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Your Ref: Warragamba Dam EIS
Our Ref: HCC Submission - Warragamba Dam EIS

1 December 2021

The Major Projects Team
Department of Planning, Industry and Environment

E-mail: Warragamba.DamEI@dpie.nsw.gov.au

Dear Sir/Madam

Hawkesbury City Council Submission - Warragamba Dam Raising Environmental Impact Statement

I refer to the above mentioned Warragamba Dam Raising Environmental Impact Statement on exhibition until 19 December 2021. Council has formally considered the EIS at its Ordinary Meetings on 26 October 2021, 9 November 2021 and 23 November 2021, and has resolved to provide the following submission for your consideration and action.

Introduction

Given the extent of the Environmental Impact Statement and the time available to review the material and prepare a submission with the available resources, the Hawkesbury City Council review has specifically focussed on:

- The downstream flooding and socio-economic impacts of the Project on the Hawkesbury Local Government Area as documented in the Environmental Impact Statement (EIS)
- A technical assessment of the EIS assessment methodology and our confidence in the EIS findings as related to the downstream socio-economic and flooding elements of the EIS
- The perceived adequacy of the proposed management and mitigation measures
- Commentary regarding the upstream impacts of the Project, specifically those relating to biodiversity and Aboriginal Cultural Heritage.

The EIS chapters and background documents directly relevant to these areas have been considered, however, a detailed review of technical methodology or the EIS as a whole has not been undertaken during the time available to review the EIS material.

For the socio-economic and flooding EIS elements listed above, the submission considers:

- The adequacy with which the EIS addresses potential downstream risks of the Project. Specifically alignment with Council's strategic directions (specifically the socio-economic situation and flood related studies) as well as completeness of the EIS chapters, with gaps highlighted within the reviewed chapters.
- The reasonableness of the proposed mitigation measures proposed and advice on whether they are likely to achieve the desired risk reductions described in the EIS chapters that were reviewed.

The review of the EIS has highlighted areas where Council recommends that various action or recommendations as part of finalisation of the EIS are undertaken. The advice does not consider the balance of upstream impacts versus downstream benefits as this would require an assessment of the EIS as a whole, which is not achievable in the allocated time for the preparation of a submission.

It is considered that the EIS chapters that have been reviewed generally address the Secretary's Environmental Assessment Requirements, with no significant gaps identified. There is also adequate alignment between the EIS chapters and Council strategic documents and flooding studies.

The review has identified a number of general findings as follows:

- The EIS appears to have been based on fit for purpose hydrologic and hydraulics analysis of the impact of the Project on flood conditions in the Hawkesbury Nepean Valley. There are minor improvements that could be made to the method, however their impact on the results is likely limited, and these improvements could still be utilised at a later date when revising the relevant flood studies.

- Mitigation and management measures relating to the impact of flooding on geomorphology, biodiversity and aboriginal cultural heritage were found to be light on and non-committal.

- Quantitative figures regarding the impact of flood risk drawn from a number of sources over a period of time extending back to 2012. This made it difficult to determine the 'point of truth' between flood risk impacts published in various state government strategic planning documents.

- Within the Socio-economic chapter, there is a reliance on secondary research and older studies to assess a number of impacts. It is not clear the extent to which this detracts from the overall findings.

Impacts from February 2020 and March 2021 Flood Events

As part of this submission, Council would like to take the opportunity to highlight the impacts of recent flood events in the Hawkesbury River (the first since 1992) including the February 2020 and March 2021 flood events which caused significant issues for the Hawkesbury local government area in particular. These events came on the back of the 2019/2020 bushfire season with vast proportions of the Hawkesbury local government area significantly affected. Additionally, it should be noted that the recovery from these events has been occurring during the COVID-19 Pandemic.

With the March 2021 flood event, despite predictions during the event of an expected higher flood peak (1:50), the flood event was approximately 1:15, but still caused significant damage to privately owned properties and council assets.

The flood recovery process is currently underway but preliminary assessments undertaken to date have a total forecast cost of $24.2M for Council assets, including:

- Roads $18.5M
- Buildings $2.78M
- Parks $2.05M
- Sewer $43,000
- Debris Clean Up $1,012,794 (2020/2021 and 2021/2022 figures)

For privately owned properties, 629 properties were affected in the March 2021 flood event, with:

- 30 destroyed
- 385 damaged
- 2 commercial/industrial destroyed
- 61 commercial/industrial damaged
- 9 outbuildings destroyed
- 142 outbuildings damaged.

To emphasise the wide area of affected properties, these impacts were across the following locations:

- Windsor/South Windsor
- Richmond/Richmond Lowlands
- Freemans reach and Cornwallis
- Wilberforce and Ebenezer
- Sackville, Cumberland Reach, Lower Portland
- Leets Vale, Lower Macdonald, Webbs Creek

- Pitt Town, Pitt Town Bottoms, McGraths Hill

There is an ongoing process of inspections of those properties to ascertain the full impacts and quantify losses. It is sobering to realise that the March 2021 flood event was a 1:15 event and that:

- The predicted 1:100 event is a further 4.3 metres on top of the peak experienced at Windsor
- The 1867 (maximum recorded flood) is 6.7 metres on top of the peak experienced at Windsor

Based on Councils Hawkesbury Floodrisk Management Study and Plan 2012:

- During a 1:50 event, 1,600 properties would be inundated $184M Damage (2010 $)
- During a 1:100 event 3,200 properties would be inundated $403M Damage (2010 $)

Council has ongoing concerns that it has previously raised is that of evacuation including those residents west of the Hawkesbury River (in excess of 30,000 almost 50% of the population of the local government area) who are effectively isolated in flood events. During the March 2021 flood event, the assumption was that theses residents could travel west through the Blue Mountains, however, this was stopped by significant road closures, and in particularly the Bells Line of Road.

During the recent March 2021 flood event the community have expressed their views that they want action with respect to addressing the impacts of flooding.

Hawkesbury City Council Flood Policy 2020

Council adopted its Flood Policy in October 2020, the purpose of which is to:

a) Highlight Council's position in respect of the need for a collaborative approach across all levels of government to respond to issues associated with floodplain management across the Hawkesbury-Nepean Valley, and

b) Set the information and development controls to be used for the preparation and assessment of Development Applications for land affected by the 1:100 ARI flood event to address the requirements of the Hawkesbury Local Environmental Plan 2012.

Within the policy, Council recognises the need for a collaborative approach to floodplain management across the Hawkesbury-Nepean Valley as outlined in the Resilient Valley, Resilient Communities – Hawkesbury-Nepean Valley Flood Risk Management Strategy 2017 prepared by Infrastructure NSW. The Resilient Valley, Resilient Communities Strategy prepared by Infrastructure NSW in particular states that:

> *"Resilient Valley, Resilient Communities – the Hawkesbury-Nepean Valley Flood Risk Management Strategy is a comprehensive long-term framework for the NSW Government, local councils, businesses and the community to work together to reduce and manage the flood risk in the Hawkesbury-Nepean Valley."*

Whilst supporting a collaborative approach to floodplain management for the Hawkesbury-Nepean Valley, Council also recognises the importance of applying relevant, best practice measures to manage the risks from flooding associated with development on the Hawkesbury floodplain.

