

PURPOSE OF THIS REPORT

This report was commissioned by NRM North's Tamar Estuary and Esk Rivers (TEER) Program to provide independent advice to partners of the TEER program on the potential environmental impacts of developing a barrage on the Tamar River estuary as proposed by Tamar Lake Inc.

The scope of this peer review is to provide an independent assessment of the environmental reports commissioned by Tamar Lake Inc. as at September 2014. Specifically this report aims to identify any gaps in understanding of specific and system wide impacts not addressed in the Tamar Lake Inc. environmental reports; provide recommendations for further study and investigations; and to describe the likelihood and consequence of the potential environmental impacts during the lifespan of the project.

This peer review focuses on the potential environmental impacts of the Tamar Lake proposal in the context of the Tamar River estuary and does not include any direct assessment of the economic or social impacts associated with the Tamar Lake proposal.

This report was commissioned by the TEER program for the purpose of informing program partners in future discussions regarding the potential impacts, costs and benefits of the proposal. No inference should be made regarding the level of endorsement or support for the Tamar Lake proposal by any of the TEER program partners or NRM North as a result of information contained in this report.

This report has been completed independently of NRM North and as such has not been subject to NRM North editorial or style review.



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Peer Review Report

Assessment of the comprehensiveness of the potential environmental impacts, threats and risks identified in the Tamar Lake Inc. reports.

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Report for NRM North



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Executive Summary

Disclaimer: It is recognized that this review is part of an ongoing body of work aimed at creating a full understanding of the potential impacts and consequences of the proposed Tamar Lake. As such, this review is limited as outlined below and seeks to provide guidance and suggestions which progress the required work in a satisfactory way.

NRM North through the Tamar Estuary and Esk Rivers Program has commissioned an independent peer review to assess the current environmental reports commissioned by Tamar Lake Inc. The aim of the peer review is to provide an independent assessment of these reports in respect of potential environmental impacts of the Tamar Lake proposal and to identify any gaps in understanding of specific and system impacts.

In particular, this peer review focuses on the potential environmental impacts of the Tamar Lake proposal in the context of the Tamar estuary and does not include an assessment of the economic or social impacts associated with the Tamar Lake proposal.

Tamar Lake Inc. has commissioned three environmental assessment reports related to the proposal which have been reviewed in this report. These reports have been predominantly desk-top in nature and vary in the depth to which they have been able to identify and address issues. Whilst they provide a good start for stakeholders to build an understanding of the implications of the proposed barrage, this review posits that they lack sufficient detail to describe the consequence or impact of the issues on the entire system which would enable community debate and informed discussion. This review has also identified a number of critical gaps which were not addressed in the Tamar Lake commissioned reports.

A summary of the major findings from this review are documented below to capture the key environmental issues, key gaps identified in the reports and key recommendations for further investigation.

Water Quality and Hydrology

Key Issues:

Water quality issues in the Tamar River are well recognised particularly in the upper estuary in the more populated urban areas around Launceston. High nutrient, sediment and bacterial loads from both point sources (e.g. Waste water treatment plants WWTPs) and diffuse sources (eg. run off from agricultural, forestry and other landuses) currently result in degraded water quality limiting recreational use in the upper estuary.

Although Tamar Lake Inc. have proposed that WWTPs would be upgraded under a Tamar Lake scenario to allow discharge into a freshwater environment, only 20 to 30% of the nutrients entering the Tamar estuary are from WWTPs. Currently 70% to 80% of the nutrient loads enter the Tamar estuary from the catchment. A key concern is the potential for algal blooms to occur. Algal blooms are already known to occur during the warmer months in both Lake Trevallyn and the Cataract Gorge. Under a Tamar Lake scenario it is likely that algal blooms would occur without significant reduction in nutrient loads from WWTPs and the catchment, and there is potential for blooms of toxic blue green algae to occur which would greatly impact the recreational use and amenity of the proposed Tamar Lake.

The Tamar estuary currently receives significant loads of pathogens (bacteria) in the upper estuary. More than 90% of these loads come from catchment run off, primarily from livestock waste on top of natural loads. Under a Tamar Lake scenario it is likely that the Lake will continue to receive high bacteria loads which will impact on the recreational use of the Lake in certain conditions. Currently, only the upper to mid-upper estuary is unsuitable for primary contact activities due to poor flushing. Under a Tamar Lake scenario it is possible that majority of the



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60km Lake would experience high pathogen levels at times, making it unsuitable for primary contact recreational activities, and consequently limiting its potential use and economic value (e.g. for irrigation purposes, potable water supply). It is also possible that current dairy expansion and irrigation intensification of agricultural land in the catchment will contribute higher loads of pollutants to the Lake environment from the Esk river systems.

Key Gaps:

The contribution of diffuse loads of pollutants (nutrients, sediments, pathogens and metals) to the proposed Tamar Lake have not been adequately explored in the environmental reports. Although Tamar Lake has developed the proposal under the assumption that Waste Water Treatment Plants would be required to be upgraded to allow for discharge into freshwater, the majority of the pollutant loads (70-80%) are attributed to diffuse sources transported to the Tamar estuary through the North and South Esk river systems. It is highly likely that the reduced flushing in the Lake environment would result in poor water quality which could limit the social, and economic values of the proposed Tamar Lake. More modelling with respect to these issues would be required in a full feasibility study.

