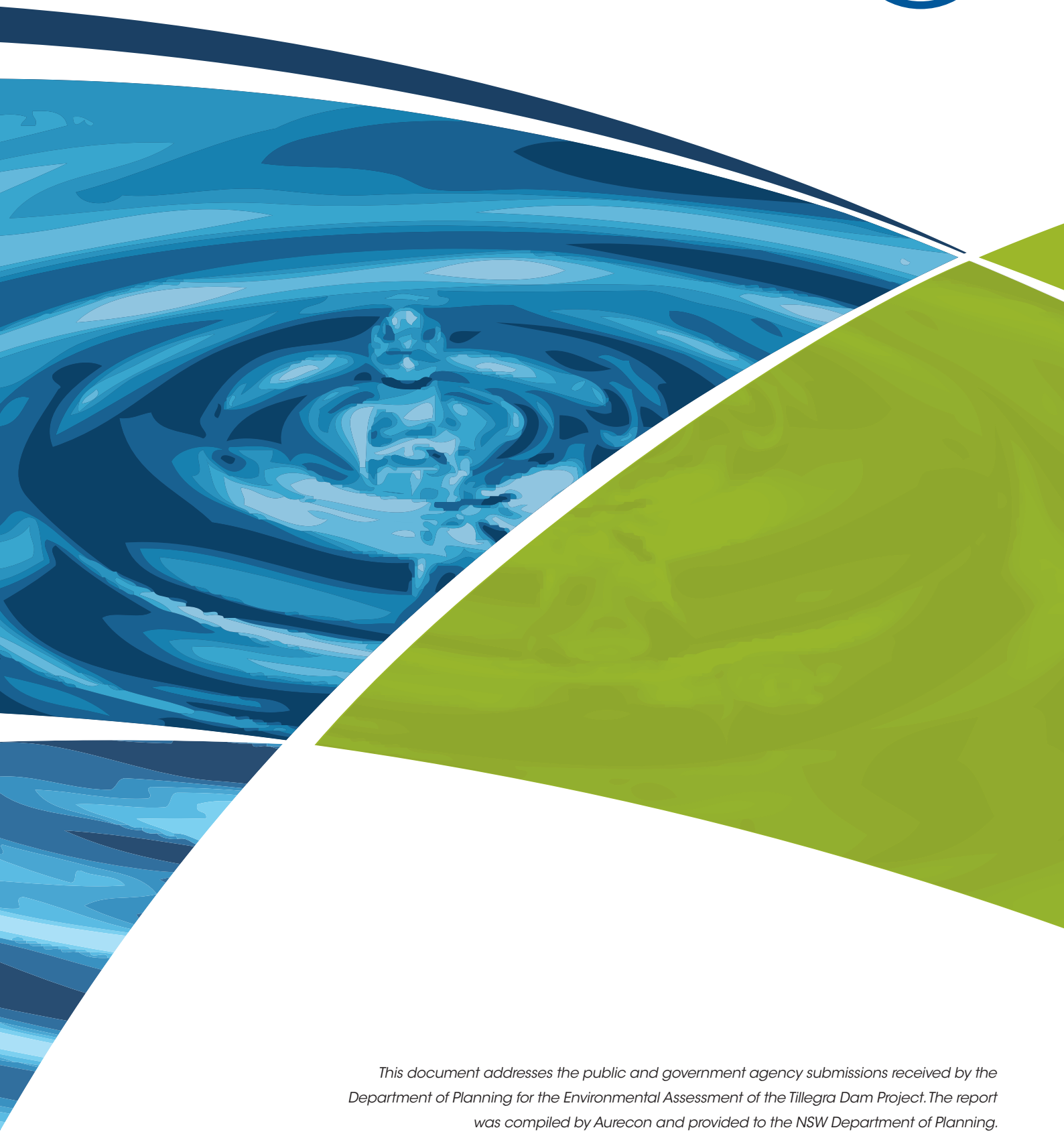
Tillegra Dam Project

ENVIRONMENTAL ASSESSMENT SUBMISSIONS REPORT

March 2010



This document addresses the public and government agency submissions received by the Department of Planning for the Environmental Assessment of the Tillegra Dam Project. The report was compiled by Aurecon and provided to the NSW Department of Planning.

