

Department of Climate Change, Energy, the Environment and Water

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Snowy Montane Rivers Increased Flows: Safety Management Plan 2022-2027

ENVIRONMENTAL FLOW RELEASES INTO THE UPPER MURRUMBIDGEE RIVER BELOW TANTANGARA DAM

March 2025 (Version 6)





Acknowledgement of Country

The Department of Climate Change, Energy, the Environment and Water acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

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1. Introduction

As part of the Snowy Montane River Increased Flows (SMRIF) program, environmental water is released from Tantangara Dam into the upper Murrumbidgee River.

1.1. Purpose of environmental releases

Since the completion of Tantangara Dam in 1960, the upper Murrumbidgee River hydrology has been significantly altered, reducing flows to about 1% of natural flows. The reduction of flows has resulted in loss of aquatic habitat and severe sedimentation of the riverbed, including infilling of riffles, pools and connected ponds and the smothering of aquatic plants.

The build-up of sediment in the upper Murrumbidgee riverbed has been recognised as one of the key limitations for the recovery of the health of the river as this reduces the quality of river habitat and directly impacts on water dependent plants and animals including native fish, frogs and platypus.

To address the effects of river regulation, since 2005 environmental water has been released into the upper Murrumbidgee from Tantangara Dam. Higher planned releases tend to be during the winter and spring months to reflect the natural hydrology of a mixed rainfall and snowmelt river. The releases encourage movement of fine sediment and inundation of lower lying connected ponds to provide habitat for water dependant species.

1.2. Purpose of this plan

The SMRIF Safety Management Plan (SMP) has been prepared by the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW), including the Water (NSW DCCEEW- Water) and Conservation Program, Heritage and Regulation (NSW DCCEEW-CPHR) divisions.

This SMP details the anticipated risks associated with environmental releases into the Upper Murrumbidgee River from Tantangara dam, and outlines the actions and processes required to be undertaken by NSW DCCEEW-Water, NSW DCCEEW-CPHR, Snowy Hydro and other key stakeholders to mitigate or manage these risks.

The Snowy River SMP is a requirement of the Snowy Water Licence and the SWIOID 2002, which state that a SMP be developed to address risks to public safety, third-party property, and workplace health and safety in connection with the release of 'flushing flows', which are defined as a daily release greater than 5,000 ML/day. Consistently, flows in excess of 1,400 ML/day for upper Murrumbidgee River is considered "high-flow events" which requires a SMP.

NSW DCCEEW-Water takes a risk-based approach to safety, and this SMP addresses all environmental releases from Tantangara Dam.

The objectives of the SMP are to ensure that risks relating to environmental flow releases are appropriately minimised by:

- Promoting public awareness of the risks associated with environmental releases into the Upper Murrumbidgee River catchment below Tantangara Dam.
- Issuing of community information and warnings prior to high flow events
- Working with organisations that also have an interest in safe management of environmental releases (e.g. Snowy Hydro, State Emergency Service, Councils, and Bureau of Meteorology) before and during high flow events to mitigate, as far as possible, any detrimental impacts.

1.3. Scope of this plan

Flows from Tantangara Dam into the upper Murrumbidgee River may be a result of the following:

1. Planned SMRIF releases – These are the environmental releases as designed by NSW DCCEEW-CPHR and outlined in the annual SMRIF Operations Plan
2. Modified planned SMRIF releases – These are modifications to the dates or volumes of the planned SMRIF releases as a result of climatic, environmental or other unforeseen circumstances that may arise closer to the time of the planned SMRIF release.
3. Snowy Hydro Tantangara Unplanned storage releases – These are releases such as those made by Snowy Hydro in order to manage the volume of water held in storage, including to avoid uncontrolled spills. These are not accounted as SMRIF, but where possible may be released in consideration of environmental outcomes.
4. Uncontrolled spills – These are spills over the dam spillway when the volume of Tantangara Dam exceeds the storage capacity of the dam.

This SMP covers the safe management of (1) planned and (2) modified planned SMRIF releases, including public communications.

Snowy Hydro is responsible for the safe management of (3) unplanned storage releases and (4) uncontrolled spills, including public communications, and as such these are not covered by this SMP.

The SMP covers a 5-year period from May 2022 to April 2027

1.4. Structure of this plan

This SMP outlines the risks and mitigation measures associated with all planned environmental releases. It details the processes to be undertaken in managing safety. The planned release strategy for each water year is outlined in the SMRIF Operations Plan (see Error! Reference source not found.) and is available on the NSW DCCEEW-Water's website. Daily environmental flow releases are published on Snowy Hydro's website.

1.5. Policy and legislative context

The release of SMRIF is governed by the following key acts and agreements:

- Snowy Water Inquiry Outcomes Implementation Deed 2002 (SWIOID)
- The Snowy Water Licence
- *Snowy Hydro Corporatisation Act 1997*
- *Workplace Health and Safety Act 2011*

1.6. Overview of responsibilities

Multiple organisations are involved in the planning, design, implementation and safety management of environmental releases. In summary this includes:

- NSW DCCEEW-Water determines annual water allocations to the entitlement associated with SMRIF.
- NSW DCCEEW-CPHR, in consultation with the Snowy Advisory Committee (SAC), designs the pattern of environmental flow releases to achieve environmental objectives listed in the SWIOID, taking into account Snowy Hydro's operational constraints.

- NSW DCCEEW-Water coordinate and implement the safety management process, with involvement of the Tantangara Safety Technical Advisory Committee (STAG), including community engagement, noting that all organisations involved are responsible for ensuring safe management of releases.
- NSW DCCEEW-Water instruct Snowy Hydro to make the releases.
- Snowy Hydro makes the physical release if safe to do so, and measure released volumes which subsequently are reported to NSW DCCEEW-Water.
- All organisations involved are responsible for ensuring safe management of releases.

Other stakeholders also have responsibilities and roles in identifying risks associated with environmental flows and implementing actions that will reduce the risks down to an acceptable level. Specific responsibilities for safety management are detailed further in **Section 3**.

1.7. Review of Safety Management Plan

This SMP is current for the 5-year period from May 2022 to April 2027. NSW DCCEEW-Water will review the SMP for currency prior to the commencement of planned environmental water releases annually. Any required amendments would be made as a revision to this document.

In the event of any adverse impacts resulting from a release, the SMP will be reviewed.

An annual SMIRF Operations Plan is also prepared each year by NSW DCCEEW-CPHR. This is an internal document that details the release strategy.

2. Risk assessment

NSW DCCEEW-Water in collaboration with stakeholders, has analysed the anticipated risks to public safety, property and work healthy and safety, associated with planned environmental flow releases. NSW DCCEEW-Water has also assessed the significance of the potential consequences for each associated risk, as well as the probability of that risk being realised. A detailed table of risks is provided in Error! Reference source not found..

The table also includes proposed control measures required to mitigate or reduce the risks. These measures have been developed into the safety management processes outlined in **Sections 3 and 4**.

2.1. Stakeholders

In assessing risks, NSW DCCEEW-Water has taken reasonable steps to identify stakeholders likely to be affected by the releases from Tantangara Dam, or who may be able to assist in ensuring the safety of staff, the public and property during the releases. These include:

- landholders along the upper Murrumbidgee River
- local businesses within the upper Murrumbidgee region
- members of the general public
- recreational fishing and water user groups
- community interest groups
- recreational campers/hikers and tourists
- Bureau of Meteorology (the Bureau)
- Snowy Monaro Regional Council (SMRC)
- NSW State Emergency Service (NSW SES)
- ACT State Emergency Service (ACTSES)
- Local Land Services
- NSW National Parks and Wildlife Service (NSW NPWS)
- NSW Roads and Maritime Services (NSW RMS)
- Snowy Hydro
- Snowy Advisory Committee (SAC)
- users of The National Trail

NSW DCCEEW-Water recognises that effective management of the risks that could arise from the releases requires the support and coordination of many stakeholders. Effective working relationships with stakeholders must be maintained to ensure the environmental flow events occur safely.

2.2. Catchment description

To understand the risks it is important to understand the river system downstream of where releases are made at Tantangara Dam. A catchment map is shown in Figure 2-1.

Tantangara Dam was completed in 1960 and until recently had captured 99% of inflows. This flow is redirected to Eucumbene Dam where it is used to generate electricity (with flows redirected to the Tumut River and upper Murray River system).

Releases have historically been made from Tantangara dam in the upper Murrumbidgee River to provide a minimum 'base passing flow' of 32 ML/day at Mittagang Crossing near Cooma. However, when tributaries such as Yaouk Creek provide this flow, releases are shut off and the river above these tributaries can cease to flow. The SMRIF initiative was undertaken to reduce this effect and return on average around 30% of the volume of the mean annual natural flow. These returned flows are, however, restricted by the valve capacity of the dam, the availability of water and the requirement to set releases in advance of the water year.

Environmental flows released from Tantangara dam travel down the upper Murrumbidgee River in a south easterly direction towards Cooma before flowing in a northwards direction towards the ACT.

The ecological condition of the upper Murrumbidgee's water-dependent environmental assets is largely driven by flows that connect the instream benches, cut-off channels, anabranches, floodplains, wetlands and deflation basins. Flows that provide these connections support organic carbon transfer and nutrient cycling, trigger movement and breeding of native fish and waterbirds, and directly impact vegetation condition and habitat availability.

The upper Murrumbidgee (upstream of Burrinjuck Dam) supports environmental values such as threatened native fish like the Macquarie perch but is adversely affected by the diversion of the majority of flows at Tantangara Dam for the Snowy scheme.

UPPER MURRUMBIDGEE CATCHMENT

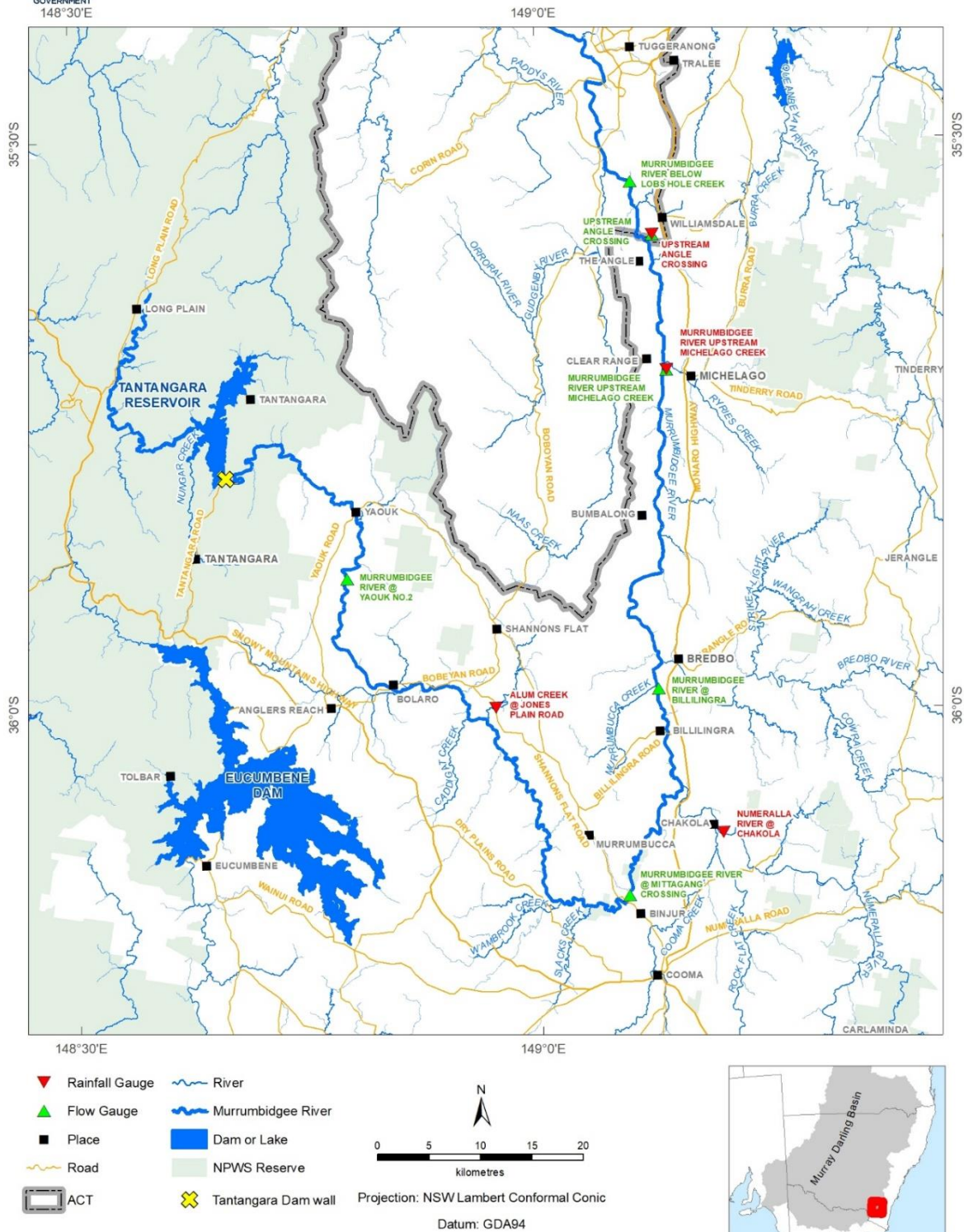


Figure 2-1 Contextual map of the upper Murrumbidgee River

2.3. Catchment flow and rainfall gauges

There are six existing relevant flow gauges and four rain gauges as shown in Figure 2-1 and detailed in Table 2-1.

