

Abbreviations

Abbreviation	Name
ACT	Australian Capital Territory
ACTEW	ACTEW Corporation Limited, the proponent
ACTPLA	Australian Capital Territory Planning and Lands Authority
ADWG	<i>Australian Drinking Water Guidelines 2004</i>
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
ANZECC	Australian and New Zealand Environment Conservation Council
AS/NZS	Australian Standard/New Zealand Standard
AUSRIVAS	ACT Australian River Assessment System
BoM	Bureau of Meteorology
CBD	central business district
CEMP	construction environmental management plan
CH	chainage
CO ² -e	carbon dioxide equivalent emissions
COAG	Council of Australian Governments
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DA	development application
dB	decibel
dB(A)	decibel A-weighting
dB(L)	decibel linear-weighting
DECC	NSW Department of Environment Climate Change and Water
DEWHA	Commonwealth Department of Environment, Water, Heritage and the Arts
DPI	NSW Department of Primary Industries
EEC	endangered ecological community
EHN virus	epizootic haematopoietic necrosis virus
EIA	environmental impact assessment
EIS	Environmental Impact Statement
GHD Pty Ltd	GHD

Abbreviation	Name
GHG	greenhouse gas
GIS	geographical information systems
GL	Gigalitre (1 GL = 1000 ML)
ha	hectare
ICOMOS	International Council on Monuments and Sites
ISO	International Standards Organisation
kg	kilogram
km	kilometre
km/hr	kilometre/hour
kV	kilovolt
kWh	kilowatt hour
L	litre
L_{A10} (18 hour)	The arithmetic average of the L_{10} levels for the 18-hour period between 0600 and 2400 hours on a normal working day. It is a common traffic noise descriptor.
L_{A90} (Period)	The A-weighted sound pressure level that is exceeded for 90 per cent of the time over which a given sound is measured. This is considered to represent the background noise e.g. L_{A90} (15 min)
L_{A90} (Day)	The A-weighted sound pressure level that is exceeded for 90 per cent of the time for the daytime period 7 am to 6 pm
L_{A90} (Evening)	The A-weighted sound pressure level that is exceeded for 90 per cent of the time for the evening time period 6 pm to 10 pm
L_{A90} (Night)	The A-weighted sound pressure level that is exceeded for 90 per cent of the time for the night-time period 10 pm to 7 am
L_{Aeq} (15 min)	The L_{Aeq} noise level for a 15-minute period
L_{Aeq} (1 hr)	The L_{Aeq} noise level for a one-hour period. In the context of the NSW DECC environmental criteria for road traffic noise, it represents the highest tenth percentile hourly A-weighted L_{eq} during the period 7 am to 10 pm, or 10 pm to 7 am, (whichever is relevant). If this cannot be defined accurately, use the highest A-weighted L_{eq} noise level.
L_{Aeq} (9 hr)	The L_{Aeq} noise level for the period 10 pm to 7 am.
L_{Aeq} (15 hr)	The L_{Aeq} noise level for the period 7 am to 10 pm.
L_{Aeq} (1 hr, peak)	The peak L_{Aeq} noise level for a one-hour period
m	metre
m^2	metre squared

Abbreviation	Name
m ³	metre cubed
m/s	metres/second
M2G	Murrumbidgee to Googong
ML	megalitre
ML/day	megalitres per day
mm	millimetre
MW	mega watt
NSW	New South Wales
NUZ	non-urban zone
PPV	peak particle velocity
REALM	REsource ALlocation Model
sp.	species (singular)
spp.	species (plural)
t	tonnes
TAMS	Territory and Municipal Services
the assessment	This environmental impact assessment document
the project	Murrumbidgee to Googong Water Transfer
TJ	terajoules
V	Volts
°C	degrees Celsius

Glossary of Terms

Term	Definition
alien species	Exotic fish species breeding in the wild
affected person (from the ACT Environment Protection Regulation 2005)	For an affected place, means an occupier of the affected place, and includes a person who is lawfully in an affected place that is on: <ul style="list-style-type: none"> • Unleased land; or • Public land under the crown lands act 1989 (NSW), Section 153, as in force from time to time.
anaerobic digestion	A biological process that occurs naturally when bacteria breaks down organic matter in the absence of oxygen, producing a biogas that can be used to generate electricity and heat.
annual average daily traffic	The total volume of traffic passing a roadside observation point over the period of a calendar year, divided by the number of days in the year
aquifer	Rock or soil formation containing groundwater in recoverable quantities
average daily traffic	A sample of the AADT and is the traffic count averaged over a particular month, a week or a few days.
bulk transfer	Bulk transportation of potable water from a reservoir to a water treatment plant before household use
capital region	Australian Capital Territory and surrounding region
causeway	A raised roadway, as across water or marshland
catchment	The area drained by a stream, lake or other body of water
cryptosporidium spp.	A pathogen that is transported in water and can contaminate water supplies.
cumulative impact	A significant impact created by accumulation or successive additions of individual impacts, which may not in themselves be significant
cyanotoxins	A cyanotoxin is a toxin produced by certain cyanobacteria. When produced during algal blooms, cyanotoxins can poison and even kill animals and humans.
dB	Decibel, which is 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.
dB(A)	Frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at very low and very high frequencies.
NSW Director Generals requirements	Outline the environmental assessment requirements, as part of the NSW planning approval process.
effluent	Liquid industrial waste or wastewater, which may or may not have

Term	Definition
	been passed through a type of purification process
emission	The release of material into the atmosphere (e.g. gas, noise)
environmental flow	The amount of water needed in a watercourse to maintain a healthy, natural ecosystem
environmental flow guidelines	Guidelines issued by the ACT Government's Territory and Municipal Services in 1999 concerning environmental flow
environmental management plan	A document setting out the management, control and monitoring measures to be implemented during construction (a construction environmental management plan) and /or operation (operational environmental management plan) of a development, to avoid or minimise the potential environmental impacts identified during an environmental assessment process
flora and fauna	Plants and animals
hydrology	The science dealing with water on the land or under the surface, its properties and distribution
inflow	The act or process of water flowing into a water body
net economic benefit	The sum of all economic benefits
noise sensitive place	<i>Noise sensitive place</i> means any of the following places: (a) a dwelling; (b) a library, childcare centre, kindergarten, school, college, university or other educational institution; (c) a hospital, surgery or other medical institution; (d) a protected area, or an area identified under a conservation plan as a critical habitat or an area of major interest, under the <i>Nature Conservation Act 1992</i> ; (e) a marine park under the <i>Marine Parks Act 1982</i> ; (f) a park or garden that is open to the public (whether or not on payment of money) for use other than for sport or organised entertainment.
pathogens	A pathogen is an infectious agent, or (more commonly) germ, is a biological agent that causes disease or illness to its host.
particulate	Small particles, usually occurring in suspension
pH	Measure of acidity (or alkalinity)
project approval	A approval granted under Section 75J of the NSW <i>Environmental Planning and Assessment Act 1979</i> .
proponent	ACTEW Corporation Limited
putrescible	Capable of biological decomposition

Term	Definition
rating background level (RBL)	<p>The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24 hour period used for the assessment background level). This is the level used for assessment purposes. It is defined as the median value of:</p> <p>All the day assessment background levels over the monitoring period for the day; (7 am to 6 pm);</p> <p>All the evening assessment background levels over the monitoring period for the evening; (6 pm to 10 pm) or</p> <p>All the night assessment background levels over the monitoring period for the night. (10 pm to 7 am).</p>
reservoir	A natural or artificial pond or lake used for the storage and regulation of water
residential receiver	A dwelling potentially affected by noise or vibration.
scoping document	The ACT scoping document, which outline the EIS requirements as part of the ACT planning approvals process
sound pressure level	20 times the logarithm to the base 10 of the ratio of the RMS sound pressure level to the reference sound pressure level of 20 micropascals.
study area	Subject site and any additional areas likely to be affected, either directly or indirectly, by the proposal - 200m wide corridor surrounding the Subject Site.
the assessment	This environmental impact assessment
the preferred project or project	Murrumbidgee to Googong Water Transfer
threatened species	Species of animals or plants that are at risk of extinction (also known as 'endangered species') or becoming endangered within the next 25 years ('vulnerable species'), defined by the <i>Threatened Species Conservation Act 1995</i>
vehicles per day	The number of vehicles passing a point on a road in both directions for 24 hours.

