North Woodburn-Kilgin Drain

Active Floodgate Management Plan

Date: 2025-2030

ROUS Taking care of what matters.

Management Plan operational summary

North Woodburn-Kilgin Drain is located 8 kilometres north of Woodburn in Northern NSW. The approximately 1.2-kilometre-long drain enters the Richmond River on its western bank. The system drains a section of a large low-lying area that stretches from Dungarubba in the north, through Buckendoon, Kilgin and south to North Woodburn. North Woodburn-Kilgin drain is a constructed drainage system that shows no natural characteristics and is surrounded by agricultural land used for sugar cane and grazing. The drain discharges into the Richmond River estuary and the focus of management is in reducing any impact on the downstream environment.

The drain has been floodgated at its junction with the Richmond River, with a large concrete headwall that Kilgin Road runs over. Five floodgates are installed on the downstream side, one of those has been modified with a sluice window to allow tidal exchange. It is that modification to which this Plan applies. The term 'floodgate' within this Plan refers to the sluice window that is opened and closed to allow tidal exchange between the drain and the Richmond River.

Active floodgate management has occurred at North Woodburn-Kilgin drain since 2004. Opening the sluice window to allow tidal exchange, during non-flood periods, has improved water quality within the drain. The frequency and magnitude of acidic discharge has been reduced, as has the accumulation of Mono-sulfidic Black Ooze (MBO) within the drainage system.

Although monitoring has not occurred, it is reasonable to expect that tidal exchange has improved water quality discharging from the North Woodburn-Kilgin drain. Research has shown that tidal exchange can improve water quality through dilution and naturalisation of acidity. It is important to acknowledge that active floodgate management does not resolve all water quality issues in the system, e.g. tidal exchange does not reduce deoxygenation (blackwater) events after flooding.

While acknowledging the limitations, the environmental impact of North Woodburn-Kilgin drain floodgates has been reduced through active management and it continues to be an important on-going strategy. This Plan outlines how tidal exchange will continue and suggests additional management strategies to reduce the system's impact further.

Environmental goals and strategies

The goals and strategies listed here specifically relate to North Woodburn-Kilgin drain and identify the desired outcome from actively managing the floodgates. Goals are listed in priority order.

GOAL	1.	Reduce the frequency and magnitude of acidic discharge from the North Woodburn-Kilgin drain.
	2.	Reduce the accumulation of Mono-sulfidic Black Ooze within the system.
	3.	Reduce the impact of the North Woodburn-Kilgin drain on the downstream environment.
STRATEGIES	4.	Formalise the current opening strategy for the system's floodgate.
	5.	Encourage best management practices and additional remediation strategies to further reduce the impact of the North Woodburn-Kilgin drain.

Opening strategy for floodgates

A floodgate on the North Woodburn-Kilgin drain is fitted with a sluice window, which can be winched open. The sluice window requires careful management to reduce the risk of negative impacts on properties upstream. The land surrounding the drainage system is very low and there is little freeboard between normal drain water level and the surrounding land. This increases the risk of prolonged inundation after rain events and overtopping and inundation of land from tidal water. The operational strategy for this sluice window has been developed and refined by the landowner volunteer over many years and this management plan documents it in detail.

The sluice window is opened whenever possible but needs to be lowered before significant rain events. Given the limitations on tidal exchange at this site, this is the optimal strategy for the existing floodgate structure and no improvement is suggested at this time for its future management. Even minimal tidal exchange, if it occurs regularly, can improve discharged water quality and this drain is a priority because of its history of acidity from acid sulfate soils.

The sluice window will be opened and closed, in accordance with the details below by the nominated landowner volunteer. Council and the landowner volunteer acknowledge there are many variables during flood events and will be guided by the details below. This Plan will not restrict Council from taking emergency actions outside of those listed, taking into consideration safe work procedures.

Close sluice in floodgate

To allow adequate storage within the drain for heavy rain, ideally the sluice will be closed before 75mm (3 inches) of rain or more falls and when further rain is forecast in the coming 1-2 weeks or the ground is already saturated.

Monitor rainfall forecasts along with drain and river water levels.

Flood Watch issued by the Bureau of Meteorology for the Wilsons and Richmond Rivers.

Monitor water levels and catchment conditions. If it is likely that a minor flood warning will follow, close the sluice window.

When vegetation growing in the drainage channel is being controlled with herbicide.

Fully close the sluice window at the first available low, run-out tide during daylight.

Reduce sluice in floodgate

Dependent on prevailing weather conditions landowners may rely on the drain to water in planted cane. This occurs during September and October. If required, the sluice will be reduced to an opening of 50mm from early August until early November to reduce salinity levels in the drain. After this time, the sluice will be reopened.