Table 2-1 Flow gauges in the upper Murrumbidgee River

Flow gauges	Operated by	Site Number	Location
Yaouk #2	WaterNSW	41000260	South of Yaouk
Mittagang	WaterNSW	410033	Murrumbidgee Reserve, Mittagang Road, Binjura
Billiligara	WaterNSW	410050	North west of Billilingra
Michelago	WaterNSW	41000272	Upstream of Michelago Creek
The Angle	ACTEW	41001702	Upstream Angle Crossing ACT
Lobbs Hole	ALS*	410761	In Gigerline Nature Reserve

* owned by ACTGov, utilised as a Bureau information location

Rainfall gauges	Operated by	Site Number	Location
Alum@Jones Plain Rd	WaterNSW	41000271	Alum Creek, Upstream of Jones Plain Road, Shannons Flat
Numeralla@Chakola	WaterNSW	41001701	Numeralla River, upstream of Chakola Road, Chakola
Michelago	WaterNSW	41000272	Upstream of Michelago Creek
The Angle	WaterNSW	41001702	Upstream Angle Crossing ACT

There are a number of main tributaries to the upper Murrumbidgee, as listed in Table 2-2. Additionally, there are many minor and unnamed tributaries throughout the catchment. Detailed waterway information can be accessed in NSW DCCEEW-Water's web mapping portal¹.

Table 2-2 List of main tributaries into the upper Murrumbidgee River, from Tantangara Dam downstream to ACT border.

Main tributaries into the Upper Murrumbidgee River, from Tantangara Dam downstream to ACT border		
1. Gulf Plain Creek	13. Bulga Creek	25. Long Flat Creek
2. Paytens Creek	14. Bennetts Creek	26. Middle Creek
3. Farm Creek	15. Bridle Creek	27. Snowy Creek
4. Yaouk Creek	16. Slacks Creek	28. Teatree Swamp Creek
5. Dog Plain Creek	17. Pilot Creek	29. Gap Creek

¹ <https://water.dpie.nsw.gov.au/licensing-and-trade/hydro-line-spatial-data>

Main tributaries into the Upper Murrumbidgee River, from Tantangara Dam downstream to ACT border		
6. Boundary Creek	18. Butlers Creek	30. Gungoandra Creek
7. Long Corner Creek	19. Black Snake Creek	31. Colyers Creek
8. Back Creek	20. Numeralla River downstream of Cooma Creek	32. Ingalara Creek
9. Jones Creek	21. Billilingra Creek	33. Micaligo Creek
10. Caddigat Creek	22. Murrumbucca Creek	34. Michelago Creek
11. Alum Creek	23. Bredbo Creek	35. Gossoon Creek
12. Back Creek	24. Spring Vale Creek	36. Waterhole Creek

2.4. River levels at various flow release rates

In determining risks, NSW DCCEEW-Water considers the impact of different flows on river heights at key points along the length of the river. Table F-1 (Appendix F) provides water levels during past environmental flow releases, recorded at gauges downstream of Tantangara Dam. Water levels are strongly influenced by catchment and climate conditions at the time of the event, and as such should be used as a guide only

2.4.1. Flood levels at Lobb's Hole gauge

The Lobb's Hole gauge is utilised by the Bureau of Meteorology (Bureau) for the issuing of flood warnings. At this gauge, the Bureau has determined river level heights that would cause impacts upstream and downstream in line with minor, moderate and major flood classifications. The levels at Lobb's Hole are shown in Table 2-4. There are no other gauges with associated flood classifications on the upper Murrumbidgee River, upstream of this location.

Table 2-4 Flood levels at Lobb's Hole gauge in the upper Murrumbidgee River

Classification	Bureau flood classification description	Flood level height (m)	Flow rate (m ³ /s)
Minor	Causes inconvenience. Low-lying areas next to water courses are inundated. Minor roads may be closed and low-level bridges submerged. In urban areas inundation may affect some backyards and buildings below the floor level as well as bicycle and pedestrian paths. In rural areas removal of stock and equipment may be required.	4.5	140
Moderate	In addition to the above, the area of inundation is more substantial. Main traffic routes may be affected. Some buildings may be affected above the floor level. Evacuation of flood affected areas may be required. In rural areas removal of stock is required.	11.0	1,807
Major	In addition to the above, extensive rural areas and/or urban areas are inundated. Many buildings may be affected above the floor level. Properties and towns are likely to be isolated and major rail and traffic routes closed. Evacuation of flood affected areas may be required. Utility services may be impacted	13.0	3,174

2.5. Travel times

In determining risks, NSW DCCEW-Water also considers the time taken for a flow release to travel down the river. Travel times can vary significantly, influenced by rainfall, existing catchment conditions, depth of flow and channel storage effects. If the ground is already wet, travel times are often reduced. Travel times also reduce as flow increases in the natural channel due to the declining influence of within-channel vegetation and obstructions.

In the event of floods, large volumes of water extending outside the main channel have a dampening effect on peak flows and slow the travel time.

To determine risk, NSW DCCEW-Water estimates travel times based on observed data from similar historical events. Travel times for 1,500ML flow releases in 2022 and 2023 between key locations along the upper Murrumbidgee River are provided in Table 2-5.

Table 2-5. Approximate travel times for 1500ML events (range of events in 2022 and 2023)

Reach	Distance (km)	Time to initial rise in flow rate (hrs)	Time to peak flow rate (hrs)
Tantangara Dam to Yaouk Gauge	38	11-12	15-19
Tantangara Dam to Mittagang Gauge	116	28-29	28-39
Tantangara Dam to Billilingra Gauge (Bredbo)	147	39 - 46	42-56
Tantangara Dam to Michelago	188	50 - 58	53-65
Tantangara Dam to The Angle	206	52 - 60	52-69
Tantangara Dam to Lobbs Hole Gauge	212	55 -63	60-83

Note: Distances are approximation only and based on GIS measurements from aerial photography.

2.6. Impact of climatic and catchment conditions on risk

Climatic and catchment conditions can increase the risks associated with environmental flow releases by creating uncertainty around predicted flow rates and water levels.

In the upper Murrumbidgee catchment, tributary inflows have a significant influence on flows and water levels in the main river. Inflows may result in the river rising before or during an environmental release, such that the release may contribute to increased flooding risk. Mitigation for this risk has been included in the safety procedures outlined in the next section.

High rainfall events that extend over the catchment area can lead to increases in the dam storage levels which could result in an uncontrolled spill, although this is very unlikely to occur from Tantangara dam. Safety management of spills or unplanned releases to manage dam storage levels are the responsibility of Snowy Hydro and are not covered by this SMP. However, in some instances a planned environmental release may be brought forward to reduce the risk of uncontrolled spill.

2.7. Known locations of potential impact

Rising water may inundate public roads and private causeways, restricting safe transportation movements. However, feedback from stakeholders has indicated that environmental releases thus far have not caused any significant impacts along the river. Instead of environmental releases, the rising water from tributaries under wet weather are potential risks to downstream stakeholders.

The following locations have been raised by stakeholders as potentially being impacted by environmental releases:

- The causeway at Bumbalong Road, Colinton. Residents have advised that the causeway cannot be crossed when the Billilingra gauge is at approximately 1.85m. A new bridge is being constructed in this location with complete date to be confirmed.
- The causeway at Dromore Road, Chakola. Residents have reported using an alternate access during wet periods of the year.
- The Angle Causeway, The Angle. An alternate access route is available.

3. Roles and responsibilities in managing risks

The following procedures have been developed to mitigate the risks tabled in Error! Reference source not found.. This section defines the responsibilities of the participating organisations.

3.1. NSW DCCEEW-Water responsibilities for safety management

NSW DCCEEW-Water is responsible for coordinating the safe management of planned environmental releases.

3.1.1. Decision making delegations

As the formal delegate for the Water Administration Ministerial Council, NSW DCCEEW-Water's Executive Director Operation & Resilience (ED) is responsible for approving the SMP at the start of each water years and for instructing Snowy Hydro to make any modifications to, or cancellation of, planned flows for safety reasons.

The Director Asset Management and Performance is responsible for chairing STAG meetings, receiving advice from the STAG, and determining appropriate actions based on that advice. The Director can instruct Snowy Hydro to proceed where it is determined that planned flows can be safely implemented without modification. Responsibilities within NSW DCCEEW-Water are depicted in Figure 3-1. Note that Snowy Hydro can cease a release at any time if Snowy Hydro deems it to be unsafe.

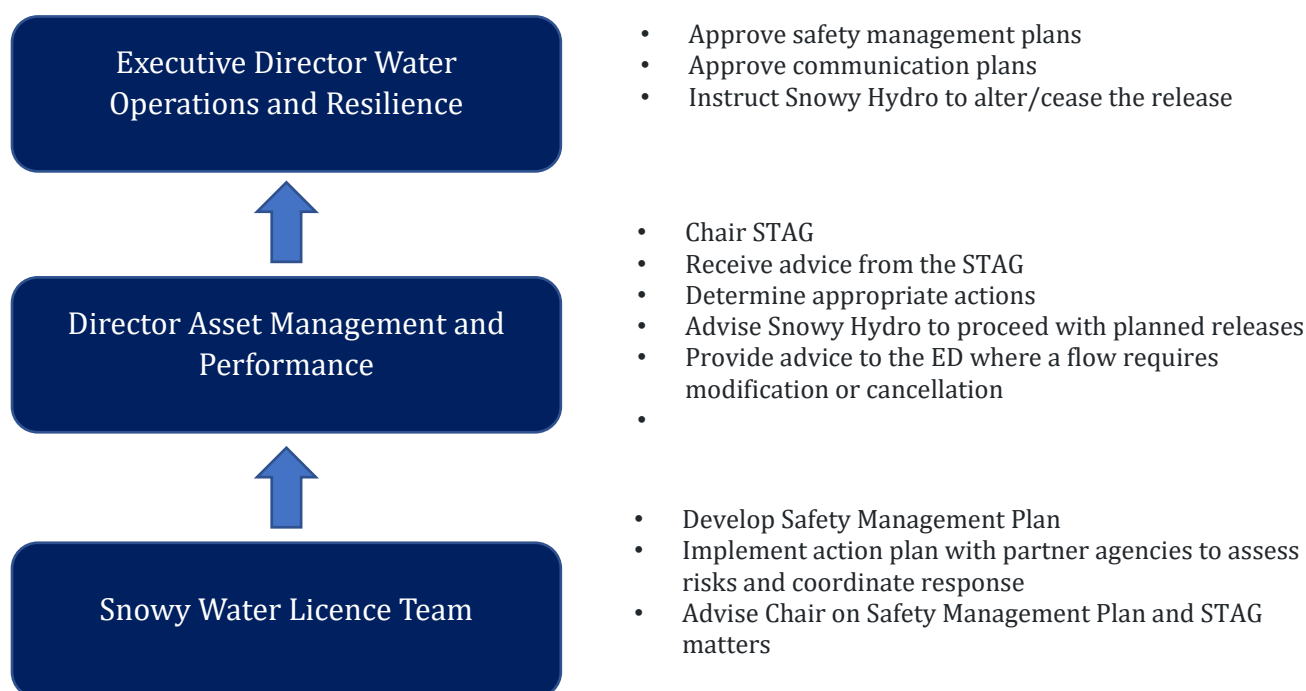


Figure 3-1 SMRIF Safety management framework within Department of Climate Change, Energy, Environment and Water

3.1.2. Planning responsibilities

NSW DCCEEW-Water is responsible for planning including for each water year:

- NSW DCCEEW-Water is responsible for developing, updating and reviewing the Safety Management Plans.
- NSW DCCEEW-CPHR is responsible for developing, updating and reviewing the Operations Plan.

-
- NSW DCCEEW Corporate Communications is responsible for developing updating and reviewing the Stakeholder and Community Engagement Plan.

3.1.3. Coordination responsibilities

NSW DCCEEW-Water is responsible for coordination, including:

- Liaising between NSW DCCEEW-CPHR and Snowy Hydro in relation to SMRIF volumes and release patterns.
- Providing timely advice to Snowy Hydro to commence, amend or cease dam releases.
- Chairing, coordinating and secretariat support to the Tantangara Safety Technical Advisory Group (Tantangara STAG) (details of the Tantangara STAG are provided later). NSW DCCEEW-Water internal technical staff may also provide advice to the Tantangara STAG as required.
- Through the Tantangara STAG process, coordinating, informing and delegating to stakeholders and responsible agencies, such as NSW DCCEEW-CPHR, Snowy Hydro, the State Emergency Service (SES), the Bureau of Meteorology (Bureau), National Parks and local councils, for the management of risks.
- Coordinating stakeholder and public communication (in coordination with NSW DCCEEW Corporate Communications).
- Alerting relevant emergency services during a flow release to activate emergency arrangements, if required.