Executive summary

The Murrumbidgee to Googong Water Transfer is located within the ACT and NSW and impacts on Commonwealth owned land. Consequently the different planning approval processes apply to the parts of the project located in each jurisdiction. The Environment Impact Statement (EIS) has been prepared to meet the requirements of section 216(2) of the ACT *Planning and Development Act 2007* and Part 3A of the NSW *Environmental Planning and Assessment Act 1979*. The project has been declared as 'critical infrastructure' by the Director General of the NSW Department of Planning.

The EIS has been prepared following public exhibition of a combined Environmental Assessment (New South Wales (NSW)) / Draft Environmental Impact Statement (Australian Capital Territory (ACT)) document during August 2009. The EIS incorporates ACTEW's responses to all submissions received from ACT and NSW government agencies, community stakeholders and affected land-holders. This document includes a description of the "Preferred Project" and a Consultation and Submissions Report to meet the requirements of the ACT Planning and Land Authority (ACTPLA) and the NSW Department of Planning (DoP).

Securing our water supply

Inflows into the drinking water storages within the ACT and region have been below average for the last 15 years. The Canberra and Queanbeyan communities have been in water restrictions since mid-December 2002. Stage 3 restrictions have been in place since November 2006. These restrictions have had a significant impact on the regional economy. In particular, inflows in 2006 were about 90% below the long term average and so far in 2009 the inflows are below what was received in the same period during 2006. The continuing decline of inflows and continuing uncertainty of climate change highlights the need for prudent investment to ensure future water security for the ACT and region.

In response to this situation, ACTEW recommended to the ACT Government that a diversified portfolio of water supply security measures be adopted. The integrated strategy of diversified water infrastructure investments will increase the security of supply, increase the efficiency of current storage and treatment facilities, supplement inflows into Googong Reservoir and access a source of water that is not wholly dependent on rainfall in the ACT region, known as the Tantangara Transfer.

In 2004, the ACT Government launched its water policy 'Think Water Act Water', which required ACTEW to 'provide a long term reliable source of water for the ACT and region'. This is in addition to the ACT Government's commitment to reduce per capita water use by 25% by 2023. Since 2004, ACTEW has investigated a range of water supply options. The ACT Government has agreed with ACTEW's recommendations that the portfolio of water supply options be implemented. These options include the project, enlargement of the Cotter Dam, the Tantangara Transfer and to offset greenhouse gas emissions associated with the construction and operations of these projects. ACTEW is committed to delivering these projects consistent with the principles of sustainability.

In response to the current drought, ACTEW has already implemented a number of water supply improvements including the Cotter to Googong Bulk Transfer, abstraction from the Murrumbidgee River at Cotter, building the Mount Stromlo Water Treatment Plant and increasing the capacity of Googong Treatment Plant. In addition to these measures ACTEW has introduced permanent water conservation measures in conjunction with the ACT Government's demand management program. These measures have resulted in a reduction in per capita water use in the order of 13%.

The project

The Murrumbidgee to Googong Water Transfer encompasses the construction and operation of pumping and pipeline infrastructure to transfer up to 100 ML/day of water approximately 12 km from the Murrumbidgee River at Angle Crossing, to the Googong Reservoir via run-of-river flow in Burra Creek (refer to Figure E.1).

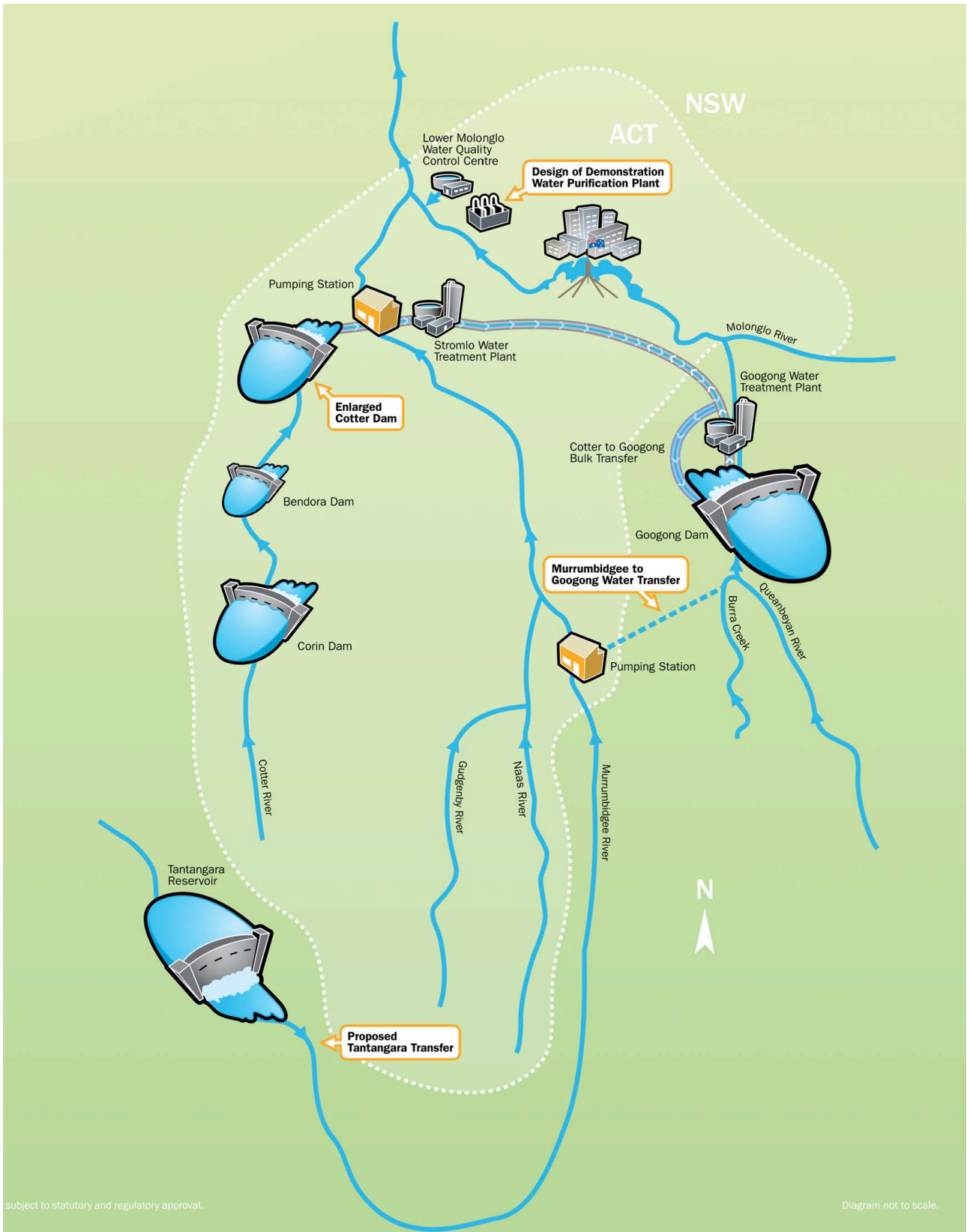


Figure E.1 Proposed ACT and region water security measures, showing the proposed location of the project

The water will be transferred via a one metre diameter underground pipeline from the Murrumbidgee River over Gibraltar Range to Burra Creek at Williamsdale Rd. From the pipeline outlet, the water will flow 13.2 km along Burra Creek to the Googong Reservoir, which forms part of the ACT's water supply. The project incorporates a combined intake and low lift pump station, a high lift pump station, an 11 kV power supply, an outlet structure and a mini-hydro power generator located near the outlet structure. The mini-hydro power generator will recover and reuse almost 20% of the pumping energy required to lift the water over the Gibraltar Range. The power generated will be transferred back to the high lift pump station through an underground cable in the same trench as the transfer pipeline.

