop type and replace with an alternative.</p> <p>Fertiliser must be applied using zero-till machinery.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.2	<p>Crop selection</p> <p>Maintaining >30% stubble cover must be a high priority when choosing crops. Successive low stubble crops are avoided.</p> <p>Back-to-back pulse crops must not occur.</p> <p>Grain crops may be planted into marginal soil moisture for the purpose of increasing ground cover.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence.
1.3	<p>Wheel traffic</p> <p>A controlled traffic system is in place with all tractors and implements, headers and mobile grain bins operating on the same set of wheel tracks. All machines must operate under GPS guidance of at least 4 cm pass to pass accuracy.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.4	<p>Erosion control</p> <p>Contour and diversion banks must be present and regularly maintained. The placement and design of banks must be informed by a skilled third party.</p> <p>Secondary forms of sediment control, such as sediment traps, must be in place including for first tillage of a field or when destroying a crop.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Nutrient Management (LMCOP Reference: Section 4.1.2)					
2.1	<p>Determining nitrogen requirements</p> <p>Yield mapping data informs precise variable fertiliser rate control for specific management zones.</p> <p>Pulse crops must be regularly included in the crop rotation to reduce the need for N fertiliser.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.2	<p>Influence of stored soil moisture on yield and N fertiliser decisions</p> <p>Stored soil moisture must be monitored throughout the fallow and decision support tools must be used to indicate yield potential when selecting fertiliser application rates.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence.
2.3	<p>Application timing to minimise potential losses and maximise uptake of N fertiliser</p> <p>N fertiliser is applied early in a fallow to minimise probability of losses. Fertiliser may be applied as split applications (e.g., during the fallow, at planting and/or in crop).</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Farm Chemical Management (LMCOP Reference: Section 4.1.3)					
3.1	<p>Targeting herbicide application</p> <p>Farmer must bandspray residual herbicides, and/or target specific zones within paddocks rather than apply to 100% of the paddock.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.2	<p>Use of residual herbicides</p> <p>Residual herbicide use must be confined to paddocks, parts of paddocks and seasons when weed pressure is high. Application of multiple below-label rates of residual herbicides through the year is preferred to full label rates.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.3	<p>Efficient herbicide application</p> <p>Boomspray must operate under machine guidance of at least 10 cm pass to pass accuracy in a controlled traffic system.</p> <p>Boom must have automated section and individual nozzle controls to further minimise overlap.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence.
3.4	<p>Pesticide selection</p> <p>Pesticide choice must be informed by assessment of control efficacy AND environmental risk, and lower toxicity products must be selected wherever feasible.</p> <p>Product choice must consider the amount of active ingredient applied, its relative toxicity, half-life, solubility, and soil adsorption properties and their interaction with the soils on the farm.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Irrigation Management (where applicable) (LMCOP Reference: Section 4.1.4)					
4.1	<p>Calculating the timing of irrigation</p> <p>Objective tools must be used regularly to modify irrigation applications.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.2	<p>Calculating the volume of irrigation to apply</p> <p>Must have an automated irrigation system and application rate must be suited to crop stages and soil type.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.3	<p>Minimising irrigation losses</p> <p>As per Farm Plan.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.4	<p>Irrigation tail water capture and re-use</p> <p>Must have full water reuse. Water quality tests of recycled water must be completed at least twice during the irrigation season unless there is no opportunity to test. Tests must include Total N, Total P and TSS.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



Land Management Code of Practice

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence.
4.5	Production indicator As per Farm Plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p>Other:</p> <p>Have any water quality samples been taken as part of the Farm Plan or as required in Section 5 of the LMCOP? Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/></p> <p>If so, please provide details including locations (map/coordinates), suitably trained sampling person, and results</p>					

Source: Grains Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0033/78864/grains-water-quality-risk-framework-2017-22.pdf)

LMCOP Compliance Checklist – Sugarcane

This checklist should be read in conjunction with the Farm Plan for the Irrigator and the Water Quality Objectives of the LMCOP.

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
Soil Management (LMCOP Reference: Section 4.2.1)					
1.1	<p>Crop residue cover</p> <p>Cane trash blanket must be retained, including as fallow cover after final ratoon.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.2	<p>Controlled machinery traffic</p> <p>Machinery must traffic less than 36% of the field every year.</p> <p>All machinery wheel spacings must be matched to row spacing for all operations including harvesters and haul-outs.</p> <p>GPS guidance must be used for all field operations, including harvesters and haul-outs.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.3	<p>Land management during sugarcane fallow</p> <p>Legume or cover crops must be planted on all fallow land, without tillage.</p> <p>Crop residues must be maintained.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.4	<p>Preparing land for planting</p> <p>Minimum tillage only including zonal tillage.</p> <p>Only the row area must be cultivated, inter-rows must be left uncultivated.</p> <p>Plant cane must be established after fallow using 1 tillage operation or less.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