Reduce the sluice window opening to 50mm at the first available low, run-out side during daylight.

Open sluice in floodgate

Reopen the sluice window to a maximum aperture of 140mm after flooding or the cancellation of flood warning, when the lifting mechanism is visible, water levels in the drain and river are not elevated, it is safe to access the site and operate the infrastructure during daylight.

Contingencies

Flood warning is unexpected and occurs overnight.

Sluice needs to be closed and it is a high or rising tide, or river water levels are too high.

Sluice will remain open until safe (for operator and infrastructure) to close it.

Landowner is away when sluice needs to be operated.

Landowner volunteer will notify Council before leaving, and Council will manage the sluice in their absence.

- If the nominated landowner volunteer requires assistance with the floodgate, or any associated infrastructure, they are to contact Council.
- Council are to be notified by either phone or email within 24 hours if the floodgate is opened or closed for any reason other than what is outlined above.
- If Council has not been notified of any action outside of what is outlined above, they will return the floodgate to the agreed upon state and aperture (open or closed) for the current conditions.
- All notifications should be directed to Council Reception on 6623 3800 or council@rous.nsw.gov.au

Rous County Council contact details

Rous County Council
PO Box 230, Lismore NSW 2480
(02) 6623 3800
council@rous.nsw.gov.au
www.rous.nsw.gov.au

Authorisation

This plan has been endorsed by Council and the landowners within the immediate catchment whose land is influenced by the management of floodgates.

Landowners have signed a letter of endorsement stating they understand the management strategy for the floodgate, including the triggers for opening and lowering the sluice window.

The nominated landowner volunteer has agreed to operate the floodgate on behalf of Council, as outlined in this Active Floodgate Management Plan and in accordance with the Workplace Health and Safety advice and directions provided to them.

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Version control

Version	Description	Reviewed by	Date
0.1	Draft developed before landowner consultation	Chrisy Clay	23/07/2020
0.2	Final draft incorporating landowner feedback	Chrisy Clay	12/08/2020
1.0	Final version – issued to landowners	Brenda Ford	11/11/2020
1.1	Review of plan, incorporating landowner feedback	William Jones	20/10/2025

Rous County Council content manager D20/6816

Contents

1. Overview

The majority of coastal floodplains in New South Wales have been extensively modified for flood mitigation. Networks of drains have been constructed, natural water courses altered, and floodgates installed to mitigate the impacts of floods and large rainfall events.

Constructed drains reduce inundation after flooding and floodgates prevent flood and tidal water from inundating low areas of the floodplain. This in many cases has converted prior wetlands and low-lying floodplain areas into dryland farming areas. While these developments have enhanced rural settlement and agricultural industries, they have also caused unintended adverse impacts to downstream water users, fisheries, and the ecology of estuaries.

Rous County Council (Council) is the Flood Mitigation Authority operating across the local government areas of Ballina, Lismore and Richmond Valley. Council operates and maintains a network of rural flood mitigation infrastructure which includes floodgates, pipes, levees and drains and canals. Council's natural resource management function relates to the environmental consequence resulting from the operation of this infrastructure.

The flood mitigation directive that Council operates under in accordance with the *Local Government Act 1993* and Council's Proclamation is 'Prevent and mitigate menace to the safety of life or property from floods and natural resource management issues arising therefrom'.

Purpose of an Active Floodgate Management Plan

Council has an Active Floodgate Management Plan ('Plan') for each of its floodgates that are actively managed. Active management is the opening of floodgates during non-flood periods when the floodgate is otherwise operating passively. Opening floodgates and allowing tidal exchange can reduce their environmental impact by improving water quality and enhancing aquatic habitat and fish passage. Opening a floodgate for tidal exchange can occur by modifying a floodgate with a sluice window or an automatic, tidally operated float system, or the floodgate can be winched opened.

These plans document and communicate:

- how active management can assist in reducing the environmental impact of the floodgate,
- a strategy for how that will be monitored and achieved,
- appropriate and consistent strategy for opening the floodgate and returning it to the operational position or state and by whom,
- safe operating procedures for volunteers and Council staff,
- how adverse effects on current land use will be identified and prevented, and
- additional management strategies for the drainage system that would further reduce the environmental impact of flood mitigation.

Each Plan is tailored for the system and its floodgates, considering their location, purpose, and function.

Guiding principles for management

- Rous County Council is the Flood Mitigation Authority and acts in consultation with stakeholders on the management of its infrastructure.
- The primary function of Council's infrastructure is for flood mitigation.
- The intention of active floodgate management is to reduce environmental impact without causing adverse effects on current land use.
- All landowners behind the floodgate whose property may be impacted will be invited to participate in reviewing and updating the Plan and will be sent a final version of the Plan for their records. Where property ownership changes, the new landowner will be involved at the time the Plan is reviewed, unless their location and role are critical to the management strategy.
- Active floodgate management is a cooperative exercise between Council, as the Flood Mitigation Authority, and the surrounding landowners. Council appreciates landowners' continued support of this important activity.