The quantity of water transferred will be contingent upon the availability of water in the Murrumbidgee River, maintenance of Murrumbidgee River downstream environmental flows, any geomorphologic and aquatic ecology impacts in Burra Creek, and the available storage capacity within Googong Reservoir. Minimising construction impacts, rehabilitation of the disturbed areas, offsetting of unavoidable impacts, and a monitoring and adaptive management program are all elements of the project.

Potentially, the Tantangara Transfer is closely linked to the preferred project. This project proposes to release additional water to the Murrumbidgee River via the Snowy Mountains Scheme for transfer to Googong Reservoir via the Murrumbidgee to Googong Water Transfer.

The following steps are required before the Tantangara Transfer is able to commence releases:

- ACTEW purchase of the equivalent of about 11 GL of high security water entitlement;
- Intergovernmental arrangements to allow water trade to occur between NSW and ACT; and
- A commercial agreement between ACTEW and Snowy Hydro Limited for use of infrastructure to store and release purchased water to the ACT when required from Tantangara Reservoir.

These preconditions may take several years to achieve.

Project justification

Total inflows into ACTEW's three main storages over the period 2003–2009 has averaged approximately 71 GL/year, well below long term average inflows of 200 GL/year. In 2006 alone, water storage decreased from 51% to 39%. The continuing risk to water supply security for Canberra and Queanbeyan is confirmed by climate change studies conducted by CSIRO, with the medium and long term outlook (i.e. beyond 2030) suggesting a further decline to inflows.

ACTEW's planning to secure the water supply for the ACT and region determined that a diverse portfolio of supply options was required. If the portfolio of water supply options were not constructed and the current understandings of future climate change come to fruition, then the region can expect to suffer longer and more severe water restrictions. Construction of the Murrumbidgee to Googong Water Transfer will reduce the likelihood of Stage 4 water restrictions. The reduced periods of water restrictions are estimated to save \$866 million over the period 2010 to 2032 (based on the do nothing approach), and result in a net economic benefit to the ACT and region of over \$500 million.

Project alternatives

Over the past few years, ACTEW has been reviewing options for a secure water supply for the ACT and surrounding region, with a considerable amount of work undertaken in the last four years. The proposal to extract water from the Murrumbidgee River has been considered as part of these investigations. All the options identified between 2004 and 2007 have been the subject of community consultation, and the reports in which they were considered were made available to the public.

Water supply options have been considered in the following reports:

- Think Water, Act Water (2004);
- Options for the next ACT Water Source (2004);

- Future Water Options (2005);
- Water Security for the ACT and Region - Recommendations to ACT Government (2007); and
- Water Security for the ACT and Region – Progress Report and Recommendations to ACT Government (2008).

In October 2007, the ACT Government announced a range of projects that will be implemented to secure the ACT and regional water supply. The ACT Government confirmed its commitment to the project by issuing a media release in March 2009 stating:

'The ACT Government has given the green light to build the Murrumbidgee to Googong pipeline and buy water from Tantangara Reservoir improving Canberra's water security for many years to come. These projects are in addition to the Government's previous decision to enlarge the Cotter Dam. In these tough times, with an ongoing drought resulting in below average-level rainfall, it is essential the Government acts now to ensure adequate supply down the track' (Corbell 2009).

Commonwealth requirements

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) prescribes the Commonwealth's role in environmental assessment. ACTEW lodged a project referral with the Commonwealth Government on 6 October 2009 and was placed on public exhibition to the Department of the Environment, Water, Heritage and the Arts on 9 October 2009. On 20 November 2009, the Commonwealth advised ACTEW the project had been declared a controlled action that will be assessed by a Public Environment Report (PER) for approval under the EPBC Act.

The National Capital Authority (NCA) administers a National Capital Plan under the Commonwealth *Australian Capital Territory (Planning and Land Management) Act 1988*. Approval from the NCA will be required for the pipeline crossing of the Monaro Highway and for works on the foreshore of the Murrumbidgee River.

Consultative process

Prior to the preparation of the draft EIS/EA, ACTEW engaged with a broad cross-section of stakeholders including government agencies, community groups and landholders. Formal consultation on the draft EIS/EA was conducted between 14 August and 18 September 2009. The NSW DoP accepted late submissions up to 2 October 2009. The consultation program was in addition to ongoing liaison with local community groups and directly impacted landowners, and exceeded the consultation requirements of the NSW DoP and ACTPLA.

The formal consultation activities included publication of the draft EIS/EA document and supporting specialist assessments, preparation of a user-friendly CD and an easy to read summary document that detailed the complete list of commitments made in relation to the project.

Project fact sheets prepared on construction, environmental commitments, Murrumbidgee flows and how the community could have its say, were distributed with the draft EIS/EA documents. The ACTEW website was updated with the draft EIS/EA and associated fact sheets.

A direct mail campaign invited more than 100 individuals and community organisations to participate in the public exhibition process. Five community drop-in sessions were hosted. A range of stakeholder group or one-on-one meetings and presentations were held and the public exhibition process was advertised in the Canberra Times and regional papers, as well as promoted by media release. The ACTEW email and telephone hotline number contact points were promoted for community members who wanted more information or had comments to make.

A targeted consultation program was conducted at the conclusion of the formal public exhibition period for the upstream outlet location proposed both prior to and during the consultation period. The EIS adopts the upstream outlet as part of the preferred project.

Environmental impacts and mitigation measures

Investigations have been undertaken during the preparation of the environmental assessment to assess potential environmental impacts. These included specialist assessments of potential environmental impacts on hydrology, ecology, heritage, soils and groundwater, landscape and visual amenity, noise and vibration, climate, greenhouse gas, social, community traffic, transport and health. A summary of the key findings of the environmental assessments and proposed mitigations follows.

Hydrology and geomorphology

The project will comply with the ACT's obligations in respect of diversions from the Murrumbidgee River under Murray Darling Basin inter-governmental agreements. The ACT's net Cap of 40 GL per annum will not be exceeded as a result of the project. The project has less than 1% impact on the average flows leaving the ACT and flowing into Burrinjuck Reservoir. Within the ACT, the ACTEW licence to take water from the Murrumbidgee River will include conditions on the use of ACT's Environmental Flows Guidelines as established by the *Water Resources Act 2007*. These requirements will ensure protection of downstream environmental flows within the Murrumbidgee River.

The project will significantly increase current flows in Burra Creek. Modelling has indicated that flow velocities will generally remain low, typically about 0.1 to 0.9 m/s, and the average water depth will increase by around 0.1 to 0.4 m (i.e. knee deep and walking pace). Additional investigations have provided improved forecasts of potential geomorphic adjustments along Burra Creek in response to the proposed transfer discharges. Key findings include that riffle zones may be expected to undergo some degree of adjustment if prolonged discharges or floods result in a loss of vegetation; scouring of sediments that make up the banks of pools may occur under prolonged periods of transfer flows in the event fringing vegetation is lost. The majority of pools along Burra Creek have a high degree of bedrock control and the likely amount of sediment released as a result of initial riffle zone adjustment is estimated to be between one to two times the annual catchment sediment budget. The vulnerability of the higher macro-channel banks has been assessed and indicates that around 1.5% of total bank length has a significant potential for accelerated erosion due to the transfer flows.