3.1.4. Stakeholder communication responsibilities

NSW DCCEEW-Water recognises that effective management of the risks requires the support and coordination of many stakeholders. Effective working relationships with stakeholders must be maintained to ensure the high-flow events occur safely.

NSW DCCEEW-Water, in collaboration with the NSW DCCEEW Corporate Communications team and NSW DCCEEW-CPHR, is responsible for coordinating communication to stakeholders and the public in relation to environmental releases. NSW DCCEEW Corporate Communications is responsible for developing an annual Stakeholder and Community Engagement Plan (Error! Reference source not found.) to ensure proactive messaging to all stakeholders regarding environmental flow releases. NSW DCCEEW Corporate Communications ensures that community engagement and key messaging on the safety impacts of the releases and its related events is undertaken and continually improved.

NSW DCCEEW-Water currently provides information to stakeholders, downstream residents, and the community in a range of ways or channels in relation to environmental flow releases, including:

- Publishing the SMP, SMRIF Operations Plan, Rising River Alerts, media releases, frequently asked questions and the dates/times/volumes of releases on the NSW DCCEEW-Water website
- Publishing a tweet to the NSW DCCEEW-Water X account (formerly Twitter) approximately seven and three days prior to each release
- Issuing an SMS three days prior to each release to a distribution list of downstream landholders and other interested stakeholders held by NSW DCCEEW-Water's Snowy Water Licence Team.
- Direct communication via email, phone and meetings with agency members of the Tantangara STAG.
- Direct communication with downstream landholders and stakeholders prior to a release (for example, via targeted mailing lists), and following a release as required. The NSW DCCEEW-CPHR website enables members of the public to opt-in to this distribution list.

-
- Advice and provision of information to the STAG (which includes emergency services, local councils, National Parks, and other partner agencies) who are then expected to enact their own communication arrangements.

In the event of an escalating flooding situation NSW DCCEEW-Water will assist relevant emergency service agencies i.e. contact SES STAG member or SES State Communication Centre as required.

In the event of major floods or an impending disaster, legislated NSW emergency management arrangements will be activated by emergency service authorities. At this time, emergency response agencies would take responsibility for provision of community safety and emergency messaging through established systems.

Tantangara STAG detailed list of communication actions and responsibilities is provided in **Appendix B - Stakeholder and Community**

3.2. Responsibilities of the Tantangara STAG

The Tantangara STAG consists of technical experts that provide NSW DCCEEW-Water with timely advice and information to make informed decisions regarding proceeding with, or the need to alter the timing or volume of environmental flow releases.

The STAG is not required to reach a consensus; each agency may provide independent advice for consideration by NSW DCCEEW-Water. Final decision making, policy direction or delegating additional work is to be carried out by NSW DCCEEW-Water.

The Tantangara STAG Terms of Reference is included in **Appendix C - Terms of Reference for the Safety Technical Advisory Group**

3.2.1. Composition of the Tantangara STAG

The Tantangara STAG includes organisations with knowledge and expertise relevant to management the safety of environmental flow releases. The composition is flexible and may change subject to the expertise required. Current membership includes representatives from:

- NSW DCCEEW-Water
- NSW DCCEEW-CPHR
- NSW DCCEEW Corporate Communications
- The Bureau of Meteorology (the Bureau)
- Snowy Hydro
- NSW National Parks and Wildlife Service (NSW NPWS)
- NSW State Emergency Service (NSW SES)
- ACTSES
- Snowy Monaro Regional Council (SMRC)

3.2.2. Roles of key Tantangara STAG members

All STAG members are expected to undertake the following tasks:

- Provide technical advice to the STAG Chair based on the agency's expertise and local knowledge, on the potential risks and impacts of the releases and appropriate mitigation measures.

- Provide advice to the STAG chair on whether the SMP and flows should proceed.
- Ensure agency attendance at all STAG meetings and provide timely responses to STAG meeting actions.
- Distribute media releases and Rising River Alerts through their own agencies communication channels as required.
- Assist with community engagement as required.

Additional tasks specific to individual agencies are listed in in Table 3-1.

Table 3-1. Tantangara STAG roles and responsibilities

Agency	Role
NSW DCCEEW-Water	• Develop the Safety Management Plan • Lead implementation of processes detailed in the Safety Management Plan • Chair Tantangara STAG • Provide secretariat support to Tantangara STAG • Coordinate all public and stakeholder communications prior to high flow releases • Reply to contentious issues and enquires • Make decision in consideration of advice of the Tantangara STAG
NSW DCCEEW Corporate Communications	• Develop and implement the Stakeholder and Community Engagement Plan • Undertake all public and stakeholder communications prior to high flow releases
NSW DCCEEW-CPHR	• Development of Snowy Montane Rivers Increased Flow (SMRIF) release pattern • Develop the SMRIF Operations Plan • Work with Snowy Advisory Committee to ensure they consider risks in planning future SMRIF release patterns • Liaise with impacted stakeholders
Bureau	• Provide advice to the STAG on rainfall forecasts (Note Bureau do not undertake flood forecast modelling for Tantangara releases)
NSW SES	• NSW SES is the legislated Combat Agency for floods and is responsible for the control of flood operations. NSW SES work with the Bureau and Councils to develop warning systems. • Responsible for flood consequence management
ACTSES	• ACTSES is the legislated “Hazard Management Agency” for floods and is responsible for the control of flood operations. ACTSES work with the Bureau and the broader ACT Government to develop warning systems. • Responsible for flood consequence management
Snowy Hydro	• Ensure releases are able to be undertaken safely • Operate infrastructure to make releases to the Snowy River in accordance with planned targets or agreed changes • Cease / alter releases (from this plan) when advised by NSW DCCEEW-Water

Agency	Role
Snowy Monaro Regional Council	• Assist in providing up to date contact details for downstream landholders • Install additional signage where necessary
NSW National Parks and Wildlife Service	• Install additional signage to alert park users including campers in camping areas • Erect road closed signs as required

4. Process of managing risks

The following sections out the process to be followed prior to and during environmental releases. The estimated timeframes are indicative only and may be subject to change because of factors such as unexpected climatic conditions, ongoing stakeholder consultation, ongoing licence review considerations, etc.

4.1. Start of the water year

4.1.1. SMRIF planning

Prior to the start of the water year (1 May), the design of the SMRIF release pattern is undertaken by NSW DCCEEW-CPHR in consultation with the Snowy Advisory Committee (SAC) and Snowy Hydro. The design considers environmental, safety, available water allocation and operational requirements. The strategy is detailed in the SMRIF Operations Plan with further reasoning provided in NSW DCCEEW CPHR's 'Annual Plan for the Snowy and Montane Rivers Increased Flows'.

It is important to note that the annual release plan may change throughout the year due to climatic and other environmental conditions.

4.1.2. Safety planning

Once the SMRIF release has been determined the Tantangara STAG may convene² to:

- Discuss the planned releases for the upcoming water year and the Annual SMRIF Operations plan
- Review the Safety Management Plan.
- Review the STAG ToR.
- Review any new data on flow releases and water levels acquired from the previous water year.
- Determine any risks associated with the planned timing, duration, and size of planned SMRIF releases.
- Determine any risk mitigation measures that may be required for the upcoming water year.
- Determine which flow events would require the Safety Management Process to be enacted, as set out in the next sections. Based on current available evidence the release threshold for triggering the safety management process was revised from 1,000 ML/d to 1,400 ML/d during dry conditions. However, this threshold would be reviewed annually and upon receipt of any evidence that may suggest a more appropriate value. Flow events that exceed the determined threshold are labelled as 'high-flow events'.
- Determine any risk and mitigation measures associated with water release impacted by algae growth in the dam.

The process of Tantangara STAG involvement is detailed in the STAG terms of reference in Error! Reference source not found.. The algae safety protocol to mitigate risk of water release impacted by algae is detailed in **Appendix F – Algae Safety Protocol**

² Meetings may be undertaken in person, virtually or as group emails.

4.1.3 Public Communications

A key strategy for mitigating many of the risks identified in **Appendix A** - Risk analysis and mitigation measures is ensuring effective and timely stakeholder communication. At the start of the water year, the following communications activities are undertaken:

- The Annual SMRIF Operations Plan is developed by NSW DCCEEW-CPHR and shared with NSW DCCEEW-Water
- The Stakeholder and Community Engagement Plan (Error! Reference source not found.) is developed by the NSW DCCEEW Corporate Communications team based on the SMRIF Operations Plan.
- The SMP is reviewed for currency.
- The contact list for downstream landholders and key stakeholders is reviewed for currency by NSW DCCEEW's Communications team as per the process set out in the Communications and Stakeholder Engagement Plan.
- An overview list of the dates of planned environmental flows is published on DCCEEW-Water website by DCCEEW Corporate Communications.
- A media release providing an overview of the environmental flow releases is issued to all relevant media outlets and published on the NSW DCCEEW-Water website by NSW DCCEEW Corporate Communications.
- NSW DCCEEW Corporate Communications publishes FAQs on the SMRIF release plan on the NSW DCCEEW-Water website; emails them directly to downstream landholders and interested parties on the NSW DCCEEW contact list; and shares them directly with relevant stakeholder agencies as required.

Details of communications task and responsibilities are summarised in the Stakeholder and Community Engagement Plan in **Appendix B** - Stakeholder and Community

4.1.4 Modelling to estimate flow levels

The NSW DCCEEW-Water modelling team has developed a source model of the upper Murrumbidgee catchment. The model is run for each planned high-flow release event, to generate estimates of the *change* in river flows at each gauge compared to a modelled baseline. This value is then added to the observed flow levels (and/or flow levels predicted by the Bureau at Billilngara ([7-day Streamflow Forecasts: Water Information: Bureau of Meteorology \(bom.gov.au\)](#)) and Lobbs Holes) ([7-day Streamflow Forecasts: Water Information: Bureau of Meteorology \(bom.gov.au\)](#)) at each gauge 7 days and 2 days prior to the release, in order to estimate the potential flow rate and depth at each gauge as a result of the release. The information is presented to the STAG at relevant STAG meetings.

4.2. Approximately 4 to 6 weeks before first planned high-flow release commences

Approximately 4 to 6 weeks prior to the commencement of the first planned high-flow environmental release event, NSW DCCEEW Corporate Communications team contact (via email or similar) downstream landholders and key stakeholders (as identified on the NSW DCCEEW-Water contact list), coinciding with the issuing of the 'overview' media release and updates to the NSW DCCEEW-Water website with information on the planned environmental water releases for the upcoming water year. In some cases, this timeframe may be reduced, however NSW DCCEEW-Water intends to provide the maximum notice period possible for the circumstances.

4.3. Approximately 1 week before planned high-flow release

4.3.1. Notify Bureau and review weather

During the week leading up to a release, the Bureau of Meteorology (the Bureau) provides NSW DCCEEW-Water with details of any climate risks during the release period such as:

- Flood watch issued for any part of the catchment
- Severe Weather Warning
- Flood warning

This information will be shared with the STAG for consideration.

4.3.2. Review by Tintangara STAG

The Tintangara STAG convenes to review: the planned releases; the Bureau's rainfall predictions; and notification of any climatic risks. The Tintangara STAG considers risks by:

- Reviewing estimated travel times listed in Table 2-5.
- Reviewing similar past flow events documented in Table 2-3 to estimate the potential water levels at key locations.
- Reviewing the current water levels prior to the release using WaterNSW real-time data.
- Using the results of NSW DCCEEW-Water Source modelling to determine an estimated change in flow as a result of the event, and equating this to an estimated change in river levels (noting this is not based on a flood forecasting model and should be used as a guide only).
- Reviewing the risk and mitigation measures table in Error! Reference source not found. **as part of the annual review of this SMP.**
- Using local knowledge or agency intelligence records to relate the estimated water levels to local impacts, such as inundation to property, access routes, roads, etc.
- Using local knowledge of upcoming events that may be impacted.
- Or any other appropriate means.

Where risks are identified, the Tintangara STAG will use their specialist technical and local knowledge to provide advice on both the risk and relevant mitigation measures.

STAG members will provide advice to NSW DCCEEW-Water as to whether they are comfortable that risks are known and mitigated against or reduced to an acceptable level, and consequently on whether the release should proceed, be modified or cancelled based on knowledge of site and weather conditions.

The NSW DCCEEW-Water Director Asset Management and Performance will decide on whether to proceed, based on the advice of the STAG. The decision-making process to be undertaken is outlined in the flow chart in Figure 4-1.

This meeting may occur via an in-person meeting, virtual meeting or through emails. A representative from each STAG agency is required to attend, or to otherwise provide their advice following the meeting in writing. Where the meeting is replaced by an email, each STAG agency must provide advice via email within the requested timeframe.