Stakeholder involvement

This Active Floodgate Management Plan is a formal agreement between Rous County Council and landowners on how tidal exchange will occur on the identified drainage system. The Plan has been developed in consultation with landowners whose property may be impacted from the floodgate's operation.

Rous County Council seeks the input and support of other stakeholders for their Active Floodgate Management program and its delivery.

Table 1. Stakeholders and relevant roles

Organisation	Role
Rous County Council	Owns, develops and uses individual Active Floodgate management plans.
Relevant landowners	Endorses and uses individual Active Floodgate management plans.
Lismore City Council Ballina Shire Council Richmond Valley Council	Supports active floodgate management and provides input on general program where relevant.
NSW Department of Primary Industries and Regional Development	Supports active floodgate management and provides input on general program where relevant. Regulatory role under *Fisheries Management Act 1994*

Plan review frequency

The Plan will be formally reviewed every 5 years (from the date of adoption) and the effectiveness of the outlined strategy assessed.

Feedback on the Plan and active floodgate management matters

Feedback and comments should be referred to Council by telephone on (02) 6623 3800 or by email: council@rous.nsw.gov.au

2. North Woodburn-Kilgin drainage system

Asset number and description

A reference in this section to ‘asset number’ is to a unique reference that Council has assigned to the specified asset.

Asset number 3170 – North Woodburn-Kilgin drain

- Five square 2,400mm floodgates, one with a sluice window operated with a winch.

Table 2: Floodgate asset number and description

Asset No.	Description	Number
3170-031	Aluminium floodgate (2,400mm square)	4
3170-031	Aluminium floodgate (2,400mm square) with sluice window	1
3170-035	Lifting gear	2
3170-610	Handrail	2
3170-261	Canal	
3170-290	Outlet	
3180-031 3190-031 3200-031 3210-031 3220-031 3230-031 3240-031 3250-031 3260-031 3270-031-01 3270-031-02 3280-031 3290-031 3300-031 3310-031 3320-031	Secondary floodgates	16

Aerial photograph of asset location and images of asset

Figure 1: North Woodburn-Kilgin drain locality map.

Figure 2: North Woodburn-Kilgin drain floodgates.

Figure 3: Sluice window installed on the floodgates at North Woodburn-Kilgin drain.

Figure 4: North Woodburn-Kilgin drain looking upstream from floodgates.

Drainage system characteristics

Location in estuary	Mid-estuary.
Location in landscape	Riverine natural levee and floodplain.
Land elevation	0.47m - 1.98m AHD
Land use	Agriculture: sugar cane and grazing.
Vegetation	Limited to grasses and pastures.
Salinity levels and estuary dilution capacity	Varies depending on rainfall, usually moderate.
Tidal range	Moderate.
Land elevation adjacent to drains	Very low in places. Graduating from natural levee along Richmond River to low-lying land upstream.
Soil type	Likely to be alluvial sediment overlaying estuarine clay.
Acid sulfate soils	High risk, areas of sulfuric sediments (actual sulfate soils) present in low-lying areas. MBOs present in drain.
Hydraulic conductivity	Unknown. Based on chronic acid conditions observed in drain, likely to be medium-high in places. An assessment of a drain nearby with similar characteristics was determined to be moderate by Hirst et al (2009).
Acid export	System is known to export acid after heavy rain and for acidic conditions to persist for some time afterwards.
Water quality issues	Prolonged acidification after rain. Can discharge deoxygenated water (blackwater) after flooding.
Sea-level rise	Given the very low elevation of land adjacent to the North Woodburn–Kilgin Drain (0.47m–1.98m AHD), future sea level rise may reduce drainage efficiency and increase the risk of prolonged inundation.

Water quality

Historic spot water quality readings and observations indicate the drain can be acidified for a prolonged time after rainfall. In 2004, the former Richmond River County Council collected spot water samples from the drain for laboratory analysis. The results showed severe acidification with pH readings of 3.2 and 2.9 and dissolved aluminium of 13 and 35 mg/L and dissolved iron of 4.6 and 21 mg/L.

An assessment of the saturated hydraulic conductivity of surrounding soil was made to the drainage system to the north of the North Woodburn-Kilgin drain by Hirst et al (2009). The results showed moderate levels which an equate to approximately 1.5 to 15 meters of potential groundwater movement toward the drain under favourable conditions. Acid discharge at North Woodburn-Kilgin drain is groundwater driven and occurs when the hydraulic gradient between groundwater and the drainage system is greatest.