Overall, the general impact of the proposed transfer flows on the geomorphology of Burra Creek is expected to be negligible to low. That is, the general existing form of Burra Creek will remain largely unchanged in response to the transfer flows. ACTEW has already commenced more intensive monitoring of flows and geomorphic processes, and is committed to an adaptive management approach. If any trends towards significant impacts are observed operating regimes will be adjusted or other mitigation measures will be put in place.

Water quality

Construction will involve excavation within the riparian zone of Murrumbidgee River's at Angle Crossing and Burra Creek just downstream of Burra Road. Environmental protection works and adherence to approved environmental management plans within these waterways are expected to mitigate any significant impacts.

The potential for impacts on the water quality of Burra Creek during construction is considered to be low to moderate and manageable as a result of the proposed measures to control suspended particles and sediment; the short term nature of the construction period; and low flow velocities in the creek.

The potential operational impacts on the water quality of the Murrumbidgee River is considered to be low and manageable through; an extensive monitoring and adaptive management approach; maintenance of regulated environmental flows; the very low proportion of overall flow extraction; proposed mitigation measures to control suspended particles and sediment during construction; and the short term nature of the construction period.

ACTEW is already implementing an extensive monitoring program that includes water quality. It is committed to an adaptive management approach based around the development of site and seasonal specific trigger values. Exceedance of these triggers will initiate more intensive ecological monitoring, adjustment of operating regimes and/or other mitigation measures at the earliest possible time to minimise impacts.

Trigger values are fundamental to the use of the ANZECC guidelines. Local conditions vary between waterways and it is sometimes necessary to modify these trigger levels to local conditions, such as exist in Burra Creek. The modified triggers can be applied to assess compliance with the *Protection of the Environment Operations Act 1997*, or as conditions of any Environment Protection Licence issued under that Act. The guidelines provide a process for refining trigger levels and ACTEW intends to adopt that process over a period of time for application to the Burra Creek discharges.

Aquatic ecology

The study area is known or likely to support a number of threatened fish species including Trout Cod, Macquarie Perch, Silver Perch, Murray Cod and Murray River Crayfish. These species were assessed under the ACT, NSW and Commonwealth threatened species provisions including assessment of significance and application of significant impact criteria.

Implementation of the Construction Environmental Management Plan (CEMP) will minimise the effect of silt and suspended particles in the vicinity of the work, and the potential for impacts on the water quality of the Murrumbidgee River is considered to be low. As a result, the impact of the project on the river's aquatic ecosystems is assessed as being low, especially since environmental flow will be maintained. The change in water depth at the Angle Crossing causeway on the Murrumbidgee River during most flow conditions will not have a significant impact on its current status as an obstruction to fish passage. When fish passage is normally possible, during higher flow events, the proposed transfer will have a minimal impact on flow depths and fish passage.

The small change in depth at Angle Crossing causeway and downstream during most flow conditions will have negligible impact on fish passage. The passive design of the offtake screen will prevent adult and juvenile fish being impinged and is not expected to significantly impact threatened fish species within the Murrumbidgee River. The fish disease Epizootic Haematopoietic Necrosis (EHN) virus is known to exist within the Googong Reservoir. The current degree of infection within Burra Creek is unknown but the presence of the virus is considered highly likely.

Two alien species, Carp and Oriental Weatherloach are considered a high risk for translocation, as they are known or suspected to be present in reasonable numbers at Angle Crossing, are hardy and known to impact native fish communities and are not yet established in Googong Reservoir. Carp is, however, present elsewhere in the Googong Reservoir catchment. Transfer of these fish into Googong Reservoir will increase the risk of these species invading the more significant conservation reaches of the upper Queanbeyan River. The proposed 0.5 mm offtake filtering system will minimise the potential risk for the transfer of fish in all their life stages. Monitoring is also proposed to evaluate the screening effectiveness.

Given the relatively low amount of water to be abstracted from the Murrumbidgee River and the proponent's commitment to preserving environmental flows in the river, it is unlikely that there will be a significant impact on the aquatic ecology of the river under projected operating conditions. This will be monitored during the operation of the project.

The aquatic ecosystems of Burra Creek were considered to be in a poor condition in the upper sections and moderate condition in the lower section. The project has the potential to modify habitat through adverse impacts to macrophyte beds and increased mobilisation of sediment. The additional flow in Burra Creek will impact on the narrow channel in which the flow is contained by scouring some sediment from the channel reducing the extent of reed beds and impacting on macroinvertebrate communities. Given the relatively low flow velocities and depths, and the intermittent nature of flow it is expected this impact will be low to moderate.

Aquatic ecology, particularly submergent macrophytes (a key component of the Burra Creek ecosystem) will be monitored and any trending towards significant impacts will trigger adjustment of operating regimes and/or implementation of other mitigation measures.

Terrestrial ecology

The project area contains a wide range of vegetation and habitat types, which vary from non-native pasture to high conservation value native grassland and woodland. The area of impact has been limited by minimising the width of construction footprints in sensitive areas or by fencing and isolation to prevent losses. As a result the total areas of impact will be around 16.7 ha of native vegetation and around 23.8 ha of non-native vegetation, essentially pasture and weed affected areas.

Highly modified vegetation are typically east of the area Gibraltar 'saddle' and provide minimal opportunities for native flora and fauna. Native vegetation range from poor to high quality and is most common in the area between the Gibraltar 'saddle' and the Murrumbidgee River corridor. It includes Box Gum Grassy Woodland Endangered Ecological Community (EEC) and Natural Temperate Grassland. It includes EEC on the elevated slopes above the Murrumbidgee River corridor. Vegetation along Burra Creek to the east contains high quality Snow Gum Grassy Woodland (recently nominated for listing as an EEC in NSW). Habitat opportunities for threatened species broadly correlate with high quality woodland and forest habitats, native grassland and exposed rock outcrops. Some of these habitats have additional conservation value as regional wildlife movement corridors, such as the Murrumbidgee River corridor.

Three threatened plant species were recorded: *Swainsona recta*, *Swainsona sericea* and *Leucochrysum albicans* var. *tricolor*, and one ROTAP species, *Discaria pubescens*. Eight threatened animal species were also recorded during the surveys: Pink-tailed Worm Lizard, Gang Gang Cockatoo, Speckled Warbler, Diamond Firetail, White-winged Triller, Varied Sittella, Eastern Bent-wing Bat and Large-footed Myotis.

Generally, pipeline construction will have short term impacts on some components of high quality Box Gum Grassy Woodland and Natural Temperate Grassland EECs and probably longer-term impacts on some components of Pink-tailed Worm Lizard habitat. Permanent structures will however have long lasting but relatively small impacts on affected terrestrial habitats.

The overall impact of the project is likely to manifest in different and unequal ways depending upon the species, its local occurrence and habitat preference, but these impacts are unlikely to be significant. Some impact will occur to threatened species and communities that occur within the study area. Biodiversity offsets are proposed for impacted EECs and threatened species habitats.

Unavoidable biodiversity impacts will be addressed through a systematic and scientific approach to biodiversity offsetting. An Offset Plan is being developed with a focus on delivering a "maintain and improve" outcome to address the residual impacts of the preferred project.

The key objectives of the Offset Plan will be to:

- Provide appropriate offsets to compensate for the residual impacts on biodiversity, in particular any threatened species or endangered ecological communities affected;
- Deliver an offset of a suitable size and condition that provides a "maintain or improve" environmental outcome;
- Ensure that the offset provides for the protection of like-for-like vegetation and specific habitat attributes;
- Ensure in-perpetuity security of offset sites and provide a framework for their ongoing and long-term management; and
- Provide one offset that meets the requirements of the multiple regulators.

Recognising the cumulative impacts of similar projects in the area, a consolidated offset proposal will be proposed to deliver the best possible biodiversity outcome. A contiguous set of land offsets adjacent to the nearby Murrumbidgee River corridor is considered to be the best way to achieve this outcome.