Council's Flood Policy 2020 outlines the context for the policy, including:

The Hawkesbury-Nepean Valley has one of the most significant flood risk exposures within Australia. Infrastructure NSW's Flood Strategy Resilient Valley, Resilient Communities states:

> *"The (Hawkesbury-Nepean) Valley has a high flood hazard, with both historical and geological evidence of widespread flooding across the Valley. Climate change may further increase the severity and frequency of the flood hazard in the future.*

There is also a high level of flood exposure as the floodplain is located in an area with a large and growing population, and one of Australia's most significant and diverse economies. Expanding urban development across the Valley means that flood exposure will increase in the future. Up to 134,000 people live and work on the floodplain and could require evacuation. This number is forecast to double over the next 30 years. Over 25,000 residential properties and two million square metres of commercial space are currently subject to flood risk, and this will increase significantly in the coming years.

The flood risk is heightened by a number of factors:

- *insufficient road capacity to safely evacuate the whole population in a timely fashion*
- *a fragmented approach to managing flood risk*
- *low community awareness about the flood risk.*

In addition to the above, there is a high risk of infrastructure failure of facilities and systems i.e water, wastewater, power, gas etc.

The Insurance Council of Australia considers this Valley to have the highest single flood exposure in New South Wales, if not Australia."

Within the Hawkesbury Local Government Area, the risks to life and property are significant given the depths of floodwaters and local and regional evacuation constraints. During major flood events, significant areas of land are inundated, flood islands are formed, isolating communities, and these islands have the potential to be fully inundated. Approximately 15,172 buildings are within the floodplain, 13,418 of which are residential dwellings. If evacuation does not occur, risks to life are increased through isolation. Depths of floodwaters are high within the Hawkesbury Local Government Area and therefore most existing buildings are subject to potential failure during a flood.

Prior to the February 2020, and March 2021 flood events, the last major flood in the Hawkesbury occurred in 1992, some 29 years ago. During this period many new residents have moved into the area with no knowledge or experience of flooding in the Hawkesbury Local Government Area. Additionally, many long-time residents have not experienced flooding greater than a 1 in 30 year event for a considerable period of time.

Within the policy, Council acknowledges that there are nine key outcomes of the Resilient Valley, Resilient Communities – the Hawkesbury-Nepean Valley Flood Risk Management Strategy 2017 that are being progressed or investigated, including:

- Coordinated flood risk management across the Valley
- Reduced flood risk in the Valley by raising Warragamba Dam Wall
- Strategic and integrated land use and road planning
- Accessible contemporary flood risk information
- An aware, prepared and responsive community
- Improved weather and flood predictions
- Best practice emergency response and recovery
- Adequate local roads for evacuation
- Ongoing monitoring and evaluation, reporting and improvement of the Flood Strategy.

Council would like to take this opportunity to again highlight the importance of progress being made on all elements in a transparent manner, so that individual elements such as consideration of raising the Warragamba Dam wall are not considered in isolation. In this respect, Council would like to take this opportunity to particularly highlight the need for greater certainty regarding:

- The regional strategic land use planning framework
- The plan to upgrade the evacuation network
- Up to date flood modelling including impacts of overland flow and changes as a consequence of development within the North West Growth Area in particular.

The development controls of this Policy are based on the Hazard Category in which a development will be situated, and controls are provided depending on whether the proposal is:

- New development, or
- Is for the purposes of additions, alterations, intensification, rebuilding or redevelopment of an existing use, or
- If an existing use, whether or not it is within a compatible or incompatible Hazard Category.

Flood hazard is the potential for damage to property or risk to persons during a flood. It is a key tool used to determine flood severity and for assessing the suitability of future land uses.

The vulnerability of the community and its assets can be described by using thresholds related to the stability of people as they walk or drive through flood waters, or shelter in a building during a flood.

Hazard classifications provide guidance on how a flood may impact on people, vehicles and buildings.

For the purposes of Council's Flood Policy 2020, the hazard classifications within the Australian Disaster Resilience Handbook Collection, Guideline 7-3 Flood Hazard have been adopted and provides a general classification for flood hazard, incorporating 6 flood hazard classifications (H1 – H6). Handbook 7 and its associated guidelines are considered to be best practice in terms of flood risk management.

In short, Council takes the issue of flood risk and hazards extremely seriously, and recognises the importance of providing up-to-date and relevant, best practice controls to meet the objectives and requirements of the Hawkesbury Local Environmental Plan 2012, and to clearly express how a proposed development's suitability is assessed in relation to the impacts of flooding. As such, Council does not view the Warragamba Dam Raising project as a means to facilitate further new development within the Hawkesbury floodplain.

Key Submission Points:

- Highlight that Hawkesbury City Council's Flood Policy 2020 recognises the need for a collaborative approach to floodplain management across the Hawkesbury-Nepean Valley and demonstrates our commitment to providing up to date and relevant, best practice controls based on consideration of flood hazard and risks.

- Concerns about the lack of disclosure of documents relating to this project, as detailed in the NSW Select Committee Report.

- Concerns that there is too much reliance on the Warragamba Dam Raising Project, and that all actions of the Hawkesbury-Nepean Valley Flood Risk Management Strategy - Resilient Valley, Resilient Communities need to be progressed in a coordinated and transparent matter in order to avoid complacency within the community and state agencies that the dam raising project will resolve the issue of floodplain management within the Hawkesbury Nepean Valley. Council is awaiting the release or further details of a range of targeted actions across the nine outcomes contained within the Hawkesbury-Nepean Valley Flood Risk Management Strategy - Resilient Valley, Resilient Communities, including:

  - Outcome 3 Strategic and integrated land use and road planning – strategic land use framework for the Hawkesbury Nepean Valley being prepared by the Department of Planning, Industry and Environment, the details of which are yet to be received by Council

  - Outcome 4 Accessible contemporary flood risk information noting that the Regional Flood Study was released in 2019 and that a 2D Model is currently being prepared

  - Outcome 8 - Adequate local roads for evacuation - it is understood that Transport for NSW are working on a program of works to upgrade evacuation routes which is yet to be received by Council.

- Concerns about infrastructure provision, including potential loss of power, telecommunications, and lack of access to emergency services during flood events.
- Concerns about increased development in areas likely to be inundated or cut off by flooding (Pitt Town, McGraths Hill, South Windsor, Windsor Downs, Bligh Park, etc).
- Inadequate evacuation routes, improvement of which would also improve travel times for those working outside the LGA each day.
- Concerns about development along flood evacuation routes which will slow evacuation by Hawkesbury residents.

Socio-economic, land use and property

EIS Chapter 21 Socio-economic, Land use, and Property; and Appendix M: Socio-economic, Land Use, and Property Assessment Report have been reviewed. In addition, a high-level review of the following EIS chapters was also undertaken:

- Executive Summary
- Chapter 1 – Introduction
- Chapter 3 – Strategic Justification and Project Need
- Chapter 4 – Project Development and Alternatives
- Chapter 5 – Project Description
- Chapter 28 – Cumulative Impacts
- Chapter 29 - EIS Synthesis, Project Justification, and Conclusion.