Land Management Code of Practice

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
Nutrient Management (LMCOP Reference: Section 4.2.2)					
2.1	<p>Matching nitrogen (N) supply to crop nitrogen requirements</p> <p>The Six Easy Steps Nutrient Management program must be employed, which includes developing a whole farm nutrient management plan.</p> <p>Nutrient management plans must include consideration of yield history and trends in order to estimate optimal amounts of nitrogen required for each major soil type and/or management zone.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.2	<p>Matching phosphorus (P) supply to crop phosphorus requirements</p> <p>P fertiliser requirements must be determined through soil testing and extractable phosphorus and the P buffer index must be considered. P must not be applied unless testing indicates it is necessary.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.3	<p>Application of mill mud or mud/ash</p> <p>Mill mud or ash must not be applied; or</p> <p>Mill mud/ash must be deep banded at <50 wet tonnes per hectare.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Farm Chemical Management (LMCOP Reference: Section 4.2.3)					
3.1	<p>Use of residual herbicides in ratoons</p> <p>Residual herbicides must not be used in ratoons.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



Land Management Code of Practice

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
3.2	<p>Targeting herbicide application</p> <p>Residual herbicides must be applied in a directed band over the row only.</p> <p>Inter-row spaces must be managed with knockdown herbicides.</p> <p>Must use precise weed mapping to inform zonal residual herbicide applications.</p> <p>Application must only occur where weed pressure is expected.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.3	<p>Timing of application</p> <p>Residual herbicides must be applied more than 3 weeks prior to a significant runoff event.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.4	<p>Pesticide selection</p> <p>Pesticide choice must be informed by assessment of control efficacy AND environmental risk, and lower toxicity products must be selected wherever feasible.</p> <p>Product choice must consider the amount of active ingredient applied, its relative toxicity, half-life, solubility, and soil adsorption properties and their interaction with the soils on the farm.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



Land Management Code of Practice

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
3.5	<p>Managing canegrub</p> <p>Control of canegrub must be based on monitoring plant damage and risk assessments of likely pressure. An integrated pest management approach and participation in a district monitoring program must inform grub management plans.</p> <p>No more than one application per crop cycle is allowed unless monitoring indicates economic thresholds are likely to be exceeded. For liquid formulations, coulter slots must be completely closed or covered in.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Irrigation Management (LMCOP Reference: Section 4.2.4)					
4.1	<p>Calculating the timing of irrigation</p> <p>Irrigation schedule must be informed by the use of in-field indicator tools in the <i>majority</i> of blocks, and the use of crop growth models to optimise timing.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.2	<p>Calculating the volume of irrigation to apply</p> <p>Irrigation applications must aim to replace a measured or modelled soil water deficit.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.3	<p>Minimising irrigation losses</p> <p>Irrigation must be monitored closely (manual or with in-field advance sensors) and furrows must be turned off as they reach completion. Inflow rates must be increased in remaining furrows to ensure all/majority of furrows get through.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



Land Management Code of Practice

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
4.4	<p>Irrigation tail water capture and re-use</p> <p>No irrigation tailwater must leave the farm (tailwater from 100% of farm area must be captured).</p> <p>Storages must be equipped with adequate pumping capacity and captured tailwater must be rapidly re-used in the short term (days/weeks).</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.5	<p>Production indicator</p> <p>Must be more than 9 tonnes of cane per megalitre per hectare.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p>Other:</p> <p>Have any water quality samples been taken as part of the Farm Plan or as required in Section 5 of the LMCOP? Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/></p> <p>If so, please provide details including locations (map/coordinates), suitably trained sampling person, and results</p>					

Source: Sugarcane Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0036/78867/sugarcane-water-quality-risk-framework-2017-22.pdf)

LMCOP Compliance Checklist – Bananas

This checklist should be read in conjunction with the Farm Plan for the Irrigator and the Water Quality Objectives of the LMCOP.

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
Soil Management (LMCOP Reference: Section 4.3.1)					
1.1	<p>Ground cover during banana fallow</p> <p>A deliberate break crop must be planted between banana crop cycles, with no tillage during the wet season.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.2	<p>Tillage prior to plant crop</p> <p>The banana crop must be planted into permanent beds.</p> <p>The row area must only receive minimum tillage necessary for establishment. The rest of the block must receive no tillage.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.3	<p>Maintaining covered ground</p> <p>Inter-rows and headlands must be maintained with living vegetation. Vegetation must be managed through slashing/mulching.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.4	<p>Controlling runoff</p> <p>If the farm has areas under banana production with a gradient of 3% or more, ALL blocks in these areas must be planted along the contour and designed to include diversion banks and constructed waterways. Advice must be sought for placing these structures correctly. Annual maintenance must be carried out to ensure these structures are operating correctly. Blocks must be left undeveloped if erosion cannot be managed.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