The development of the Offset Plan will be undertaken in consultation with regulatory authorities and other relevant stakeholders. The Offset Plan will be developed and implemented in line with the *Principles for the use of biodiversity offsets in NSW*.

Indigenous heritage

The majority of the pipeline corridor has been variously impacted by clearing and pasture development, track, road and fencing construction. The field survey for the Aboriginal heritage assessment identified a total of 81 Aboriginal heritage sites in the study area. The sites include isolated finds, artefact scatters, potential archaeological deposits and a possible scarred tree. Four sites were previously recorded in the vicinity of the pipeline corridor.

A significance assessment was undertaken in accordance with the assessment criteria that apply in NSW and the ACT. The assessment identified that 23 sites located in NSW and five sites located in the ACT are considered to have moderate scientific significance. For other sites, the scientific significance was low or not able to be determined at this stage. It is noted that only the Aboriginal community can determine Aboriginal cultural significance and that confirmation of this significance component is dependent on written submissions to the heritage assessment by appropriate representative organisations.

No areas of high archaeological significance were identified during the stage one subsurface testing program and no significant issues were identified. The results of the impact assessment indicate that 28 Aboriginal sites have the potential to be directly impacted by the project. All of the Aboriginal sites subject to impact are assessed as having moderate or low archaeological significance.

Non-Indigenous heritage

The study area has been subject to farming and rural residential occupation since the early-mid 1800s. Two heritage listed sites, London Bridge Homestead and London Bridge Natural Arch, are located within or close to the study area in NSW. A detailed assessment of the potential erosion impacts on London Bridge a natural limestone arch concluded that there will not be any significant impact on this structure. The London Bridge homestead and outbuildings are situated some distance from the creek and will not be impacted by the project. The results of the impact assessment indicate that the Goulburn to Cooma railway line, the line of trees at the entrance to Burra Station, the former Williamsdale school site, the refuse dump, a cadastral boundary marker at Angle Crossing and the Moore family 'Lagoon' house site have some heritage value, but will not be impacted by the project.

Topography, soils and groundwater

The project will involve extensive excavation along the length of the pipeline route, with additional excavation and earthworks being undertaken at the site of the intake/low lift pump station, high lift pump station, outlet structure and mini-hydro power generator. The potential for impacts to geology, soils, groundwater and soil contamination during excavation works and other construction activities are considered to range from unlikely to moderate and can be managed with the implementation of the proposed erosion and sedimentation controls proposed for the project.

A rehabilitation plan will be developed for the project. The rehabilitation plan will describe the rehabilitation management, objectives and activities necessary to assess and rehabilitate areas impacted by construction works. Rehabilitation will be undertaken with close interaction with the affected local community. Rehabilitated areas will be maintained during the establishment period.

Potential operational impacts to geology, soils, groundwater and soil contamination are likely to be less significant than the potential construction impacts as they have been minimised by the design of the project.

Land use

The major land uses within the pipeline corridor and surrounding area are river corridor/water catchment, agriculture, rural residential development and transport, power supply, water and communications easements.

The potential impacts from activities required for the construction and operational stages of the project are considered to be recreational users at Angle Crossing, local farming activities and local residents along the length of the pipeline corridor.

Potential impacts on land use will primarily be during construction of the project. These include disruption to recreational activities at Angle Crossing, impacts on land use and access, particularly with regard to use of

land along the pipeline corridor and disruption to roads, underground services and electricity transmission lines. The impacts will be limited to the duration of the construction and rehabilitation periods. The intake/low lift pump station introduces a new structure into the river in the Angle Crossing area will not change the use of this area in the long term.

Land use impacts during operation of the project will predominantly relate to restrictions on the use of land within the 15 m permanent pipeline easement (such as building, digging and planting restrictions) and for maintenance access. Agricultural activities such as livestock grazing and small-scale cultivation will be able to continue over the proposed easements during operation of the pipeline. Maintenance access will be infrequent and localised to specific points along the pipeline, mainly the locations of the scour valves, and will not impact on the use of the land. As such, it is considered that operational impacts on land use will not be significant.

Landscape character and visual amenity

The construction of the project will generate visual impacts during the construction period. Impacts will be experienced at the sites for the structures and along the length of the pipeline corridor. During construction works exposed soils will be visible, along with machinery and equipment required for construction and the structures under construction. The agreed rehabilitation plan will guide the restoration of construction sites.

Operational impacts of the project will occur as a result of:

- The introduction of new structures in the landscape at the intake/low lift pump station, high lift pump station and outlet sites, ancillary infrastructure and associated access arrangements;
- The 15 m wide pipeline easement will need to remain free of trees and allow vehicle access; and
- Pipeline infrastructure/structures, including maintenance access, signage, air and scour valves which will increase the number of permanent static elements.

The intake/low lift pump station and the high lift pump station will have moderately adverse landscape and visual impacts. The outlet structure will have a minor adverse impact, as views of the outlet site are limited. The mini-hydro power generator will be substantially underground. The impact of the pipeline and power supply will be negligible as both are predominantly underground.

Spoil handling and waste management

The main wastes that will be generated during construction include excess spoil, vegetation and landscape materials, construction material, general waste from site personnel, paints and solvents and wastewater and sewage.

The majority of landowners have indicated their interest in using spoil remaining after pipeline construction works to address erosion issues. A detailed investigation of these areas will be undertaken as part of the construction program and will require ongoing liaison with the landowners during the construction process. Any commitments to assist landowners will be developed before construction commences.

Any spoil that could not be reused will be sent to a licensed landfill, where it will be beneficially used as a landfill cap. Other construction waste will be reused and recycled where possible. The remaining waste will be disposed of at appropriately licensed facilities.

Potential major haulage routes for offsite disposal or reuse of spoil and other waste materials include Angle Crossing Road, Williamsdale Road, the Monaro Highway and Burra Road.

A detailed waste management sub-plan will be prepared as part of the CEMP to address relevant legislation and set out the requirements and procedures for the management of spoil and other wastes. Procedures to prevent spillage and emergency plans to manage environmental incidents will be developed as part of the CEMP.

Noise and vibration

Potential noise and vibration impacts will generally be associated with the construction of the project. Due to very low ambient noise levels the construction of the pipeline may potentially exceed construction noise goals at nearby residences. Up to 10 residences have the potential to exceed *the highly noise affected level*, although they should only be exposed to this level of noise for less than one day. Approximately 100 residences have potential to exceed the *noise affected level* for up to 37 days.

The majority of construction activities along the pipeline will not produce perceptible levels of vibration due to the distance from residences. However, some activities such as excavation, rock breaking, rolling and compacting may produce levels of vibration that are perceptible and potentially intrusive when construction activities are located within 50 m of residence. Up to ten residences have the potential to exceed vibration goals for less than one day. Building condition surveys would be undertaken at all potentially impacted buildings prior to commencement of, and at the completion of, any vibration generating works.

Approximately 20 residences have the potential to exceed the *noise affected level* during construction of the outlet structure, however the *highly noise affected level* is not expected to be exceeded. The construction of the outlet structure is expected to comply with the vibration criteria at the surrounding residential locations.

Construction traffic is expected to comply with the noise criteria at the surrounding residences, but construction compound noise may potentially exceed the noise criteria at four residential locations.

Blasting during construction may also be required due to the presence of hard rock within the construction corridor. There are up to 22 residents within 800 m of the possible blast locations, where there is the potential to exceed the ANZECC blasting criteria. Prior to any blasting, ground vibration and airblast overpressure estimates will be undertaken and appropriate control measures implemented.

The construction of the low lift pump station and high lift pump station will comply with noise and vibration criteria. The operation of the low lift pump station, high lift pump station, pipeline air-release valves and outlet structure will also comply with noise and vibration criteria at the surrounding residences.