Active floodgate management can improve water quality discharging from North Woodburn-Kilgin drain by diluting and/or neutralising any acidity before it enters the Richmond River estuary as well as reducing the accumulation of Monosulfidic Black Ooze (MBO).

After major summer floods, the system does discharge deoxygenated water (blackwater). Low-lying areas within the drainage system can be inundated for lengthy periods, until water levels in the Richmond River drop allowing water to drain away.

In 2020 the Richmond River Floodplain Prioritisation Study was developed by the Water Research Laboratory (WRL) which is part of the University of NSW (UNSW). The final report was published in 2023. The primary purpose of the study was to develop a roadmap for the strategic management of Acid Sulfate Soil (ASS) and blackwater runoff from NSW coastal floodplains to improve the water quality and overall health of the marine estate. This is accomplished by providing an evidence-based assessment of 13 floodplain subcatchment drainage areas across the Richmond River floodplain, prioritising them based on the risk they pose through acid and blackwater generation, and suggesting management options for remediation actions. Of the 13 subcatchments the Kilgin/Buckendoon subcatchment (of which North Woodburn-Kilgin Drain is part of) ranked 8th for acid risk and 6th for blackwater risk.

Floodplain drainage – sea level rise vulnerability

The Richmond River Floodplain Prioritisation Study also considered the impact of sea level rise on floodplain drainage. To complete this assessment, detailed numerical modelling of the Richmond River estuary was completed to assess the vulnerability of floodplain drainage to sea level rise. Historical (~1960s), present day (2020), near future (~2050) and far future (~2100) sea levels were modelled and compared to floodgate infrastructure geometry and floodplain topography to assess floodplain vulnerability to reduced drainage under future sea levels. The sea level data used in this report is an increase of 0.16m above AHD 2020 levels in the near future (NF) and an increase of 0.67m above AHD in the far future (FF). This data is from a technical report, "Sea Level Rise Science and Synthesis for NSW", (Glamore et al., 2016), prepared for the NSW Office of Environment and Heritage's Coastal Processes and Responses Node.

Table 3. Adopted mean sea level (MSL) relative to 2020 (Harrison et al., 2023)

Time period	Adopted change in MSL relative to 2020 (m)
HS – Historical (circa 1960)	-0.05
PD – Present day (circa 2020)	0
NF – Near future (circa 2050)	+0.16
FF – Far future (circa 2100)	+0.67