The Term of Reference of Tintangara STAG involvement is summarised in **Appendix C** - Terms of Reference for the Safety Technical Advisory Group

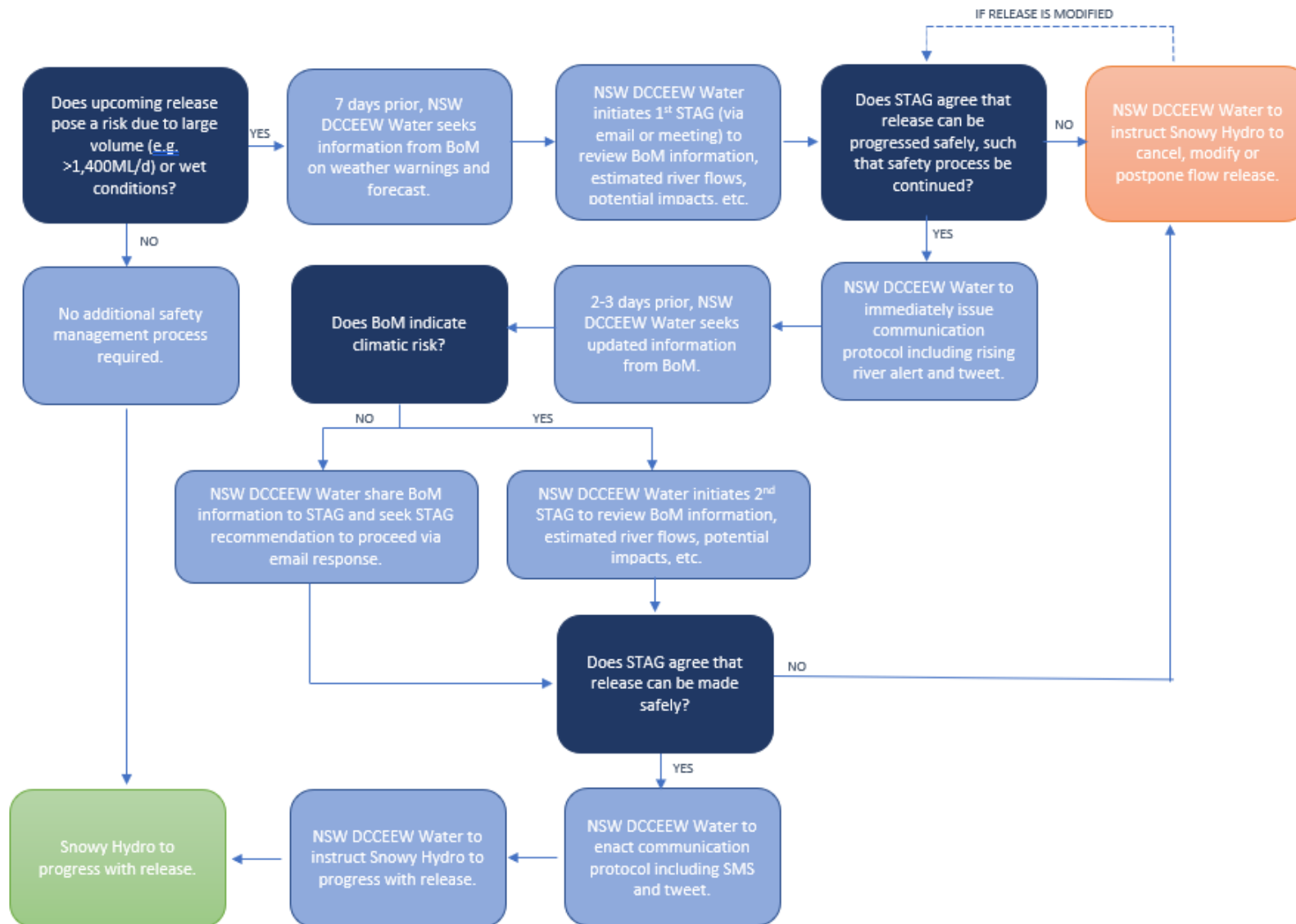


Figure 4-1 Tantangara STAG process flow chart

4.3.3. Public Communications

A 'Rising river alert' media release is issued by NSW DCCEEW Corporate Communications approximately seven days before each planned high-flow environmental release to inform affected communities/general public of the upcoming event. The 'Rising river alert' is shared with STAG for distribution through their respective agency communication channels. The alert is published on NSW DCCEEW-Water website and a tweet is also issued on the same day of the NSW DCCEEW-Water X account (formerly named Twitter). (See **Appendix B** - Stakeholder and Community)

4.4. Approximately 3 days before releases

4.4.1. Review weather

In the days leading up to the high-flow environmental release, NSW DCCEEW-Water and Snowy Hydro closely monitor weather forecasts and flows in the upper Murrumbidgee River and the tributaries downstream of Tantangara Dam.

4.4.2. Final Bureau advice

NSW DCCEEW-Water continues to liaise with the Bureau, and the Bureau undertakes a final weather forecast based on the most recent weather data.

4.4.3. Final review by Tantangara STAG

NSW DCCEEW-Water consults with the Tantangara STAG to undertake a final review, virtually or by email, dependant on the level of risk observed in the Bureau rainfall forecast. The review includes:

- the planned release flow rate,
- updated Bureau rainfall predictions,
- updated estimates of water levels (based on using adding the modelled change in flow value to the current observed flow rate, and converting this to a water level at each gauge) and
- and any final safety issues or actions required.

This information is used to seek advice from the Tantangara STAG that they are comfortable that the risks of the impending flow event are known and have been mitigated to an acceptable level and therefore that the release can safely proceed.

The STAG again undertakes recommendations in line with the previous flow chart in Figure 4-1. NSW DCCEEW-Water considers the STAG's advice, makes the decision on whether the flow should proceed, and instructs Snowy Hydro based on the outcome.

Where there is a level of uncertainty with the forecasts the Tantangara STAG may determine to reconvene 1 day prior to the environmental release and reconsider available data.

Tantangara STAG involvement is summarised in **Appendix C** - Terms of Reference for the Safety Technical Advisory Group

4.4.4. Public communications

If the release is determined safe to proceed, approximately 1 to 3 days prior to release an SMS is sent by NSW DCCEEW-Water to the list of SMRIF stakeholders in the NSW DCCEEW distribution list. NSW DCCEEW-Water and NSW DCCEEW Corporate Communications will work together to regularly review and update the list of stakeholders.

NSW DCCEEW Corporate Communications will also issue a Tweet the day before each respective environmental release event (**See Appendix B - Stakeholder and Community**)

4.5. During release

During the release, NSW DCCEEW-Water monitors information as required through liaison with the NSW DCCEEW-CPHR, Bureau, Snowy Hydro and the Tantangara STAG, particularly if forecasts indicate that rain is likely or a Flood Watch is issued for any part of the upper Murrumbidgee River or surrounding catchments.

Where any significant rainfall risks are forecasted during the duration of the event, NSW DCCEEW- Water will request Bureau to review rainfall predictions. Where risks are determined, NSW DCCEEW-Water may seek advice from the Tantangara STAG on continuing, ceasing or modifying the release.

In addition to a flood mitigation directive from NSW DCCEEW-Water, Snowy Hydro will cease releases if:

- Directed to by NSW Police or the State Emergency Service.
- Deemed necessary to manage public safety or environmental health risks.

4.6. Modified SMRIF releases

Modifications to the planned SMRIFs may occur throughout the year as a result of climatic, environmental or other unforeseen circumstances that may arise closer to the time of the planned SMRIF release.

For example, prolonged climatic conditions in wet years may result in Tantangara Dam approaching or realising spill level, such as occurred with Lake Jindabyne in December 2021 to March 2022. At these times, modifications to the volume, timing or flow rate of SMRIF releases may be required to prevent uncontrolled spills and ensure that water levels can be reduced in a safe manner. Changes to the planned SMRIF regime may be made rapidly.

As another example, where SMRIF accounting is not finalised at the commencement of the water year, NSW DCCEEW-CPHR will design an interim SMRIF regime which may be modified once accounting arrangements are resolved.

In these rare occurrences, a condensed approach to that described in Section 3 would be undertaken within the available timeframe. Warnings would be provided to stakeholders with as much time as practically available. The timeframes may be less than outlined Section 3, and in some extreme instances may be limited to less than 24 hours notice.

During unplanned storages releases or uncontrolled spills (See Section 3), Snowy Hydro is responsible for safety management, stakeholder coordination and public communication. NSW DCCEEW-Water would assist Snowy Hydro as requested.

4.7. Workplace health & safety

All agencies, corporations and stakeholders are responsible for their actions with regards to Workplace Health and Safety (WHS) legislation and must follow their organisation's WHS policies and procedures.

Departmental employees must follow the NSW DCCEEW Work Health and Safety Policy (DOC21/38032) and related procedures, accessed through the internal DCCEEW intranet. Prior to any field work, departmental employees must consider relevant risks and follow all relevant departmental procedures. This may include, but is not limited to, DCCEEW WHS procedures and critical risk controls in place for:

- Driving (WHS CRC 007)
- Remote or isolated work (WHS CRC 014)

-
- Working on or near water (WHS CRC 017)
 - Dealing with aggressive stakeholders (WHS CRC 020)

These documents should be accessed by NSW DCCEEW employees through the internal NSW DCCEEW intranet. These documents have not been included herein as they are updated frequently, and it is important to access the most recent version. Further information is below.

5. Further information

Further information on the Snowy Water Initiative and Snowy Montane Rivers Increased Flows is available on the NSW DCCEEW-Water website.

- Snowy Water Initiative:

<https://www.industry.nsw.gov.au/water/basins-catchments/snowy-river/initiative>

- Snowy Montane Rivers Increased Flows:

<https://www.industry.nsw.gov.au/water/basins-catchments/snowy-river/initiative/snowy-montane-rivers>

Further information on the environmental management of Snowy and Montane Rivers is available on the NSW DCCEEW-CPHR website:

<https://www.environment.nsw.gov.au/topics/water/water-for-the-environment/snowy-and-montane>

Register for Rising River Alert notifications or to receive information about the upper Murrumbidgee or Snowy Water for the Environment programs here:

<https://www.environment.nsw.gov.au/topics/water/water-for-the-environment/snowy-and-montane/snowy-and-upper-murrumbidgee-landholder-survey-and-contact-information>

Appendix A - Risk analysis and mitigation measures

Table A- 1 Risks and mitigation measures associated with environmental releases of SMRIF

Ref	Hazard description (A hazard is a situation or thing that has the potential to cause harm.)	Risk description (A risk is the possibility a hazard can cause harm.)	Likelihood	Consequence	Initial risk rating	Proposed risk controls	Type of risk control	Likelihood	Consequence	Residual risk rating
E.g.	(i.e. wet floor)	(i.e. slip on floor)				(i.e. mop the floor and place wet floor hazard signage)	-	-	-	
1	Lack of public awareness of flow release, given large environmental releases from Tantangara are infrequent.	The community being unprepared, leaving people and property exposed to harm and damage from the release.	Possible	Extreme	High	- SMP process to be followed by all members of STAG. - Stakeholder and Community Engagement Plan to be developed and implemented by NSW DCCEEW Corporate Communications, in collaboration with NSW DCCEEW-Water, to ensure community is aware of upcoming flows. - All communications to include accurate data of the date, volume and time that the release is physically made - Communications to include targeted communication to community by NSW DCCEEW Corporate Communications (via email, media release and tweet) and by NSW DCCEEW-Water (via SMS) at the start of the water year, 7 days and 3 days prior to higher-risk flow events. - Information materials, such as FAQs and 'Rising River Alerts' will be made publicly available by NSW DCCEEW Corporate Communications via the NSW DCCEEW-Water website and emailed directly to downstream landholders. - NSW DCCEEW to maintain up-to-date contact list of stakeholders and downstream landholders. - STAG members to communicate relevant information within their organisation's networks.	Reduce exposure to the hazard using administrative actions	Unlikely	Moderate	Medium
2	Flooded roads, causeways and property access.	- Nuisance caused by restricted vehicle access - Harm to human safety, such as injury or fatality from entering flooded roads and causeways. - Damage to vehicles - Damage to roads and driveways Potential known issues occur at: - Bumbalong Road, Colinton, which is known to become inundated when Billilingra gauge is from 1.67m - 1.85m/ - Dromore Road, Chakola, which is known to become inundated when Billilingra gauge is at 1.67m/ - Crossing north of Bredbo (Gillands Crossing, downstream of Cooma) will be	Possible	Extreme	High	- SMP process to be followed by all members of STAG. - Proposed communication measures detailed in item 1 to be enacted to ensure community is aware of upcoming flows. - STAG members to use local knowledge to identify potential roads / causeways / property access that may be impacted at STAG meetings prior to release. - SES to be informed through STAG process when access is likely to be inundated in order for SES to enact their own processes. - STAG to recommend modifying or cancelling release if risk is deemed unacceptable due to nuisance or safety. - NSW DCCEEW-Water to communicate with relevant road authority (Council or National Parks) through the STAG meetings to close any roads identified by the STAG and will request Council or National Parks to communicate closures to the public. - Where public roadways are cut by flood water, Councils or other relevant authority will erect road closure signage.	Reduce exposure to the hazard using administrative actions Isolate hazard from people	Unlikely	Moderate	Medium

