

Resilient Valley, Resilient Communities **Hawkesbury-Nepean Valley** **Flood Risk Management Strategy**

Frequently asked questions

Raising Warragamba Dam



Why raise Warragamba Dam for flood mitigation?

Warragamba Dam is on the Warragamba River - one of the major tributaries to the Hawkesbury-Nepean River. Flows from the large Warragamba Catchment are involved in all major regional floods that pose the greatest risk to life and property.

Warragamba is Sydney's largest water storage dam and provides around 80% of current storage. The dam is not built or operated to manage or mitigate floods.

In developing the Flood Strategy, a range of options were investigated to use or modify Warragamba Dam to provide flood mitigation. It was found that raising the dam wall by around 14 metres is the infrastructure option with the highest benefit – significantly reducing the risk to life downstream, and reducing flood damages by around 75% on average while balancing the impacts on the upstream environment. It would significantly reduce the risk to life and property, including the worst floods on record, and increase the certainty of time for people to evacuate.

How would a raised Warragamba Dam mitigate floods?

The raised Warragamba Dam wall would mitigate floods by creating 'airspace' in a dedicated flood mitigation zone around 14 metres above the current full water supply level. This flood mitigation zone behind the wall would capture and temporarily hold back floodwaters coming from the large Warragamba Catchment. After the flood peak, the floodwaters would be released in a controlled way – reducing flood levels downstream and potentially devastating impacts on downstream communities.

The flood mitigation zone would only be used during floods. The current water supply level would not change.

Can the existing Warragamba Dam be operated to mitigate floods?

Warragamba Dam was not designed or approved to operate as a flood mitigation dam. In developing the Flood Strategy, options were investigated for operating the current Warragamba Dam differently to potentially provide flood mitigation. The options investigated were:

- pre-releasing water ahead of a predicted flood inflow
- changing the operation of the gates to temporarily hold back flood water (known as surcharging)
- permanently lowering the full supply level to provide airspace for flood mitigation.

Pre-releasing water would have limited effectiveness - with minor benefits for small floods, and none for larger floods. Two options to lower the dam's full storage were examined - five metres, and 12 metres (the maximum possible to the depth of the spillway gates).

The five-metre lowering was found to have limited benefits for the larger floods that pose the most risk to lives and property.

The 12-metre lowering would provide moderate flood mitigation capacity, reducing flood damages by around 60% on average. However, it reduces the dam's capacity by around 40% or 795 billion litres of water. This would have a significant impact on water security for greater Sydney and on water bills for Sydneysiders. New sources of water would need to be built, **and** the desalination plant would need to be operated at its maximum effective capacity, at a cost of well over \$1 billion.

For a more detailed discussion, please see Chapter 3 of the Flood Strategy.

Would raising Warragamba Dam eliminate flood risk in the Hawkesbury-Nepean Valley?

No. The dam raising would significantly reduce the flood risk, including the worst floods on record, but not eliminate it completely. It is not feasible to build a dam high enough to capture the most extreme, rare floods possible in the valley. This true for most river valleys.

Flooding can also be generated by the other tributaries to the Hawkesbury-Nepean River. However, floodwaters from the large Warragamba Catchment are the major contributor to the most damaging and dangerous floods in the valley. The contributions from the Nepean River and other tributaries downstream of Warragamba Dam contribute to flooding but at much lower levels.

What's happening with the environmental assessment for the proposal?

WaterNSW, as the owner and operator of Warragamba Dam, is preparing a comprehensive environmental impact statement (EIS) and detailed concept designs for the proposal. The project is considered state significant infrastructure under NSW legislation. The NSW Secretary of the Department of Planning and Environment has issued a detailed set of assessment requirements.

Modelling, surveys, technical studies and analysis are under way to inform the EIS, including Aboriginal Cultural Heritage Assessment in consultation with traditional owners, and detailed flora and fauna surveys and assessments. Community and stakeholder consultation is an important part of this process.

The proposal is also considered a 'controlled action' by the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999*, and will be assessed in relation to matters of World Heritage, National Heritage and threatened species and communities.

What is the timeline for the proposal?

The EIS for the Warragamba Dam Raising proposal is scheduled to be exhibited in 2019. Subject to environmental and planning approvals, a final business case will be prepared for consideration by the NSW Government in 2020. If approved, it is estimated construction would take approximately four years.

Will the nomination as an 'Aboriginal place' effect the Warragamba Dam Raising Proposal EIS?

The declaration of an area as an Aboriginal Place is made by the NSW Minister for the Environment based on assessment supported by the Office of Environment and Heritage.