The mini-hydro power generator will be substantially underground with appropriate acoustic treatments to ensure any noise emissions do not exceed 35 dB (A) at the surrounding residences.

Air quality

Existing air quality along the pipeline corridor is considered to be good. Potential air quality impacts during construction include dust and particulate emissions and fuel combustion emissions. The potential for emissions will be minimised through a number of mitigation measures and controls and the implementation of a dust management sub-plan. Operational impacts are expected to be negligible.

Greenhouse gas

The total construction emissions were estimated to be 31,700 tonnes of CO₂-e over the construction period and average annual emissions of 8,800 tonnes of CO₂-e per annum. The annual emissions equate to 0.005% of total emissions for NSW and ACT, based on Department of Climate Change *State and Territory Greenhouse Gas Inventories 2007*.

The construction and operational total emissions for the first thirty years of operations are estimated to be 295,700 tonnes CO₂-e. The construction emissions contribute approximately 11 % of the total emissions for the first thirty years without Tantangara flows and approximately 7 % with Tantangara flows.

The major sources of emissions during construction were identified as construction vehicles and plant (diesel use), steel pipe manufacture and vegetation clearance. Emissions associated with the consumption of electricity were estimated to contribute 100 % of the total emissions during operation of the proposed infrastructure.

Almost 20% of the pumping energy use will be recovered by the mini-hydro power generator, and ACTEW has committed to offsetting all greenhouse gas emissions associated with the construction and operation of the project.

Social and economic

The location of infrastructure and the alignment of the pipeline have been chosen in consultation with local landowners and community to minimise overall impacts. The proponent is currently in negotiations with directly affected landowners for construction access, rehabilitation measures, and to acquire a permanent easement of operational and maintenance purposes.

During the construction phase, potential social impacts will be minimised through careful planning and the adoption of appropriate mitigation measures. The increase in traffic, road closures, noise and disturbance to property access will all modify rural ambience to a moderate degree during construction. These impacts are not expected to be overly significant and will be of a limited duration.

Due to public safety concerns, and in consultation with ACT Parks Conservation and Lands (PCL), the Angle Crossing recreation area will be temporarily closed during construction. The proponent has agreed with ACT government to construct stage one of improvement works at Tharwa Sandwash to provide an alternative local recreation area.

The project will deliver a social benefit to the ACT and region through improved water supply security as well as an economic benefit. The net economic benefit of the project resulting primarily from the reduced frequency of high level water restrictions estimated to be over \$500 million (CIE, 2009). Employment generated by the project, both directly and indirectly, will also bring significant benefits.

ACTEW will continue to implement its community engagement program to ensure that the community is kept fully informed of the progress of construction and of any expected impacts.

Health and risk

The available water quality data shows that most parameters are similar between the Murrumbidgee River, Burra Creek and Googong Reservoir. The introduction of a new source of water to the Reservoir may lead to increased levels of nutrients in the Reservoir (as a result of the new water source increasing the overall load of nutrients), which may increase algae bloom potential in the longer term. The quantitative risk assessment for drinking water notes that this risk is manageable and ACTEW's ongoing drinking water quality monitoring program will address this risk during operation.

HAZOP (Hazard and Operability) and CHAIR (NSW Construction Hazard Assessment Implication Review) assessments have been undertaken, and management of residual risks during construction of the project will be undertaken consistent with an integrated Health, Safety and Environmental Management System that conforms to *AS/NZS 4801:2001 Occupational Health and Safety Management Systems* and *AS/NZS ISO 14001:2004 Environmental Management Systems*. All operational public safety requirements have been incorporated into the project design.

Traffic and transport

The potential for traffic and transport impacts arises from the construction activity. The additional construction traffic can be adequately accommodated on Angle Crossing Road, Monaro Highway, Williamsdale Road and Burra Road at acceptable levels of service. The pipeline will be trenched through the Monaro Highway. There is likely to be disruption to traffic including some short-term road closures where the pipeline crosses roads and where the pipeline is laid along sections of the road. The engagement strategy will ensure that the community, affected landholders and emergency services are consulted and receive prior notice any unavoidable disruptions.

Additional traffic generated during the construction phase can be satisfactorily accommodated within the existing layouts of the intersections of Williamsdale Road/Monaro Highway at acceptable levels of service. At the Angle Crossing Road/Monaro Highway intersection, the increased traffic volume may cause some queuing on the highway and the Highway will be widened to accommodate traffic turning into Angle Crossing Road.

A Traffic Management Plan will be prepared in accord with Australian Standard *AS 1742.3:2002 Manual of uniform traffic control devices – Traffic control devices for works on roads*. This will include advance warning signs for all works in road reserves.

Cumulative impacts

Cumulative impacts have the potential to arise from the interaction of individual elements within the project; and the additive effects of the project with other projects in the region. During the construction phase, impacts associated with clearing of vegetation, noise, air quality and traffic and transport may have some cumulative impact on the overall amenity of the locality. Specific mitigation measures have been developed to minimise impacts and ensure that the short term effects of construction are appropriately managed.

During the construction of the project, it is possible that other projects and infrastructure works may be taking place in the vicinity of the project. There are two unrelated developments that are currently being implemented. Transgrid are proposing a 330 kV/132 kV substation in Williamsdale, ACT, to provide a second point of electricity supply into the ACT, and ActewAGL plan to construct 132 kV transmission lines from this substation to Canberra.

The operational impacts from the Williamsdale substation and transmission lines are not expected to have a significant negative cumulative impact with this project. However, the cumulative impacts of improved essential infrastructure (water and electricity supply) will have an overall positive impact.

In April 2009, ACTEW announced that it had purchased land in Williamsdale and that it will seek to be an active participant in the development of commercial solar power generation for the ACT by providing this land as a suitable site. While ACTEW will not develop a solar power proposal in its own right, ACTEW intends to work with ActewAGL or any other potential proponents that may bid to undertake the project in response to the ACT Government's recent call for expressions of interest for development of a solar farm in the ACT.

The proposed Tantangara Transfer is subject to separate negotiations with the NSW Government and commercial agreements. If implemented, the Tantangara Transfer will increase in the amount of water flowing in the Murrumbidgee River, however it will not change the proposed 100 ML/day transfer rate of the Murrumbidgee to Googong Water Transfer.

Environmental management, monitoring and adaptive management

Both the construction and operation of the project will be supported by the implementation of best practice management techniques defined by the construction and operational environmental management plans. The community engagement and stakeholder management plan will form an integral part of these.

Ongoing monitoring and an adaptive management approach are key components of the project. The already commenced monitoring program will determine the Murrumbidgee River and Burra Creek aquatic ecosystem responses occurring as a result of the project construction, water abstraction from Angle Crossing and water discharge into Burra Creek. The monitoring program covers:

- Stream-flows;
- Physico-chemical water quality parameters;
- Ecological water quality indicators;
- Fish biota;
- Sediment transportation and deposition;
- Geomorphology;
- Riverine vegetations; and
- Screening effectiveness at Angle Crossing.

All monitoring will be undertaken according to the relevant Australian Standards and accepted scientific protocols. The local community and other interested stakeholders will be encouraged to participate in the monitoring program and development of any adaptive response measures that may be required.

The monitoring will inform future reviews of the ACT Environmental Flow Guidelines and will be used to develop a set of Burra Creek specific water quality triggers for key parameters such as conductivity, nutrients (total phosphorus and total nitrogen) and turbidity. The Burra Creek specific water quality trigger levels will be established prior to initial operation. Any exceedances of water quality triggers will result in intensified monitoring of any potential impacts on aquatic ecosystems. Any observed trends toward significant adverse impacts will be countered by adjustment of the operating regime or other environmental management measures.