		inundated when Billilingra gauge is at 1.85m.								
3	Flow release combining with rainfall event and/or downstream tributary inflows to cause flooding.	· Harm to human safety such as injury or drowning from rising floodwaters. · Harm to human safety such as injury or drowning from entering waterways. · Damage to private property, e.g. pumps, vehicles, access roads and buildings. · Damage to public property, e.g. pathways, roads, buildings, parks. · Nuisance caused by restricted vehicle and pedestrian access.	Possible	Extreme	High	· SMP process to be followed by all members of STAG. · Proposed communication measures detailed in item 1 to be enacted to ensure community is aware of upcoming flows. · NSW DCCEEW-Water to seek weather warning and rainfall forecast from Bureau, who must provide this as requested approx. 7 and 3 days prior to release. This information to be shared with STAG for consideration. · NSW DCCEEW-Water to use Source model to estimate potential water levels from proposed release under current climate condition and share information with STAG. · NSW DCCEEW-Water to review past release and climate conditions to gain and understanding of potential flow impacts. · STAG to use local knowledge to provide insight into potential risks and impacts from the release in the existing climate and catchment conditions. · STAG to advise NSW DCCEEW-Water on any mitigation measures necessary to maintain river heights below minor flood levels and at an acceptable level of risk. Releases can be reduced if required to minimise the risk of targeted flows being exceeded. · STAG to recommend modifying or cancelling release if risk is deemed unacceptable due to nuisance or safety. Based on this, NSW DCCEEW-Water to decide if release should be modified or ceased. · NSW DCCEEW-Water to monitor flows prior to and during a release, and to liaise with the Bureau, Snowy Hydro, and seek updated rainfall forecasts from the Bureau as required to determine risks. · Snowy Hydro to cease releases if requested to do so by NSW DCCEEW, the State Emergency Service (SES) or NSW Police. Note: ceased flow may take considerable timeframe till it has a noticeable effect on a locality.	Reduce exposure to the hazard using administrative actions Isolate hazard from people	Unlikely	Moderate	Medium
4	Rising water levels at campsites, picnic areas, hiking paths, including The National Trail	· Harm to human safety from people entering waterways, such as injury or drowning, especially to holiday makers/ travellers/ hikers, campers and the general public using these areas. · Damage to private property, e.g. camping gear, vehicles, etc · Damage to public property, e.g. campground facilities.	Possible	Extreme	High	· SMP process to be followed by all members of STAG. · Proposed communication measures detailed in item 1 to be enacted to ensure community is aware of upcoming flows. · NSW DCCEEW-Water to work collaboratively to address any identified flooding issues with the National Parks and Wildlife Service (NPWS) through the STAG process. · NPWS to post a warning regarding environmental release alerts on the NPWS website and to install temporary and/or permanent signage at any locations they have identified as vulnerable by NPWS and the STAG.	Reduce exposure to the hazard using administrative actions Isolate hazard from people	Unlikely	Minor	Low
5	Flow release impacting bridges	· Bridges subject to gathering of debris, such as tree branches/logs, causing failure of the bridge	Rare	Major	Medium	· Stakeholder Engagement and Communication Plan to be developed by NSW DCCEEW Corporate Communications, in collaboration with NSW DCCEEW-Water, and implemented by both. · RMS and Council are notified of releases as part of the plan.	Reduce exposure to the hazard using administrative actions	Rare	Minor	Low
6	Flow release impacting property (buildings, pumps, livestock equipment, etc.)	· Damage to property located within close proximity to the river · Although the infrastructure is close to the river, most items are located on the high bank and are unlikely to be inundated.	Unlikely	Minor	Low	· SMP process to be followed by all members of STAG. · Proposed all communication measures detailed in item 1 to be enacted to ensure community is aware of and prepared for upcoming flows. · Pump owners were previously identified and contacted individually to seek their interest in being notified about upcoming releases. · STAG members to use local knowledge to identify potential property that may be impacted at STAG meetings prior to release. · STAG to recommend modifying or cancelling release if risk is deemed unacceptable due to nuisance or safety.	Reduce exposure to the hazard using administrative actions	Unlikely	Insignificant	Low

7	Change to planned volume or timing of release with limited notice to the public	The community being unprepared, leaving people and property exposed to harm (injury or fatality) and damage from the release.	Possible	Extreme	High	- SMP process to be followed by all members of STAG. - Stakeholder Engagement and Communication Plan to be developed and implemented by NSW DCCEEW Corporate Communications, in collaboration with NSW DCCEEW-Water, to ensure community is aware of upcoming flows. - Communications to include targeted communication to community by NSW DCCEEW Corporate Communications (via email, media release and tweet) and by NSW DCCEEW-Water (via SMS) at the start of the water year, 7 days and 3 days prior to higher-risk flow events. - Information materials, such as FAQs and 'Rising River Alerts' will be made publicly available by NSW DCCEEW Corporate Communications via the NSW DCCEEW-Water website and emailed directly to downstream landholders. - NSW DCCEEW-Water to ensure communications includes messaging that releases can be modified at short notice, - NSW DCCEEW to maintain up-to-date contact list of stakeholders and downstream landholders. - STAG members to communicate relevant information within their organisation's networks.	Reduce exposure to the hazard using administrative actions	Unlikely	Insignificant	Low
8	Cancellation of release with limited notice to public.	- Nuisance to community that have already made alternative arrangements to address the impact of the release. - Commercial losses to businesses that have already made alternative plans to address the release, such as cancellation of accommodation bookings due to restricted property access. - Reputational damage to department where community has been unnecessarily impacted - loss of environmental benefit from the release - Reputational damage to department and Minister due to environmental water not being delivered as designed.	Possible	Minor	Medium	- NSW DCCEEW-Water to ensure communications includes messaging that releases can be modified or cancelled at short notice, including Rising River Alerts and NSW DCCEEW-Water Website. - Snowy Hydro to update website to include a note that releases can be cancelled at short notice. - Where NSW DCCEEW-Water has notified parties of an environmental release, NSW DCCEEW-Water to also notify them, by the same medium, if a release is changed or cancelled. This is to be completed as closely to the decision being made as possible.	Reduce exposure to the hazard using administrative actions	Unlikely	Insignificant	Low
9	Public access to dam infrastructure during release (dam wall, spillway, plunge pool)	Harm to human safety, such as injury or drowning from entering spillway, dam, plunge pool or river.	Unlikely	Extreme	High	The area around the dam wall is being fenced off by Snowy Hydro with warning sign to stop access. A buoy line is in place around spillway in the storage. Snowy Hydro will cease releases if notified of a person or watercraft in the plunge pool or if a person or watercraft enters the area of the Dam between the buoy line and the spillway.	Reduce exposure to the hazard using administrative actions Isolate hazard from people Provide protective equipment	Rare	Extreme	High

10	Snowy Hydro personnel access to dam infrastructure during release (dam wall, spillway, plunge pool)	Harm to Snowy Hydro employees undertaking releases or working in the vicinity, such as injury or fatality.	Unlikely	Extreme	High	Snowy Hydro have work health and safety procedures in place for its employees and worksites and is required to comply with them. Snowy Hydro applies its own safety management procedure including access rules and risk managements. These are completed under various internal access rule and risk management policies and procedures that meet WH&S requirements. Operating the dam to release the environmental flows is part of Snowy Hydro's core business.	Reduce exposure to the hazard using administrative actions Provide protective equipment	Rare	Extreme	High
11	Public access to sites downstream of Tantangara Dam wall during releases	Harm to human safety, such as injury or drowning from entering waterway during release	Unlikely	Extreme	High	Snowy Hydro have warning signs and handrails at immediate downstream of the dam to minimise risk of public access.	Reduce exposure to the hazard using administrative actions	Rare	Extreme	High
12	Monitoring the release near riverbank or spillway	Injury or fatality from falling into water.	Rare	Extreme	High	· All personal working near water will work in compliance with approved relevant work, health and safety procedures. · For NSW DCCEEW-Water this includes 'Working on or near water procedures', WHS CRC 017. · For NSW DCCEEW-CPHR this includes the South West Region General Fieldwork Job Safety Assessment (signed 09/03/2020) which includes measures for working in and around water · NSW DCCEEW-CPHR to ensure that any consultants or subcontractors work to relevant NSW DCCEEW-CPHR WHS procedures. · NSW DCCEEW-CPHR to alert SHL that they will be working downstream of the dam prior to any monitoring.	Reduce exposure to the hazard using administrative actions	Rare	Moderate	Low
13	Remote work to inspect release	Lack of mobile phone signal causing inability to seek help during emergency.	Possible	Extreme	High	· All personnel working in remote or isolated areas will work in compliance with approved relevant work, health and safety procedures. · For NSW DCCEEW-Water this includes 'Remote or isolated work procedures' · NSW DCCEEW-Water personnel to carry a Breon device. · For NSW DCCEEW-CPHR this includes the South West Region General Fieldwork Job Safety Assessment (signed 09/03/2020) which includes measures for working in bushland and "Remote and isolated work procedure". · NSW DCCEEW-CPHR personnel to carry a Spot device or satellite phone. · NSW DCCEEW-CPHR to ensure that any consultants or subcontractors work to relevant NSW DCCEEW-CPHR WHS procedures.	Reduce exposure to the hazard using administrative actions	Rare	Moderate	Low
14	Animals	Snake bite and insect stings	Possible	Moderate	Medium	· Personnel to wear sturdy shoes, long pants and long sleeves where appropriate. · Personnel to wear insect repellent. · Personnel to have access to a first aid kit. · At least one member of the group to be trained in first aid.	Reduce exposure to the hazard using administrative actions Provide protective equipment	Unlikely	Minor	Low
15	Driving to inspect release	Injury to personnel from vehicle crash	Unlikely	Extreme	High	· All staff undertaking extended periods of driving will work in compliance with approved relevant work, health and safety procedures. · For NSW DCCEEW-Water this includes 'Driving procedures', WHS CRC 007. · For NSW DCCEEW-CPHR this includes the South West Region General Fieldwork Job Safety Assessment (signed 09/03/2020) which includes measures for driving and "Driving & Vehicle Safety Policy and Procedures" · NSW DCCEEW-CPHR to ensure that any consultants or subcontractors work to relevant NSW DCCEEW-CPHR WHS procedures.	Reduce exposure to the hazard using administrative actions	Rare	Moderate	Low
16	Meetings with community and landholders	Aggressive stakeholders causing harm to personnel	Unlikely	Extreme	High	· All staff working in remote or isolated areas will work in compliance with approved relevant work, health and safety procedures. · For NSW DCCEEW-Water this includes 'Dealing with Aggressive Stakeholders', WHS CRC 020. · For NSW DCCEEW-CPHR this includes the South West Region General Fieldwork Job Safety Assessment (signed 09/03/2020) which includes the "Guide to dealing with aggressive, abusive, threatening "	Reduce exposure to the hazard using administrative actions	Rare	Moderate	Low

						· NSW DCCEEW-CPHR to ensure that any consultants or subcontractors work to relevant NSW DCCEEW-CPHR WHS procedures.				
17	Public swimming downstream of Tantangara Dam during increased flow release	Harm to human safety, such as injury or drowning from entering waterway during release	Unlikely	Extreme	High	· SMP process to be followed by all members of STAG. · Proposed communication measures detailed in item 1 to be enacted to ensure community is aware of upcoming flows.	Reduce exposure to the hazard using administrative actions Isolate hazard from people	Rare	Extreme	High
18	Release of water impacted by algae	Harm to human safety through contact or intake. Harm to ecological system i.e. aquatic animals like fishes	Unlikely	Moderate	Medium	· Algae safety protocol to be followed by NSW DCCEEW. · STAG members to communicate relevant information within their organisation's networks.	Reduce exposure to the hazard using administrative and operation actions to isolate hazard from entering downstream	Rare	Insignificant	Low

Appendix B - Stakeholder and Community Engagement Plan 2024/25

B.1 Introduction

The Snowy Water Initiative was formally established in 2002 to significantly improve river health by releasing environmental water into the Snowy, upper Murrumbidgee and upper Murray river systems.

Embodied in the Snowy Water Inquiry Outcomes Implementation Deed 2002 (SWIOID 2002), the SWI is an agreement for water recovery and environmental flows between the NSW, Victorian and Australian governments (the partner governments) and Snowy Hydro Limited. The NSW Government is responsible for the implementation of the SWI.

The SWIOID 2002 also provides for environmental releases into a number of higher altitude (montane) rivers whose flows are significantly affected by the operation of the Snowy Scheme known as the SMRIF allocation.

The environmental water is released from small weirs as a passing flow, or as managed releases from Tantangara Dam. The NSW Government is responsible for determining the annual release strategy of these environmental flows, which collectively are called the Snowy Montane Rivers Increased Flows (SMRIF).

The annual increased flows strategy focuses on three key aspects, these being:

- Increased daily flow variability - as the flow rates will reflect the natural pre Snowy Scheme hydrology of Snowy montane rivers.
- A series of high-flow releases to rework the riverbed and improve in instream habitat.
- Frequent smaller releases.

B.2 Key issues/considerations

There is strong community interest in rehabilitating the upper Murrumbidgee River, as well as widespread agreement that the delivery of additional flows is greatly needed.

The department has previously consulted widely with the local community to identify stakeholders likely to be affected by the planned 2024 high-flow water releases, or who may be able to assist in ensuring the safety of staff, the public and property during the releases.

The department recognises that effective management of the risks that could arise from the releases requires the support and coordination of many stakeholders.

For the 2024-25 water year, the New South Wales, Victorian and Australian governments have committed a volume of approximately 87,090 megalitres (ML) to be released into Snowy montane rivers. Of this, 35,080 ML is planned for release to the upper Murrumbidgee from Tantangara Dam.