Land Management Code of Practice

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
1.5	<p>Managing inter-rows</p> <p>Cultivation and reshaping to repair inter-rows must usually not be required. Machinery traffic must be carefully managed to avoid rutting. High flotation tyres and tracked vehicles must be used where possible, and/or ladders must be used in preference to bagging machines in wet conditions. Blocks must be maintained in a level state to ensure that run-off is directed safely from inter-rows.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.6	<p>Sediment trapping</p> <p>Sediment trapping structures must be professionally designed and effective across as much of the production area as possible.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Nutrient Management (LMCOP Reference: Section 4.3.2)					
2.1	<p>Matching nutrient supply to crop demand</p> <p>Fertiliser program must be supported by annual soil testing and routine leaf testing to guide application rates. This must be revised frequently to ensure targets are achieved.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.2	<p>Fertiliser application frequency</p> <p>The aim must be to apply fortnightly applications of fertiliser during high growth periods such as summer, and potentially reduce this during low growth periods such as winter. Weather conditions may mean this is not always possible.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Farm Chemical Management (LMCOP Reference: Section 4.3.3)					



Land Management Code of Practice

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
3.1	<p>Managing foliar disease</p> <p>Foliar diseases must be monitored on a regular and consistent basis by trained staff or service providers. Treatments must be developed using monitoring information and relevant thresholds for control. Regular and effective cultural control practices and use of paraffinic oils may reduce the need for fungicide applications (<10 fungicide sprays).</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.2	<p>Managing plant parasitic nematodes</p> <p>Management must incorporate reduced tillage, eradicating bananas from fallows, use of tissue cultured plant material, and non-host fallow crops. Crop must be routinely monitored using the root disease index. Nematicide use must only be considered if economic thresholds are exceeded and impact on IPM program is justified.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.3	<p>Managing corm and soil-borne insect pests</p> <p>Management must rely on good crop hygiene and monitoring for pest presence in relation to control thresholds. Control must usually be achieved through stem injection of insecticides.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Irrigation Management (LMCOP Reference: Section 4.3.4)					
4.1	<p>Irrigation method</p> <p>All irrigation must be automated drop or micro sprinkler system underneath trees.</p> <p>The efficiency of irrigation and evenness of distribution must be checked frequently.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



Land Management Code of Practice

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
4.2	<p>Irrigation scheduling</p> <p>Irrigation schedules and volumes applied must be based on capacitance probes in most blocks, must factor in local climate data and must be fully automated.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p>Other:</p> <p>Have any water quality samples been taken as part of the Farm Plan or as required in Section 5 of the LMCOP? Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/></p> <p>If so, please provide details including locations (map/coordinates), suitably trained sampling person, and results</p>					

Source: Banana Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0032/78863/banana-water-quality-risk-framework-2017-22.pdf)



LMCOP Compliance Checklist – Horticulture

This checklist should be read in conjunction with the Farm Plan for the Irrigator and the Water Quality Objectives of the LMCOP.

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
Soil Management (LMCOP Reference: Section 4.4.1)					
1.1	Controlling runoff using buffers Buffers must be in place which provide good protection of waterways and wetlands at all times (or not applicable).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.2	Fallow management Fallow cropping/promotion of ground cover must be conducted at all times to provide full protection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.3	In-field erosion control Crops must be planted across slope with regular spaced wide vegetation strip cropping.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.4	Inter-row management Inter-rows must be managed with ground cover (selected plants) or not applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.5	Roadway and headland maintenance Roadways and headlands are strategically designed, constructed and maintained to minimise erosion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.6	Sediment traps As required by the Farm Plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Nutrient Management (LMCOP Reference: Section 4.4.2)					

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
2.1	Soil testing Soil tests must be completed frequently (more than once per year) to fulfill nutrient budgeting requirement across the entire farm.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.2	Leaf testing Leaf tests must be conducted at strategic crop stages in line with nutrient budgeting across entire farm.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.3	Nutrient budgeting and recording If available, must have industry recognised software package (e.g., Avoman), at paddock scale, based on soil tests, yield data and other sources of nutrient.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.4	Fertiliser application method Various fertiliser application methods must be used (fertigation, incorporation and/or foliar) with automated fertigation being dominant.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.5	Calculating fertiliser rates Application rates must be based on frequent soil and leaf testing using a nutrient budget on a block-by-block basis.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Farm Chemical Management (LMCOP Reference: Section 4.4.3)					
3.1	Calculating pest and crop chemical requirements Calculations of pest and crop chemical requirements must be done using own recorded crop monitoring results, action thresholds and labelled rates in line with crop monitoring consultant recommendations/implementation of Integrated Pest Management Practices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.2	Reducing chemical loss to runoff and drift Must be applied at times of low risk using low drift nozzles and low volume applicators in conjunction with wind breaks and recorded weather data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
3.3	Integrated pest management A full complement of Integrated Pest Management practices must be implemented with minimal pesticide usage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Water Management (LMCOP Reference: Section 4.4.4)					
4.1	Irrigation scheduling Objective tools must be used regularly to modify irrigation applications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.2	Matching irrigation interval and volume to crop requirements and soil limitations Must have an automated irrigation system and application rate must be suited to crop stages and soil type.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.3	Water reuse Must include onsite water reuse opportunities. Where practicable water from site shall be collected and reused for irrigation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Irrigation Management (where applicable as per the Farm Plan)					
5.1	Calculating the timing of irrigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.2	Calculating the volume of irrigation to apply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.3	Minimising irrigation losses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.4	Irrigation tail water capture and re-use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.5	Production indicator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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Number	Description (Best Practice)	Not achieved	Partial best practice achieved	Best practice achieved	Attach Farm Plan developed by SQP and provide additional information as supporting evidence
<p>Other:</p> <p>Have any water quality samples been taken as part of the Farm Plan or as required in Section 5 of the LMCOP? Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/></p> <p>If so, please provide details including locations (map/coordinates), suitably trained sampling person, and results</p>					