Commitments

The summary of commitments listed in the table below include the development of construction and operation environmental management and monitoring plans as discussed above, and the additional measures recommended by each of the individual impact assessments.

Table E.1 Summary of commitments

Commitment	
Environmental management, rehabilitation and monitoring	
1	The construction and operation environmental management plans, rehabilitation plan and monitoring/adaptive management plan, will be prepared and implemented as described in Chapter 27 (the monitoring program has already commenced).
Hydrology and geomorphology	
2	Regular review of geomorphological monitoring results for any trends toward significant impacts in Murrumbidgee River, Burra Creek or Googong Reservoir. The monitoring and adaptive management plan will include actions required to address any identified trends in a timely manner.
3	The proponent will consult with the NSW Department of Water and Energy with regard to watercourse crossing methodologies and site-specific mitigation measures for watercourses that can then be incorporated into the CEMP.
Water quality	
4	All construction discharges from the area of works will meet ACT EPA legislative requirements (for the Murrumbidgee River) and NSW DECCW legislative requirements for Burra Creek.
5	A standard operating procedure will be developed for access to the pipeline during maintenance activities, chemical/fuel storage, and for pipe flushing that meets legislative requirements.
6	ACTEW's Source Water Protection Program will continue to address water quality issues in the Murrumbidgee River.
7	Installation of a grit collection hopper at the low lift pump station and discharge of captured sediments back to the Murrumbidgee River to reduce the turbidity of water transferred to Burra Creek. Use of an automatic timer on the grit collection hopper to ensure that relatively small volumes of sediments are discharged on a continuous basis to reduce impacts on the Murrumbidgee River downstream. Ongoing monitoring and appropriate adjustments to the timers or release volumes to minimise potential impacts.
8	Water abstracted from the Murrumbidgee River will be released into Burra Creek without delay to minimise deoxygenisation and cooling. Operational rules will be developed to acceptable levels of turbidity in the Murrumbidgee.

Commitment	
9	<p>A sediment and erosion control plan will be developed for the project as part of the CEMP. The plan will address the requirements associated with working in the riparian zone of the Murrumbidgee River and Burra Creek, as well as the requirements for the minor waterway crossings.</p> <p>The CEMP will include a provision for monitoring total dissolved solids, turbidity and pH (triggers will be based on the ANZECC 2000 guidelines or any seasonal site specific triggers developed for Burra Ck.) during the construction period to serve as indicators of impacts on water quality.</p>
10	<p>Regular review of water quality monitoring results for any trends toward significant impacts in Murrumbidgee River, Burra Creek or Googong Reservoir. The monitoring and adaptive management plan will include actions required to address any identified trends in a timely manner.</p>
Aquatic ecology	
11	<p>Maintenance of flow transfers where possible during the fish breeding season to protect any spawning populations of threatened fish species. If flows need be altered, then the 48 hour step up/down operating regime will be utilised to allow fish to exit the creek.</p>
12	<p>Prior to construction, inspection of river and creek banks within the construction footprint for platypus burrow entrances. Excavation will be undertaken in small scoops with an un-toothed bucket in case a lactating female and/or dependent young are present. Procedures for the management of any platypus detected during construction will be included in the aquatic ecology management sub-plan.</p>
13	<p>Regular review of the results of the aquatic monitoring program and the development of management actions that may be required to address any observed impacts.</p>
14	<p>Design measures into the project, to prevent the spread of invasive fish species including:</p> <ul style="list-style-type: none"> • A proposed mesh size on the intake screen of 0.5 mm to prevent transfer of fish and eggs; • Provide continuous filtering and monitoring of transfer flows at the outlet into Burra Creek; • Use filters year round, rather than only during the spawning season; and • Investigate the known current presence of carp in the near vicinity of Googong Reservoir, within the Googong catchment.
15	<p>An aquatic ecology management sub-plan will be prepared as part of the CEMP, outlining the procedures to manage and minimise the potential for impact to aquatic environments.</p>
16	<p>Regular review of aquatic ecology monitoring results for any trends toward significant impacts in Murrumbidgee River, Burra Creek or Googong Reservoir. The monitoring and adaptive management plan will include actions required to address any identified trends in a timely manner.</p>
Terrestrial ecology	
17	<p>Detailed design of the pipeline will ensure the pipeline is constructed in the identified construction impact zone in order to minimise direct impact on moderate to good quality Box Gum Grassy Woodland, grasslands and hollow-bearing trees and rock outcrops, and any other higher quality vegetation, as far as practicable.</p>
18	<p>The construction and scour widths will be reduced in areas that contain EECs and/or threatened species habitat. The exact location and extent of reduced construction corridor widths will be determined in the CEMP.</p>
19	<p>Where the removal of hollow-bearing trees and/or hollow limbs is unavoidable, an appropriately qualified arborist will be employed. Tree-hollows will be inspected for resident fauna by a qualified ecologist/zoologist prior to felling or trimming. Any trees or limbs that are removed will be retained on site for ground based habitat.</p>

Commitment	
20	A flora and fauna management sub-plan will be prepared as part of the CEMP, outlining the procedures to manage and minimise the potential for impact to terrestrial ecology.
21	Offsets for the removal and/or modification of approximately 16.7 ha of native vegetation, including 11.1 ha of Box Gum Grassy Woodland (and secondary grassland) that ranges from poor to good condition, 1.7 ha of Natural Temperate Grassland and 0.3 ha of Snow Gum Grassy Woodland occurring within the construction footprint, will be provided.
Indigenous heritage	
22	Impact to Aboriginal sites/objects along Burra Creek and at London Bridge will be avoided.
23	A second stage of subsurface archaeological investigations will be undertaken following approval. The aim of the second stage should be to further assess the subsurface archaeological resource of the project and develop appropriate management strategies for any salvage works required. The management of material recovered by this program should be developed in consultation with the statutory authorities and the Aboriginal stakeholder groups.
24	As part of an impact mitigation program, a salvage collection of a representative sample of surface Aboriginal artefacts will be undertaken prior to the conduct of ground surface disturbance within the construction 'footprint'. The management of material recovered by this program should be developed in consultation with the statutory authorities and the Aboriginal stakeholder groups.
25	Consultation with the registered Aboriginal organisations will be ongoing.
26	Impacts to the London Bridge karst formations and sites along Burra Creek will be undertaken as part of the on-going monitoring and adaptive management work that the proponent will undertake. This will be described in the adaptive management plan.
Non-Indigenous heritage	
27	Impact to the cultural heritage values of the London Bridge karst formations (natural arch, caves and archaeological deposits) will be avoided.
28	Impact to the site of the Williamsdale School will be avoided. Temporary fencing will be erected during construction to protect it from indirect impact. An archival recording will be made of the site and any historic material collected during research will be lodged with the ACT Historic Society.
29	The Goulburn to Cooma railway line will be reinstated following completion of construction at the location where the pipeline needs to pass under the railway.
30	A non-Indigenous heritage management sub-plan will be prepared as part of the CEMP, outlining the procedures to manage and minimise the potential for impact on items of historic heritage.
31	The design and construction of the project will ensure that disturbance to the line of trees marking the driveway for Burra Station will be minimised and any lost trees will be replaced with the same species following the completion of the project.
32	A protocol will be followed in the event that historical relics are encountered during the preferred project construction works. An Unanticipated Discovery Protocol will be included within the non-Indigenous heritage management sub-plan. The protocol will address both Indigenous and non-Indigenous finds and comply with the requirements of the ACT and NSW statutory authorities.