The 2024-25 release strategy uses the natural flow-scaling approach to deliver frequent small releases and a number of larger pulses from Tantangara Dam into the upper Murrumbidgee River, one of which is more than the 1,400ML/d flow trigger that requires the department to implement the safety management process. This threshold value represents the flow at which potential safety impacts may begin to occur. The “high-flow” event will peak at 1,500 ML/d, which is the limit of the dam’s release infrastructure without requiring Snowy Hydro to actively target high reservoir levels.

This high-flow release and other smaller flow releases are designed to mimic the natural characteristics of the Murrumbidgee River, including snowmelt and ‘freshes’ that occurred before the construction of the Snowy Mountains Scheme. The yearly flow sequences are designed to differ from previous years in order to introduce variability between years, especially around the timing and magnitude of high-flow events.

B.3 Key water release dates

There will be 8 days where flows will be above 500 ML/day across 3 peak events, including 4 days of high flows above 1,000 ML to move fine sediment and inundate low lying benches. The highest of these planned flow events will be a high-flow release of 1,500 ML/day, with details shown below.

Date	Volume of release
Tuesday 24 September 2024	Daily peak flow of 1,500 over 24 hours

Note: The 24-hour release period from Tantangara Dam commences at 12.00pm local time, this is to allow for manual operation of releases above 500 ML/d.

Environmental flows from Tantangara Dam will vary in volume but will be continuous between 1 May 2024 and 4 January 2025 and between 27 March and 30 April.

A series of small ‘freshes’ will also be provided from January 2024 to March 2025 to recharge the system between periods of zero environmental release.

B.4 About this stakeholder and community engagement plan

The stakeholder and community engagement activities outlined in this plan have been developed in line with the department’s Stakeholder and Community Engagement Policy (IND-I-245) to ensure effective and genuine engagement with stakeholders and the broader community to achieve better public policy outcomes, improved service delivery and enhanced customer service.

The methodologies and actions listed in this plan demonstrate a transparent and consistent approach in relation to stakeholder and community engagement and have been developed using the principles of the International Association for Public Participation (IAP2) model.

These principles include:

- **Purposeful** – deliver on NSW Government priorities, corporate goals with a clear understanding of what we want to achieve.
- **Inclusive** – the identification of all stakeholders and enabling participation.
- **Timely** – clear identification of timeframes and allow sufficient time for meaningful consultation.
- **Transparent** – clearly explain the engagement, consultation and implementation processes and provide the information necessary to enable meaningful and purposeful participation.
- **Respectful** – ensure engagement activities acknowledge and cater for the differing needs, perspective and levels of understanding of participants.

B.5 Objectives

The aim of this Stakeholder and Community Engagement Plan is to outline the key activities to be undertaken during the 2024-2025 water year, but predominantly focusing on the one planned high-flow event that is greater than 1,400 ML/day in September.

The department has prepared a *Snowy Montane Rivers Increased Flows: Safety Management Plan (SMP) 2022-2027* to identify and manage public and staff risks associated with the planned environmental water releases. This plan reflects the communication requirements of the SMP.

This plan will:

- Identify agency responsibilities and actions to be undertaken within specified timelines and methods to ensure the principles of the department’s engagement policy are achieved.

- Identify and define the approach, methods and collateral material to engage stakeholders to inform them of, and assist them to prepare for, the Tantangara Dam releases.
- Ensure appropriate action is undertaken in a timely manner to inform stakeholders and the community, with particular emphasis on down-stream landholders, of the planned 'high-flow' water releases, the anticipated dates of each release, the associated volumes of each release, and the potential water depths at existing gauges downstream of Tantangara Dam.

B.6 Engagement purpose

To effectively engage with relevant stakeholders regarding the Snowy montane rivers environmental high-flow events by:

- Informing all interested parties of planned 'high-flow' event for the water year between 1 May and 30 April.
- Providing interested stakeholders and the broader community with access to relevant materials regarding high-flow events.
- Ensuring interested people, particularly landholders immediately down-stream of Tantangara Dam, are aware of planned high-flow events, their timing and magnitude.

B.7 Stakeholders targeted under this plan

- Commonwealth, NSW and Government agencies
- Snowy Hydro Limited
- Snowy Advisory Committee
- Landholders along the upper Murrumbidgee River
- Snowy Monaro Regional Council
- NSW National Parks and Wildlife Service
- NSW Roads and Maritime Services
- State Emergency Services
- Bureau of Meteorology (the Bureau)
- Local Land Services
- State/Regional/Local media organisations
- Local businesses within the Snowy region
- Recreational fishing industry
- Recreational campers and tourists
- Community interest groups
- Members of the general public
- Department of Climate Change, Energy, the Environment and Water – staff
- The National Trail

B.8 Key messages

Specific details for 2024/25 high-flow releases

- There is one scheduled high-flow environmental water release of 1,500ML/d to the upper Murrumbidgee River planned for 2024 on Tuesday 24 September.
- The high-flow release to the upper Murrumbidgee River will have a peak of 1,500 ML/d over 24 hours, increasing and decreasing either side with the event spanning a period of 72 hours above 500 ML/d.

- Two moderate releases will occur on Monday 22 July (1,200 ML/d) and Tuesday 20 Aug (1,375 ML/d). The department and Safety Technical Advisory Group (STAG) consider that these volumes are unlikely to pose a safety risk.
- In total over the year there will be 8 days where flows will be above 500 ML/d across 3 peak events, including 4 days of high flows above 1,000 ML to move fine sediment and inundate low lying benches.
- Environmental flows from Tantangara Dam will vary in volume but will be continuous between 1 May 2024 and 4 January 2025 and between 27 March and 30 April.
- A series of small 'fresches' will also be provided from January 2024 to March 2025 to recharge the system between periods of zero environmental release.

General details for all high-flow releases

- "High flow" releases are those in excess of 1,400 ML/day. This is the threshold above which flows may have the potential for creating safety risks, based on local risk knowledge and evidence from past releases. Smaller releases are also made throughout the water year.
- The days leading up to and following high-flow releases will have intermediate flows to create a more natural flow release pattern (hydrograph) that maximises ecological benefits.

Changes to planned dates and volumes

- Planned flows may be modified or cancelled subject to climatic environmental or operational conditions near to the time of release.
- The department will endeavour to inform the public of changes to large flow releases, where possible.
- Whilst the volumes of smaller releases are also planned at the start of the year, these may be changed at any time without notice. This allows greater flexibility in the delivery of environmental releases, which provides improved environmental outcomes.

Why releases are being made

- Environmental water releases to the Snowy montane rivers are mandated under the *Snowy Water Inquiry Outcomes Implementation Deed 2002*, a tri-government agreement between the Australian, New South Wales and Victorian Governments, to achieve significant improvements in river health.

Design of the flow release patterns

- The timing and duration of high-flow events varies from year to year, based on natural inflows to the Snowy catchment.
- High-flow water releases are designed to better mimic the natural flow characteristics that are seen in Snowy Mountain rivers, with the aim of improving the long-term health of these river systems.
- High-flow environmental water releases improve the health of the upper Murrumbidgee River by flushing sediment, clearing vegetation that encroaches into the channel, providing opportunities for fish and other native animals to move and wetting and filling riverside wetland areas.
- A series of smaller flow releases has been demonstrated to improve river health by establishing a new smaller channel, wetting the riparian zone and promoting the establishment of aquatic and riparian vegetation.

Safety messaging

- The release of environmental water into the Snowy montane rivers over a series of high-flow events has been successfully trialled since 2011.
- Downstream landholders are encouraged to make appropriate plans ahead of the water releases, including securing watercraft and moving stock, pumps and infrastructure to higher ground.

- Measures to ensure safe management of high-flow releases are detailed in the Safety Management Plan, which is available on the NSW DCCEEW -Water website.

B.9 Supporting materials

- **Fact sheet: Frequently Asked Questions** – provides an overview of the high-flow water release events.
- **Snowy Montane Rivers Increased Flows: Safety Management Plan 2022-2027**– identifies risks associated with the high-flow water release events and outlines the management of these risks for both the public and staff.
- **Rising River Alerts** – provides specific details for each of the three high-flow events in relation to timing, volume and anticipated river level heights down-stream of Tantangara Dam for the duration of each of the water releases.

B.10 Agency responsibilities for high-flow events

STAG members are expected to undertake the following tasks:

- Provide technical advice to the STAG Chair based on the agency's expertise and local knowledge, on the potential risks and impacts of the releases and appropriate mitigation measures.
- Provide advice to the STAG chair on whether the SMP and flows should proceed.
- Ensure agency attendance at all STAG meetings and provide timely responses to STAG meeting actions.
- Distribute media releases and Rising River Alerts through their own agencies communication channels as required.
- Assist with community engagement as required.

Additional tasks specific to individual agencies are listed in the below table.

Agency	Responsibility
NSW DCCEEW-Water	• Develop the Safety Management Plan • Lead implementation of processes detailed in the Safety Management Plan • Chair Tantangara STAG • Provide secretariat support to Tantangara STAG • Coordinate all public and stakeholder communications prior to high flow releases • Reply to contentious issues and enquires • Make decision in consideration of advice of the Tantangara STAG
DCCEEW Corporate Communications	• Develop and implement the Stakeholder Engagement and Communications Plan • Undertake all public and stakeholder communications prior to high flow releases

Agency	Responsibility
NSW DCCEEW-CPHR	• Development of Snowy Montane Rivers Increased Flow (SMRIF) release pattern • Develop the SMRIF Operations Plan • Work with Snowy Advisory Committee to ensure they consider risks in planning future SMRIF release patterns • Liaise with impacted stakeholders
Bureau	• Provide advice to the STAG on rainfall forecasts (Note Bureau do not undertake flood forecast modelling for Tantangara releases)
NSW SES	• NSW SES is the legislated Combat Agency for floods and is responsible for the control of flood operations. NSW SES work with the Bureau and Councils to develop warning systems. • Responsible for flood consequence management
ACTSES	• ACTSES is the legislated Combat Agency for floods and is responsible for the control of flood operations. ACTSES work with the Bureau and Councils to develop warning systems. • Responsible for flood consequence management
Snowy Hydro Limited	• Ensure releases are able to be undertaken safely • Operate infrastructure to make releases to the Murrumbidgee River • Cease / alter releases (from this plan) when directed by DCCEEW-Water
Snowy Monaro Regional Council	• Assist in providing up to date contact details for downstream landholders • Install additional signage where necessary
NSW National Parks and Wildlife Service	• Install additional signage to alert park users including campers in camping areas • Erect road closed signs as required

B.11 Direct actions for high-flow events

Action item	Responsibility	Comment
Provide FAQ's factsheet	NSW DCCEEW-Water and NSW DCCEEW Corp Comms	The factsheet will be made publicly available via the department's website, emailed directly to downstream landholders (those with listed contact details) and via the working group.

Action item	Responsibility	Comment
Provide updates on the down-stream landholder and key stakeholders contact list to NSW DCCEEW-Water and NSW DCCEEW Corp Comms	NSW DCCEEW-CPHR	Opt-in list data is collected by NSW DCCEEW CPHR, via its website. This information is input directly into a contact list held by the Snowy Licence Team. SMS contacts added to Borealis by Snowy Licence Team and Email contacts forwarded to Comms Team for inclusion on their list. Media contacts maintained by Media Team, including interstate contacts. Amendments made following requests from individuals or following bump back on emails. Other agencies submit direct request to NSW DCCEEW CPHR or the departments, for removal or inclusion of representatives.
Advise Local Police and SES of the planned high-flows and seek comment on any issues they perceive	NSW DCCEEW Corp Comms	Act on any issues identified.
Email landholders below Tantangara Dam along the upper Murrumbidgee River (those with listed contact details) and key stakeholders advising of the timing and magnitude of the flows	NSW DCCEEW Corp Comms	The department to make direct contact with downstream landholders (those with listed contact details) and key stakeholders approximately 4 to 6 weeks prior to first high-flow event – then ongoing as required.
Distribute 2024 Snowy montane rivers high-flows FAQs to relevant SES offices for display	NSW DCCEEW Corp Comms	The department to prepare FAQs in PDF format and distribute to working group members and appropriate stakeholders – further copies will be emailed to external contacts as required.
Issue a total of one media release/notice including one rising river alerts approximately seven days prior to the respective flow release to inform the affected communities Media outlets to be targeted: Snowy Shire Council – e-news Shire Wire Snowy Magazine Jindabyne Summit Sun Monaro Post XL FM Snow FM ABC Radio South East	NSW DCCEEW Corp Comms	Media release providing ‘overview’ of the high-flow water releases issued in May 2024 - and then ‘Rising river alerts’ to be issued 7 days before the planned releases.
Advise Minister for Water of planned flows.	NSW DCCEEW Corp Comms	Minister’s Office to be advised of the timing of the flows prior to issuing of ‘overview’ media release – May 2024, when BN is approved.
Provide Departmental ‘Customer Experience’ staff with all up-to-date information to answer any requests received	NSW DCCEEW Corp Comms	‘Customer Experience’ staff to be provided with all relevant information – May 2024.