Source: Horticulture Water Quality Risk Framework (https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0035/78866/horticulture-water-quality-risk-framework-2017-22.pdf)

Appendix 2: Land Management Compliance and Incident Response Procedure



Sunwater – Rookwood Weir: Land Management Compliance and Incident Response Procedure

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1. Introduction and purpose

The Rookwood Weir project was approved by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) under a variation to the existing approval under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* (EPBC 2009/5173) on 27 May 2020. The variation to the approval for Sunwater Limited (**Sunwater**) is provided at *Appendix A*.

The approval required Sunwater to develop the following key documents and plans:

- a separate water quality monitoring and reporting program for the weir subject to Conditions 1a - 1f;
- a land management code of practice (the **Code**) to be approved by the Minister subject to Conditions 2a - 2f.

Sunwater has subsequently prepared both the *Rookwood Weir Water Quality Monitoring Program* (Sunwater 2022) (**WQMP**) and the *Sunwater Land Management Code of Practice for Irrigation Water from Rookwood Weir* (EM/SLR 2022).

The specific WQMP conditions of the approval included monitoring to detect potential water quality changes, primarily in relation to increased levels of nitrogen from decaying inundated vegetation, and potential impacts from the commencement of new agricultural activities. The Fitzroy Basin Association (**FBA**) was originally commissioned in 2018 to develop a preliminary pre-baseline WQMP and to provide guidance for a final WQMP that meets the requirements of Condition 1 of the EPBC approval. To address the approval condition and objectives of this WQMP, a range of water quality parameters need to be monitored. The parameters were chosen in consultation with water quality experts and relevant government departments to meet the objectives of all relevant Australian and State Government monitoring requirements including the *Reef 2050 Long-Term Sustainability Plan* and the Queensland water quality monitoring standards. Baseline monitoring sites upstream, within and downstream of the impoundment were chosen to assess the potential impacts from the impoundment, such as increases in nitrogen levels. Baseline monitoring commenced in July 2020 and continues to be undertaken. Monitoring is also being undertaken immediately upstream and downstream of the weir construction area as per relevant Queensland approval conditions. Outcomes of the WQMP will be used as part of compliance assessment and the process to review the effectiveness of the Code.

The Code is focused on land management practices and does not include specific water quality monitoring. The Code includes objectives to be achieved and nominates the issues which must be managed in order to achieve the required water quality objectives. It acknowledges existing approaches, which are recognised as best practice in terms of management of the nominated issues. It is based on an existing framework in order to minimise the implementation burden on Water Users.

The Code applies to:

- each purchaser of water from Rookwood Weir who proposes to use water for the purpose of irrigated agriculture (called Water Users);
- new Water Users as well as existing Water Users purchasing extra allocation;
- all types of irrigated agriculture, and at all scales;

- to irrigated agriculture on a property, irrespective of the availability of other sources of water or the proportion of total water supply afforded by the water purchased from Rookwood Weir on that property.

If a Water User grows more than one type of irrigated crop (such as in rotation), then they will need to comply with the management practices applicable to each crop.

The Code will be attached as a condition of sale of water for irrigated agriculture and will include a requirement for Water Users to provide annual notification of compliance. If a Water User is non-compliant, water will not continue to be sold to that entity.

Compliance with the Code does not replace the need to comply with state-based reef protection regulations or any other Australian or State Government obligations which may relate to the activity.

Condition 19 of the EPBC approval requires Sunwater to report non-compliances. Condition 19 specifically requires that Sunwater:

must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in approved plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify:

- *any condition which is or may be in breach;*
- *a short description of the incident and/or non-compliance; and*
- *the location (including co-ordinates), date, and time of the incident and/or non-compliance. In the event the exact information cannot be provided, provide the best information available.*

Condition 20 of the approval requires that Sunwater:

must provide to the Department the details of any incident or non-compliance with the conditions or commitments made in an approved plan as soon as practicable and no later than 10 business days after becoming aware of the incident or non-compliance, specifying:

- *any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future;*
- *the potential impacts of the incident or non-compliance; and*
- *the method and timing of any remedial action that will be undertaken by the approval holder.*

The purpose of this *Sunwater – Rookwood Weir: Land Management Compliance and Incident Response Procedure* is to provide a procedure for reporting non-compliances under Condition 19 of the approval, as well as the procedure for providing further details of the non-compliance as required under Condition 20 of the approval.