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Document control

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Document ID: 43471 Submissions Report Final

Rev No	Date	Revision details	Typist	Author	Verifier	Approver
0	22/01/2010	Preliminary Draft to Hunter Water		CM/CH/BC	CM	DVS
1	05/02/2010	Revised Draft to Hunter Water		CM/CH/BC	CM	DVS
2	12/02/2010	Revised Draft to Hunter Water		CM/CH/BC	CM	DVS
3	19/02/2010	Revised Draft to Hunter Water		CM/CH/BC	CM	DVS
4	24/02/2010	Final		CM/CH/BC	CM	DVS

Contents

Glossary

Term	Definition
Alluvium	Silt or fine sand deposited by flowing water
Amphidromous	Fish that migrate between the fresh water and the sea (or estuaries) at a regular life history stage, but not directly to spawn
Anoxic	Lacking in oxygen
ANZECC	Australian and New Zealand Environment Conservation Council
ARI	Annual recurrence interval - the long-term average period (usually expressed in years) between the occurrence of a flood as big as or larger than the selected event
Bankfull	Refers to the high flow within a river's channel capacity
BOM	Bureau of Meteorology
Catadromous	Fish that migrate from fresh water as adults to spawn at sea (or in estuaries)
Catchment	The area drained by a stream or body of water or the area of land from which water is collected
Coffer dam	A temporary dam built to divert a river around a construction site so a dam can be built on dry ground
Concept design	Initial functional layout of a concept, such as a road or road system, to provide a level of understanding to later establish detailed design parameters
Council	Dungog Shire Council
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTGM	Chichester Trunk Gravity Main
DGRs	Director-General's Requirements (for the environmental assessment)
DECC	(former) NSW Department of Environment and Climate Change (now Department of Environment, Climate Change and Water
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts (formerly the Department of the Environment and Heritage)
Design speed	A nominal speed used for the design of geometric features of the road, such as curves
DHS	Dungog Historical Society
Diadromous	Fish that migrate between fresh and salt water at regular life history phase, in either direction, but not necessarily to spawn
DNR	NSW Department of Natural Resources
DO/L	Amount of dissolved oxygen (milligrams) per litre
DoC	(former) NSW Department of Commerce (now Department of Services, Technology and Administration)
DoP	NSW Department of Planning
DPI	(former) NSW Department of Primary Industries (now Department of Industry and Investment)
DSEP	Dam Safety Emergency Plan
DSRD	NSW Department of State and Regional Development
DWE	(former) NSW Department of Water and Energy (DWE water responsibilities are now managed by the Office of Water in DECCW)
DWTW	Dungog Water Treatment Works
ESD	Ecologically sustainable development – the use and conservation of community resources so that ecological processes on which life depends are maintained and the total quality of life, now and in the future, can be increased
EEC	Endangered ecological community
Embankment	A mound or bank of earth or stone formed to support a roadway, serve as a protective barrier, or the like
EMP	Environmental management plan
Environment protection licence	A licence that regulates pollution of the environment under controlled conditions regulated by DECCW