The EIS was reviewed in the context of the following background documents:

- Hawkesbury-Nepean Flood Risk Management Strategy (INSW, 2017)
- Hawkesbury Flood Policy (HCC, 2020)
- Hawkesbury-Nepean Valley Flood Study (WMA for INSW, 2019)
- Hawkesbury Local Strategic Planning Statement 2040 (HCC, 2021)
- Hawkesbury Flood Risk Management Study and Plan (Bewsher for HCC, 2012)
- Hawkesbury Community Strategic Plan 2017-2036 (2017).

The proponent was asked to provide a social impact assessment that identifies potential impacts (positive and negative), considering the following matters:

- Way of life (how people live, work, play, and interact)
- Environment (including amenity, aesthetics, and access
- Culture (including values, heritage, and customs)
- Wellbeing and health (physical and mental)
- Community (including cohesion and sense of place)
- Personal and property rights
- Decision-making systems (people's capacity and power to influence decisions that affect them)
- Justified fears and aspirations about the above matters.

Generally, the review of the EIS has identified that the EIS has considered these matters, however, it is noted that for several impacts (e.g. those relating to environment, cultural and way of life) the assessment of consequence is largely qualitative and not always based on quantitative estimates of impacted receptors.

This makes it challenging to determine the accuracy of the overall significance assessment.
Table 1 (attached) provides a summary of the potential impacts (positive and negative) related to the Hawkesbury local government area, and identified in the Socio-Economic, Land use and Property chapter of the EIS (Chapter 21). The table does not include identified potential impacts (positive and

negative) that relate to areas other than the Hawkesbury local government area. The content of the four left-most columns is directly from the EIS (column 3 being paraphrased).

The EIS identifies a total of 28 potential impacts (positive and negative) relating to the Hawkesbury local government area that are anticipated to occur as a consequence of the Project. The residual significance ratings, after mitigation measures have been applied, are distributed as follows across the benefits and impacts:

15 Extreme benefits (positive)

The benefits are mainly related to the effects of reductions in the frequency and magnitude of flooding as well as the improved certainty (and associated notification times) achieved through greater control of flood management. For the community, these overriding benefits relate to two main streams of improvements in:

- Economic conditions (e.g., through improved access to insurance, reduction in costs of damages, reduction of economic losses for businesses impacted by flooding, greater housing market certainty),

- Community wellbeing and health (e.g., through improved safety, evacuation, and access to services; reduction in anxiety; reduction in water borne diseases, protection of vulnerable community members living in manufactured dwellings; protection of colonial heritage sites).

3 High benefits (positive)

- Improvements to visual amenity as a result of reduced extent of flood inundation.

7 Low impacts (negative)

- Natural areas access, flora and fauna, and amenity of the local environment

- Complacency risk with reduction of flood risk eg. Governments and individuals assuming that there is no longer any risks and education/awareness no longer occurs and funding for actions such as flood evacuation routes does not occur

- Access to services and health facilities during discharge of water from the Flood Management Zone – this is also mentioned as an Extreme benefit

- Reduction in water quality (temporary)

- Aboriginal cultural heritage (negligible impact and hence no mitigation proposed)

- Tourism and recreation related businesses - occasional economic losses – this is also mentioned as an Extreme benefit.

3 Moderate impacts (negative)

- Some private or agricultural/commercial assets impacted as a result of longer periods of inundation, but fewer flood events. These impacts are not quantified

- ‘Altered’ visual amenity resulting from release of the Flood Management Zone

- The importance of mitigation measures, especially for negative impacts.

The focus of this review has been on impacts deemed to have a negative residual impact following mitigation. These impacts are important for understanding the trade-offs associated with the benefits provided by the Project. These impacts include:

- Impact 6. Decreased frequency, but increased duration of inhibited access to and from low lying property due to longer duration of the Flood Management Zone discharge (high to moderate)
- Impact 7. Alteration of visual amenity associated with release of the Flood Management Zone (moderate to moderate – no mitigation identified)
- Impact 9. Operation — Disruption to the enjoyment of natural areas and the flora and fauna they support (low to low – mitigation only changes consequence from minor to minimal so no real change in consequences)
- Impact 14. Operation — Reduced levels of flood risk awareness, reduced (individual) flood disaster planning and increased complacency (moderate to low)
- Impact 16. Operation — Occasional reduced access to services and health facilities during discharge of water from the Flood Management Zone (moderate to low)
- Impact 17. Health risk relating to temporary reduction in water quality (low to low – mitigation only changes consequence from minor to minimal so no real change in consequences)
- Impact 21. Effects on Aboriginal cultural heritage (low to low – no mitigation identified as consequence assessed as minimal so no real change in consequences)
- Impact 23. Potential effects on listed cultural heritage due to release of the Flood Management Zone (moderate to low)
- Impact 29. Occasional additional economic losses for agricultural and industrial businesses (high to moderate)
- Impact 31. Occasional additional economic losses for tourism and recreation related businesses (moderate to low).

Of these the following are deemed to have a moderate negative residual impact:

- Impact 6. Decreased frequency but increased duration of inhibited access to and from low lying property due to longer duration of the Flood Management Zone discharge
- Impact 7. Alteration of visual amenity associated with release of the Flood Management Zone
- Impact 29. Occasional additional economic losses for agriculture and industrial business.

Key Submission Points:

It is recommended that greater detail regarding the proposed mitigation measures be provided, and in particular, additional information on:

- What proportion of impacted residential properties are expected to benefit from the implementation of mitigation measures that are designed to reduce the impact of Flood Management Zone discharge events
- The anticipated duration of the impact on visual amenity associated with the release of the Flood Management Zone and what clean-up costs would involve
- How many agricultural and industrial businesses can be expected to be impacted (and for how long) with release of the Flood Management Zone, and what proportion of these businesses are expected to avoid this impact with the implementation of the mitigation measure.?

- Environmental impacts downstream, including bank erosion, high impacts on critically endangered ecological communities and wetlands, and prolonged flooding of Scheyville and Cattai National Parks.

- Concerns on the impacts on downstream prawn and fishing industries, and the need for further details or commitments to mitigate the impacts.

Implications for vulnerable members of the community

As highlighted above, it is not clear how a residual significance assessment of 'extreme benefit' was determined when the Project results in only an 11.5% reduction in the number of affected manufactured homes.

Furthermore, it is noted that the EIS has not considered the potential indirect impact on the local housing market as a result of greater protection of private property. With greater market confidence (impact 26) it is anticipated that housing demand will increase which has the potential to reduce housing affordability and hence, have adverse impacts on vulnerable members of the community.

Key Submission Points:

It is considered that the EIS has an apparent over-stating of the benefit to those living in manufactured housing or social housing at risk of flooding (impact 12 and impact 13). It may also wish to consider highlighting the lack of information regarding indirect impacts such as the potential decline in affordable housing as a consequence of the Project and a more confident housing market. It is also recommended that the Government investigate appropriate mitigation measures to address such issues.