2. Compliance with the Code

Compliance with the Code will be audited at two levels:

- a) On-farm compliance with land management practice implementation
- b) Water quality monitoring in the receiving waters via the WQMP developed in response to Condition 1 of the EPBC Act approval.

a. On-farm compliance with land management practice implementation

On-farm compliance checks will be undertaken by a suitably qualified person on an annual basis. This will include an initial review of the Farm Plan, checklists and the progress of the transition to best practice plans.

The annual review will include an assessment of progress toward implementation of best practice where a transitional pathway has been agreed, such as with respect to construction of new/revised infrastructure in accordance with the Farm Plan.

Once a property achieves compliance with best management practice as nominated in the Code (as confirmed by a suitably qualified person), it will be accredited against the Code and the independent on-farm audit will no longer be required, but will be replaced by annual notification by the landholder.

However, Sunwater may reinstate the on-farm audit if it becomes aware of circumstances that indicate a possible failure to comply with the Code, such as failure to achieve a relevant water quality objective in the WQMP, in circumstances where the failure was potentially related to the on-farm practices (Figure 1).

If a property is found to be non-compliant, or fails to achieve the transition to best practice in the agreed timeframe as per Best Practice Transition Plan, it will be allowed no longer than 6 months to achieve compliance or its contract for water supply will be suspended until such time as compliance is achieved (Figure 1). Sunwater may, at its discretion, suspend the contract for water supply if compliance is not achieved within a further 6 months (Figure 1). Achievement of compliance must be confirmed by a suitably qualified person.

b. Water quality monitoring (WQMP) highlights a non-compliance

Where there is a general failure to achieve a relevant water quality objective in the WQMP and the program reports that the failure was potentially related to on-farm practices, Sunwater will undertake enquiries with Water Users. On-farm audits will be undertaken, where a potential non-compliance is found, with the aim of identifying the cause of the failure.

As outlined in Section 2.1, where a property is found to be non-compliant, or fails to achieve the transition to best practice in the agreed timeframe, it will be allowed no longer than 12 months to achieve compliance or its contract for water supply will be suspended until such time as compliance is achieved (Figure 1).

Sunwater may, at its discretion, cancel the contract for water supply if compliance is not achieved within a further 6 months (Figure 1). Achievement of compliance must be confirmed by a suitably qualified person.

If a non-compliance with the Code is detected, the process nominated above will be followed.

Results of the WQMP and reports of inspections by suitably qualified persons will be presented and discussed at an annual stakeholders meeting.



3. Legal obligations to notify

Table 1 lists the legal obligations of Sunwater relevant to reporting and notifying the department of non-compliances with “conditions or the commitments made in the WQMP and/or the Code.”

Table 1: Legal Obligations to Notify

Approval name	Approval type	Approval Start Date	Approval Condition	Condition text	Notification period	Management actions
EPBC2009/5173	EPBC Act and WQMP	27 July 2021	1d	If the monitoring results from the Program (WQMP) for a weir determine that a residual impact to the Great Barrier Reef World Heritage Area and National Heritage place is likely to or has actually occurred, the approval holder must notify the Minister within 20 business days	20 business days	Notify the Minister of potential residual impact to the Great Barrier Reef World Heritage Area and National Heritage place
EPBC2009/5173	EPBC Act and WQMP	27 July 2021	1d	If and when such notification occurs, a description of actions and timeframes for the provision of water quality offsets in accordance with the Program and the offsets strategy for that weir must be provided to the Minister within 20 business days after notification.	20 business days	Notify the Minister of provision of water quality offsets in accordance with the Program and the offsets strategy for that weir must be provided to the Minister
EPBC2009/5173	EPBC Act and the Code	27 July 2021	2e	The approval holder must require each purchaser, proposing to use water in a manner that may impact on the quality of the water entering the Great Barrier Reef World Heritage Area and National Heritage place, to comply with the approved code for the relevant weir; and	NA	Refer Section 2: “On-farm compliance will be undertaken by a suitably qualified person on an annual basis. This will include an initial review of the Farm Plan, checklists and transition to best practice plans.”
EPBC2009/5173	EPBC Act and the Code	27 July 2021	2f	The approval holder must require the purchaser to provide annual notification of compliance with the approved code for the relevant weir, as it applies to land management practices on their property or require the purchaser to participate in the accreditation scheme under condition 2d).	NA	Refer Section 2: “annual notification by the landholder.”
EPBC2009/5173	EPBC Act	27 July 2021	10	Within three months of every 12-month anniversary of the commencement of the action, the approval holder must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of any management plans as specified in the conditions. Documentary evidence providing proof of the date of publication must be provided to the Department at the same time as the compliance report is published.	Within three months of every 12-month anniversary of the commencement of the action	Prepare and submit annual compliance report within three months of every 12-month anniversary of the commencement of the action.
EPBC2009/5173	EPBC Act	27 July 2021	11	Upon the direction of the Minister, the approval holder must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Minister. The independent auditor and audit criteria must be approved by the Minister prior to the commencement of the audit. The audit report must address the criteria to the satisfaction of the Minister.	If directed by the Minister	Undertake an independent audit of compliance with the conditions of approval, and submit a report to the Minister
EPBC2009/5173	EPBC Act	27 July 2021	12	The approval holder may choose to revise a management plan, program or code of practice approved by the Minister under conditions 1, 2, 5 and 6 without submitting it for approval under section 143A of the EPBC Act, if the taking of the action in accordance with the revised plan, program or code of practice would not be likely to have a new or increased impact. If the approval holder makes this choice they must: a) notify the Department in writing that the approved action management plan has been revised and provide the Department with: i. an electronic copy of the revised plan, program or code of practice; ii. an electronic copy of the revised plan, program or code of practice marked up with track changes to show the differences between the approved revised plan, program or code of practice and the revised plan, program or code of practice;	20 business days	Notify Minister of revised plan

