Transport for NSW

Guidelines for Managing Potential Hazards on Water Storages in NSW

March 2023

NSW GOVERNMENT

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Disclaimer

The information provided in these guidelines is for informational purposes only. TfNSW accepts no liability or responsibility to any person as a consequence of reliance on the information contained in these guidelines. For comprehensive information regarding waterways safety, please visit watersafety.nsw.gov.au.

Foreword

These guidelines are intended to act as a guide for water storage managers in New South Wales (NSW) being WaterNSW and non-government entities such as Snowy Hydro Limited (SHL) to improve safe navigation on water storage facilities in NSW. As guidelines, they do not establish standards that must be met on all waterways, or by all existing safety and hazard minimisation infrastructure.

The key purpose of this guideline is to improve safe navigation on water storages across NSW by establishing consistency with the installation of navigation aids and signage to clearly identify built hazards to navigation. These guidelines also establish a framework for waterway user education, asset maintenance, record-keeping and interagency communication while incorporating the objectives and guiding principles of the Maritime Safety Plan.

TfNSW acknowledges that while some hazards may be obvious risks to vessel operations on water storages in NSW, it is appropriate to consider additional safety measures to further minimise risks.

The NSW Government provides the legislative and policy framework for waterway safety in NSW. Transport for NSW (TfNSW) Maritime is the delegated authority under the *Marine Safety Act 1998* (the Act) for ensuring the safety of navigation on NSW navigable waterways and regulates the majority of activities undertaken on NSW waterways.

The objects of the Act include promoting the safe and responsible operation of vessels on NSW waters and protecting the safety and amenity of other users of those waters and the amenity of occupiers of any adjoining land.

Background

NSW waterways are situated over Crown-owned land or TfNSW-owned land. Many waterways in NSW are owned and/or managed by other state government agencies, local government agencies or state-owned corporations. These waterways are often built water storages created by the construction of dam walls for the purposes of drinking water supply, storage for irrigation and/or hydro-electric power generation.

In addition to their primary purposes of water storage, these waterways provide highly valuable secondary uses as recreation spaces, either through the launching and navigation of vessels for fishing and water sports or for the use of adjoining land for recreation.

Water storages also often possess high environmental values through a mix of natural landscapes, healthy wildlife populations and fish stocks. These assets make many water storages highly regarded boating destinations, which in turn are important to local communities in terms of social and economic value, through increased amenity and tourism opportunities.

The considered use of water storages for recreational purposes and the value they add provide a significant contribution to regional economies.

The provision of public access to these water storages brings obligations on both the owner/manager of the waterway and TfNSW Maritime to ensure that any facilities or structures do not pose

unreasonable safety risks and that reasonable measures have been taken to minimise the risk of injury or property damage.

Examples

- The marking of the outlet manifold in Lake Eucumbene. The outlet is a large concrete structure which becomes unsafe with turbulent water around 20% capacity and exposed at around 15%.
- The placement of a barrier across the spillway of Googong Dam.

Clause 23 of the *Marine Safety Regulation 2016* sets out the responsibilities of the owners of obstructions to navigation and the powers that are available to TfNSW Maritime to ensure compliance with clause 23.

In March 2018, TfNSW Maritime approached the two most significant water storage managers in NSW, Water NSW and Snowy Hydro Limited, to work together to produce a best-practice guideline for addressing the risks posed by built hazards on water storages, through strategies such as the construction of safety barriers where necessary and the installation of appropriate and consistent safety buoyage and signage.

Previously, it has generally been the practice of water storage owners/managers to install and maintain safety barriers and signage at the site of any built hazard.

TfNSW Maritime as the NSW on-water safety regulator for vessel operations has marked natural hazards where necessary and practicable, provided safety and advisory signage at access points such as boat ramps, and delivered education and compliance activities aimed at educating the public on the risks of boating.

It is not our intention to change current practices that are working well, rather the intention of these guidelines is to help provide a more consistent and cooperative approach which will lead to improved communication and inter-agency collaboration between organisations. This should result in improved safety outcomes for waterway users, ensure the continued viability of public access to water storages and increase opportunities for effective targeted education programs to support safety, amenity, and environmental outcomes.

Risk management

Risk management guidelines

This section is concerning the types of risks and non-exhaustive factors that should be considered when assessing risks to water storage users posed by built hazards.

Water storage owners/managers should ensure a risk-based management approach is adopted for the planning, installation, maintenance and modifications of any man-made structures and the safety management systems in place for those structures to prevent injuries, damage to property and interruption to supply of water or electricity.

While we understand that each agency or corporation will have its own corporate risk management processes we expect that these will conform to or exceed *AS ISO 31000:2018 Risk management - Guidelines* and be conducted by a competent person familiar with that Standard.