Implications for private insurance

The EIS finds that the Project will result in a potential reduction in insurance premiums at individual properties (impact 27) and this is rated as an 'extreme benefit'. This is based on a secondary source (DPI,2014a, Hawkesbury-Nepean Valley Flood Management Review Stage One – Review Report, DPI, Office of Water) which is described as containing preliminary analysis from the Insurance Council of Australia. Given this finding in the EIS is based on preliminary analysis, it is challenging to determine the extent to which the residual significance of 'extreme benefit' is accurate.

Key Submission Points:

It is recommended that given the basis for the assessment of the potential reduction in insurance premiums was a preliminary analysis undertaken in 2014, as the source is preliminary and somewhat dated, further detail on the assessment of this impact, especially as the residual impact is assessed as 'extreme benefit' and given community concern about insurance premiums.

Highlight that for many Hawkesbury residents on the floodplain that the costs of insurance are prohibitive, and that it is considered there is a need for a government-based insurance scheme to combat those costs.

Flooding and hydrology

EIS Chapter 15 – Flooding and Hydrology, and Appendix H1: Flooding and Hydrology Assessment have been reviewed in the context of the following background documents:

- Hawkesbury-Nepean Flood Risk Management Strategy (INSW, 2017)
- Hawkesbury Flood Policy (HCC, 2020)
- Hawkesbury-Nepean Valley Flood Study (WMA for INSW, 2019)
- Hawkesbury Local Strategic Planning Statement 2040 (HCC, 2021)
- Hawkesbury Flood Risk Management Study and Plan (Bewsher for HCC, 2012)
- Draft Greater Sydney Water Strategy (NSW DPIE, 2021).

These documents indicate that reducing flood risk to people and property in the Hawkesbury Nepean Valley (HNV) is a strongly desired outcome for Hawkesbury City Council and the NSW Government. Several of these documents describe a series of options analyses that have been performed over the years to investigate the best way to mitigate flooding in the valley. A similar project was considered in the Hawkesbury Flood Risk Management Study and Plan (Bewsher for HCC, 2012) and the Hawkesbury Nepean Flood Risk Management Strategy (INSW, 2017) concluded that the proposed 14m raise of Warragamba Dam is the preferred solution. Given this background, the review sought to assess whether the Project's impact on flooding was adequately accessed and communicated in the EIS.

The EIS appears to have been based on fit for purpose hydrologic and hydraulics analysis of the impact of the Project on flood conditions in the HNV. The supporting detailed investigations have been completed by prominent engineering firms and are documented in the Flooding and hydrology assessment report (BMT Eastern Australia Pty Ltd 2019, Appendix H1) and the Flood risk analysis (WMAwater 2020, Appendix H2). The latter provided more detailed modelling of the Project impacts on the downstream floodplain to address specific flood events outlined in the SEARs. The investigations are consistent with the guidance in Australian Rainfall and Runoff – A guide to flood estimation (Geoscience Australia 2019) and the EIS notes the modelling has been extensively reviewed and endorsed by numerous Australian and international experts.

The hydrology assessment methodology accounts for the complex interaction between the amount and distribution of rainfall, dam storage levels, gate operation, antecedent catchment conditions, tides and timing of dam inflows through a Monte-Carlo assessment. The hydrology model was calibrated to available streamflow and rainfall data which mostly included stations upstream of the dam. Outputs from a Monte-Carlo assessment is represented by an 'envelope' of events, which cover a wide range of flood durations and affected areas. It is worth noting the EIS has conservatively adopted the largest modelled event, which is a 'worst case' approach, and the actual flooding impacts are likely to be less.

Hydraulic modelling of the downstream floodplain used a quasi-two-dimensional RUBICON model (hydrodynamic model software used to quantify the hydraulic aspects of flood behaviour) that was also calibrated and verified against ten historical flood events. A TUFLOW model (hydrodynamic model software) was also used give a general indication of the velocity distribution for the 1 in 100 AEP event to determine flood hazards and hydraulic categories. The EIS notes however further refinement and detailed bathymetry are required before the TUFLOW model is suitable for detailed modelling.

By virtue of the nature of the works, the Project generally results in a flood risk benefit to the people of the Hawkesbury local government area. However, during the review of the other associated documents, some key aspects of flooding in the HNV were identified that it is considered that the EIS should address. These items are described below, with a description of how, if at all, they were considered in the EIS, and if applicable, whether the proposed management measures appear suitable.

Flooding and hydrology factors

From a flooding perspective, the project predominantly benefits downstream areas through a reduction of flood risk. Our review has indicated that the expected reduction in downstream flood risk from the project has been adequately documented, and the details of the change to flood risk will be further refined if the project is constructed. The EIS discussed a range of potential downstream flood impacts, though takes only three residual impacts through to a risk analysis:

- Construction
- Operation: Upstream
- Operation: Downstream.

Table 2 provides an extract of the flood impact risk assessment presented in the EIS.

Table 2. Flooding and hydrology risk analysis (EIS Table 15-33)

Flooding and hydrology								
Key impacts	Risk before mitigation			Mitigation and management	Risk after mitigation			Residual risk
	L	C	R		L	C	R	
Construction								
▪ construction areas would be directly exposed to dam spills and flooding resulting in potential impacts to worker safety, construction works and scheduling, plant and equipment, erosion and sedimentation, and water quality ▪ debris may potentially wash downstream causing environmental and safety impacts ▪ reduced downstream flows ▪ stormwater runoff ▪ water demands.	b	D	22	H1	d	C	11	Flooding is an "extreme" risk because of the high likelihood that the construction area would be flooded, which could have serious environmental and health and safety consequences. Similarly, debris and potential pollutants washing downstream could create a significant environmental and safety hazards. Mitigation measures include installation of infrastructure and management measures to manage flows, which would significantly reduce the likelihood that flood damage would occur. The consequences of flood damages would also be reduced by implementing rapid response management measures to contain potential impacts. Successful implementation of mitigation will reduce this issue to a Medium residual risk.
Operation: Upstream								
▪ increase area of inundation ▪ increase duration of inundation ▪ relative impact during smaller order flood events is higher than that of the rarer events.	a	E	25	H2, H3	a	C	20	The Project would increase the upstream extent and durations of temporary inundation, which may impact on biodiversity and indigenous heritage values, as well as increasing potential for soil and water quality degradation. There is uncertainty around potential environmental impacts due to the lack of scientific information and the relative infrequency of impact from the rarer flood events. The consequences are a potential loss of environmental qualities that are of regional, national, and international significance. Mitigation includes an operational protocol that aims to minimise upstream flooding durations, as well as specific biodiversity, water quality and soil management plans, and a comprehensive monitoring and offset strategy (see Chapter 8). The likelihood of increased upstream flooding remains; however, the consequences can be managed to reduce potential impacts. However, the residual risk remains high and it will be important that adequate resources are available to ensure successful implementation of mitigation measures.