Environmental flow	The amount of water required by a watercourse to maintain a healthy ecosystem
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
Extirpate	To become locally extinct
Fresh	Flow which is greater than the median flow for a particular season
FSL	Full supply level – the level of the storage at 100% capacity; set at RL 152.3 for Tillegra Dam
GL	Gigalitres
HCRCMA	Hunter-Central Rivers Catchment Management Authority
Hunter Water	Hunter Water Corporation
Hypolimnetic	Describes a deeper, cooler layer of a waterbody which results from stratification
ISF	Institute for Sustainable Futures
kg/m^3	Kilograms per cubic metre
km/h	Kilometres per hour
L_{A10}	The noise level which is exceeded for 10 % of the sample period. During the sample period, the noise level is below L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise
L_{A90}	The noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below L_{A90} level for 10% of the time. This measure is commonly referred to as background noise level
L_{Aeq}	The equivalent continuous sound level. This is the energy average of the varying noise over the sample period and is equivalent to the level of constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise
Lacustrine	Pertaining to lakes
LALC	Local Aboriginal Land Council
Lentic	Freshwater habitat characterised by standing or still waters
LEP	Local environment plan
LGA	Local Government Area
$L/m^2/hr$	litres per square meter per hour
Lotic	Freshwater habitat characterised by running waters
L/s	Litres per second
mAHD	Metres above Australian Height Datum
ML	Megalitres (one million litres)
ML/d	Megalitres per day
ML/yr	Megalitres per year
m/s	Metres per second
m^3/s	Cubic metres per second
m^3/yr	Cubic metres per year
NES	(matter of) national environmental significance
NO_2	Nitrogen dioxide
NOW	NSW Office of Water (part of the Department of Environment, Climate Change and Water)
NPWS	NSW National Parks and Wildlife Service (part of the Department of Environment, Climate Change and Water)
PFM	Planning focus meeting
PMF	Probable maximum flood
$PM_{2.5}$	Particulate matter less than or equal to 2.5 micrometres in diameter
PM_{10}	Particulate matter less than or equal to 10 micrometres in diameter
POEO Act	NSW *Protection of the Environment Operations Act 1997*
PPV	Peak particle velocity – measured in millimetres per second (mm/s)

Potamodromous	Fish whose life history is contained entirely within fresh water; migrations, if they occur, do so within the freshwater system
REP	Regional environmental plan (this type of environmental planning instrument ceased to exist as of July 2009; existing REPs became deemed SEPPs)
RFO	River flow objective
RFS	NSW Rural Fire Service
RL	Reduced level
SEPP	State Environmental Planning Policy
SOCs	Statement of Commitments
TAPM	The Air Pollution Model
Taskforce	Whole of Government Taskforce
TDCRG	Tillegra Dam Community Reference Group
t/ha/yr	tonnes per hectare per year
Thermocline	The middle layer in a thermally stratified lake or storage where the temperature declines with depth
TMP	Traffic management plan
TN	Total nitrogen
TDS	Total dissolved solids – the dissolved mineral content of groundwater, commonly expressed in milligrams per litre
TP	Total phosphorus
TSC Act	NSW *Threatened Species Conservation Act 1995*
TSP	Total suspended particulates
TSR	Travelling stock reserve
t/yr	Tonnes per year
µg/m^3	Micrograms per cubic metre
µs/cm	Microsiemens per centimetre

Executive Summary

Introduction

Hunter Water Corporation (Hunter Water) is proposing to construct a 450 GL dam at Tillegra, including a new section of Salisbury Road, near the town of Dungog in the Hunter Valley (the Project). The dam would be located within the Williams River catchment, a subcatchment of the Hunter River catchment.

The Project is being assessed under Part 3A of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act). Following consultation with relevant public authorities, the Director-General of the NSW Department of Planning (DoP) issued environmental assessment requirements, or Director-General's Requirements (DGRs) on 8 January 2008 (refer Appendix 4 of the Environmental Assessment (EA) Report).

The Project was referred to the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) for consideration as to whether approval was also required under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Minister determined that the Project may have potential to affect the Hunter Estuary Wetlands which are listed wetlands of international importance ('Ramsar wetlands'). As a consequence, the Project was declared to be a 'controlled action' requiring assessment under the bilateral agreement. Supplementary DGRs were issued to this effect by the Director-General of DoP on 1 May 2009.

The EA Report was prepared in accordance with the relevant matters under the EP&A Act and the EPBC Act. It provided a comprehensive analysis of the key issues relating to the Project as specified by the DGRs.

Following DoP acceptance of the EA Report satisfying the 'adequacy test', it was placed on public exhibition from 10 September 2009 until 13 November 2009. At the suggestion of Hunter Water the period of public exhibition was twice that required under the EP&A Act, and some late submissions were still accepted after the public exhibition period finished.

