



Sandy Creek No.2 Active Floodgate Management Plan

2021-2024

Management Plan operational summary

Sandy Creek No.2 drain is located 5.5 kilometres south-west of Coraki in Northern NSW. The approximately 750m-long drain enters Sandy Creek on its southern bank. The system drains a low-lying area of approximately 10ha between Sandy Creek and Myall Creek Road and is an escape route for overland flood water in major events. Sandy Creek No.2 drain is a constructed drainage system that shows no natural characteristics and is surrounded by agricultural land used for grazing and tea tree.

The drain is floodgated at its junction with Sandy Creek with a large concrete headworks constructed through a man-made levee and two floodgates installed on the downstream side. One floodgate 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 Sandy Creek.

Active floodgate management has occurred at Sandy Creek No.2 drain since 2006. Based on scientific understanding, it is known that opening the sluice windows to allow tidal exchange (during non-flood periods) can improve water quality within the drain by reducing the frequency and magnitude of acidic discharge. However, active floodgate management does not resolve all water quality issues in the system, particularly deoxygenated (blackwater) water after flooding.

While acknowledging the limitations, the environmental impact of Sandy Creek No.2 floodgates can be 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 Sandy Creek No.2 drain and identify the desired outcome from actively managing the floodgates. Goals are listed in priority order.

Goals

1. Reduce the frequency and magnitude of acidic discharge from the system.
2. Reduce the impact of the system on its receiving waters of Sandy Creek.

Strategies

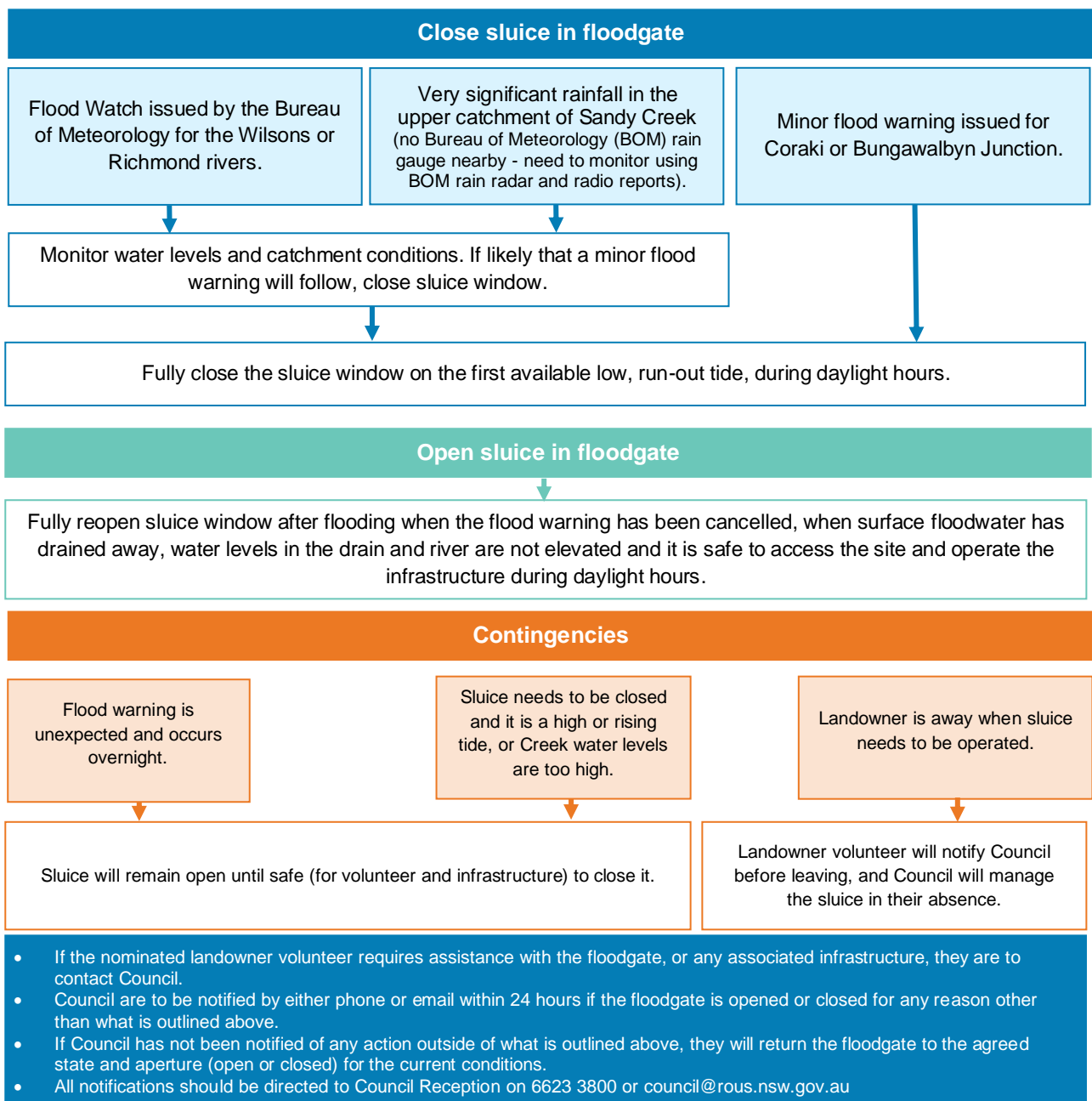
- Formalise the current opening strategy for the system's floodgate.
- Encourage best management practices and additional remediation strategies to further reduce the impact of Sandy Creek No.2 drain.