Flooding and hydrology								
Key impacts	Risk before mitigation			Mitigation and management	Risk after mitigation			Residual risk
	L	C	R		L	C	R	
Operation: Downstream								
Water discharge from the FMZ after a rainfall event may result in environmental, social and economic impacts as minor flooding would occur for a longer duration than the existing situation. This may result in minor flooding and disruption of bridge access, drinking water supply and river related commercial and recreational activities	a	C	20	H2, H3	b	B	12	The purpose of the Project is to alleviate potential for downstream flooding and reduce impacts related to safety, property damage and socio-economic aspects. There are therefore significant benefits, particularly for reducing floods up to about the 1 in 1,000 chance a year flood event. The major recipients of these benefits are the large urban centres of Windsor, Richmond and Penrith. However, without mitigation there is a possibility of poorly managed flood discharges, which could worsen smaller flood events. The Warragamba Dam Raising proposal is only one workstream of the broader Hawkesbury-Nepean Valley flood recovery management strategy (HNVFRMS - Flood Strategy) that also includes a workstream for a comprehensive plan to improve emergency management response and recovery in the Hawkesbury-Nepean Valley (the valley). This workstream plan is to cover implementing changes to the state emergency plan and to respond to the changed operations with a flood mitigation dam in operation. Implementation of approved flood operation procedures would lower the likelihood for poorly managed dam discharges and increase community awareness about dam operations and flood characteristics. Improving community preparedness would also reduce the adverse consequences, resulting in a Medium residual risk.

As seen in the risk analysis (Table 2), two key impacts of relevance to the downstream area are assessed, namely:

- Construction impacts
- Downstream operation impacts.

Both were found to have a residual risk rating of Medium following the proposed mitigation and management (Table 2).

Table 3. Proposed Hydrology and flooding Environmental Management Measures (EIS table 15-31.)

Impact	ID	Environmental management measure	Timing	Responsibility
Impacts during construction	HF1	A Construction Flood Management Plan will be developed to minimise any changes in hydrology up and downstream of the dam and minimise risks to the construction site. Construction activities will be sequenced in accordance with Dams Safety NSW guidelines to ensure dam safety during construction. A Dam Safety Emergency Plan will also be prepared in accordance with the requirements of Dams Safety NSW.	Pre-construction	WaterNSW Construction contractor
Impacts from operation of FMZ	HF2	A detailed operational protocol for the operation of the FMZ will be developed in consultation with relevant downstream and upstream stakeholders.	Pre-construction	WaterNSW
Monitoring	HF3	Investigate water monitoring systems to reflect Project changes in operational protocols.	Pre-operation	WaterNSW

The management measures include the preparation of a Construction Flood Management Plan (HF1). This appears an appropriate management measure for the Construction impacts, as assessed in the risk assessment. Similarly, measure HF2 was developed to address the upstream operational impacts (the appropriateness of which is out of scope of this study, however these were considered at a high level and our findings summarised in Section 4).

The flooding management measures do not however address how “Water discharge from the Flood Management Zone after a rainfall event may result in environmental, social and economic impacts as minor flooding would occur for a longer duration than the existing situation” (paraphrased from the risk assessment: operation downstream). Following the risk analysis, the downstream operational risk rating was lowered from High to Medium upon consideration of mitigation and management, however, this seems only due to the Project delivering flood benefits downstream. It appears that the Project has given light treatment to addressing downstream risks such as erosion and disruption of ecological communities that would result from discharge of the Flood Management Zone. The Geomorphology Assessment includes two Mitigation Measure relevant to management of downstream erosion. Figure 1 shows the measures.

5.4.2 Mitigation measures

Mitigation measures were proposed to reduce the potential impacts of the above risks. A post-mitigation risk rating was then assigned to the various risks identified. The proposed mitigations have been divided into the following broad categories:

- **Geomorphology stability assessment –** A detailed assessment of potential geomorphological issues would be undertaken. This would identify specific areas which may be susceptible to bank erosion and/or changes to bed profiles as a result of the Project. The outcomes of this work would direct mitigation measures to reduce the scale of predicted effects.
- **Existing mitigation measures** that WaterNSW have partial/full responsibility for under existing plans and agreements. These measures are intended to benefit the catchment independently of the Project. Further details are provided in Appendix L

Figure 1. Geomorphological impact mitigation measures (Section 5.4.2 of EIS Appendix N2)

These mitigation measures do not actually commit to mitigating impacts, but rather just:

1. A further investigation into potential impacts
2. Business as usual under current responsibilities.

Flood Planning

Flood planning has historically adopted a binary definition of flood prone land. Under this definition, land below the design flood level (generally the 1 in 100-year flood zone is considered as flood prone, and land above the design flood is considered 'flood free'. This does not consider the fact that properties just outside the design flood level are flood prone in an event with only a slightly lesser likelihood than the design flood (e.g., 1 in 105 event). This can create a false sense of security for residents occupying this land and endanger them in an event greater than the 1 in 100-flood. This method also does not particularly well highlight the land that may be above the flood planning level, but is a flood island, hence shares some consequences of flooding. Council's Flood Policy 2020 includes this binary definition of flooding.

The EIS however generally refrains from classifying land as flood prone or not flood prone, rather discussing flooding conditions in the various downstream areas under a range of design flood events up to the Probable Maximum Flood. This approach was deemed acceptable, and should be carried on, if not improved further by leveraging the probabilistic modelling to assign a flood risk vulnerability (i.e., %AEP) to every land parcel in the floodplain. As is discussed further in this submission, the results of the revised flood study indicating a reduced flood risk is expected to result in an extreme socio-economic benefit through reduction in insurance premiums.

Key Submission Points:

Recommend that a further improvement of the EIS could be a commitment that if the project were to go ahead, the updated flood planning documentation would be to consider flood risk to downstream property in a fully probabilistic sense, and with regard for flood islands, so future land use planning can be done accordingly. Also, that the updated flood study be provided to home insurers, so that flood insurance premium reductions can be realised.

Floodplain Storage

Several developments within the North West Growth Area have been identified, many of which are likely to have dwellings constructed by the time the project is complete. This will result in a change in flood storage and conveyance to what was modelled for the EIS.

In addition, the project will result in a revised flood study and hence a change to flood planning boundaries. The effect of this is likely to be that development moves further into the current floodplain, with the land between the existing and new flood planning boundary becoming developable. Developing floodplains results in a reduction in available flood storage, as new buildings or landscape occupy potential floodwater storage volumes. The implication of this is that over time larger floods will have

increasingly less flood storage. This may not have a significant impact on flooding in the region and is a flow on impact rather than a direct impact of the Project, however it may warrant mention. Section 15.7.5 of the EIS discusses impacts on floodplain storage and conveyance, however, it does not mention this potential impact of the project on future flood conditions.

Key Submission Points:

The EIS should consider a potential change to floodplain storage between the time of writing of the EIS and completion of the project, and later as a result of development changes resulting from the project.

Future Flood Risks and Management

Reducing the flood risk to the HNV should be achieved through a range of measures. These could include improved flood forecasting and warning, improved evacuation capabilities and education of HNV occupants about flood risk. Section 15.7.3 of the EIS states that the project is to be a part of a broader suite of measures to manage downstream flood risk. The EIS lists the potential additional measures, including improving flood awareness, local roads and flood forecasting. The EIS does not commit to delivering any of these other measures, however they are generally a responsibility of the Project or other agencies such as the State Emergency Service (SES), Transport for NSW or the downstream Councils. It appears that the requirement for a multi-faceted approach to managing flood risk in the HNV has been adequately addressed.