The following table presents a summary of the key factors for consideration:

Issue	Matters for consideration
Characteristics of the waterway	Identify the location of the structure on the waterway (suggest a detailed site plan/map is developed). Determine the width and depth of the waterway surrounding the structure (to calculate the appropriate sizes of buffer/exclusion zones). Identify historic weather patterns / conditions, water flow rates or other relevant environmental characteristics (e.g. frequency of heavy fogs or major storm events). Identify flood history patterns and water level heights at different capacity levels (i.e. where the water edge or shoreline is at different water levels). Consult with TfNSW Maritime to confirm the location of any submarine cables, subterranean cables, and overhead cables. Identify existing water harvesting equipment.
Waterway usage patterns	Determine all boating-related activities in the vicinity. Determine all recreational water-based activities in the vicinity, including swimming, passive craft, and similar activities. Identify all nearby vessel launching sites (formal and informal) or other possible waterway access points. Determine whether aquatic events (e.g. water-skiing races) take place in the vicinity. Determine daytime and night-time usage patterns.
Water user incident history	For vessel-related incidents, TfNSW Maritime may have records of historical incidents that can be made available on request. For other waterway user-type incidents (swimmers or other non-vessel related) the water storage manager should already maintain details of any incident where personal injury or property damage has occurred. Alternatively, NSW Police or other relevant emergency services may be able to provide advice.

Risks posed by built structures on NSW water storages

Water storages created for the purposes of water supply, irrigation and/or hydro-electric generation has been achieved by the building of structures such as dam walls, intake and outlet structures, and other structures such as spillways, weirs, pipes, and water testing equipment.

Built structures are critical to the primary purposes of water storages and are a permanent feature of such waterways.

Built structures are significant items of infrastructure and can pose hazards to waterway users. When no longer in use, these structures will often remain in place as removal is not cost-effective.

Other hazards include submerged fencing and other non-electrical wires or cables, as well as infrastructure provided to allow or improve public access to the waterway (e.g. vessel launching ramps or informal passive craft and swimmer access points).

The challenge of making such structures safe is amplified by the extreme and rapid water level fluctuations often seen on water storages, caused by the exercising of their primary functions and natural causes.

Built structures can be separated into three categories, each of which will be considered separately in **the pages that follow:**

Category	Description
Category A	Built structures that relate to the primary function of the water storage (such as weirs/dam wall, spillways, and other major water outlet and/or intake pipes).
Category B	Other built structures indirectly related to the primary function of the water storage or related to a secondary use of the area (such as submerged fencing and other non-electrical wires or cables).
Category C	Built structures related to the provision of public access to water storages (such as boat launching ramps, pontoons, passive craft launching facilities and swimmer access points).

Note: These guidelines do not intend to address risks related to electrical crossings or submerged electrical cables, which are separately addressed in the Australian Standard (AS6947-2009) in conjunction with TfNSW Maritimes *Crossings of NSW Navigable Waters: Electricity Industry Code.*

Some examples of the risks these hazards may pose to waterway users include:

- A vessel or person falling over the edge of a dam wall, spillway, or weir where water is flowing over it.
- A vessel or person becoming trapped on or in a water intake pipe or similar structure.
- A vessel or towed person colliding with a structure such as a water intake pipe (which may not be visible above the water surface).
- A vessel's propulsion equipment, anchor or towing equipment becoming entangled with a submerged hazard (such as unmarked fences, cables, or water pipes).

Such events may result in damage to property and/or serious injury or death to waterway users. Other consequences may include damage to the infrastructure itself requiring expensive repairs and/or interruptions to supply, as well as environmental impacts (water pollution and/or habitat damage) and social and legal consequences of such incidents.

This document is to be used as a guide only and the owners of water storages should consider the suitability of the proposed measures along with consideration of local conditions.

Risk mitigation measures for built hazards on NSW water storages

As already noted, owners/managers of water storages have employed a range of risk mitigation measures that consider factors including local geography and conditions, organisational procedures, and precedents. The vast majority of risks associated with built hazards on NSW water storages are

already appropriately mitigated through the types of measures discussed below. There are, however, some differences of approach between the various entities and across the various locations, and there are some locations where improvements may be needed.

We have identified five levels of risk mitigation measures that can be used to address risks on water storages.

The appropriate management level(s) for a particular hazard would be determined based on a site-specific risk assessment using the Risk Management principles outlined in this section (or an equivalent framework). **In many cases a hazard (particularly a Category A hazard) should ideally employ a combination of several levels of risk mitigation.**

Levels of risk mitigation measures:

Level	Description	Hazard Category
Level 1	Physical Barrier at or near the hazard to physically prevent navigation to the hazard.	Required for Category A hazards only.
Level 2	Buoys, signage and other markings or advisory material on, at or near the hazard that (but do not physically prevent access to the hazard).	Category A hazards where Level 1 measures are unable to be used, or where Level 1 measures require an additional layer of mitigation.
Level 3	Buoys marking a hazard where signs may not be required or practical, but that indicate the presence of a hazard and the line of that hazard.	Required for Category B hazards.
Level 4	Signage and other markings on the shoreline adjacent to or near the hazard that alert approaching vessels and waterway users to the hazard.	Required for category A hazards and often advisable for Category B hazards.
Level 5	Signage and other advisory material at relevant access points to the waterway (e.g. boat ramps) that alert waterway users to the hazard.	Required for all hazard categories.

Note that the design and location of any installations of safety barriers, buoys and signage should also take into account local geography and conditions in order to ensure they are effective and visible.

Additionally, all signage and barrier/marking systems should be supported by education, advisory and (only where suitable) surveillance programs, with consideration given to resourcing, inspection, and maintenance requirements, etc.

Level 1 mitigation measures

A Physical Barrier at or near the hazard that seeks to physically prevent navigation to the hazard.