Opening strategy for floodgate

One of the floodgates on Sandy Creek No.2 drain is fitted with a sluice window, which can be winched open, and the review of this management plan is an opportunity to confirm how the sluice window will be managed into the future.

The sluice window will remain fully open all year, and only lowered before flood events to protect upstream areas from riverine inundation. This is the optimal strategy for the existing floodgate structure and no improvement is suggested at this time for its future management. The degree of tidal exchange that will occur with the outlined strategy will reduce acidity discharging from the drain, while having minimal impact on surrounding land use. It is recommended that this strategy be assessed when this Plan is reviewed in three years' time to determine its effectiveness and whether tidal flushing can be increased.

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



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Authorisation

This Plan has been endorsed by the landowners within the immediate catchment, whose land is influenced by the management of floodgates. Those landowners have signed a letter of endorsement stating they understand the management strategy for the floodgates, including the triggers for opening and lowering into the operational position.

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	By	Date
0.1	Draft developed before landowner consultation	Chrisy Clay	1/07/2020
0.2	Final draft incorporating landowner feedback	Chrisy Clay	14/10/2021
1.0	Final version – issued to landowners	Andrew Logan	22/10/2021

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1. Overview

The majority of coastal floodplains in NSW 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 is responsible for the construction, replacement and routine maintenance of flood mitigation infrastructure, which includes floodgates, pipes, levees, drains and canals. Council's natural resource management function relates to the environmental consequence resulting from the operation of this infrastructure. Council is responsible for reducing the environmental impact of floodgates and other infrastructure, while retaining their benefits for flood mitigation.

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

Purpose of a 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 effect 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.

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

Organisation	Role
Rous County Council	Owens, 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	Supports active floodgate management and provides input on general program where relevant. Regulatory role under <i>Fisheries Management Act 1994</i> .

Plan review frequency

The Plan will be formally reviewed every three 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. Sandy Creek No.2 drain

Asset number and description

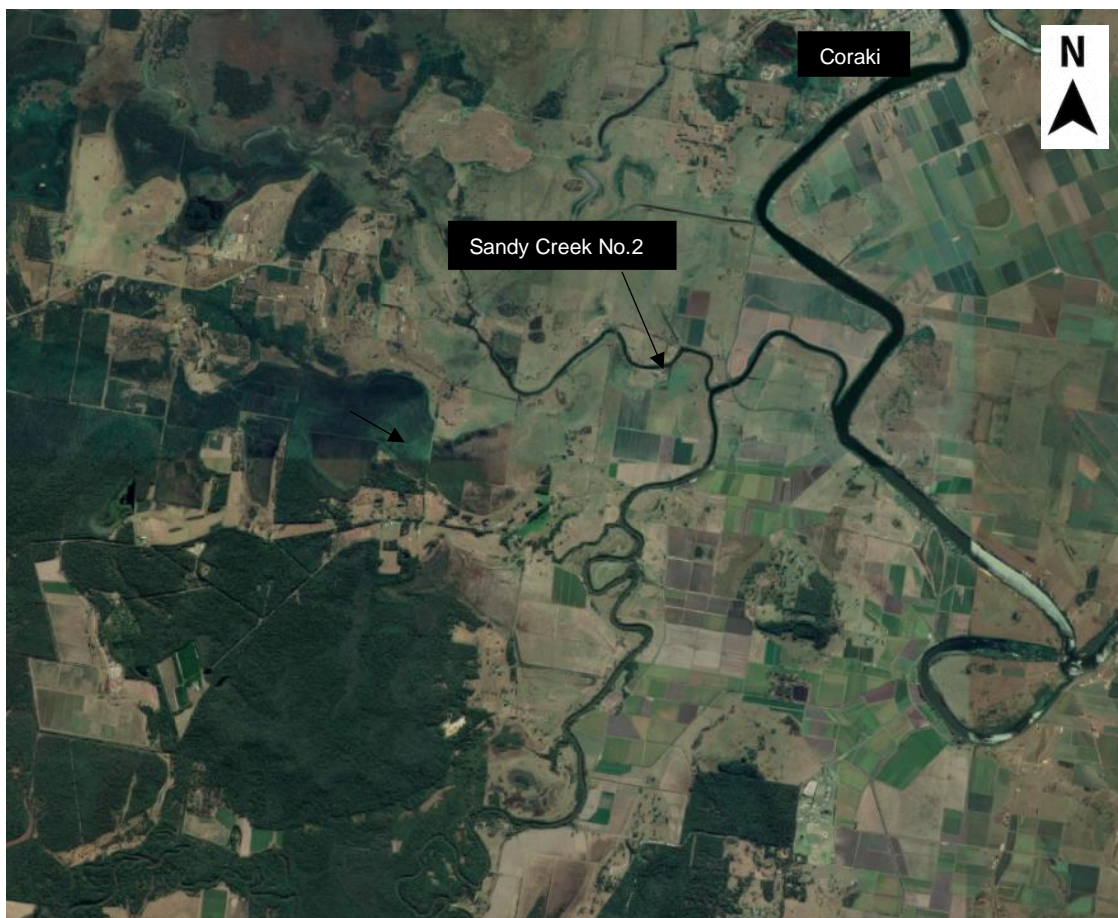
A reference in this section to 'asset number' is to a unique reference that Council has assigned to the specified asset.