Approval name	Approval type	Approval Start Date	Approval Condition	Condition text	Notification period	Management actions
				iii. an explanation of the differences between the approved revised plan, program or code of practice and the revised plan, program or code of practice; iv. the reasons the approval holder considers that taking the action in accordance with the revised plan, program or code of practice; would not be likely to have a new or increased impact; and v. written notice of the date on which the approval holder will implement the revised plan, program or code of practice; (RAMP implementation date), being at least 20 business days after the date of providing notice of the revision of the revised plan, program or code of practice, or a date agreed to in writing with the Department. b) subject to condition 15, implement the revised plan, program or code of practice from the RAMP implementation date		
EPBC2009/5173	EPBC Act	27 July 2021	19	The approval holder must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in approved plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify: <ul style="list-style-type: none"> a. any condition which is or may be in breach; b. a short description of the incident and/or non-compliance; and c. the location (including co-ordinates), date, and time of the incident and/or non-compliance. In the event the exact information cannot be provided, provide the best information available. 	Two business days	Notify the Minister within two days of becoming aware of potential non-compliance and commence investigation incident response (refer Section 4)
EPBC2009/5173	EPBC Act	27 July 2021	20	The approval holder must provide to the Department the details of any incident or non-compliance with the conditions or commitments made in an approved plan as soon as practicable and no later than 10 business days after becoming aware of the incident or non-compliance, specifying: <ul style="list-style-type: none"> a. any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future; b. the potential impacts of the incident or non-compliance; and c. the method and timing of any remedial action that will be undertaken by the approval holder. 	Ten business days	Notify the Minister within ten business days of <ul style="list-style-type: none"> a) any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future; b. the potential impacts of the incident or non-compliance; and c. the method and timing of any remedial action that will be undertaken by the approval holder (refer Section 4)