Category A hazards such as spillways and water intakes should have a physical barrier such as a cable and floating buoy apparatus surrounding them which seeks to block access to the structure. Such a barrier should also be marked where possible with clear warning notices such as 'DANGER –

NO ACCESS' (with associated international standard symbols), and in most cases will need to be supported by Level 4 and 5 measures, and in some cases Level 2 measures.

Level 1 installation should be constructed and installed in such a manner as to meet the following guidelines in conjunction with IALA Guideline 1066 – The Design of Floating Aid to Navigation Moorings:

- The apparatus should include a continuous cable with a minimum of 6 yellow marker buoys of a size not smaller than 300mm in diameter and spaced along the entire cable length not more than 5m apart (spacing to be determined with consideration of span and visibility conditions expected at the location). Where boating is known to occur on relevant waterways between sunset and sunrise or where poor visibility may be expected, consideration should be given to installing yellow flashing lights on the barrier at appropriate intervals and warning signs at boat ramps and entry points to the waterway.
- The apparatus should be a safe distance from the hazard to ensure that any water user (including swimmers and operators of passive craft or power vessels) approaching the apparatus unknowingly may alter their course of direction to avoid it without being impeded by water flow. This distance should be determined in consultation with technical experts and TfNSW Maritime.
- The apparatus needs to be constructed of a material (normally a high strength steel cable and UPVC buoys) capable of enduring the maximum expected forces (with consideration to water flow and weather conditions).
- The apparatus should be constructed in a way so that the yellow marker buoys remain above the water surface at all times, so they are highly visible to any approaching waterway users, either floating on the water surface or suspended (not more than 1 metre) above the water.
- The cable and buoy apparatus should be constructed in a manner that ensures it is visible and effective at all water storage capacity levels without permitting gaps to appear or sections to be hidden from sight.

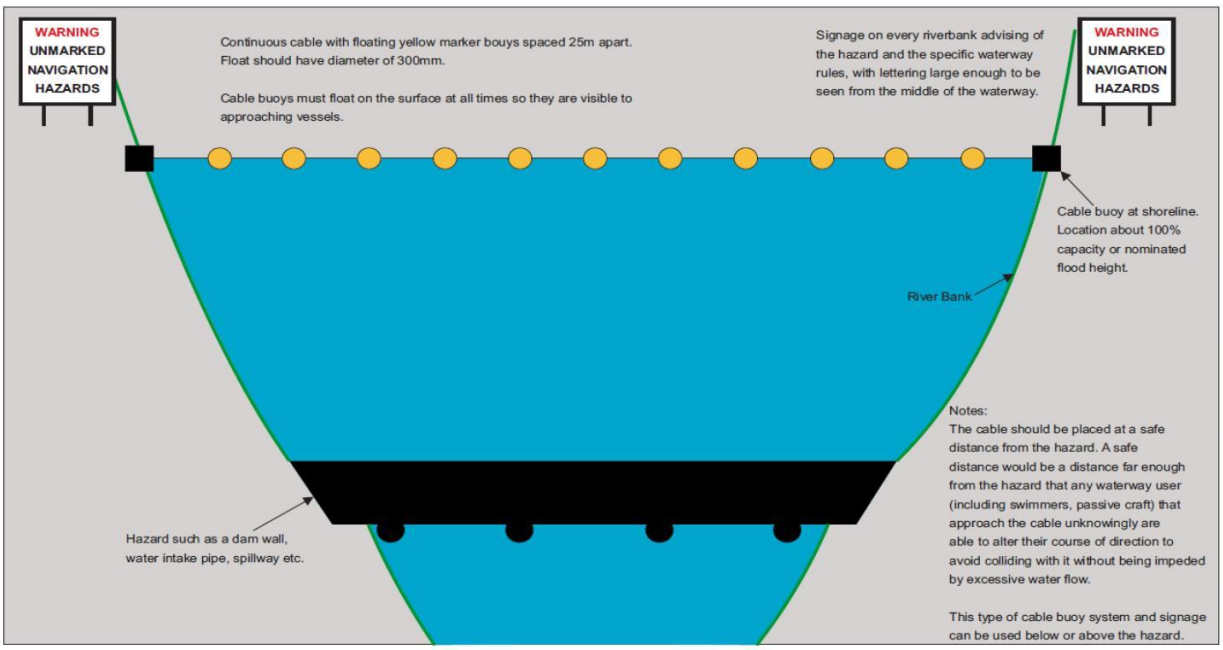


Image: The above diagram provides an example of continuous cable with floating yellow marker buoys, spaced 25 meters apart. Float should have a minimum diameter of 300mm. The cable of aqua buoys should float on the surface at all times, so they are visible to approaching vessels.