This report provides a response to the issues raised in all the submissions received and provides clarity and additional information on matters where required.

Consultation during exhibition of the EA Report

In addition to the diverse range of stakeholder consultation activities undertaken prior to public exhibition of the EA Report, and described in the EA Report, Hunter Water facilitated a series of community information sessions during the exhibition period. Eight information sessions were held at sites throughout the lower Hunter region to allow the community to directly discuss aspects of the EA Report. Sessions were advertised by displays in advance at the information session sites and in local print media.

Printed copies of the EA Report were provided to local libraries for viewing and large numbers of electronic copies on CD were made freely available on request.

Submissions received

A total of 2,669 submissions were received by DoP in response to the exhibition of the EA Report. These comprised:

- 10 from government agencies and public authorities
- 196 unique public submissions, including 168 from individuals and 28 from community groups/public organisations
- 2,463 based on form letters provided by the Wilderness Society and the No Tillegra Dam Group including 21 submissions, which included minor variations to the form template.

Key issues

A wide range of issues were raised in submissions, many of which had been identified during the EA process and have been addressed in the EA Report to varying levels of detail. The majority of issues fell into the following topic areas:

- Project need and justification
- Socioeconomic issues
- Terrestrial ecology
- The Williams River
- The Hunter Estuary and Ramsar Wetlands.

A summary of the key issues is provided in the following paragraphs and a full response to each topic is provided in the relevant section of this report.

Project need and justification

The need for Tillegra Dam arises from the stark reality that Hunter Water's current storages and emergency Drought Management Plan are unable to protect the region from the possibility of running out of water.

Justification for this need can be summarised as follows:

- The Lower Hunter is not resistant to drought. The Lower Hunter has experienced drought in the past and the current drought affecting most of the country shows that the Lower Hunter should be prepared for droughts far worse than those on record.
- If the Lower Hunter had experienced the same level of drought as the Central Coast, which saw storages drop by almost three times more than any previous drought on record, the region would have run out of water. The consequences of running out of water are so severe that Hunter Water must have measures in place to ensure this does not happen.
- The Lower Hunter's dams are small for the population they serve and they are vulnerable to evaporation. They fill up quickly, but they also deplete very rapidly. Pressure on the current supply systems will only increase with future population growth and climate change uncertainties.
- With existing storages depleting rapidly during drought, there would not be enough time to take action once the drought hits.
- Action is required now.
- Hunter Water assessed all viable options such as increased demand management strategies, water restrictions, stormwater harvesting, rainwater tanks, sewer effluent recycling, expanding groundwater sources and upgrading existing dams, new dams and desalination.
- Tillegra Dam proved to be the most cost effective solution by far.
- In addition to providing drought security, as noted in the EA Report, Tillegra Dam would also be able to accommodate significant population growth and provide a buffer for the uncertainty of long term climate change.

The Lower Hunter region has experienced severe droughts in the past. A repeat of the major droughts in the early 1940s, mid 1960s and early 1980s would affect Hunter Water's water storages by more than twice as much as they would affect those of the Central Coast. The fact that the Lower Hunter's storages have been relatively unaffected by the current drought merely reflects the complex and variable nature of weather patterns and in no way implies that the Lower Hunter is somehow immune or protected from extreme droughts.

The Water Services Association of Australia (WSAA) is the peak body representing major water utilities in Australia and New Zealand. In 2005 the WSAA published *Occasional Paper No.14-Framework for Urban Water Planning* that addressed the implications of the current drought. The WSAA recognised that even if the likelihood of a community running out of water is small, the consequences could be so high that water authorities should have robust measures in place to ensure that it does not happen under any circumstance, even under the severest regime of water restrictions.

As the authority responsible for the provision of an urban water supply to the Lower Hunter region, Hunter Water must have effective measures in place to guarantee the supply of water under extreme conditions. Therefore, it is not a question of whether or not action is required. Rather the question is: what action should be taken and when?

The best strategy to ensure adequate water security through a drought of lengthy but indefinite duration involves identification of a solution that is fundamentally independent of rainfall. In this regard, many of the coastal mainland capitals in Australia have seen no alternative but to adopt desalination for drought security.