From the perspective of reduced frequency of inundation of downstream areas, the impact of the Project on flooding is of benefit. However, there are some potential impacts to waterways and ecological communities that are not considered by the EIS. These may occur generally as a result of longer duration spills over the dam due to the operation of the Flood Management Zone (FMZ) storage. Figure 2 shows the change in discharge during a 1 in 5-year event in Richmond/Windsor area. This extension of the discharge hydrograph has the potential to erode banks and impact low lying ecosystems with the increased residence time of water on the floodplain. The EIS assesses these impacts, however, does not clearly commit to any management measures. The Geomorphology assessment includes a mitigation measure to conduct a detailed assessment of potential geomorphological issues, though it does not commit to mitigating issues. Appropriate measures could include ongoing monitoring of any high-risk areas and the remediation of impacted banks/wetland ecosystems where required, amongst other measures.

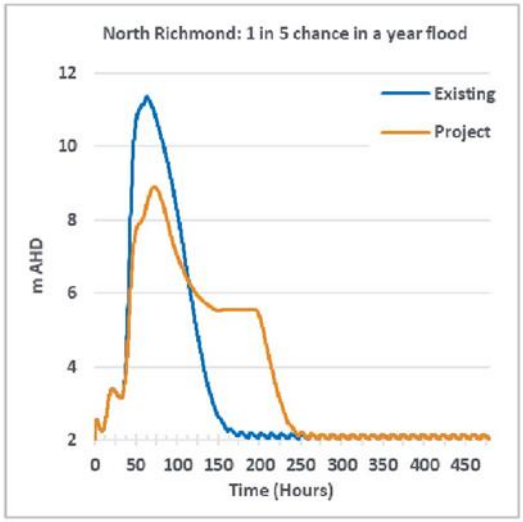

Figure 2. Change in discharge during a 1 in 5-year event (EIS table 15-21)

Key Submission Points:

It is recommended that the EIS consider committing to actual mitigation of ecological and geomorphic impacts resulting from the project, rather than just an additional study into the potential for impacts.

The Hawkesbury Local Strategic Planning Statement 2040 notes that there are areas within the LGA that do not currently have a flood warning system. This is not addressed in the EIS.

Key Submission Points:

It is recommended that the EIS note that there are currently areas in the Hawkesbury Nepean Valley floodplain that do not have a flood warning system.

Additionally, the following concerns are raised:

- Lack of water level monitoring and timely access to this information for residents
- Expert advice that changes in land use will change overland flow of water into the Hawkesbury-Nepean basin, rendering the dam less able to mitigate flooding and giving a false sense of security for residents and emergency services
- The likely delayed drop in flood levels due to water being released from the dam and the impact of prolonged flooding on downstream communities including ratepayer funded infrastructure.
- Concerns about water quality following inundation, with upstream organic matter being disturbed during flood events, washed downstream and affecting the Hawkesbury local government area and its residents
- Lack of flood studies for all tributaries within the Valley.

Upstream Impacts

As part of the review of the EIS, Chapter 8: Biodiversity – Upstream and EIS Chapter 18: Aboriginal Cultural Heritage has been considered in the context of upstream impacts of the Project.

The Project upstream impact area encompasses the reservoir formed by Warragamba dam, its tributaries and catchments including multiple state conservation areas, national parks and sections of the Greater Blue Mountains World Heritage Area. The area is home to many protected and endangered species of endemic flora and fauna and threatened ecological communities. The area is also culturally sacred to local Aboriginal people with many sacred sites and cultural assets throughout the area maintaining their continued relationship to their ancestral homelands. While many benefits may result from the Project on the downstream areas of the system for jurisdictions including the Hawkesbury City Council, damming projects by their nature often negatively impact upstream areas. The upstream impacts primarily relate to:

- Biodiversity and ecological impacts
- Aboriginal cultural heritage impacts.

The following outlines the consideration of these potential impacts in the EIS, based on a high-level review of the overall impact and mitigation results of chapters 8 and 18. A number of recommendations have been made based on the findings of this high-level review.

Biodiversity impacts and concerns

From the review of EIS Chapter 8: Biodiversity – Upstream, the key negative upstream impacts of the Project are:

- A total of 22.51 ha of native vegetation being directly cleared for the Project representing a loss of habitat for numerous threatened species
- Indirect impacts of this habitat removal resulting in further loss of native vegetation and fauna,
- A combination of direct and indirect negative impacts leading to ecological fragility through fragmentation of vegetation communities and reduced ecological connectivity
- The direct loss of 1.92 ha of the critically endangered ecological community (NSW and Cth) Shale Sandstone Transition Forest

- Direct loss of 7.0 ha of riparian vegetation.

The upstream study area largely comprises protected lands with limited civilian access. Therefore, pressures on biodiversity values for the area are largely from broader, regional threats, notably bushfire and climate change, legacy impacts from historical land use, and encroaching urban development at the fringes. The water quality of the Hawkesbury and Nepean Rivers and the drinking water of Greater Sydney depend on the ecological integrity of this catchment, hence its protection.

Potential Project impacts on upstream biodiversity values may stem from the increased temporary inundation of the catchment of Lake Burragorang. This area contains vegetation adapted to mountainous terrain, unaccustomed to inundation of their soils and root zones. They are not riparian communities. Inundation of these communities could alter their condition and composition due to the impacts of inundation, even temporary. Repeat occurrences of temporary inundation may permanently alter the vegetation, potentially leading to indirect impacts such as increased risk of erosion throughout the catchment which may have flow on effects for the ecological integrity of the catchment and the water quality of Lake Burragorang. The EIS notes the impact on ecology and proposes to mitigate it as a total loss, however, does not raise the risk and associated mitigation of these flow on impacts.

From Table 29-4 of the EIS:

> *"There is little scientific information on the impacts of temporary inundation and the subsequent regenerative capacity of most plant communities and individual species in the upstream catchment. The Framework for Biodiversity Assessment is not suited to assessing impacts of temporary inundation, which has led to a conservative impact assessment. This uncertainty has been addressed through assuming a total loss of biodiversity values in the upstream impact area and offsetting of these in accordance with the FBA."*

Only one mitigation measure has been proposed to mitigate the potential loss of diversity resulting from the Project: BUS1 – a biodiversity offset strategy (Table 4). Publicly and scientifically, concerns remain about the effectiveness of biodiversity offsets schemes regarding their cost and ecological success. Currently there are several dam projects on hold within NSW due to concerns surrounding the cost of these offsets (e.g., Wyangala and Mole River Dams).

Table 4: The offset mitigation measure (BUS1) proposed in the EIS (reproduced from Table 8-46)

Impact		Mitigation measure	Outcome	Timing	Responsibility
General flora and fauna impacts	BUS1	Offset strategy to mitigate potential impacts on biodiversity (see Appendix F6 - Biodiversity Offset Strategy)	Offset strategy	Operation	WNSW

Upstream biodiversity offsets

The review of the EIS highlighted that only one mitigation measure was proposed to mitigate for the Project's impact on biodiversity for the area upstream of the project. The cost effectiveness and environmental efficacy of these offsets programs has been called into question on similar damming infrastructure projects in NSW (Wyangala, Mole River and Dungowan).

Key Submission Points:

It is recommended that the EIS consider the cost effectiveness and environmental efficacy of the proposed offsets program.