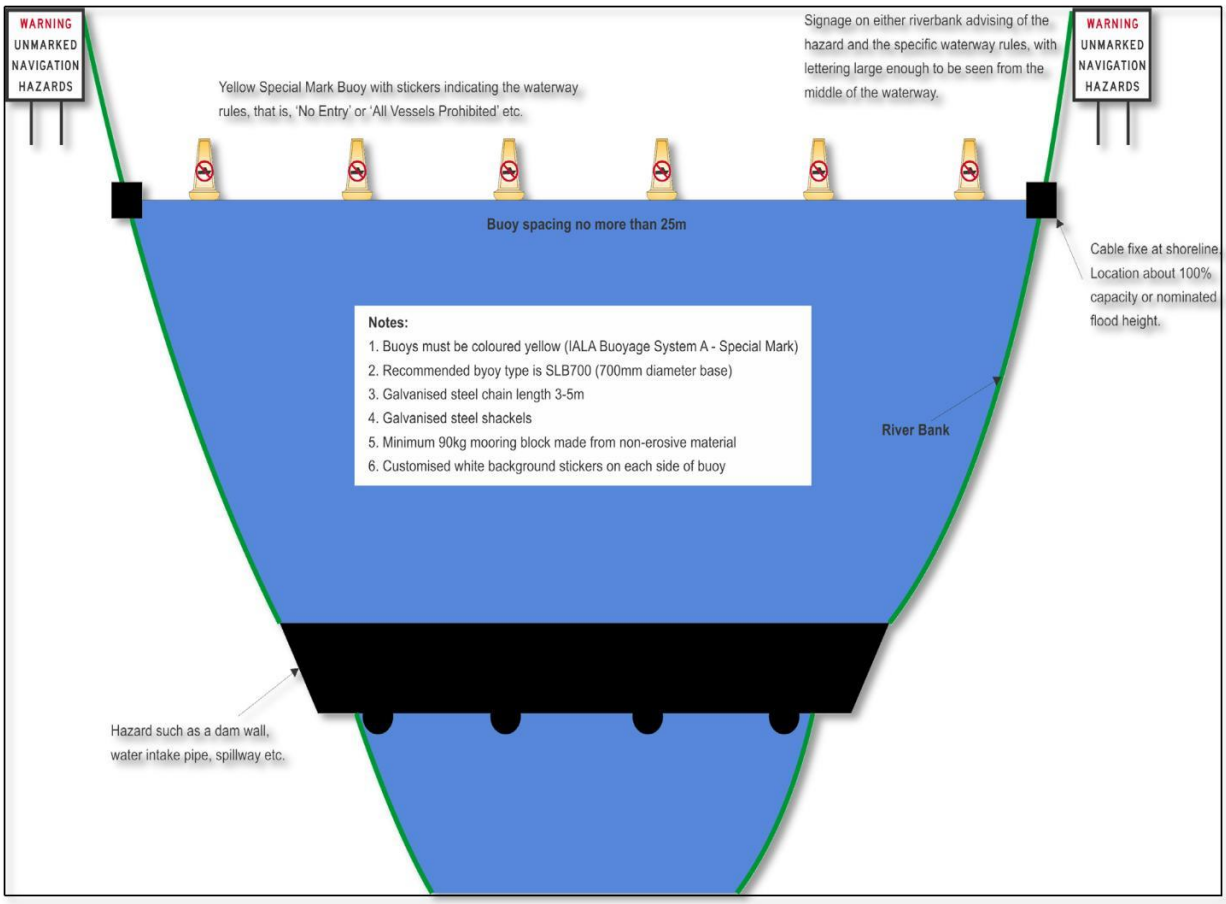
Level 2 mitigation measures

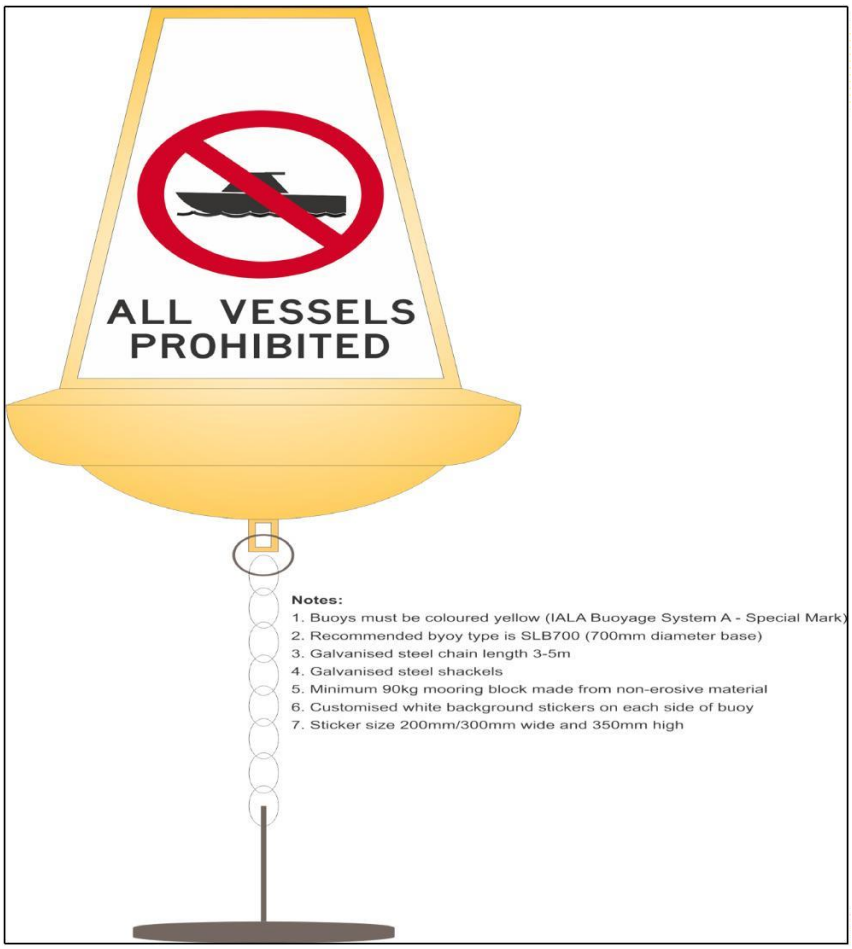
Buoys with signage affixed or separate signage on, at or near the hazard that make the dangers clear and obvious to those approaching the hazard.