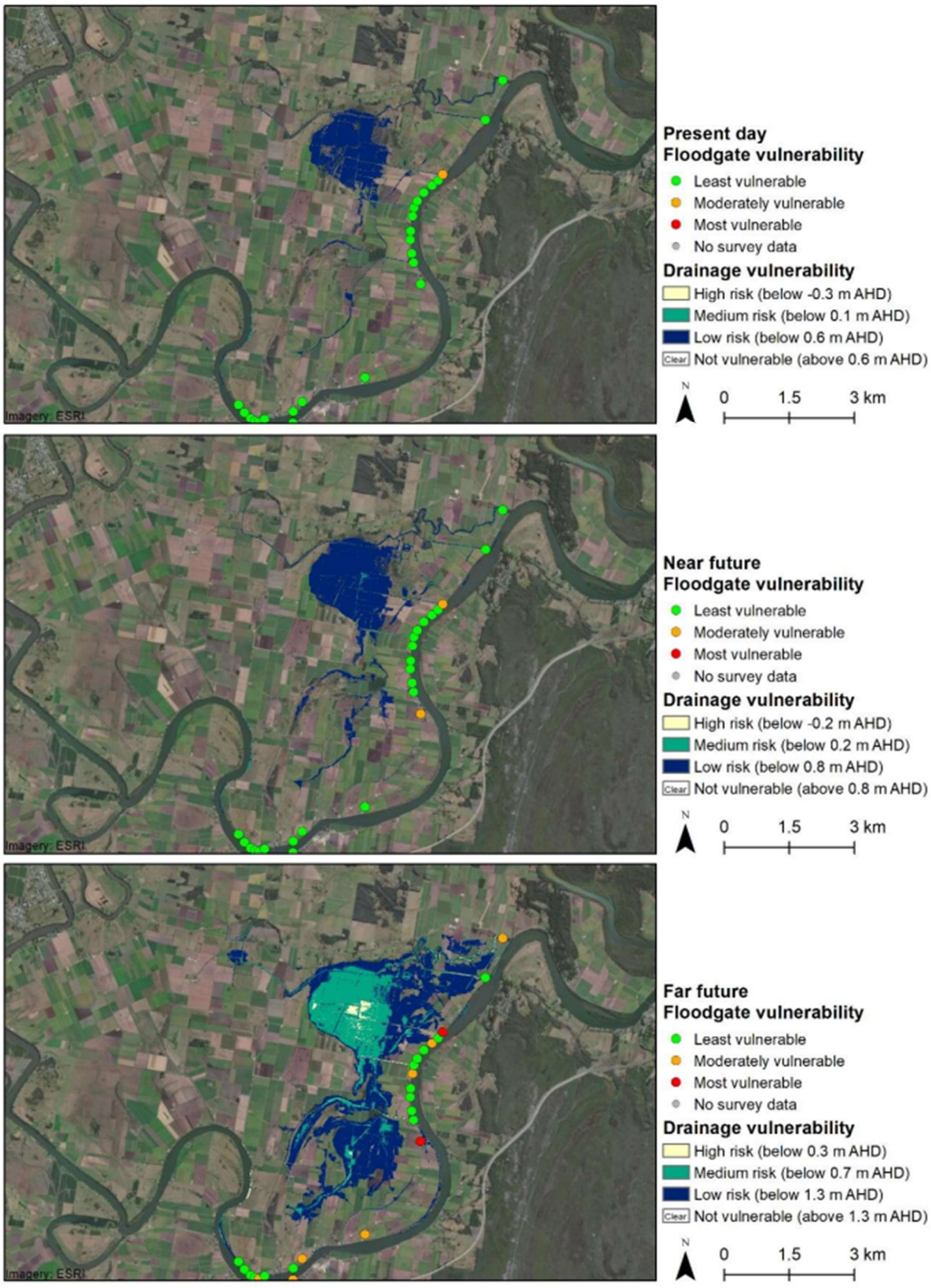

Figure 5: Sea level rise drainage vulnerability – Kilgin Buckendoon subcatchment (Harrison et al., 2023).

Impacts of sea level rise

The Richmond River Floodplain Prioritisation Study assessed the vulnerability of tidal floodgates to sea level rise based on how frequently their effective drainage is reduced by increased downstream water levels. Under the far future (~2100) sea level rise scenario, the North Woodburn-Kilgin floodgates (ID 3170) is classified as "moderate vulnerable". This designation means that the obvert (the internal top of the structure) is expected to be underwater more than 50% of the time, thereby substantially reducing the drain's efficiency and impacting the low areas of the sub catchment it serves.