Ecological integrity and importance of upstream areas

The EIS does not address how upstream ecological degradation overtime may affect downstream areas in the future. Ecological processes that occur in the upstream areas of catchments have an ever-present impact on the ecology and amenity of downstream areas. Given that the Hawkesbury City Council is downstream of this area and that the amenity and function of the Hawkesbury-Nepean River

are central to the jurisdiction's identity the potential impacts on upstream is of interest to Council. Furthermore, the ecological integrity of the catchment surrounding Lake Burragorang is crucial to the quality of the drinking water for the Greater Sydney area and any development or impact on this area must be viewed through this lens. Only one mitigation measure is proposed.

Key Submission Points:

It is recommended that:

- Other mitigation schemes should be considered in the EIS
- Additional investigation into the expected down-stream ecological impacts of the Project should be undertaken
- The EIS should better commit to mitigating upstream impacts resulting from the operation of the Flood Management Zone.

Aboriginal heritage impacts and concerns

A review of EIS Chapter 18: Aboriginal Cultural Heritage indicated that the EIS identified 334 archaeological sites of cultural significance to local Aboriginal communities. Of the 334 sites Identified:

- 43 of these sites lie within the Project upstream impact area
- 118 sites are within the existing upstream impact area
- a further 66 fall within the Full Supply level.

The potential impacts of the Project on upstream Aboriginal heritage areas, assets and values relate to the temporary inundation of additional land around Lake Burragorang. Several recommendations were made in the Aboriginal Cultural Heritage Assessment in consultation with the Registered Aboriginal Parties (RAPs). These recommendations were made "to improve the understanding and approach to management of Aboriginal cultural heritage values in the catchment for the purpose on intergenerational equity". However, the majority of RAPs "consider the proposal to raise the dam for flood mitigation as a further accumulation of impacts to Aboriginal cultural heritage that has previously been affected by the original construction of Warragamba Dam and associated permanent upstream inundation from water storage".

From Section 18.4.3 of the EIS:

- Chapter 18 (Aboriginal cultural heritage) and Appendix K (Aboriginal cultural heritage assessment) of this EIS provide management and mitigation measures to minimise impacts to Aboriginal heritage values as a result of the Project. These include the preparation of a dedicated Aboriginal cultural heritage management plan for the Project. The plan would detail protocols for involvement of Registered Aboriginal Parties (RAPs) in cultural heritage works, and procedures for management and reporting of previously unknown Aboriginal heritage sites.
- […] (an Aboriginal cultural heritage 'keeping place' would be established for archival storage of some artefacts salvaged from the [Western Sydney] airport site. If established, this facility could also be used as a repository for Aboriginal cultural heritage artefacts salvaged from other developments in the region).
- While the EIS for the Warragamba Dam Raising Project and other projects considered for the cumulative impact assessment, provide mitigation measures for Aboriginal heritage values, these and other developments would still place increasing pressure on Aboriginal values of the region, particularly the retention of sites or artefacts in their original location and landscape setting.
- It is important to note that from this consultation and assessment effort, the majority of the RAPs consider the proposal to raise the dam for flood mitigation as a further accumulation of impacts to Aboriginal cultural heritage that has previously been affected by the original construction of Warragamba Dam and associated permanent upstream inundation from water storage.

From Table 29-4 of the EIS:

> *"Due to the size of the potential impact area and access difficulties due to the low water level in the dam across the periods of survey, not all upstream areas were able to be visited. It is not considered necessary to survey 100 percent of the upstream area as certain landscapes can be reasonably discounted due to the previous survey findings and other areas are unsafe or impossible to access. However, an adequate sample of the different landforms and sites was undertaken for the EIS assessment. A precautionary position has been adopted which assumes a total loss of Aboriginal heritage values in the upstream impact area although in practice this is unlikely to occur. The Warragamba Offset Program will investigate land suitable for offsets and will prioritise land that, amongst other matters, protects Aboriginal cultural values and heritage."*

Several management options have been proposed by the EIS (Table 18-27) for Aboriginal Cultural Heritage in regard to the Project and its potential impacts. One of the management measures mentioned in the EIS is concerned with developing a management plan that involves potentially relocating 'artefacts' to the Western Sydney Airport site as a "keeping place". While the process is slated to involve Registered Aboriginal Parties (RAPs) this measure appears inadequate and culturally insensitive (if not insulting) to Aboriginal People and needs further investigation and consideration. For example, it seems paradoxical that for a culture where much of the value of their cultural assets is vested in their continued connection to "place", removing these assets for storage in another "keeping place" is viewed as a suitable solution. Similarly, the EIS talks about offsetting for impacts to Aboriginal cultural heritage, which also appears physically infeasible in the case of living artefacts such as trees and again culturally insensitive.

Currently, the EIS implies that the impacts to Aboriginal sites upstream are temporary in nature. Considering the proposed depth and lengths of inundation from the Project, and potential for physical impacts to the landscape such as tree mortality and bank erosion, it is considered that this requires further investigation.

Cultural reception of the Project

In reviewing EIS Chapter 18 it highlighted that the majority of Registered Aboriginal Parties were not in favour of the Project. Furthermore, the proposed management measures to mitigate the impact of the Project on Aboriginal Cultural Heritage may be viewed as insufficient and at times insensitive.

Key Submission Points:

Council considers that the EIS is unsatisfactory in terms of environmental and cultural heritage impact statements, including the lack of acknowledgement of the impacts on the Aboriginal Cultural Heritage of the Gundungurra People and failure to comply with the Burra Charter.

It is recommended that:

- The EIS provide more clarity on the likely contents of dedicated Aboriginal cultural heritage management plan and the potential residual impacts of the Project on cultural assets
- The EIS commit to further engage aurally with local Aboriginal communities to gauge local sentiment toward the program, and the establishment and function of the Aboriginal cultural heritage "keeping place" and the proposed offsets program, and share the results in the EIS
- The EIS state the status of support of Aboriginal parties (e.g., RAPs) of the Project
- The Project engage cultural advisors to ensure that an Aboriginal voice is present when discussing cultural heritage issues.

Summary of Hawkesbury City Council Key Submission Points

Given the extent of the Environmental Impact Statement and the time available to review the material and prepare a submission with the available resources, the Hawkesbury City Council review has specifically focussed on:

- The downstream flooding and socio-economic impacts of the Project on the Hawkesbury Local Government Area as documented in the Environmental Impact Statement (EIS)
- A technical assessment of the EIS assessment methodology and our confidence in the EIS findings as related to the downstream socio-economic and flooding elements of the EIS
- The perceived adequacy of the proposed management and mitigation measures
- Commentary regarding the upstream impacts of the Project, specifically those relating to biodiversity and Aboriginal Cultural Heritage has been provided.