Under emergency conditions in the Lower Hunter, studies have determine it would require a period of 48 months from making the decision to proceed with desalination until the plant is commissioned and delivering treated water, on the assumption some basic preparation is done in advance. With water restrictions in place, Hunter Water's current storages would run out in just over three and a half years under a prolonged drought equivalent to the repeats of the worst 12 months on record. Therefore, it is not appropriate for Hunter Water to wait until a drought has set in before taking action.

While desalination may be the only remedy ultimately independent of rainfall, there are other options for the Lower Hunter which can provide sufficient lead-time for desalination to remain only as a last resort emergency measure.

The preferred option of Tillegra Dam was the outcome of a comprehensive and robust option identification and evaluation process. Other options considered, that were found to be ineffective or impracticable included:

- Undertaking preconstruction planning, investigations and design of a desalination plant now with construction left until the last practical moment
- Reducing total demand for water by way of water saving devices, education and the early introduction of water restrictions
- Provision of 100,000 residential rainwater tanks
- Treatment and reuse of urban stormwater.

A range of options were identified as alternatives to adopting desalination in the first instance. The primary measure used to allow comparison of the effectiveness of each option is the amount of water (reliable yield) that could be drawn annually from the supply system while maintaining a given probability of triggering the need to commence emergency desalination.

The following table reproduces the results from the EA Report and shows Tillegra Dam to be the most cost effective option on a levelised cost basis at around 68% of the next most cost effective option and 35% of desalination.

Table ES1 Comparison of options

Option	Yield (GL/yr)	Capital Cost ($m 2008-09)	Levelised Cost ($/kL)
Tillegra Dam	56	397	1.66
New Chichester Dam	48.5	586	2.45
Mammy Johnsons Dam	27.5	565	2.73
Grahamstown Dam upgrade	30	656	3.04
Indirect Potable Reuse	26.3	523	3.29
Lostock Dam upgrade	9.5	425	4.76
Desalination	46.2	990	4.80

The methodologies used by Hunter Water to forecast future demands and reliable yield were questioned in a number of submissions, most notably that by the Institute for Sustainable Futures (ISF). A full response to these concerns is provided in Section 3.3 of this report. This response demonstrates that these concerns are unfounded or based on erroneous assumptions or interpretations of Hunter Water's methodologies. Demand forecasts and the definition of reliable yield have both been independently reviewed and confirmed.

Socioeconomic issues

Many of the submissions received requested further information to be provided on the socioeconomic issues associated with the Project. The main issues raised in relation to socioeconomic issues included the actual cost of the project, the assessment methodology of the socioeconomic impacts, potential impacts on the regional and local economy, loss of agricultural land and associated employment, as well impacts on the Dungog community once the dam is constructed from tourism.

A considerable number of the community, however, also recognised the potential benefits of the dam with regard to the recreational and business opportunities the dam offered was complete, as well as the positive economic impacts on the local and regional economies during the construction.

Overall, the economic benefits of the Project on the local and regional economy are expected to be positive, however, the potential social impact of the Project on the local community, particularly within the immediate area affected by the dam, is acknowledged in the EA Report. While these will vary from person to person, it is noted that during construction there will be impacts, such as increased numbers of vehicles on local roads, noise, vibration and dust emissions from construction activity that would affect local amenity.

In response to these concerns, an extensive range of mitigation measures have been identified and are documented in the Statement of Commitments for the Project. The implementation of these would be undertaken within an ongoing consultative framework, which would facilitate effective communication with affected members of the community. In addition, property owners downstream of the dam were provided the opportunity for Hunter Water to acquire their property, a number of whom took up the offer, as part of the land acquisition process for the Project.

Hunter Water maintains that the socioeconomic impact assessment in the EA Report was adequate and robust and found that many of the concerns raised in the submissions were unwarranted. The full response to the socioeconomic concerns identified is provided in Section 5.2 of this report.