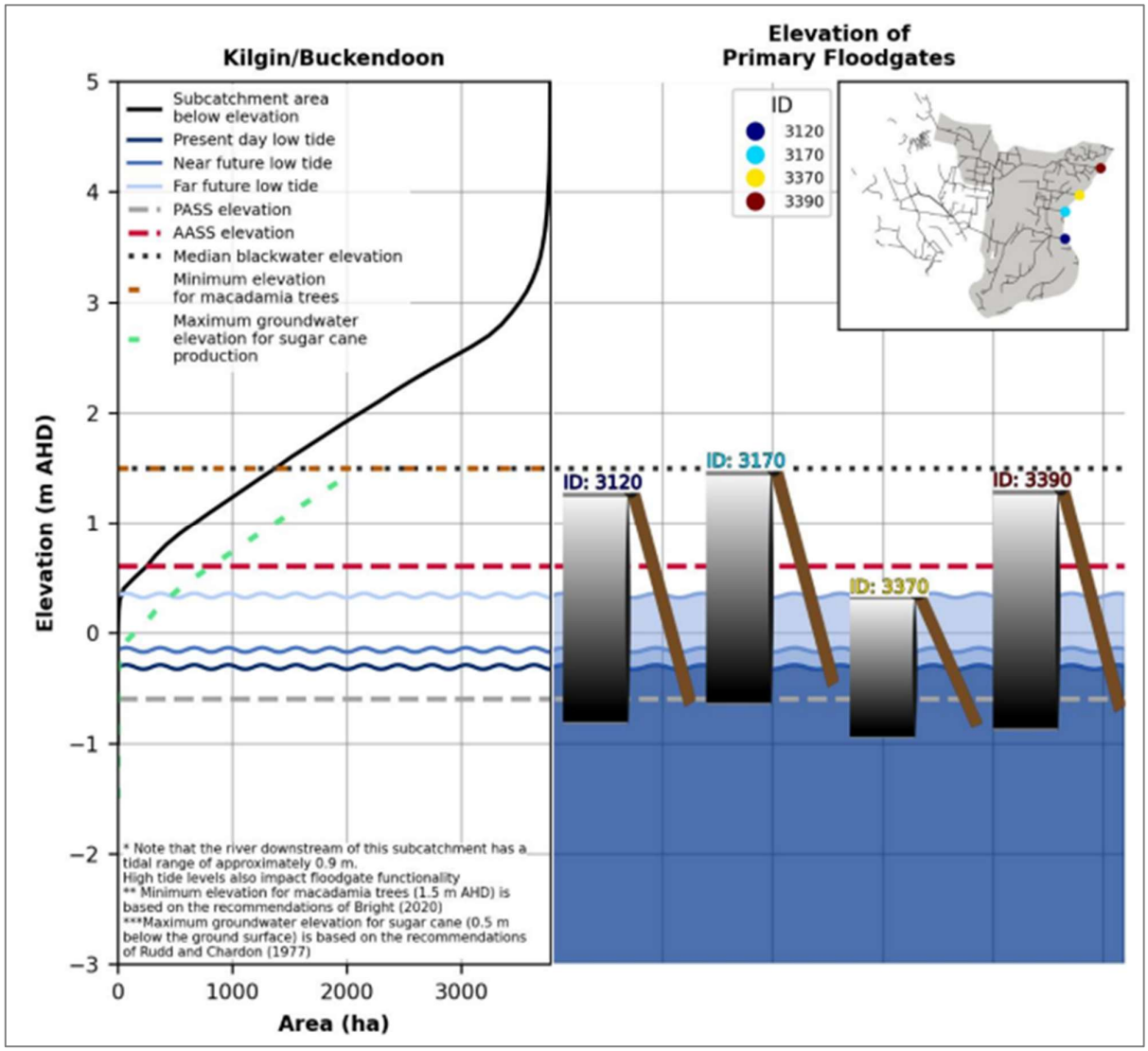

Figure 6: Primary floodgates and key floodplain elevations – Kilgin Buckendoon subcatchment (Harrison et al., 2023).

The broader Kilgin-Buckendoon subcatchment, which includes the area drained by the North Woodburn-Kilgin Drain, is predicted to face increasing drainage issues in its low-lying areas due to rising average water levels in the Richmond River estuary. Although the low backswamp areas drained by this channel are considered only low risk under present-day and near-future sea level rise scenarios, they are predicted to transition to a "moderate risk" (below the 50th percentile water level) in the far future out from the year 2100 (see Figure 7 below). This diminished drainage capacity will likely affect the viability and productivity of existing land uses, primarily sugar cane, in these lower areas.

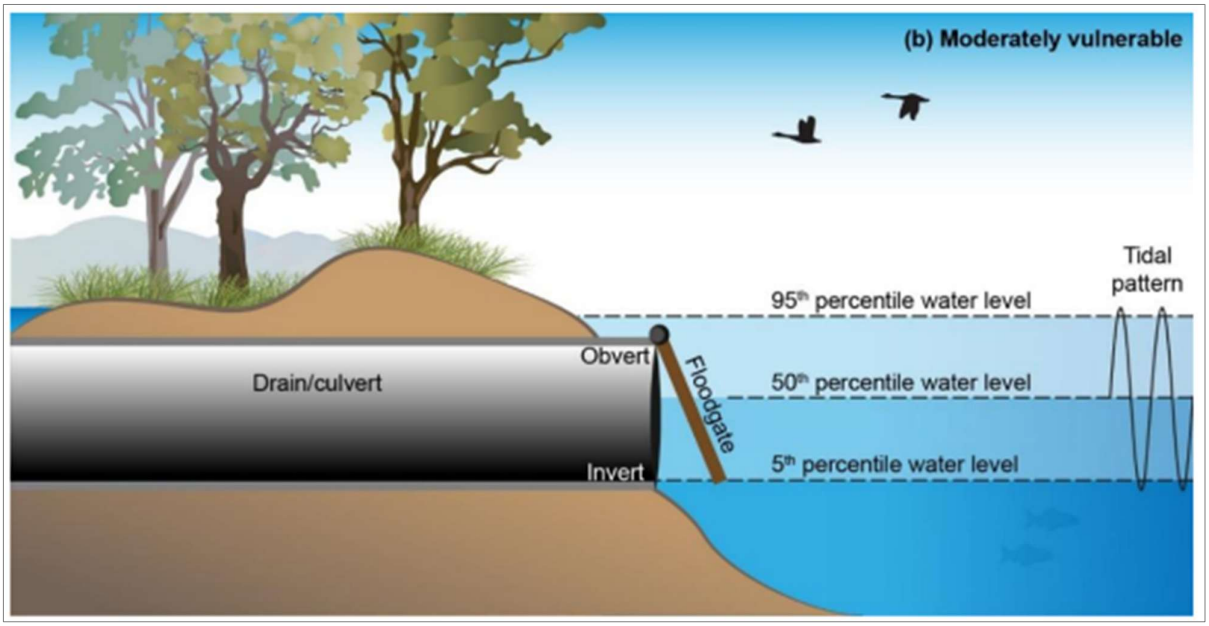

Figure 7: Floodgate vulnerability assessment – moderate for North Woodburn-Kilgin Drain.