The following consolidates the Key Submission Points from Hawkesbury City Council:

Key Submission Points:

General

- Highlight that Hawkesbury City Council's Flood Policy 2020 recognises the need for a collaborative approach to floodplain management across the Hawkesbury-Nepean Valley and demonstrates our commitment to providing up to date and relevant, best practice controls based on consideration of flood hazard and risks.
- Concerns about the lack of disclosure of documents relating to this project, as detailed in the NSW Select Committee Report.
- Concerns that there is too much reliance on the Warragamba Dam Raising Project, and that all actions of the Hawkesbury-Nepean Valley Flood Risk Management Strategy - Resilient Valley, Resilient Communities need to be progressed in a coordinated and transparent matter in order to avoid complacency within the community and state agencies that the dam raising project will resolve the issue of floodplain management within the Hawkesbury Nepean Valley. Council is awaiting the release or further details of a range of targeted actions across the nine outcomes contained within the Hawkesbury-Nepean Valley Flood Risk Management Strategy - Resilient Valley, Resilient Communities, including:
  - Outcome 3 Strategic and integrated land use and road planning – strategic land use framework for the Hawkesbury Nepean Valley being prepared by the Department of Planning, Industry and Environment, the details of which are yet to be received by Council
  - Outcome 4 Accessible contemporary flood risk information noting that the Regional Flood Study was released in 2019 and that a 2D Model is currently being prepared
  - Outcome 8 – Adequate local roads for evacuation – it is understood that Transport for NSW are working on a program of works to upgrade evacuation routes which is yet to be received by Council.
- Concerns about infrastructure provision, including potential loss of power, telecommunications, and lack of access to emergency services during flood events.
- Concerns about increased development in areas likely to be inundated or cut off by flooding (Pitt Town, McGraths Hill, South Windsor, Windsor Downs, Bligh Park, etc).
- Inadequate evacuation routes, improvement of which would also improve travel times for those working outside the LGA each day.

- Concerns about development along flood evacuation routes which will slow evacuation by Hawkesbury residents.

Socio-Economic

Key Submission Points:

It is recommended that greater detail regarding the proposed mitigation measures be provided, and in particular, additional information on:

- What proportion of impacted residential properties are expected to benefit from the implementation of mitigation measures that are designed to reduce the impact of Flood Management Zone discharge events

- The anticipated duration of the impact on visual amenity associated with the release of the Flood Management Zone and what clean-up costs would involve

- How many agricultural and industrial businesses can be expected to be impacted (and for how long) with release of the Flood Management Zone, and what proportion of these businesses are expected to avoid this impact with the implementation of the mitigation measure.?

- Environmental impacts downstream, including bank erosion, high impacts on critically endangered ecological communities and wetlands, and prolonged flooding of Scheyville and Cattai National Parks.

- Concerns on the impacts on downstream prawn and fishing industries, and the need for further details or commitments to mitigate the impacts.

Implications for vulnerable members of the community

- It is considered that the EIS has an apparent over-stating of the benefit to those living in manufactured housing or social housing at risk of flooding (impact 12 and impact 13). It may also wish to consider highlighting the lack of information regarding indirect impacts such as the potential decline in affordable housing as a consequence of the Project and a more confident housing market. It is also recommended that the Government investigate appropriate mitigation measures to address such issues.

Implications for private insurance

- It is recommended that given the basis for the assessment of the potential reduction in insurance premiums was a preliminary analysis undertaken in 2014, as the source is preliminary and somewhat dated, further detail on the assessment of this impact, especially as the residual impact is assessed as ‘extreme benefit’ and given community concern about insurance premiums.

- Highlight that for many Hawkesbury residents on the floodplain that the costs of insurance are prohibitive, and that it is considered there is a need for a government-based insurance scheme to combat those costs.

Flood Planning

- Recommend that a further improvement of the EIS could be a commitment that if the project were to go ahead, the updated flood planning documentation would be to consider flood risk to downstream property in a fully probabilistic sense, and with regard for flood islands, so future land use planning can be done accordingly. Also, that the updated flood study be provided to home insurers, so that flood insurance premium reductions can be realised.

Floodplain Storage

- The EIS should consider a potential change to floodplain storage between the time of writing of the EIS and completion of the project, and later as a result of development changes resulting from the project.

Future Flood Risks and Management

- It is recommended that the EIS consider committing to actual mitigation of ecological and geomorphic impacts resulting from the project, rather than just an additional study into the potential for impacts.

- It is recommended that the EIS note that there are currently areas in the HNV floodplain that do not have a flood warning system.

- Lack of water level monitoring and timely access to this information for residents

- Expert advice that changes in land use will change overland flow of water into the Hawkesbury-Nepean basin, rendering the dam less able to mitigate flooding and giving a false sense of security for residents and emergency services.

- The likely delayed drop in flood levels due to water being released from the dam and the impact of prolonged flooding on downstream communities including ratepayer funded infrastructure.

- Concerns about water quality following inundation, with upstream organic matter being disturbed during flood events, washed downstream and affecting the Hawkesbury local government area and its residents

- Lack of flood studies for all tributaries within the Valley.

Upstream Impacts

Upstream biodiversity offsets

- It is recommended that the EIS consider the cost effectiveness and environmental efficacy of the proposed offsets program.

Ecological integrity and importance of upstream areas

It is recommended that:

- Other mitigation schemes should be considered in the EIS,
- Additional investigation into the expected down-stream ecological impacts of the Project should be undertaken
- The EIS should better commit to mitigating upstream impacts resulting from the operation of the Flood Management Zone.

Aboriginal heritage impacts and concerns Cultural reception of the Project

- Council considers that the EIS is unsatisfactory in terms of environmental and cultural heritage impact statements, including the lack of acknowledgement of the impacts on the Aboriginal Cultural Heritage of the Gundungurra People and failure to comply with the Burra Charter.

It is recommended that:

- The EIS provide more clarity on the likely contents of dedicated Aboriginal cultural heritage management plan and the potential residual impacts of the Project on cultural assets
- The EIS commit to further engage aurally with local Aboriginal communities to gauge local sentiment toward the program, and the establishment and function of the Aboriginal cultural

heritage “keeping place” and the proposed offsets program, and share the results in the EIS
- The EIS state the status of support of Aboriginal parties (e.g., RAPs) of the Project
- The Project engage cultural advisors to ensure that an Aboriginal voice is present when discussing cultural heritage issues.

The review has also identified a number of general findings as follows:

- The EIS appears to have been based on fit for purpose hydrologic and hydraulics analysis of the impact of the Project on flood conditions in the Hawkesbury Nepean Valley. There are minor improvements that could be made to the method, however their impact on the results is likely limited, and these improvements could still be utilised at a later date when revising the relevant flood studies.

- Mitigation and management measures relating to the impact of flooding on geomorphology, biodiversity and aboriginal cultural heritage were found to be light on and non-committal.

- Quantitative figures regarding the impact of flood risk draw from a number of sources over a period of time extending back to 2012. This made it difficult to determine the ‘point of truth’ between flood risk impacts published in various state government strategic planning documents.

- Within the Socio-economic chapter, there is a reliance on secondary research and older studies to assess a number of impacts. It’s not clear the extent to which this detracts from the overall findings.

Thank you for the opportunity to provide a submission. Council would welcome ongoing communication and discussion with the proponent Water NSW, Infrastructure NSW, the Department of Planning, Industry and Environment and other key agencies associated with floodplain management in the Hawkesbury Nepean Valley.

Should you have any enquiries in relation to this matter please contact me on (02) 4560 4604.

Yours faithfully

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