Commitment	
Topography, soils and groundwater	
33	Should groundwater be intercepted during construction in a volume that will necessitate dewatering, the NSW Department of Water and Energy will be consulted to determine if approval under Part 5 of the Water Act 1912 is required.
34	A soils management sub-plan will be prepared as part of the CEMP. It will be prepared consistent with relevant guidelines, including Managing Urban Stormwater: Soils and Construction.
35	Clearing of the pipeline corridor will be minimised where practicable to the extent necessary for construction of the pipeline and will not exceed the 40 m construction corridor. Where the alignment passes through areas of good quality remanent vegetation the construction corridor will be reduced and the area of disturbance restricted to a narrow band (down to 15 m). Clearance activities will be conducted in accordance with specific work method statements that will be developed as part of the CEMP.
36	The pipeline construction process will restore native topsoil so that following construction the site alignment can be rehabilitated, with impacted flora restored to original condition. Topsoil will be stockpiled along the alignment and spread in accordance with the rehabilitation plan.
37	A suitably qualified soil conservationist will be engaged to work on the construction of the preferred project. Erosion and Sediment Control Plans (ESCP) which will be adopted as a sub plan under the CEMP. The ESCP will be developed prior to construction commencing, and will be progressively updated. Soil testing will be conducted to determine soil types. All construction personnel will be trained on ESCP.
Land use	
38	The detailed design of the project and CEMP will aim to ensure that disruption to any farming businesses or recreational uses in the vicinity of the project is minimised.
39	The proponent will consult and prepare agreements between the proponent and landholders to manage the potential for construction impacts to the operation and use of each property affected by the project.
40	The pipeline route will be periodically inspected to ensure rehabilitation and stabilisation works have been effective in the longer term.
41	Consultation with land owners will occur in accordance with the operational environmental management plan for the project, especially with regards to maintenance access.
42	Reinstatement of areas disturbed during construction of the project will be undertaken progressively during the construction period. A Rehabilitation Plan will be developed to describe the rehabilitation management, objectives and activities necessary to assess and rehabilitate areas impacted by construction works.
43	The CEMP will include measures to minimise the potential for impacts to land use during construction.
Landscape character and visual amenity	
44	Landscaping, vegetation rehabilitation, replacement planting and encouragement of natural regeneration will be undertaken in accordance with the rehabilitation plan.
45	The detailed design of all structures will involve consideration of building materials and treatments to minimise the potential visibility of the project.
46	Above ground structures along the pipeline corridor will be designed and located to be as visually unobtrusive as practicable.

Commitment	
Spoil handling and waste management	
47	Wherever practicable spoil will be reused. Any surplus spoil that cannot be reused will be transported off-site to recycling depots or approved landfill sites. The material will be tested in accordance with relevant NSW and ACT legislation prior to disposal.
48	The proponent will continue dialogue with local landowners and Palerang Shire Council regarding spoil reuse options.
Noise and vibration	
49	A noise and vibration management sub plan will be prepared as part of the CEMP to minimise the potential for impacts from noise during construction.
50	It is recommended that community consultation or notification (e.g. letter box drop) be undertaken prior to pipeline maintenance involving air valve operation. Landowners should be provided with details of the time and date at which the maintenance event is to be conducted, so that domestic livestock and pets can be restrained or housed appropriately.
Climate and air quality	
51	A climate change risk management sub-plan will be developed based on the results of the first pass climate change risk and adaptation appraisal of the project. This will include monitoring program to manage climate change risks to the project into the future as data on climate change impacts becomes more robust.
52	An Emergency and Incident Response Management Plan (EIRMP) will be developed in consultation with the ACT and NSW Government Authorities to guide the appropriate response in the event of any reasonably foreseeable emergency situation.
53	A Bushfire Risk Management Plan will be prepared for the project. This will include a review of construction activities, with any necessary mitigation forming part of the CEMP.
54	Maintenance of areas around the high lift pump station and mini hydro power facility to minimise fuel sources.
Greenhouse gas	
55	All greenhouse gas emissions associated with the construction and operation of the project will be offset.
56	In addition to the mini-hydro power facility, a number of potential options for reducing construction and operational greenhouse gas emissions will be assessed, including the use of biodiesel during construction and energy efficiency measures.
Social and economic	
57	Consultation with the community throughout the project planning and construction phases, as outlined by the community engagement and stakeholder management plan, will be undertaken to ensure that community members have adequate information about the project, access arrangements, and the timing and scope of activities in their area.
58	Consultation with affected and adjacent land holders with farm animals to determine mechanisms to minimise noise and disturbance to animals.
59	Traffic management measures to account for the special needs of the equine owners and local business within the area.

Commitment	
60	The proponent will work with Palerang Shire Council and community members to identify and assist the progression of potential community benefits, including road realignment and safety improvements at Gibraltar Saddle, maintenance of Burra Creek vehicle crossings, greenways and riparian revegetation of Burra Creek adjacent to Burra village and raising of pedestrian access to London Bridge Homestead above the predicted high water mark.
Health and risk impacts	
61	An integrated risk management plan will be developed for the project, to provide a systematic proactive approach to identifying, analysing, assessing, documenting, accepting or mitigating and managing risks. Ongoing risk identification, assessment and risk ranking will be done at the concept design phase, the detailed design stage, during the construction phase, at the commissioning phase and again at the completion of the warranty period. The plan will cross-reference the other plans being prepared for the project.
62	The proponent will implement the integrated risk management plan to ensure that risks and their management through the construction period are tracked.
Traffic and transport	
63	Monaro Highway/Angle Crossing Road intersection will be improved by widening the road pavement to provide a right turn land from the Monaro Highway and improved geometry for the left turn from Angle Crossing Road.
64	Grading of Angle Crossing Road and unsealed sections of Williamsdale Road will be undertaken in the vicinity of the pipeline construction be undertaken.
65	Disruption to private property access will be minimised for the duration of the construction works and access will be restored and maintained at each property as soon as practicable as work moves along the pipeline corridor.
66	Any damage to road surfaces that result from the project will be repaired at the expense of the proponent.
67	Consultation with the lessee of the rail crossing - the Australian Railway Historical Society will be undertaken to ensure that timing of the works minimises impacts on any use of the Goulburn to Cooma Railway (Michelago Tourist Railway).
68	A traffic management sub-plan will be prepared as part of the CEMP, with detailed measures to manage impacts from traffic as a result of construction of the project.
Consultation	
69	ACTEW community engagement and stakeholder management program will continue throughout the life of the project and provide opportunities for the community to continue to contribute to the implementation of the project.
70	ACTEW will continue to work closely with directly affected landholders to discuss construction requirements and in particular develop individual agreements with landholders around the long term rehabilitation of land.

Commitment	
71	The proponent will work with Palerang Shire Council and community members to identify potential community benefits in recognition that benefits derived from the project (including secure water supply and a stable economy) are not directly related to the local impacted community.
72	The proponent will keep the community informed about the project during construction via regular letterboxed updates, the project website and where appropriate, through advertisements in the local newspaper and community information sessions. ACTEW's toll-free project info line and construction response line will also be used.
Independent Auditor	
73	ACTEW will appoint an independent auditor prior to the commencement of construction works to audit and ensure all commitments set out in the EIS are fully completed to the satisfaction of ACTPLA and NSW Department of Planning.
74	The Independent Auditor will also audit and ensure that conditions of approval under the Planning and Development Act 2007 are fully completed to the satisfaction of ACTPLA.

Conclusion

The proposal to transfer water from the Murrumbidgee River to Googong Reservoir represents a major investment in securing water supply for the ACT region. It will deliver substantial economic and social benefits.

The environmental assessment indicates that, while there are some potentially significant impacts, appropriate mitigation measures can be applied to minimise these impacts to acceptable levels. The construction and operation of the preferred project will be supported by the implementation of best practice environmental management systems encompassing construction and operation environmental management plans, and monitoring and adaptive management programs. These plans and programs will commit to compliance with relevant legislation and any conditions of approval. It is unlikely there will be any significant residual impacts as a result of the project.

ACTEW will ensure a high standard of environmental management will guide the construction and operation of this project, and the significant economic and social benefits of the project will positively impact on this region for many years to come.