Terrestrial ecology

Concerns raised about the Terrestrial Ecology component of the EA Report ranged from concern for specific threatened species in the study area to the inadequacy of proposed mitigation offsets and assessment methodologies. The main issues included: the adequacy of the ecological assessment methodology, habitat loss for many species, adequacy of the mitigation measures and proposed offsets, the loss of endangered ecological communities (EEC) within the inundation area, and the level of funding commitment for the monitoring and management of the ongoing terrestrial impacts.

In response to many of the concerns raised regarding impacts on the terrestrial ecology, habitat loss and proposed off-sets, Hunter Water has revised the original carbon offset and biodiversity offset, which consisted of dedicating or undertaking works on a total area of 1,822 ha. The revised commitment made by Hunter Water involves a total of 2,800 ha of land that will be allocated as follows:

- The dedication of a 1,323 ha national park to the NSW Government that contains 97 ha of river flat floodplain suitable for rehabilitation with EEC *River-flat Eucalypt Forest on Coastal Floodplains*
- A consolidated carbon and biodiversity offset corridor containing 709 ha of dedicated Hunter Water land.
- A 50 m buffer area around the dam shoreline (768 ha) will be maintained to protect water quality and promote sustainable activities in the vicinity of the dam.

Hunter Water believes that this revised commitment will satisfy the offsetting principles stated by NSW Department of Environment, Climate Change and Water (DECCW), as well as:

- Provide certainty that quantifiable on-ground environmental works will be delivered in riparian areas of the Williams Catchment with the rehabilitation work undertaken prior to the land being transferred to the NSW Government.
- Strengthen and contribute to the expansion of the existing Barrington Tops National Park and the World Heritage designated Gondwana Rainforests of Australia (formerly the Central Eastern Rainforest Reserves of Australia or CERRA).
- Provide an area that complements other government initiatives, such as the Great Eastern Ranges Initiative

(GERI) corridor by siting the proposed national park at Chichester, thus contributing to broader regional & national ecosystem resilience.

The NSW Office of Water (NOW) also expressed concerns regarding the Water Management Principles of the *Water Management Act 2000* with respect to Groundwater Dependent Ecosystems (GDEs). While not meaning to understate the value of the *River-flat Eucalypt Forest on Coastal Floodplains* EEC that will be lost, Hunter Water believes that the significance of the loss will be negated by the 1,323 ha national park offset, which will provide a unique opportunity to replace the EEC at a local level with 97 ha of equivalent or better *River-flat Eucalypt Forest on Coastal Floodplains* GDE that will be rehabilitated and protected via its status within the Barrington Tops National Park.

The full response to the concerns raised with respect to the terrestrial ecology assessment is provided in Section 4.5 of this report.

The Williams River

Numerous submissions were received regarding the potential impacts of Tillegra Dam on the Williams River, including the impacts on: water quality both in-storage and in the downstream reaches of the Williams River, the fluvial geomorphology aspects of the project, the aquatic ecology and the environmental flows.

A full response to all the submissions is provided in this report. In summarising Hunter Water's response to the submissions, Hunter Water maintains that the original assessment in the EA Report adequately addressed most of the issues raised but has provided a commitment to some additional mitigation measures.

In order to manage the changes to the flow regime in the Williams River and mitigate potential impacts Hunter Water has currently committed to:

- Releasing flows from Tillegra for 70% of the time on an annual basis. Effectively the majority of the water entering the dam except in times of flood will be released
- Increasing flows from Chichester Dam, from a maximum of 14 ML/d to 20 ML/d
- Releasing bulk water from the dam in a manner that mimics natural flow events, including a minimum of six releases to provide moderate to high flows below the dam every year. A 'fresh' release flow peaked at 270 ML/d for duration of 1.5 to 2 days has been proposed in this regard should spillway flows or run-of-river releases not occur
- Improving the connectivity of the Williams River between the estuary and the river by performing an upgrade of Seaham Weir. This will occur through the construction of a vertical slot fish-way, which will also increase movement of water between the weir pool in the low flow class by about 20 ML/d.