Action item	Responsibility	Comment
Release the 'Public Safety Management Plan' – to be placed on the department's website and sent to members of the inter-agency working group	NSW DCCEEW-Water and NSW DCCCEEW Corp Comms	Updated 'Public SMRIF Safety Management Plan' provided to interagency working group members – May 2024. Updated 'Public Safety Management Plan' uploaded to NSW DCCEEW website – May 2024.
Update the department's website to ensure it contains the latest information on the Tantangara Dam environmental releases – will need to create a new 'Tantangara Dam' website landing page	NSW DCCEEW Corp Comms	'Snowy Montane Rivers Increased Flows website (Tantangara Dam landing page) updated to coincide with the issuing of the 'overview' media release. Overview media release to be issued in May 2024.

B.12 Evaluation

The following qualitative data will be used to indicate if this plan has successfully achieved its objectives.

Objective	Key indicators of success
Identify and define the best approach to engage key target groups to better inform them of planned high-flow water releases.	▪ media coverage resulting from the 'overview' media release issued announcing the planned winter-spring high-flow water releases. ▪ the number of media requests for interviews received. ▪ the amount of positive/negative/incorrect media coverage (through media monitors). ▪ stakeholder and landholder comments in both traditional and social media. ▪ direct feedback from down-stream landholders as a result of the outlined notification process for planned high-flow water releases during winter-spring. ▪ visits to the department's website for information on the Snowy River environmental water releases. ▪ feedback from inter-agency members.

Appendix C - Terms of Reference for the Safety Technical Advisory Group

Endorsed May 2022 – Amended March 2024

The Snowy River and Tantangara Safety Technical Advisory Group (STAG) “Terms of Reference” are the guiding principles and functions for assisting the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW-Water) in the implementation of the Snowy River and upper Murrumbidgee Safety Management Plans.

C.1 Background

The Snowy and Tantangara STAG are an advisory committees established to assist DCCEEW-Water to:

- implement the safety management processes for the waterways below the Jindabyne and Tantangara Dam.
- creates the opportunity for the views of key stakeholders to be identified and captured through the implementation of the safety management plan, and
- act as a consultative forum for the development and implementation of the safety management plan.

C.2 Purpose

The STAG is established to review safety matters associated with high-flow releases. It provides advice as requested by NSW DCCEEW-Water to assist the safety management process. The STAG has an advisory role and will not have a formal role in decision making, policy direction or delegating additional work to be carried out by NSW DCCEEW-Water.

The purpose of the STAG is to provide specific advice in relation to how to:

- reduce the probable impact of flooding and flood liability on the community from high flow releases
- reduce and prevent private and public losses resulting from high flow releases

C.3 Establishment and membership

The Committee

The committee comprises representatives from various Federal, State and Local Government departments / authorities / corporations and Snowy Hydro Ltd.

Membership of the advisory committee shall comprise of one representative from:

Departments / Authorities / Corporations	Jindabyne Releases	Tantangara Releases
NSW Department of Climate Change, Energy, the Environment and Water - Water (NSW DCCEEW-Water)	x	x
NSW Department of Climate Change, Energy, the Environment and Water- Biodiversity, Conservations and Science (NSW DCCEEW-CPHR)	x	x
NSW National Parks and Wildlife Service (NSW NPWS)	x	x
East Gippsland Catchment Authority (EGCA)	x	
NSW State Emergency Service (NSW SES)	x	x

Departments / Authorities / Corporations	Jindabyne Releases	Tantangara Releases
Victoria SES (Vic SES)	x	
ACTSES		x
The Bureau - Hazard Preparedness and Response (HPR) South	x	
The Bureau - Hazard Preparedness and Response (HPR) East		x
Snowy Hydro	x	x
Snowy Monaro Regional Council (SMRC)	x	x
East Gippsland Shire Council (EGSC)	x	
Victoria Police (Vic Police)	x	

From time to time, other people who have clearly defined interest in topics being pursued by the committee, may be invited.

Chairperson

The committee shall be chaired by the NSW DCCEEW-Water, Director Asset Management and Performance. If the nominated staff is not available the replacement Chair shall be the alternate from NSW DCCEEW-Water, or if unavailable, a committee member agreed upon by the majority of members.

Acting members

Each of the agencies can nominate an alternative person to act as their committee member representative, including the Chair.

Secretariat support

To enable the committee to operate effectively NSW DCCEEW-Water shall provide:

- any relevant and available data, technical/management studies and mapping
- expert advice from NSW DCCEEW-Water staff as required
- as agenda items relevant draft documents, and the opportunity to discuss open and transparent communication; and
- secretariat services and venues for meetings.

Tenure

This Terms of Reference is effective from the establishment of the SSTAG and will be ongoing as required.

Other meeting participants

Relevant technical and policy staff may attend meetings and provide advice as appropriate. committee members should notify the Chair of additional attendees in advance of the meeting.

Committee members may invite representatives of Snowy Hydro and other agencies to attend and participate in meetings as required.

Invited staff and other representatives will not be authorised to vote on matters to be decided by the committee.

C.4 Amendment Modification or Variation

This Terms of Reference may be amended, modified, or varied in writing after consultation and agreement by the committee.

C.5 Responsibilities and scope

The STAG shall:

- Provide technical support to NSW DCCEEW-Water in the decision-making concerning the safe planning and implementation of environmental releases (SRIF) from Jindabyne Dam and (SMRIF) from Tantangara Dam, particularly where it is possible that they could contribute to flooding impacts.
- Provide advice on planned and modified planned SRIF releases (as described in the Safety Management Plan)
- Provide technical advice to the STAG Chair based on the agency's expertise and local knowledge, on the potential risks and impacts of the releases and appropriate mitigation measures.
- Provide advice to the STAG chair on whether the SMP and flows should proceed.
- Ensure agency attendance at all STAG meetings and provide timely responses to STAG meetings.
- Distribute media releases and Rising River Alerts through their own agencies communication channels as required.
- Assist with community engagement as required.
- Provide input as set out in Table C-1.

Bureau of Meteorology

The Bureau of Meteorology (the Bureau) provides input to the Snowy River and Tantangara Safety Technical Advisory Group, relating to weather conditions. The level of input is determined by the availability of information. For Tantangara Dam releases this is limited to rainfall forecasts only. For Jindabyne Dam releases, hydrological modelling and rainfall forecasts can be provided.

The Bureau is not involved in the making of recommendations regarding dam management or releases, they only provide information to allow informed decisions.

Table C- 1: Process for the STAG input prior to a high-risk release

Timing	Process
When SRIF/SMRIF flow plan for the coming year is released	Snowy and Tantangara Safety Technical Advisory Group (STAG) may meet to: 1. Discuss the coming years planned releases and the Annual SRIF/SMRIF Operations plan 2. Review the Safety Management Plan, 3. Review the STAG ToR 4. Determine any risks associated with the planned timing, duration, and size of planned SMRIF releases. 5. Determine any risk mitigation measures that may be required for the upcoming water year. 6. Determine which flow events would require the Safety Management Process to be enacted, as set out in in the next sections.

Timing	Process
Approximately 5-7 days prior to commencement of SRIF/SMRIF release	1. NSW DCCEEW-Water notifies the Bureau of upcoming release. The Bureau and NSW DCCEEW-Water review any likely weather event or triggers during the planned release. The Bureau undertakes rainfall and flood forecasting (Snowy River only) to determine water levels. 3. NSW DCCEEW-Water informs STAG of upcoming planned release and makes any required meeting arrangements or via email response. 4. STAG reviews planned releases along with the Bureau's weather predictions, climatic risks and/or flood forecasting. SSTAG reviews risks and mitigation measures and provides advice on whether the release will be recommended to proceed to the next stage. 5. NSW DCCEEW decision-making process in flow chart followed (Figure C-1)
Approximately 2-3 days prior to commencement of each SRIF/SMRIF release	1. The Bureau and NSW DCCEEW-Water undertake a final flood / weather forecast. 2. Decision made if STAG requires meeting via Teams or via email. 3. STAG considers updated rainfall and flood forecasting (Snowy River only) and any final safety issues/actions required. 4. STAG reviews planned releases, risk and proposed mitigation measures and communication. 5. STAG members confirm that they are comfortable that the risks of the impending flow event are known and have been mitigated to an acceptable level. 6. NSW DCCEEW-Water makes decision on whether the flow should proceed and instructs Snowy Hydro based on the outcome. Where there is determined to be a high risk the STAG may reconvene 1 day prior to release and review
During release	1. The Bureau monitors weather and advises NSW DCCEEW-Water of any likely event that coincides with the full duration of the current release. 2. If necessary, the Bureau / NSW DCCEEW-Water undertake flood forecasting (Snowy River only) to determine any potential impacts from any forecasted weather. 3. If a risk arises, NSW DCCEEW-Water advises the STAG, and may call a SSTAG meeting. 4. Flow chart decision making process followed (Figure C-1).

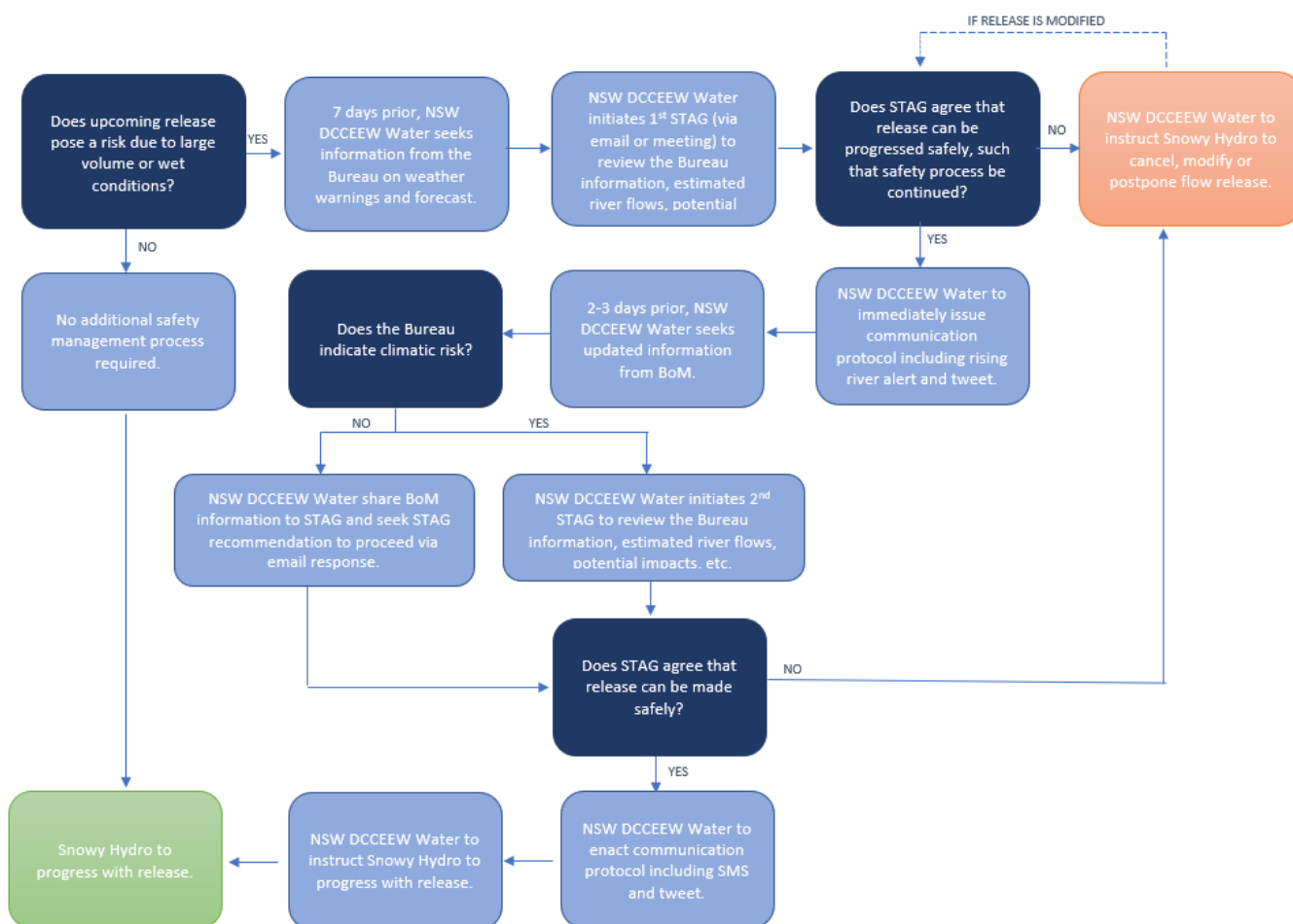


Figure C-1 STAG process flow chart

C.6 Operating protocols

Convening meetings

- The Committee will meet as required to satisfy its responsibilities and will have at least one meeting in each calendar year.
- Meetings may be called at short notice, due to deteriorating conditions.
- Meetings may be arranged at the request of one or more Committee members, through the Chairperson.
- Meeting locations will be agreed upon by Committee members and can be face-to-face or by video/teleconference.
- All attendees will meet the costs of their own travel and accommodation.
- The Chair is responsible for deciding to reschedule meetings should the need arise.