Sedimentation

Key Issues:

Mitigating issues associated with sedimentation of the Tamar estuary has been one of the advantages cited by Tamar Lake Inc. in its proposal for creating a barrage on the Tamar estuary. It is likely that sedimentation under a Tamar Lake scenario will continue to occur with sediment transported to the Lake environment from the North and South Esk river systems. Although flocculation of sediments will not occur in the freshwater Lake, sediment will continue to settle out and may require occasional sediment removal inside the Lake to remove excess sediments over a protracted period of time.

The zone immediately below the barrage is most likely to be impacted by sedimentation as the flocculation zone will be moved to the area below the barrage where freshwater is released from the lock into the salt water. As the freshwater carrying the sediment from the Lake meets the saltwater below the barrage the sediments will clump together into a 'floc' and settle out. Modelling scenarios are required to ensure that sedimentation impacts inside the Lake environment and below the barrage are closely examined. The proposed 3D modelling will help to underpin full feasibility modelling of these issues.

Key Gaps:

Acid sulfate soils are naturally occurring soils found in low lying coastal landscapes. When these soils are waterlogged they remain harmless, however when they are disturbed through excavation or drainage they can release sulphuric acid. The Tamar estuary is known to contain extensive areas of potential acid sulphate soils (PASS).

Any sediment removal within the Lake or construction of the barrage infrastructure will need to consider the impact of Passive Acid Sulfate Soils which have the potential to release acid when exposed to oxygen and consequently result in contamination of the Lake environment. If left untreated this can lead to a range of environmental, engineering, infrastructure and health related impacts.

Ecology

Key Issues:

In 2011 the Tamar estuary was listed by the Australian Government as a High Conservation Value Aquatic Ecosystem (HCVAE). The Tamar Estuary possesses extremely high plant, invertebrate and fish species diversity, and many of these species are not found elsewhere in



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Tasmania. The estuarine and coastal ecosystems of the Tamar Estuary and its environs provide many important habitats, including soft muddy and sand bottoms, rocky reefs and soft corals, open ocean environments, wetland communities and sandy beaches.

The site includes species protected under state, national and international instruments. Fifteen threatened fauna species visit or inhabit the Tamar Estuary. These include the humpback and southern right whales (both endangered), the Australian grayling (vulnerable) and the white-bellied sea eagle (vulnerable). A number of threatened vegetation communities also occur along the shores of the Tamar, including the rare or endangered swamp paperbark (*Melaleuca ericifolia*) forest. Protected species include a number of migratory birds protected under international treaties, marine mammals, Syngnathidae (pipefishes, seahorses, sea dragons) and a number of shark species.

Many of the identified nationally listed threatened species will likely be displaced from the Tamar estuary under the proposed Tamar Lake project.

Key Gaps:

In August 2013 *Subtropical and Temperate Coastal Saltmarsh* was officially added to the list of threatened ecological communities under section 181 of the Environment Protection and Biodiversity Conservation Act 1999. The Tamar estuary has extensive coastal saltmarsh (1731 ha mapped) in the low lying tidal flooding zone. Saltmarsh communities that occur within the proposed freshwater Lake area will be displaced.

Gambusia (*Gambusia holbrooki*) is a pest fish species which has colonised a number of areas within the Tamar estuary (Tamar Island Wetlands and adjacent farm dams and drains). This is the only known infestation of Gambusia in Tasmania. Gambusia compete with native fish for food and habitat and they have been linked to the decline of native fish and frog species throughout Australia. To date the spread of the pest fish has been limited due to its isolation in the Tamar Island Wetlands. Under a Tamar Lake scenario the habitat for Gambusia is likely to expand significantly posing a significant risk of infestation of the pest species, particularly via human translocation, to other areas in Tasmania and impacts on native fish and frog species.

Key Recommendations

Risk Assessments

Full risk assessments are recommended to determine the risk to the survival and health of ecological communities present in the Tamar River estuary, particularly the nationally and state listed high conservation value and threatened species and communities. Further detail on specific risk assessments recommended can be found in the issues tables within this report.

Modelling scenarios

Modelling a range of scenarios to determine the impact of a proposed barrage on hydrology, sedimentation and sediment transport, ecology and water quality will be a critical component of future investigations required to assess the viability of the Tamar Lake Inc. proposal. Further detail on specific modelling scenarios recommended can be found in the issues tables within this report.

Monitoring and evaluation

In the event that the development is approved, there is a need for the associated impacts and mitigating management actions to be monitored and reported over the lifespan of the development. It is strongly recommended that data are collected in a highly rigorous manner with sufficient spatial and temporal replication, to enable a statistically rigorous monitoring program to be developed.

Develop a Business Case

Reports reviewed to date describe the advantage of a barrage as a means of mitigating 'siltation'



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in the Tamar. The creation of a lake may remove visibility of mud flats however may not mitigate on-going sedimentation of the Lake and will likely increase sedimentation below the barrage. The ongoing potential for water quality issues in the Lake are also likely to limit use of the lake for recreation and its potential economic value if there was a demand for irrigation or potable water supply. Additionally use of a barrage to mitigate flood and climate change risks requires further detailed investigation and modelling before they can be promoted as a case for project development. This review recognizes that any development requires trade-offs between the economic and in this case recreational values and the environmental values but the reports reviewed at this point do not present a robust argument regarding the potential environmental trade-offs and issues against the potential value. A strong business case with respect to these trade-offs, once more fully explored is strongly recommended.



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