Level 2 measures involve the installation of advisory buoys and signs (with associated international standard symbols), that warn the public of the hazard and provide a visual (but not physical) barrier that ensures awareness of the hazard. Buoys with appropriate warning messages or signs affixed would be placed around or in front of the hazard, or signs placed directly on the hazard where practical, and allow appropriate visibility.

Level 2 installations should meet the following guidelines:

- Where buoys are used in lieu of a Level 1 barrier they should be spaced at intervals determined by a risk assessment of each individual waterway/hazard.
- Buoys should be coloured yellow (IALA Buoyage System A–Special Marks) and sit a minimum of 700mm above the water level. High flow buoys are also available for locations that experience extreme water flow or weather conditions. All buoys should have yellow reflectors attached on each side/face. A description of Buoys are located at https://www.nsw.gov.au/driving-boating-and-transport/waterways-safety-and-rules/navigation-marks-lights-and-sounds/navigation-marks.
- Buoys should be secured with suitable galvanised steel chain, shackles, and swivel, with length to be determined in order to ensure the buoy remains visible at all water storage levels. The length of the chain should be adjusted with rise and fall of the water level to minimise shifting of buoy's position.
- Buoys should be anchored with a mooring block made from non-corrosive material of a suitable weight to ensure they remain in place in all conditions (minimum 90kg is recommended). This may increase depending on the current, depth, weather, and reservoir bed condition.
- TfNSW Maritime may be consulted if necessary to determine appropriate buoy, accessories, location and spacing, etc.
- Where stickers are added to buoys, they should feature the same visual cues as used on TfNSW Maritime safety signage, with a white background, black text and red/black symbols where used. Stickers should be visible on each side/face of the buoy and legible at an appropriate distance.
- Buoys should include a suitable marine light/latent for waterways which are frequently used at night or subject to heavy fog and other low light conditions. Recommend solar powered marine Light with 2NM range and minimum 15 days autonomy.
- A diverse range of signage options are available from the TfNSW Maritime Signage Catalogue. This includes options for specific hazard advisory signage for locations adjacent to a hazard. The list can be located at https://roads-waterways.transport.nsw.gov.au/cgi-bin/index.cgi?action=searchwaterwaysigns.form.


WARNING
UNMARKED
NAVIGATION
HAZARDS
Yellow Special Mark Buoy with stickers indicating the waterway rules, that is, 'No Entry' or 'All Vessels Prohibited' etc.
Signage on either riverbank advising of the hazard and the specific waterway rules, with lettering large enough to be seen from the middle of the waterway.
WARNING
UNMARKED
NAVIGATION
HAZARDS
Buoy spacing no more than 25m
Cable fixe at shoreline. Location about 100% capacity or nominated flood height.
Notes:
1. Buoys must be coloured yellow (IALA Buoyage System A - Special Mark)
2. Recommended byoy type is SLB700 (700mm diameter base)
3. Galvanised steel chain length 3-5m
4. Galvanised steel shackels
5. Minimum 90kg mooring block made from non-erosive material
6. Customised white background stickers on each side of buoy
River Bank
Hazard such as a dam wall, water intake pipe, spillway etc.


ALL VESSELS
PROHIBITED
Notes:
1. Buoys must be coloured yellow (IALA Buoyage System A - Special Mark)
2. Recommended byoy type is SLB700 (700mm diameter base)
3. Galvanised steel chain length 3-5m
4. Galvanised steel shackels
5. Minimum 90kg mooring block made from non-erosive material
6. Customised white background stickers on each side of buoy
7. Sticker size 200mm/300mm wide and 350mm high