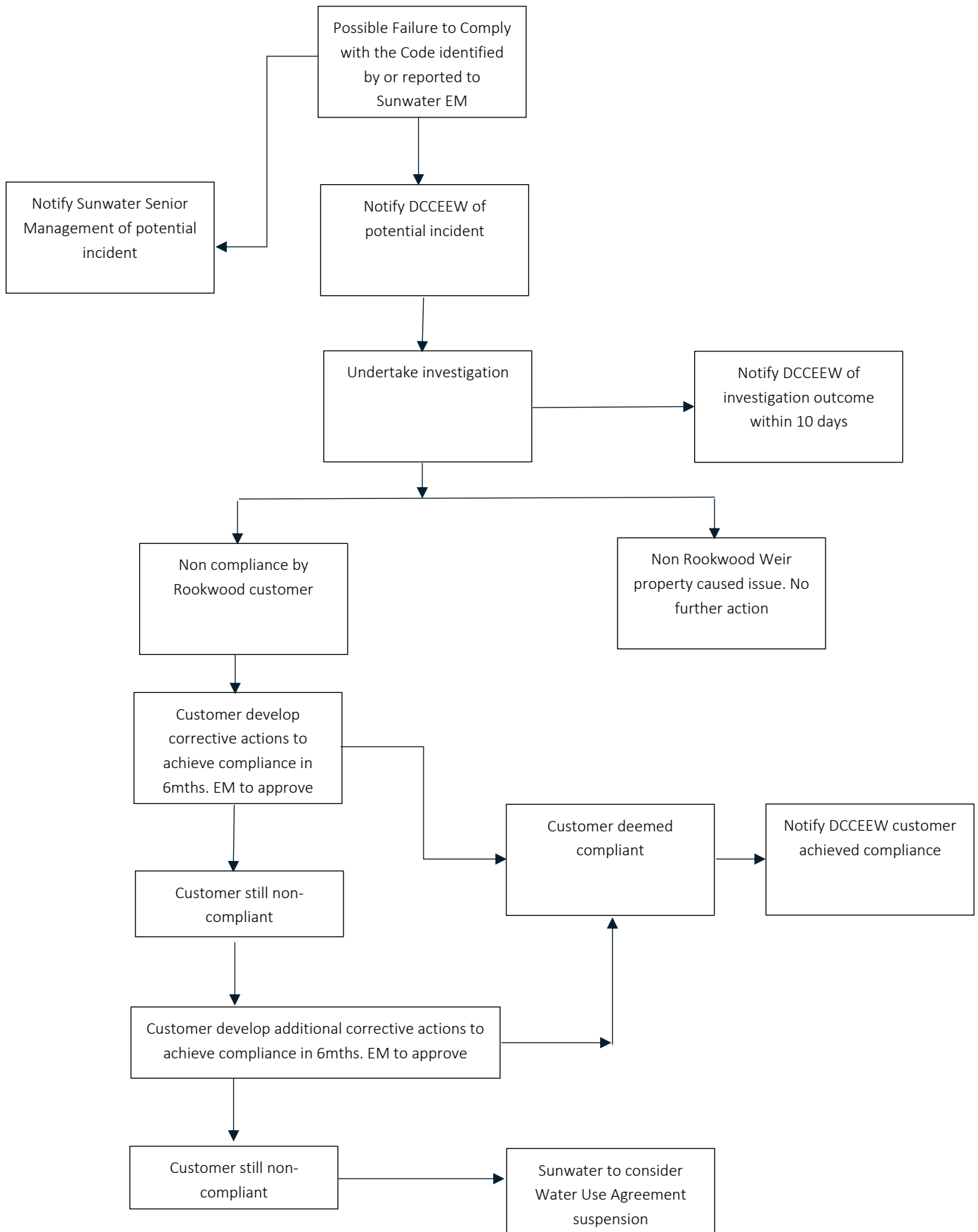
4. Incident response

Table 2 lists the responsible people required to control the incident and provide notifications, as detailed in Table 1 above.

Table 2: Responsible people – incident control and notification

Role	Company	Responsibility
Environment Manager (EM)	Sunwater	Responsible for compliance reporting and notifications
Water Quality Monitoring	Water quality monitoring consultant	Responsible for reporting on WQMP and notifying Sunwater of any potential incidents of non-compliance
Water Users	Private Water Users	Responsible for annual reporting and compliance with the Code
Land management specialist	An agronomist or otherwise suitably qualified person	Undertake investigations and determine corrective actions

Figure 1: Incident response procedure and responsible persons



Appendix 3: List of useful support tools for Irrigators

General

- Rookwood Weir Landholder Support Program being facilitated on behalf of Sunwater by Advance Rockhampton
- Hort360 and Hort360 Reef Certification <https://www.hort360.com.au/> and https://www.hort360.com.au/?page_id=1481
- SmartCane BMP, <https://smarcane.com.au/>
- Grains BMP, <https://www.grainsbmp.com.au/>
- My BMP, <https://www.mybmp.com.au/home.aspx>
- Water Quality Risk Frameworks 2017-2022 (Grains, Horticulture, Grazing, Sugarcane and Bananas), <https://www.reefplan.qld.gov.au/tracking-progress/paddock-to-reef/management-practices>
- Reef 2050 Long Term Sustainability Plan (Commonwealth of Australia 2018), <https://www.reefplan.qld.gov.au/working-together>
- Reef Water Quality Improvement Plan (State of Queensland 2018)
- Queensland Soil Conservation Guidelines. <https://www.publications.qld.gov.au/dataset/soil-conservation-guidelines>
- Queensland Government Farming in Reef Catchment, Reef Protection Regulations website <https://www.qld.gov.au/environment/agriculture/sustainable-farming/reef/reef-regulations>
- Reef protection regulations, Farming in Reef Catchments, Farm and nitrogen and phosphorus budget guide, https://www.qld.gov.au/data/assets/pdf_file/0014/115142/sugarcane-farm-nitrogen-phosphorus-budget-guide.pdf
- Sugarcane cultivation in the Great Barrier Reef catchment Agricultural ERA standard, https://www.qld.gov.au/data/assets/pdf_file/0017/113147/sugarcane-era-standard.pdf
- Commercial cropping and horticulture in the Great Barrier Reef catchment (prescribed ERA 13A) https://environment.des.qld.gov.au/data/assets/pdf_file/0019/237313/pr-es-era13a-cropping.pdf
- Fitzroy Basin Association <https://www.fba.org.au/services/project-assistance/>

Resources

A range of resources are available to help you comply with the State Reef protection regulations. These contain practical information that can also be used to assist to comply with this Code.