In addition, on the basis of submissions received from NOW, DECCW, Hunter-Central Rivers CMA, I&I NSW, as well as several other public submissions, Hunter Water will also guarantee within the Tillegra Dam project the minimum inclusion of an additional 2,500 ML of water per year held within the dam for use as environmental contingency allowance.

It is acknowledged that construction and operation of proposed Tillegra Dam, particularly during the filling phase may lead to some unavoidable but manageable environmental impacts downstream of the dam. The absence of flows above 270 ML/d during the filling phase would lead to decline in the current condition of the ecosystem particularly for the reach from the dam wall to the Chichester River confluence. This impact would be less pronounced below the confluence of the Williams and Chichester Rivers and the impact would be further reduced with distance downstream as a result of other tributary inflows.

Hunter Water notes, however, that the preferred environmental release strategy proposed represents a significant environmentally sympathetic improvement compared to current environmental release strategies operating in many other NSW storages.

The Hunter Estuary and Ramsar wetlands

Concerns were raised in several submissions regarding the potential impacts of Tillegra Dam on the Hunter Estuary and wetlands. To provide a context for discussing the impacts of the dam on the estuarine reaches and to address the issues raised, additional information is provided in Section 6 of this report, including some

further background on the water flow, estuarine mixing and flushing processes within the four reaches suggested by NOW in its submission and additional modelling.

A multi-disciplinary team of scientists was engaged to consider potential impacts on the Ramsar wetlands located in the Hunter River. This work was headed up by Professor Max Finlayson from Charles Sturt University, who is also past Oceania representative and a prior Chair of the Ramsar Scientific and Technical Review Panel. This multi-disciplinary team led by Professor Finlayson did not identify any notable impacts on the wetlands that would be caused by the Tillegra Dam project.

The NOW concerns regarding the original modelling assessment of the temporal variability in salinity both near the Ramsar sites of the lower estuary and in the Hunter/Patterson Rivers Tidal Pool (upstream of the Williams river confluence with the Hunter River) have been addressed through additional modelling by BMT WBM.

The additional modelling confirmed the original work by Professor Finlayson's team to be correct in that the overriding control point for flows to the estuary is Seaham Weir, which substantively influences the types of flows that reach the estuary regardless of whether Tillegra Dam is constructed. Further, the portion of affected flows to the wider estuary from the Williams River is very small in comparison to all sources of water to the estuary.

In considering the proposed slight reduction in annual freshwater flows downstream of the Williams and Hunter River's confluence, studies indicate that there is not expected to be a discernable impact on the commercial fishing industry as a result of the construction of Tillegra Dam.

Commitments

Hunter Water and its consultants have developed a range of management and mitigation strategies to prevent, reduce and where necessary offset environmental harm.

Such commitments include a substantial environmental flow release strategy downstream of the dam to maintain the aquatic ecosystem as well as providing for existing water uses downstream, such as irrigation.

Significant commitments have also been made to aquatic ecosystem monitoring, improvement and management, partnered with water quality monitoring, geomorphological monitoring and general improvement works.

In lieu of a fish passage at Tillegra Dam at least 4 priority barriers to fish passage within the Hunter region will be remediated under the guidance of the I&I NSW (Fisheries). As a result hundreds of kilometres of river will be opened up to fish migration elsewhere in the Hunter catchment, as opposed to about 30 kilometres of fish passage lost as a consequence of the dam.

These management and mitigation measures have also been refined in response to representations received during the public exhibition period, ensuring that the communities concerns and aspirations are incorporated within the project. The most notable refinements include the dedication of a 1,323 ha National Park to the NSW Government to promote biodiversity conservation within the Williams River Catchment and the Barrington Tops.

Another major refinement is the offer to amend operation of the existing Seaham Weir to allow the release of an additional 2,500 ML/yr of water from Tillegra Dam past Seaham Weir and into the estuary, providing benefits to the estuary not possible since construction of Seaham Weir in the 1960s.

Refinements have not over looked smaller, but just as important issues for community groups. The Project Statement of Commitments has also been refined to ensure that freshwater anglers can access and make the most of the reservoir for recreational purposes and adjustments have been made to the location of the proposed rural fire station in close consultation with the RFS.