Level 3 mitigation measures

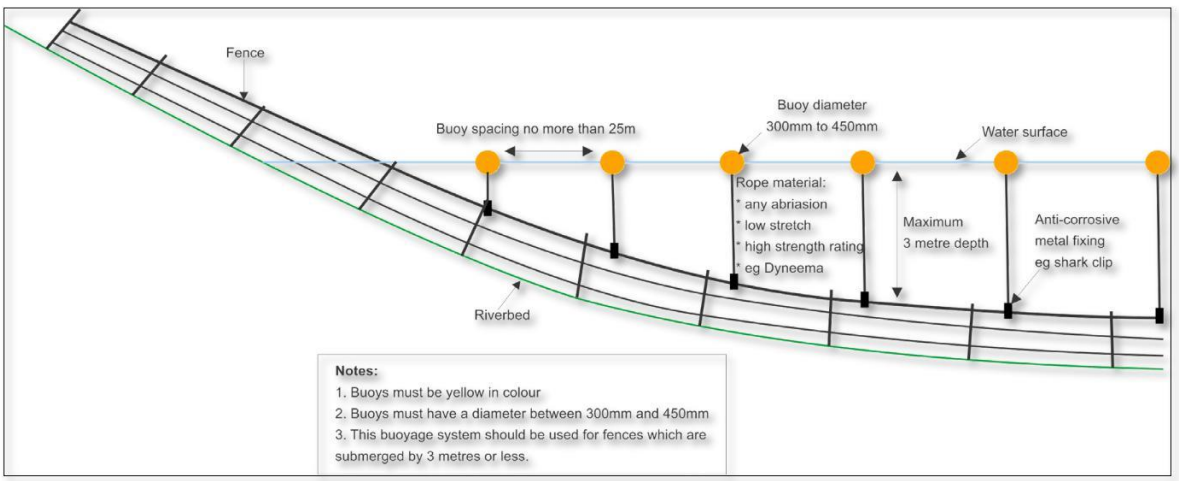
Buoys marking a hazard where signs may not be required or practical, but that indicate the presence of a hazard and the line of that hazard.

Level 3 measures are appropriate for hazards that pose a moderate risk such as submerged or semi-submerged fences and non-electrical cables that are less than three metres below the water surface. This type of installation has not been widely used in the past and is now proposed as a result of discussions held during a concept/planning workshop held in 2018 with representatives from TfNSW Maritime, WaterNSW and SHL.

We propose that this type of installation will prove practicable in marking many Category B hazards and may be able to be attached to such hazards, moved when water levels fluctuate as necessary, and stored for re-use when no longer needed. The intention is to use a suitable number of buoys (with associated international standard symbol stickers attached to all sides) to create a highly visible line indicating the location and orientation of the submerged fence or cable (hazard).

Level 3 measures should conform to the following guidelines:

- Buoys should be yellow in colour, with a diameter of at least 300mm and be spaced not more than 25 metres apart, with a minimum of three buoys used where a line should be indicated and the first buoy no more than 10 metres from the shore.
- Buoys should be securely attached the fence or non-electrical cable using a non-corrosive metal fixing (e.g. galvanised steel shark/carabiner clip or shackle) and either non-corrosive wire or strong, non-abrasive, low stretch rope material (such as dyneema). Wire/rope length should be sufficient to ensure the buoys are fully visible when the hazard is three metres or less below the water surface.
- Alternatively, buoys may be secured to each other in a line that is appropriately placed above a hazard in order to ensure equivalent placement.
- Fencing etc. is to be removed or made temporary for 'rise & fall stock management' wherever possible and marker buoys used for permanent features that cannot be removed.
- These systems will require regular scheduled inspections and maintenance, especially in locations prone to significant water level fluctuation. Ideally, buoys should be removed and stored when the water level drops below the hazard (or moved along to the appropriate location. While it would be possible for buoys to be left in place when water levels drop below the hazard (or rise more than three metres above the hazard), we do not advise this in most cases, as the condition of the apparatus may deteriorate.



Level 4 mitigation measures

Signage (with associated international standard symbols), and other markings on the shoreline adjacent to or near the hazard that alert approaching vessels and waterway users to the hazard.

Level 4 measures consist of signs placed on the adjacent shoreline where they will be visible to vessels approaching a hazard. Where the shoreline is distant from a hazard, a Level 1 or 2 installation should also be considered.

Level 4 signage should meet the following guidelines:

- Signs should be large enough to be legible from at least 100 metres distant, and from the middle of the waterway where possible. Where this is not possible, we recommend a Level 1 or 2 installation.
- Signs should conform to visual signage cues as used on TfNSW Maritime safety signage, with a white background, black text and red/black symbols to depict any restriction.
- Signs should use Australian Standard Reflective 1X Diamond Grade background to attract maximum attention.
- Signs should be installed in accordance with the recommendations at Appendix 2.
- Signs should be installed at the most visible location, and at an angle that ensures maximum visibility to approaching vessels, such as 45° degrees to the shoreline facing the direction from which vessels are expected to approach, or parallel to the shoreline where vessels may approach from multiple directions (this may vary depending on the location).
- Signs should be installed with due consideration of issues such as adjoining private property, protected/sensitive habitats, water level fluctuations and bank stability.

TfNSW Maritime maintains an extensive signage catalogue, with many sign designs that comply with relevant standards that are available to water storage owners/managers.

Ordering signage from this catalogue may simplify the procurement of appropriate signs and will ensure consistency with TfNSW Maritime installed signage at the waterway and across all NSW navigable waters, increasing noticeability and reducing potential for confusion. Waterway owners/managers should contact TfNSW Maritime through their local TfNSW contacts to discuss sign selections, sizes and install locations.

Level 5 mitigation measures

Signage (with associated international standard symbols), and other advisory material at relevant access points to the waterway (e.g. boat ramps) that alert waterway users to the hazard.