Sugarcane

- [Sugarcane requirements factsheet \(PDF, 702 KB\)](#)
- [Changes for sugarcane growers in the Wet Tropics, Burdekin and Mackay Whitsunday regions factsheet \(PDF, 741 KB\)](#)
- [Support programs and assistance for agricultural producers factsheet \(PDF, 441 KB\)](#)
- [Record keeping requirements for agricultural producers factsheet \(PDF, 514 KB\)](#)
- [Recognised programs and acknowledged projects factsheet \(PDF, 510 KB\)](#)
- [Agricultural ERA standard for sugarcane cultivation \(PDF, 1 MB\)](#)

Land Management Code of Practice

- [Prescribed methodology for sugarcane cultivation \(PDF, 1 MB\)](#)
- [Sediment and erosion control guide \(PDF, 2 MB\)](#)
- [Fertiliser placement guide \(PDF, 1 MB\)](#)
- [Farm nitrogen and phosphorus budget guide \(PDF, 3 MB\)](#)

Grazing

- [Grazing requirements factsheet \(PDF, 678 KB\)](#)
- [Support programs and assistance for agricultural producers factsheet \(PDF, 441 KB\)](#)
- [Record keeping requirements for agricultural producers factsheet \(PDF, 514 KB\)](#)
- [Recognised programs and acknowledged projects factsheet \(PDF, 510 KB\)](#)
- [Agricultural ERA standard for beef cattle grazing \(PDF, 445 KB\)](#)
- [Grazing guide \(PDF, 4 MB\)](#)

Bananas

- [Banana requirements factsheet \(PDF, 700 KB\)](#)
- [Support programs and assistance for agricultural producers factsheet \(PDF, 441 KB\)](#)
- [Record keeping requirements for agricultural producers factsheet \(PDF, 514 KB\)](#)
- [Recognised programs and acknowledged projects factsheet \(PDF, 510 KB\)](#)
- [Agricultural ERA standard for banana cultivation \(PDF, 518 KB\)](#)
- [Prescribed methodology for banana cultivation \(PDF, 1 MB\)](#)
- [Erosion and sediment control guide \(PDF, 2 MB\)](#)
- [Fertiliser placement guide \(PDF, 1 MB\)](#)

Grains

- [Reef protection regulations factsheet \(PDF, 501 KB\)](#)
- [Grains and horticulture requirements factsheet \(PDF, 482 KB\)](#)
- [Support programs and assistance for agricultural producers factsheet \(PDF, 441 KB\)](#)

Horticulture

- [Reef protection regulations factsheet \(PDF, 501 KB\)](#)
- [Grains and horticulture requirements factsheet \(PDF, 482 KB\)](#)
- [Support programs and assistance for agricultural producers factsheet \(PDF, 441 KB\)](#)



New or expanding cropping and horticulture

- [New or expanding cropping and horticulture activities factsheet \(PDF, 1 MB\)](#)
- [ERA standard – Commercial cropping and horticulture in the Great Barrier Reef \(prescribed ERA 13A\) \(PDF, 404KB\)](#)
- [Application Guide - Applying for an environmental authority to undertake commercial cropping and horticulture \(PDF, 2 MB\)](#)
- [Standard Conditions Guide \(five-100 hectares\) Commercial cropping and horticulture in the Great Barrier Reef catchment \(prescribed ERA 13A\) \(PDF, 3 MB\)](#)
- [Standard application for a new environmental authority for a prescribed ERA 13A \(DOCX, 174KB\)](#)
- [Variation application for a new environmental authority for a prescribed ERA 13A \(DOCX, 152KB\)](#)
- [Site-specific application for a new environmental authority for a prescribed ERA 13A \(DOCX, 123KB\)](#)
- [Do I need a permit checklist? \(PDF, 665 KB\)](#)
- [New or expanding cropping and horticulture: FAQs \(PDF, 519 KB\)](#)

Industrial land use

- [Information for operators of new, expanded or intensified regulated industrial land use activities such as sewage and water treatment plants, land-based aquaculture and mining](#)
- [Guideline: Reef discharge standards for industrial activities \(PDF, 666KB\)](#)

Factsheets

- [Reef protection regulations \(PDF, 501 KB\)](#)
- [Support programs and assistance for agricultural producers \(PDF, 441 KB\)](#)
- [New expanding cropping and horticulture activities \(PDF, 1 MB\)](#)
- [Record keeping requirements for agricultural advisers \(PDF, 471 KB\)](#)
- [Agricultural advisers: FAQs \(PDF, 466 KB\)](#)
- [New or expanding cropping and horticulture: FAQs \(PDF, 519 KB\)](#)
- [Record keeping requirements for agricultural producers \(PDF, 514 KB\)](#)
- [Recognised programs and acknowledged projects factsheet \(PDF, 510 KB\)](#)
- [Sugarcane requirements \(PDF, 702 KB\)](#)
- [Changes for sugarcane growers in the Wet Tropics, Burdekin and Mackay Whitsunday regions \(PDF, 741 KB\)](#)
- [Grazing requirements \(PDF, 678 KB\)](#)
- [Banana requirements \(PDF, 700 KB\)](#)
- [Grains and horticulture requirements \(PDF, 482 KB\)](#)