Asset number 2010 – Sandy Creek No.2 drain

- Two floodgates, one with a sluice window operated with a winch.

Asset No.	Description	Number
2010-030-01 2010-030-02	Aluminium floodgate (2100mm square)	2
2010-035	Steel lifting gear	1
2010-610	Handrail	2
2010-290	Outlet	1
2010-263	Canal (first 330m upstream of floodgate)	1
2010-130	2 cell box culvert with headwall	1
	Note: RRCC file notes from 1984 show a timber bridge over the drain as a Council asset.	

Aerial photograph of asset location and images of asset



1: Sandy Creek No.2 drain locality map.



2: Sandy Creek No.2 floodgates, showing culvert headwall, lifting devices and handrail.



3: Looking up Sandy Creek No.2 drain from floodgates.

Drainage system characteristics

Location in estuary.	Mid-upper estuary.
Location in landscape.	Floodplain.
Land elevation.	0.7m – 1.8m AHD.
Land use.	Agriculture: grazing and tea tree.
Vegetation.	Grasses and pastures.
Salinity levels and estuary dilution capacity.	Low.
Tidal range.	Low.
Land elevation adjacent to drains.	Graduating from moderate on natural levee along Sandy Creek to low.
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 area.
Hydraulic conductivity.	Unknown. Based on chronic acid conditions observed in drain, likely to be medium-high in places.
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. Chronic acidic discharge with low dilution capacity within Sandy Creek. Can discharge deoxygenated water (blackwater) after flooding. Chronic acidic discharge with low dilution capacity within Sandy Creek.

Water quality

No water quality monitoring has occurred at Sandy Creek No.2 drain, however visual observations indicate that the drain experiences both acidic and blackwater conditions.

Sandy Creek No.2 drain is a source of acidity into Sandy Creek. This acidification is from the oxidation of acid sulfate soils within the sub-catchment, particularly the low-lying area at the top of the drainage system. Chronic acidic conditions are often observed within the drainage system. Active floodgate management can improve water quality discharging from Sandy Creek No.2 by diluting the acidity before it discharges downstream.

After major summer floods, Sandy Creek No.2 can discharge deoxygenated water (blackwater). Blackwater is generated when low-lying areas are inundated and the flooded vegetation rots. Low-lying areas within the drainage system can be inundated for lengthy periods, until water levels in Sandy Creek drop, allowing water to drain away.

Aquatic habitat values

Sandy Creek No.2 drain system is an artificial, manmade drainage system that shows no natural characteristics. The drainage system provides little habitat and the water quality within the system can be unfavourable for aquatic life.

However, Sandy Creek No.1 drainage system discharges into Sandy Creek just upstream of Bungawalbyn Creek, which has been previously identified as a High Conservation Value watercourse by the Northern Rivers Water Management Board (Foster, 2001). Bungawalbyn Creek provides important aquatic habitat, particularly for fish, within the wider Richmond floodplain. The active management of the Sandy Creek No.2 floodgate is focused on reducing the system's impact upon Sandy Creek and downstream aquatic habitat.