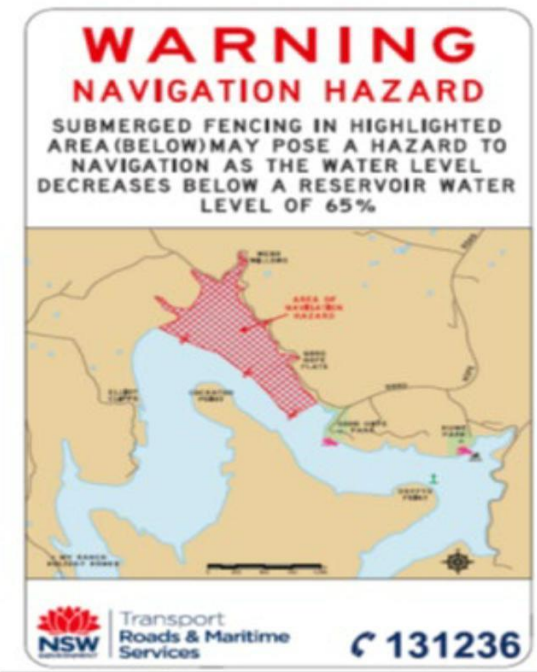
Level 5 mitigation measures should be installed for all hazards and will often be required to notify waterway users of multiple hazards that exist on and around a water storage, including those present at the site of the sign, such as hazards relating to the access point itself.

Level 5 signage should meet the following guidelines:

- Signs should feature the same visual cues as used on TfNSW Maritime safety signage,
- Signs should utilise Australian Standard Reflective 1X Diamond Grade background to attract maximum attention.
- Signs should be installed in accordance with the recommendations in this document.
- Signs should be installed at the most visible location, and at an angle that ensures maximum visibility to users of the structure or hazard.
- Signs should be installed with due consideration of issues such as adjoining private property, protected/sensitive habitats, water level fluctuations and bank stability.

Level 5 signage should inform waterway users of the full range of risks and hazards where appropriate, or the most serious risks and hazards where the number of these is high. Examples of risks and hazards that should be considered for inclusion on level 5 signage include:

- Exclusion zones
- Dam walls, spillways, water intakes and outlets and other structural hazards.
- Submerged or semi-submerged fences or cables.
- Electrical crossings
- Water level fluctuations unmarked and submerged natural hazards and flood risk.
- Weather conditions and cold-water temperatures.



TfNSW Maritime installs advisory signage at most boat ramps, including large multi-panel signs that allow multiple agencies to present relevant information and can feature a map of the waterway to highlight the location of particular hazards and to guide waterway users. It is clear that access point signage at many waterways is in need of rationalisation, with multiple signs from different agencies often duplicating some messages.

TfNSW Maritime supports the review of signage at water storages in cooperation with waterway owners/managers to improve the effective delivery of key messaging. TfNSW Maritime is willing to take responsibility for installing and maintaining such installations, ensuring the minimum number of signs are correctly placed and maintained at each location. This may involve the removal of old and/or duplicate signs at some locations.

As a general rule, it is best if risks and hazards relating to the safety of navigation are presented on a sign at the launch point (i.e. boat ramp), and signs relating to the use of the boat ramp precinct (providing information on parking etc.) are located at the entrance to the precinct. Precinct entrance signs are best determined and installed by the precinct owner/manager.

Legal responsibility of owners of obstructions to navigation and powers of TfNSW to ensure compliance

Clause 23 of the Marine Safety Regulation 2016 sets out the responsibilities of the owners of obstructions to navigation and the powers that are available to TfNSW Maritime to ensure compliance with clause 23.

In brief, Clause 23 sets out that the owner of any obstruction to navigation must ensure that it is marked and lit so that it does not cause a danger to navigation.

If the owner of the obstruction fails to mark or light the obstruction, TfNSW Maritime has the power to direct the owner of the obstruction to do so. If the direction is not complied with, TfNSW Maritime will take further action to ensure compliance.

Section 11 of the Marine Safety Act 1998 enables authorised officers to take action against vessels for a numbers of reasons as set out in the Act.

Costs of installation and maintenance in relation to these guidelines

Water storage owners/managers will order, install and maintain signage and AtoNs where it relates to managing their hazard / risk.

TfNSW Maritime will order, install and maintain signage and AtoNs if the restriction falls under its legislated responsibility.

Signage and AtoNs that are installed in relation to an aquatic event or operation are the responsibility of the licensee.

Additional waterway user education and regulation

In addition to the risk mitigation measures above, all hazards and risks associated with boating on water storages should be the subject of targeted education by TfNSW Maritime and/or water storage owners/managers.

Such education may be delivered by patrols and visits by Maritime Boating Safety Officers and Boating Education Officers, TfNSW website and social media, local print/electronic media, and the communication channels used by water storage owners/managers.

Where a water storage owner/manager would like TfNSW Maritime to promote a particular safety message, initial requests can be made to TfNSW Maritime on 13 12 36.

Additionally, the risk mitigation measures outlined above should in many cases be recorded on TfNSW Maritime Boating Maps, which are made available to the public in electronic and paper formats. These maps cover the majority of water storages used for boating, and record aids to navigation, restriction zones, safety warnings and other relevant information.

TfNSW Maritime boating maps may also be reproduced on large boat ramp signs. TfNSW Maritime encourages liaison with water storage owners/managers to ensure relevant information (including category A/B/C non natural hazards) is accurately captured and that Level 1 and 2 measures are depicted on relevant maps. Where a water storage owner/manager identifies a change needed to a Boating Map, these can be reported to TfNSW Maritime on 13 12 36.