Recommendations from The Richmond River Floodplain Prioritisation Study

For the short term, recommendations include considering additional tidal flushing through floodgate modifications (like auto-tidal gates, buoyancy gates, or sluice gates) on major drains to improve water quality and fish habitat, and investigating drain reshaping in low areas to increase the invert elevation above potential acid layers and encourage water-tolerant vegetation.

For the long term, considering rising water levels and the impact agricultural productivity, the recommended strategy within the Richmond River Floodplain Prioritisation Study is the restoration of natural floodplain hydrology in the lowest areas (e.g., below +0.7 m AHD); this involves redesigning major drains to be shallower and wider, with the majority of non-flood flows to be redirected via the natural watercourses, allowing native water tolerant species to establish thus reducing blackwater discharge risk.

Aquatic habitat values

The former freshwater wetland that historically stretched from Dungarubba in the north, through Buckendoon, Kilgin and south to North Woodburn would have had aquatic habitat value. Little information has been documented or recorded on what the area was like before extensive drainage.

North Woodburn-Kilgin drain is a constructed drainage system that shows no natural characteristics. The drainage system provides little aquatic habitat however, it discharges directly into the Richmond River estuary. Active floodgate management at North Woodburn-Kilgin drain aims to reduce the system's impact upon downstream aquatic habitat.

Whole of system management

The following table outlines what management changes have already been made within the North Woodburn-Kilgin drainage system and what could be explored in the future. A cooperative approach that balances the needs of current land use and environmental benefits is promoted by Council. North Woodburn-Kilgin drain has benefitted from the willingness of previous landowners to trial and adopt different management strategies to its environmental condition and Council acknowledges their efforts.

Council provides this information for landowners and other organisations that are responsible for promoting and facilitating natural resource management on private freehold land. This information identifies a range of relevant strategies for improving water quality based on the characteristics of the system and are consistent with current best management practice.

Management strategy	Works	Undertaken	Location	Recommendation	Responsibility
Acidic groundwater containment	Reducing drainage density – removing drains or reshaping so shallow and wide to only drain surface water.	Yes, for one secondary drain. A drain running into the North Woodburn-Kilgin drain from the south was reshaped in 2009 by the landowner and the former RRCC. The works were part of a larger project on the next major drain to the south (Kilgin School drain). The works were funded by NRCMA	Other private drains entering North Woodburn-Kilgin drain	Explore possibility with relevant landowners.	Private landowners. Local Government: • Rous County Council • Richmond Valley Council. State Government: • North Coast Local Land Services. • Department of Primary Industries and Regional Development. • Department of Climate Change, Environment, Energy and Water • Marine Estate Management Authority.
	Laser levelling of paddocks to enhance drainage of surface water and remove the need for field drains that can drain groundwater.	Likely to have on cane farms as this is a widespread industry practice.	Land growing sugar cane.	Explore with landowners whether further laser levelling and reduction of field drains can occur.	Private landowners. Local Government: • Richmond Valley Council. State Government: • North Coast Local Land Services. • Department of Primary Industries and Regional Development. • Department of Climate Change, Environment, Energy and Water • Marine Estate Management Authority.

Management strategy	Works	Undertaken	Location	Recommendation	Responsibility
Tidal flushing for dilution and buffering of acidification.	Actively manage floodgates.	Yes, by RRCC in 2004.	Sluice window installed on main floodgate.	Continue with current management strategy.	Private landowners Rous County Council.
Reduce impact of deoxygenation events.	Reducing drainage density – removing drains or reshaping so shallow and wide to only drain surface water.	No.	All drains in grazing land.	Explore possibility with landowners. Assess cost versus benefit.	Private landowners. Local Government: • Rous County Council • Richmond Valley Council. State Government: • North Coast Local Land Services. • Department of Primary Industries and Regional Development. • Department of Climate Change, Environment, Energy and Water • Marine Estate Management Authority.
	Explore further management strategies for lowest lying areas.	No.	All drains in grazing land.	Explore possibility with relevant landowners.	
Water quality monitoring.	Monitoring program to identify any water quality issues and confirm benefits of managing floodgate.	No, only spot samples and observations.	Main floodgates.	That a program be developed to determine success of Active Floodgate Management Plan. Identify resources required and assess cost versus benefit.	Local Government: • Rous County Council.