WaterNSW, in preparing the Aboriginal Cultural Heritage Assessment for the Warragamba Dam Raising proposal EIS, will take into consideration the recent nomination as an Aboriginal Place made by the Gundungurra Aboriginal Heritage Association Inc.

The methodology being implemented by WaterNSW for the Aboriginal Cultural Heritage Assessment - and reviewed by the Registered Aboriginal Parties - would be appropriate to inform consideration of an Aboriginal Place by the Minister for the Environment. See: www.environment.nsw.gov.au/conservation/AboriginalPlacesNSW.htm

Is the environmental assessment being fast-tracked or accelerated?

No. The environmental impact assessment process is not being accelerated in any way.

Will the raised dam wall be used to store more water for Sydney?

No. The flood mitigation zone created by the raised dam would only be used to temporarily store floodwaters during floods. The long-term water needs of greater Sydney are met through the mix of water supply and demand measures. This is monitored and regularly reviewed to take account of changes in population growth, water use, climate, technology and other factors. Diversification of supply and demand measures is a key to securing the long-term needs of a growing city.

When full, Warragamba Dam already holds approximately 80% of Sydney stored water supplies. An increased reliance on water supplied from Warragamba Dam was considered and rejected in the most recent water planning review. This was for sound reasons, including:

- the increased risk to water security of further reliance on a single source of supply – not ‘putting all your eggs in one basket’
- the potential environmental impacts associated with permanently increasing the level of stored water behind the dam wall.

How would a raised Warragamba Dam affect the Greater Blue Mountains World Heritage Area?

The areas upstream of Warragamba Dam are currently inundated by several metres for up to three or four days during floods. Raising Warragamba Dam wall by around 14 metres would temporarily hold back floodwater upstream of the dam for days to around two weeks during large floods.

Temporary flooding would vary according to the size of flood, the level of the storage, and the inflows from the dam's tributaries. However, preliminary analysis indicates that in a flood, the extent of Greater Blue Mountains World Heritage Area temporarily inundated upstream could increase by up to five hundredth of one percent (0.05%) above the area that would be flooded now with the existing dam wall.

Detailed flood mapping and targeted surveys for all flora and fauna species have been undertaken in accordance with both Commonwealth and State biodiversity assessment requirements. The impacts of the temporary increase in inundation on the upstream environment – and options to manage, mitigate or offset those impacts - will be detailed in the Environmental Impact Statement currently being prepared for public exhibition and comment.

Will Warragamba Dam still be safe if the wall is raised?

Yes. Warragamba Dam is a large concrete gravity dam 142 metres high. Raising a dam in the way proposed for Warragamba Dam has been completed successfully and safely for other large concrete gravity dams internationally.

When dams are modified, the structural integrity and safety of the dam, both during and after the upgrade, is the first and fundamental priority. There are stringent guidelines for building or modifying any large dam. The guidelines have been applied for all previous upgrades at Warragamba Dam and are being rigorously applied to the current process.

WaterNSW, as the dam owner and operator, has let the contract for the detailed design to Stantec/GHD joint venture following a robust procurement process. The joint venture has extensive relevant experience in major dam projects and is bringing national and international engineering and dam safety expertise to the work. The design project is being overseen by an expert technical panel, and a high-level government steering committee.

Why was an amendment made to the *Water NSW Act 2014*?

Warragamba Dam is owned and operated by WaterNSW, under the provisions of the *Water NSW Act 2014*.

A section of the *National Parks and Wildlife Act 1974* (153B) would prohibit the temporary inundation that would occur if a raised Warragamba Dam was to be operated to mitigate a flood. In late 2018, an amendment was made to the *Water NSW Act 2014* to address this prohibition.

The amendment was made to allow for NSW and Australian Government consideration of the planning application for the dam raising proposal to mitigate flood risk in the Hawkesbury-Nepean Valley. It is specific to Warragamba Dam, and only allows for temporary inundation. It cannot be applied to any other location.

Importantly, the amendment is not an approval for raising Warragamba Dam. State and Australian Government planning approvals are still required. The amendment has no impact on the environmental and planning assessment processes underway. These processes are continuing to focus on the merits of the proposal.

The amendment requires an Environmental Plan of Management to be in place before it can take effect. The plan would be approved by the Minister administering the *National Parks and Wildlife Act 1974* in concurrence with the Minister administering the *Water NSW Act 2014*.

If the Warragamba Dam Raising Proposal is not approved, the amendment once enacted will have no effect.