Whole of system management

The following table outlines what management changes have already been made within Sandy Creek No.2 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. Sandy Creek No.2 drain has benefitted from the willingness of previous landowners to trial and adopt different management strategies to improve 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
Prevent and minimise risk of acidic scalds.	Installation of drop board system to hold surface water back on low-lying area.	No.	In the very top section of the drain where the land elevation is lowest.	Explore possibility with landowners. Assess cost versus benefit.	Private landowners. Local Government: <ul style="list-style-type: none"> Rous County Council. Richmond Valley Council.
Acidic groundwater containment.	Reducing drainage density – removing drains or reshaping so shallow and wide to only drain surface water.	No.	Entire drainage system.	Explore possibility with landowners. Assess cost versus benefit.	State Government: <ul style="list-style-type: none"> North Coast Local Land Services. Department of Primary Industries. Department of Planning, Industry and Environment. Marine Estate Management Authority.
Tidal flushing for dilution of acidification.	Actively manage floodgate on drain headwall.	Yes. In 2006 by RRCC.	A sluice window in the main floodgates on Sandy Creek.	Continue with outlined management strategy.	Private landowners. Local Government: <ul style="list-style-type: none"> Rous County Council.
Reduce impact of deoxygenation events.	Reduce drainage density – removing drains or reshaping so shallow and wide to only drain surface water.	No.	Entire drainage system.	Explore possibility with landowners.	Private landowners. Local Government: <ul style="list-style-type: none"> Rous County Council. Richmond Valley Council. State Government: <ul style="list-style-type: none"> North Coast Local Land Services. Department of Primary Industries.

Management strategy	Works	Undertaken	Location	Recommendation	Responsibility
	Return lowest-lying land to a more natural water regime, i.e. shallow and permanent inundation.				<ul style="list-style-type: none"> • Department of Planning, Industry and Environment. • Marine Estate Management Authority.
Water quality monitoring.	Monitoring program to identify any water quality issues and confirm benefits of managing floodgate.	No.	Main floodgates.	That a program be developed to determine success of Active Floodgate Management Plan. Identify resources required and assess cost versus benefit.	

RRCC = Richmond River County Council, former Flood Mitigation Authority on the Richmond.

3. Risks of actively managing floodgates

Work Health and Safety

- The sluice windows are fitted with a winch and large forces can be involved in winch systems.
- The sluice windows 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 windows are 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 Sandy Creek enters the drainage system.

Increased salt levels in drainage system

Salinity levels are low in Sandy Creek, even during droughts and periods of low flows. There is no risk posed by tidal water overtopping banks in low-lying areas or of lateral salt seepage into the banks.

4. Monitoring, evaluation and reporting

Council will explore whether water quality monitoring can occur at Sandy Creek No.2 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 3-yearly review, and a report provided by Council to landowners and relevant stakeholders.

5. Historical context

History of when and why asset was installed

There is very little information on the history of Sandy Creek No.2 drain and it is not known when it was constructed. However, many flood mitigation structures in this area are historic, and in some instances works in the 1950s and 1960s upgraded infrastructure that had been constructed in the early 1900s. Historical aerial photography show the drain and floodgates were present in 1964.

The Northern Star newspaper reports in 1930 that landowners in the area were interested in having floodgates installed on drains that had previously been constructed on their properties.

August 1930 The Northern Star

Woodburn Shire Council was approached by landowners Patch, Flatley and Pursey about floodgating drains on their properties at Sandy – Bora Creek. They said a committee of landowners had formed the Sandy-Bora Creek floodgate scheme. The landowners intended to finance the works but wanted to see what assistance Council could give. They proposed putting in four floodgates and suggested Council could loan them plant necessary to install them. The landowners said the floodgating of drains would make local roads more accessible. Council agreed to contribute financially and loan plant to the landowners.

October 1930 The Northern Star

Reported the floodgates had been constructed. The works utilised local unemployed. “The large area of wonderfully rich land which the works now being completed will render practically safe from all but very high floods, will be greatly increased in value as its productive capacity will be fully doubled.”



4: Aerial photograph of Sandy Creek No.2 drain taken in 1964.

History of active floodgate management

Active floodgate management commenced on Sandy Creek No.2 when a sluice window was installed. This coincided with the existing steel floodgates being upgraded to aluminium.

This Plan outlines how tidal exchange will continue and suggests additional management strategies to reduce the system's impact further.

The sluice window will remain fully open all year, and only lowered before flood events to protect upstream areas from riverine inundation. The sluice window will be operated by the nominated landowner volunteer in accordance with this Plan.

6. References

Foster, J. (2001) Assessment of the Bungawalbyn Region for High Conservation Value Status. Unpublished report by expert panel for the Far North Coast River Management Committee.



Sandy Creek No. 2 drain catchment

THE INFORMATION ON THIS MAP MAY NOT BE ACCURATE.

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