Significant additional commitments have also been made in regards to managing road maintenance and safety, far in excess of the likely impacts that will be caused by haulage of materials to and from the dam site given that most material will be quarried on site. Hunter Water proposes to manage maintenance of the road from Dungog to the dam site, contribute to maintenance of other roads in the Shire and provide $1 million toward the upgrading of roads including the replacement of two timber bridges.

Hunter Water has provided an additional commitment to make accommodation available for the construction workforce in the form of prefabricated camp facilities to address Dungog Shire Council's concerns regarding pressure on local housing and traffic congestion. This is expected to also provide added economic benefits to local retail businesses.

Conclusions

Tillegra Dam is a key element of Hunter Water's *$H_2$50 Plan* and would contribute to meeting the objectives of other planning strategies including the:

- the *NSW State Plan*
- the *NSW State Infrastructure Strategy*
- the *Lower Hunter Regional Strategy*
- the *Central Coast Regional Strategy*.

Consequently, the Project is expected to have significant environmental, social and economic benefits at the local, regional and State scales.

The volatility of the existing Lower Hunter water supply system means there is a significant risk of storages reaching a critical level in a prolonged drought, beyond which, nothing can be done to prevent complete exhaustion of the supply.

Tillegra Dam was selected as the most cost effective of a broad range of options covering both reductions in total demand for water and increasing supplies. The construction of the dam will remove the vulnerability to drought and provide the time necessary to allow response to extreme events.

The supply and demand assessment methodologies used by Hunter Water have been independently assessed and found to be adequate and robust.

The construction of the dam will substantially reduce the likelihood of Hunter Water needing to access groundwater reserves at Worimi National Park and Tomago, an action that may pose significant environmental threats to these water sources and the surrounding environment.

The dam is forecast to provide almost three generations of growth potential for the region, even considering the prospect of climate change and the uncertainties and difficulties in modelling its effects at regional and local scales.

The site also contains almost all of the construction material necessary to construct the dam wall, apart from the cement and steel required for the dam and bitumen for the roads.

The site has been demonstrated to be geologically suitable for the proposed dam. The geological features at the site are typical for dam sites and can be readily addressed by routine dam design techniques. Geotechnical conditions have been shown to not represent major budgetary risks with no engineering works required to stabilise the reservoir rim. This conclusion is accepted as satisfactorily proven by both the Independent Peer Review Panel and the NSW Dams Safety Committee.

It is recognised that the Tillegra Dam project will have some environmental impacts that cannot be avoided with an infrastructure proposal of this scale and dimension. However, Hunter Water has committed to a range of management and mitigation strategies to prevent, reduce and where necessary offset environmental harm. These management and mitigation measures have been refined in response to representations received during the public exhibition period, ensuring that the aspirations and concerns of government regulators, the community and other stakeholders are incorporated within the project.

Approval of the Project and its subsequent construction would:

- Ensure that the risk of the Lower Hunter running out of water becomes controllable at the least cost and with the least environmental impact
- Avoid the likelihood of severe environmental impacts on Worimi National Park
- Avoid the investment of substantial financial resources on emergency desalination

- Facilitate regional population growth, remove uncertainty and cater for investment in the region's economy
- Eliminate the possibility of severe economic consequences arising from reduced water supply to local and regional industries and business enterprises reliant on a secure water supply for ongoing operations
- Avoid business and industry being shut down in a severe drought to conserve water for essential household supply
- Avoid restriction of water supplies for essential social services such as emergency services, health facilities and educational facilities being restricted during a worse case drought scenario.

Hunter Water maintains that Tillegra Dam is essential for the Lower Hunter if its future as a major regional urban and industrial centre is to be realised, as promoted within the regional strategy. It will ensure that the communities within the Lower Hunter are able to take control of their future water supply without concern of significant drought, as recently experienced by the region's Central Coast neighbour. The Project accommodates the uncertainty of climate change, anthropogenic or otherwise, and preserves the existing emergency drought management plan.