In some circumstances where education and information alone are insufficient to ensure adequate safety for waterway users, it may be necessary or advisable to establish a restriction zone under Section 11 of the Act. TfNSW Maritime is delegated to establish such zones, which may establish speed limits, restrict certain types of vessels from entering a waterway of section of a waterway, or close an area to all vessels. Such zones are generally established following consultation with relevant partner agencies and communities.

Waterway owners/managers may request consideration of such a zone by contacting TfNSW Maritime on 13 12 36, or through their local contacts at TfNSW Maritime.

TfNSW Maritime is also well-placed to provide general or specific navigation advice to waterway owners/managers on a range of issues relating to boating safety, access, amenity, and environmental impacts, and welcomes any opportunity to assist in this way.

Maintenance, record-keeping and interagency communication

All entities should regularly inspect installations and signs under their area of responsibility to ensure they are fit-for-purpose and in good condition. Such inspections should occur at least once per year, and as soon as possible after any flood or other extreme weather event.

Where a water storage owner/manager becomes aware of work needed on a TfNSW Maritime installation, this should be reported via 13 12 36 (and TfNSW Maritime will provide reciprocal reports to waterway owners/ managers).

We recommend that all installations be reviewed, as part of a whole of water storage audit, every five years to ensure they remain effective and relevant, in conjunction with a review of management of the entire waterway.

TfNSW Maritime will request to be involved in these reviews and hopes that the implementation of these guidelines will prompt closer working relationships between TfNSW Maritime and waterway owners/managers at the local staff level that will encourage the flow of up-to-date information and cooperation on an ongoing basis.

Water storage owners/managers should maintain accurate records of all installations, works and inspections in an appropriate register. This register may be requested by TfNSW Maritime, NSW Police or the Coroner in the event of an incident, and should include such details as:

- Description/purpose (including photos where possible).
- Location (i.e. waterway map and GPS-WGS 84 datum locations recommended).
- Inspection, review and maintenance schedule for each structure / hazard.
- Requests/notifications between the waterway owner/manager and TfNSW Maritime on required works or suggested improvements.

Water storage owners/managers should be aware of the requirements around reporting incidents involving vessels and should familiarise themselves with the information contained on the TfNSW Maritime website.

Signage installation guidelines

In addition to the recommended signage guidelines previously detailed, the following standards are recommended by TfNSW Maritime for the installation of signage:

- Signs should be fixed to a metal (galvanised steel) pole (at least 50mm nominal bore) or a suitable strength structural timber pylon.
- All signage brackets and fixings to be specifically designed for purpose and made of a suitable strength metal.
- For signage larger than 1200mm (either height or width) at least two poles should be used and brackets recommended every 300mm of each pole.
- Poles should be concreted in using a hole diameter of at least 300mm and a depth 700mm.
- Signage installed on or immediately adjacent to a footpath should be a minimum of 2200mm from the ground level to the underside of the sign.

- Signage installed on or immediately adjacent to a road they should be a minimum of 1500mm from ground level to the underside of the sign.
- In other areas signage should be installed close to the ground level so as not to allow a person collides with the bottom corner of the sign.
- Ease of access to inspect, clean or undertake other required maintenance and the potential of vandalism should also be considered when deciding on the location and installation height.

Stakeholders

The major external stakeholders consulted during the preparation of this document include:

- Snowy Hydro
- WaterNSW.

The stakeholders listed below should be considered for consultation when undertaking any actions subject to these guidelines:

- TfNSW Maritime, Greater Sydney Division.
- NSW Department of Primary Industries (i.e. Fisheries where there are any possible habitat impacts).
- Any other State or Commonwealth Agencies with relevant land and property ownership and/or management responsibilities.
- Relevant Local Government Authority (local Councils).
- Local Land Councils or other local indigenous bodies.
- Other relevant private landowners or land occupation licence holders.
- Industry and peak representatives (e.g. Boating Industry Association or local boating, fishing, waterway user clubs – TfNSW Maritime may be able to assist with identifying and contacting these bodies).
- Other specific local interest groups and waterway users (such as progress associations and environmental groups).

Definitions

Term	Definition
AtoN	Aid to Navigation
Built hazards	Man-made structures that present a hazard to navigation such as dam walls, intake and outlet structures, and other structures such as spillways, weirs, fences, pipes, and water testing equipment.
Electrical crossings	An electrical cable that is suspended above the water or land between land-based stations.
Exclusion zones	An exclusion zone is a marked area intended to warn boaters of hazards or danger and restrict them from entering the marked area.

IALA Buoyage System	A Buoyage System established by The International Association of Marine Aids to Navigation and Lighthouse Authorities.
Obstruction to navigation	Means anything in, over or on navigable waters (including a vessel, whether wrecked or not) that — (a) is a danger to the safe navigation of vessels (whether or not it is lawfully erected in, over or on navigable waters), or (b) is moored, berthed or placed in contravention of the marine legislation or the National Law.
Overhead cables	An overhead cable is a cable suspended above the water or land between land-based stations.
Submarine cables	A submarine cable is a cable laid on the sea-bed between land-based stations.
Subterranean cables	A subterranean cable is a cable existing, situated, or operating below the surface of the earth.

Additional information

For additional information on these guidelines, please contact the Manager Operational Policy via maritimeoperationalpolicy@transport.nsw.gov.au.

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