Quorum

The quorum for a meeting of the Committee will be attendance by representatives of NSW DCCEEW-Water, NSW DCCEEW-CPHR, Snowy Hydro, the Bureau and SES

Delegation

- The Committee is advisory in nature providing recommendations to NSW DCCEEW-Water.
- The Committee has not been delegated authority by NSW DCCEEW-Water.
- Any recommendations of the Committee must be ratified by resolution of NSW DCCEEW-Water and implemented by department staff with an appropriate delegation.
- The Committee does not have any power to incur expenditure or to bind the NSW DCCEEW-Water to any decision upheld by the Committee.

Dissolution

The Committee may at any time be dissolved and disbanded by NSW DCCEEW-Water.

Conflicts of Interest

Panel members must declare any conflicts of interest at the start of each meeting or before discussion of a relevant agenda item or topic. Details of any conflicts of interest should be appropriately minuted.

Committee member conduct

To enable the Committee to perform effectively, members will:

- disclose interests on all matters brought before the Committee that could conflict with the proper performance of their functions.
- Respect the views and interests of other Committee members and their respective governments when considering matters brought before the Committee.
- take all reasonable steps to gain a thorough understanding of the matters brought before the Committee.
- participate to the full extent of their knowledge and expertise in deliberations of the Committee to ensure those deliberations are fully informed.
- inform their respective Ministers of issues that may warrant ministerial level attention as these issues arise for discussion or decision by the Committee.
- consult with other agencies and portfolios of their respective governments as required to ensure that the positions brought to the Committee have whole of government support.

Contact officers

Each agency shall appoint a lead and backup officer and provide contact details for each officer to NSW DCCEEW-Water. NSW DCCEEW-Water should be copied into any correspondence sent between committee members.

Attendance

The lead officer is expected to attend each meeting. Where this is not possible, the backup officer must attend. Where no representative is available to attend at all, the agency must contact the Chair with sufficient notice for the Chair to consider rescheduling the meeting. The Chair may request agencies not in attendance to provide advice in writing.

Committee Members – Confidentiality

From time to time, members may be required to review and comment on draft documentation that has not been formally considered by the NSW DCCEEW-Water's decision-making body. In these circumstances, it is crucial members understand the status of any documentation and the importance of maintaining confidentiality if they wish to have input at such a preliminary time. Similarly, discussion may take place on matters subject to state government protocols that need to be adhered to. Each member is required to agree to the confidentiality requirements of membership.

Confidentiality of Snowy Hydro related information and data

- All material dealt with by the committee shall be treated as confidential unless otherwise identified by the Chair, after consulting with the NSW DCCEEW-Water member, or if tabled by a committee member of the other Agencies.
- Where confidential information is provided to a committee member or contact officer, care must be taken to ensure the information is kept secure, and that numbers of copies are kept to the minimum necessary. If such information is to be disposed of, it must be destroyed.
- The Department may, on behalf of and on terms acceptable to Snowy Hydro, require Committee members or contact officers to sign a confidentiality agreement or deed in regard to the use of Snowy Hydro data or information it deems to be commercially sensitive.

Appendix D - Enquiries and emergency contacts

Table D- 1 Contacts (current as of March 2024)

Contact	Telephone Number
NSW DCCEEW Water	1300 081 047
Police/Ambulance	000
State Emergency Service	132 500
RMS Transport Management Centre Incident Reporting Line	131 700
Snowy Monaro Regional Council	1300 345 345
Snowy Hydro Limited	1800 766 333

Appendix E – Historic releases and recorded river heights

Table E-1 Historic releases and recorded river heights. All flows values are in ML/d.

Gauge	Flow release (ML/d)	600	700	950	1000	1025	1250	1300	1450	1500	1500	1500
	Date	6/6/22	21/9/21	14/9/22	7/7/21	23/6/22	24/8/21	27/7/22	15/8/23	22/9/21	11/7/23	20/9/23
	Rain (mm)	35.8*	no rain	<2	no rain	no rain	8*	<2	5.6*	no rain	<2	no rain
Yaouk #2¹	Height (m)	1.11	1.17	1.26	1.28	1.33	1.40	1.35	1.33	1.4	1.39	1.31
	Flow (ML/d)	922	1,094	1,369	1,450	1,672	1,980	1,756	1,642	1,975	1,894	1,579
	Travel time (hrs) ⁴	9	12	9	15	15	13^	13	12	11	12	12
Mittagang¹	Height (m)	0.77	1.03	0.87	1.15	1.19	1.31	1.18	1.13	1.27	1.2	1.09
	Flow (ML/d)	650	1,266	917	1,628	1,782	2,261	1,748	1,677	2,094	1,921	1,548
	Travel time (hrs) ⁴	29	30	28	32	32	32	28	28	29	28	28
Billiligara¹	Height (m)	1.30	1.37	1.30	1.48	1.59	1.67	1.59	1.45	1.57	1.52	1.41
	Flow (ML/d)	1,044	1,370	1,044	1,720	2,168	2,541	2,177	1,629	2,095	1,841	1,486
	Travel time (hrs) ⁴	36	38	35	43	42	41	39	46	39	42	46
Michelago¹	Height (m)	2.54	2.58	2.50	2.72	2.78	3.00	2.78	2.63	2.78	2.69	2.57
	Flow (ML/d)	1,493	2,200	1,392	1,865	2,218	3,361	2,372	1,629	2,214	1,946	1,566
	Travel time (hrs) ⁴	47	50	48	52	52	n/a^	49	46	50	56	58
The Angle²	Height (m)e	1.95	1.94	1.89	2.02	2.08	2.29	N/A	1.96	2.09	2.03	1.92

Gauge	Flow release (ML/d)	600	700	950	1000	1025	1250	1300	1450	1500	1500	1500
	Date	6/6/22	21/9/21	14/9/22	7/7/21	23/6/22	24/8/21	27/7/22	15/8/23	22/9/21	11/7/23	20/9/23
	Rain (mm)	35.8*	no rain	<2	no rain	no rain	8*	<2	5.6*	no rain	<2	no rain
	Flow (ML/d)	1,518	1,474	1,244	1,848	2,157	3,203	2,194	1,577	2,198	1,881	1,386
	Travel time (hrs) ⁴	52	54	53	56	56	n/a [^]	54	60	54	52	60
Lobbs Hole³	Height (m)	2.66	2.55	2.50	2.68	2.81	3.06	2.79	2.61	2.78	2.68	2.55
	Flow (ML/d)	1,999	1,589	1,433	2,090	2,663	2,392	2,559	1,806	2,522	2,091	1,585
	Travel time (hrs) ⁴	51	54	52	58	58	n/a [^]	56	63	55	63	63

¹ WaterNSW gauge

² ACTEW Water gauge

³ Bureau gauge

⁴ Travel time – from start of release to start of rise at gauge

[^] Cannot be determined

* Rainfall is an estimated average, derived from the following rainfall gauge reading:

Rain gauge	24/8/2021	6/6/2022	23/7/2022	14/9/2022	11/7/2023	15/8/2023	20/9/2023
Alum Creek	8.4	14.0	0.2	0	0	3.8	0
Numeralla River @ Chakola	9.5	3.2	0	0	0	2.1	0
Michelago	7.8	10.8	1.2	0	0	8.4	0
Angle Crossing	5.8	7.78	0	0.2	0.2	9	0

Appendix F – Algae Safety Protocol

Endorsed June 2024

Process to mitigate impacts from algae released from Jindabyne and Tantangara Dams during environmental releases

Context

1. Schedule 3 Part 4 Clause 15.7 of the Snowy Water Licence (the Licence) requires that the Water Administration Ministerial Corporation (WAMC) prepares a safety management plan that addresses the legal obligations with respect to public safety and other matters in connection with release of flushing flows.
2. Clause 16.2 of the Licence requires WAMC to use reasonable endeavours to mitigate a 'Prescribed Event' and its effects. Prescribed Events include public safety or environmental health risks with respect to increased flow releases from Tantangara and Jindabyne Dam.
3. Key agencies involved in environmental releases have a common law duty of care with respect to their impact on public safety and environmental health.

Objective

4. The objective of this protocol is to mitigate potential downstream impacts of algae released from Tantangara and Jindabyne Dams as part of the Snowy River Increased Flows (SRIF) and Snowy Montane River Increased Flows (SMRIF) program.
5. This protocol does not cover management of water quality or algae within Snowy Hydro reservoirs, which is not the responsibility of NSW DCCEEW.

Scope

6. The protocol applies to SRIF releases from Jindabyne Dam into the Snowy River and SMRIF releases from Tantangara Dam into the upper Murrumbidgee River.
7. This protocol is developed to tie into the existing processes within the Snowy and Tantangara safety management plans (SMPs), and will be incorporated into the SMPs during the next review phase.
8. The protocol uses a risk-based approach. Accordingly, the protocol will focus on releases between January and April when warmer water temperatures increase the risk of algal blooms in the dams.
9. The protocol may also be enacted outside of the summer period if high-risk conditions are overserved, such as unseasonal prolonged warm weather during period of low flows.

Algae mitigation process

Algae monitoring

10. Sentinel 2 satellite imagery of Tantangara and Jindabyne reservoirs is available at two to three-day intervals through the EO Browser developed by Sentinel-Hub. WaterNSW has developed a Custom Algal script for use with the Sentinel EO Browser, to map the algal risk level based on an estimate of the algae biovolume of the waterbody using the satellite imagery. The script uses the widely accepted Normalised Difference Chlorophyll Index (NDCI) algorithm for estimating the algae biovolume. The script does not

distinguish between blue-green or other algae. The colour coding produced by the script aligns with NSW algae alert levels.

11. DCCEEW-Water will review satellite imagery at approximate fortnightly intervals throughout the summer period. As an example, DCCEEW-Water will review imagery on Monday mornings from the second week of January through until the end of April (or longer if algae is persistent in the system). A pragmatic approach will be taken during public holiday periods based on available resourcing.
12. If the imagery is unclear due to cloud cover, DCCEEW-Water will review the most recent imagery available and the next earliest imagery available.
13. If imagery shows an amber or red alert, DCCEEW-Water will notify DCCEEW- Conservation Program, Heritage and Regulation(CPHR) on the same day.
14. DCCEEW-CPHR will review the data. Where a red alert is present, DCCEEW-CPHR will liaise with Snowy Hydro and WaterNSW as the Statewide Algae Coordinator, to confirm the site condition. WaterNSW may provide further algae information for the reservoir and downstream waterway. Snowy Hydro may conduct on-site visual assessments and/or algae sampling monitoring.
15. If the site condition is confirmed by Snowy Hydro or WaterNSW, DCCEEW-CPHR will lead release mitigation actions.

Mitigation actions

16. DCCEEW-CPHR will consult with relevant agencies (e.g. DCCEEW-Water, WaterNSW and Snowy Hydro) to determine appropriate mitigation measures. This may include (but not be limited to):
 - a. Amending the volume or timing of the release
 - b. Releasing water from lower in the water column (consider cold water impact to downstream)
 - c. Cancelling the release
17. DCCEEW-CPHR will consider the risks of implementing any mitigation measures, e.g.:
 - a. the degree of stratification in the reservoir and consequential thermal pollution from releasing water from lower in the water column
 - b. the reduced habitat, increased drying, reduced connectivity, decreased thermal buffering and other effects from reducing or cancelling releases.
18. DCCEEW-CPHR will inform DCCEEW-Water of the agreed action.
19. If necessary, DCCEEW-Water, acting as WAMC, will instruct Snowy Hydro in writing to implement the mitigation action.
20. Snowy Hydro will implement the mitigation action.

Follow up actions

21. DCCEEW Water will continue monitoring satellite imagery and provide updates to DCCEEW-CPHR as mentioned in item 2.
22. WaterNSW and Snowy Hydro will provide DCCEEW-CPHR with updated site observations whilst mitigation is in place.
23. DCCEEW-CPHR will monitor any feedback received from WaterNSW or other downstream stakeholders of to determine any algae issues that may be derived from environmental releases.
24. Where algae monitoring or feedback demonstrates that additional mitigation is required, the process under 'Mitigation actions' will be repeated.

25. Where monitoring demonstrates that the algae risk has subsided, DCCEEW-CPHR will consult with relevant agencies such as DCCEEW-Water WaterNSW and Snowy Hydro and determine when mitigation actions can be ceased and normal operations resumed.
26. DCCEEW-CPHR will inform DCCEEW-Water of the agreed action.
27. If necessary, DCCEEW-Water, acting as WAMC, will instruct Snowy Hydro in writing to resume normal operation.
28. Snowy Hydro will implement the action.

Evaluation and Revision

29. Algae mitigation processes will be reviewed at the end of each water year as part of the annual review of the SMP, led by DCCEEW-CPHR. The SMP will be updated to reflect improvements.

Satellite imagery colour code

30. The table below shows satellite imagery colour codes representing observed risk levels based on the estimated photosynthetic activity.

Map Colour	Risk Level - <i>Potential Photosynthetic Activity</i>	Starting concentration guide range	RACC recreational alert values approx. equivalence
Blue	Very low	<0.05 mm ³ /L	No Alert
Green	Low	0.05 to 0.5 mm ³ /L	Green
Yellow	Medium	0.5 to 5.0 mm ³ /L	Amber
Red	High	5.0 to 20.0 mm ³ /L	Red
Dark red	Extreme	> 20 mm ³ /L	Red

*RACC: Regional Algae Coordinating Committee