RRCC = Richmond River County Council, former Flood Mitigation Authority on the Richmond.
NRCMA = Northern Rivers Catchment Management Authority

3. Risks of actively managing floodgates

Work Health and Safety

- The sluice window is fitted with a winch and large forces can be involved in winch systems.
- The sluice window should only be opened on a low or falling tide. This will reduce the risk of the wire rope breaking and the floodgate bowing.
- The sluice window is opened and closed by nominated landowner volunteer or Council operator, who should consult and follow the approved Safe Work Procedure and Floodgate Fact Sheet relevant for the activity and undertake their own risk assessment before operating the floodgate.
- Operating the sluice window during and after heavy rain or flooding can require working in wet and slippery conditions. Safe access to the site should be assessed after events.
- The sluice window is only to be operated during daylight hours.

Environmental / Agricultural

Flooding

There is a risk of flooding to land upstream of the floodgate and surrounding areas, if the sluice window is not closed before a flood arrives and floodwater from the Richmond River enters the drainage system.

There is also a risk of increased flooding from tidal exchange as there is little freeboard between normal drain water and the surrounding land. This increases the risk of prolonged inundation after rain events. To reduce this risk the sluice window is closed before heavy rain events to maintain storage in the drainage system.

Saline water overtopping

Landowners have identified that if tidal exchange is not carefully managed there is a risk of saline water overtopping the drain and inundating areas. The land surrounding the drainage system is very low and the operational strategy for this sluice window has been developed and refined by the landowner volunteer over many years to reduce this risk. Extensive retrofitting of the system has also occurred to reduce the risk of tidal water inundating land upstream. In total 16 secondary floodgates were installed along the main canal to prevent tidal water from moving into side drains and inundating land.

Increased salt levels in drainage system

Salinity levels can be high in this part of the Richmond River estuary, especially during droughts and periods of low flows. Increased salinity levels in the drainage system are a risk if landowners are relying on the drain to water in planted cane. To reduce this risk the sluice will be lowered a month before cane is planted to reduce the salinity within the drain and then reopened once the cane is planted and established in early November. Cane is not planted every year and the sluice only needs to be lowered when prevailing weather conditions increase salinity in the river.

4. Monitoring, evaluation and reporting

Council will explore whether water quality monitoring can occur at North Woodburn-Kilgin drain. However, if resources are not available for monitoring, scientific principles and visual observations support the assumption that implementing the outlined management strategy will improve water quality.

An evaluation of the success of the Plan will be made at the 5-yearly review, and a report provided by Council to landowners and relevant stakeholders.

5. Historical context

History of when and why asset was installed

It is not clear when the North Woodburn-Kilgin drain and floodgates were constructed. However, drainage has long been a priority for landowners in the area, with reports from the 1920's of requests from landowners for better drainage. It is likely that some scale of drainage had already occurred by that time by landowners themselves.

In November 1928, the Northern Star newspaper reported that landowners approached Gundurimba Shire Council and requested the construction of the Kilgin drainage scheme, floodgates and concrete pipes. After hearing the presentation, the Council pointed out that it would be difficult the finance the work.

> *"The council would have either to borrow the £500 or appropriate that amount from the general fund. An alternative proposal was that some of the ratepayers affected should find the money for the work, and they would be repaid, with interest from a local rate levied the benefited area. The deputation was favorably impressed with the suggestion, especially as it would mean that an early start would be made with the work. The engineer will make an estimate of the cost of the work".*

In December 1929, the Northern Star newspaper reported that the Kilgin Drainage Committee (which consisted of local landowners) presented a proposal to Gundurimba Shire Council to have floodgates installed in the area.

When today's drainage system was constructed isn't known nor who constructed it. In 1950 the Northern Star newspaper reported of the existence of the Gundurimba Shire C Riding Drainage Union. It is possible that the Drainage Union was involved with the construction of the North Woodburn-Kilgin drain and floodgates.

History of active floodgate management

Active floodgate management commenced at North Woodburn-Kilgin drain in 2004. Extensive retrofitting of the system occurred to reduce the risk of tidal water inundating land upstream. In total 16 secondary floodgates were installed along the main canal to prevent tidal water from moving into side drains and inundating land. Rous County Council has management responsibility for those secondary floodgates, and this is comparatively a very large number for a single, short drainage system.

The sluice window requires careful management to reduce the risk of negative impacts on properties upstream. The land surrounding the drainage system is very low and there is little freeboard between normal drain water level and the surrounding land. The operational strategy for this sluice window has been developed and refined by the landowner volunteer over many years and the review of this management plan is an opportunity to document it in detail.

6. References

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Hirst P., Slavich P., Johnston S., Walsh S. (2009) Assessment of hydraulic conductivity in coastal floodplain acid sulphate soils on the north coast of NSW. Report prepared for the six North Coast Councils of NSW. NSW Department of Primary Industries

Appendix: North Woodburn-Kilgin drainage system