Macquarie River to Orange pipeline project

Environmental assessment

Volume 1

August 2012

Orange City Council

Macquarie River to Orange pipeline project

Environmental assessment

Volume 1

Main report

August 2012

Submission of Environmental Assessment

Prepared under the *Environmental Planning and Assessment Act 1979*, Section 75H

Environmental assessment prepared by	Name	Amanda Raleigh
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	Address	GHD Pty Ltd Level 15, 133 Castlereagh Street Sydney NSW 2000
	In respect of	Macquarie River to Orange pipeline project
Project	Applicant name	Orange City Council
	Applicant address	Civic Centre Corner of Byng St and Lords Place Orange NSW 2800
	Land to be developed	As shown in the environmental assessment.
Environmental assessment	An environmental assessment is attached.	
Certificate	I certify that I have prepared the contents of this Environmental Assessment and to the best of my knowledge: ◗ It is in accordance with the requirements of Part 3A. ◗ It contains all available information that is relevant to the environmental assessment of the development. ◗ That the information contained in the environmental assessment is neither false nor misleading.	
	Signature	
	Name	Amanda Raleigh
	Date	3 August 2012

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Glossary of terms

Term	Definition
air valves	An air valve or air release valve is designed to automatically release small pockets of air to the atmosphere as they accumulate along a pipeline or piping system when it is full and operating under pressure. It is also designed to automatically discharge or admit large volumes of air during the filling or draining of a pipeline.
alien species	Exotic fish species breeding in the wild.
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.
asbestos	The term for any of the fibrous (asbestiform) varieties of several different minerals. The mineral chrysotile, which is found in serpentine rock, is also known as white asbestos.
aquifer	Rock or soil formation containing groundwater in recoverable quantities.
average daily traffic	A sample of the annual average daily traffic - the traffic count averaged over a particular month, a week or a few days.
biodiversity offsets	An action that compensates for impacts caused by the development-related impacts upon biodiversity.
break tank	A break tank is a water tank apparatus that uses an air gap to stop reflux (backflow) into the system.
causeway	A raised roadway, as across water or marshland.
catchment	The area drained by a stream, lake or other body of water.
chainage	A term for distance or length along a project extent as measured by a surveyor's chain, tape or wheel.
chrysotile	Chrysotile is a mineral of the serpentine group that crystallizes in thin, flexible fibres. It is one of several different minerals of this type that together are called asbestos.
costean	Trenches or small pits dug through the surface soil or debris to the underlying rock in place for the purpose of exposing the outcrop of a mineral deposit.
cumulative impact	A significant impact created by accumulation or successive additions of individual impacts, which may not in themselves be significant.
decibel	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.
discharge structure	Water is discharged to the Suma Park reservoir via the discharge structure.
NSW Director-General's requirements	Outlines the requirements for an environmental impact assessment in accordance with the EP&A Act.
easement	An easement is a legal right to use land for a particular purpose. Ownership of the land remains with the landowner, however the use of the land would be subject to certain conditions.

Term	Definition
effluent	Liquid waste or wastewater, which may or may not have been passed through a 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 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
fluvial processes	The physical interaction of flowing water and the natural channels of rivers and streams.
geomorphology	The study of the physical features of the surface of the earth and their relation to its geological structures.
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.
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_{Aeq}	The equivalent continuous A-weighted sound level. When a noise varies over time, the Leq is the equivalent continuous sound which would contain the same sound energy as the time varying sound. It is considered to represent the average level.
L_{Aeq} (1 hr)	The L_{Aeq} noise level for a one-hour period. In the context of the 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.
naturally occurring asbestos	The natural geological occurrence of asbestos minerals found in association with geological deposits including rock, sediment or soil.
noise sensitive receiver	*Noise sensitive place* 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 *Nature Conservation Act 1992* (e) a marine park under the *Marine Parks Act 1982* (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.
offtake structure	Water is drawn out of the Macquarie River by means of the pumping infrastructure contained in the offtake structure.

Term	Definition
particulate	Small particles, usually occurring in suspension.
pH	Measure of acidity (or alkalinity).
pipeline corridor	The corridor in which the pipeline would be located and within which construction would be undertaken.
pipeline easement	The land under which the pipeline is located would be subject to an easement.
project	The project for the purposes of this assessment is the proposal to construct and operate a pipeline and associated infrastructure, between the Macquarie River and the Suma Park Dam.
project corridor	The corridor in which the project (including the pipeline and associated infrastructure such as the power supply) would be located and within which construction would be undertaken.
proponent	Orange City Council
pump station	A combination of pumps, electrical control equipment, with piping, valves and sensors, usually contained within a building or structure, used to transfer fluid (generally water) from one point to another.
rating background level (RBL)	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: ◗ All the day assessment background levels over the monitoring period for the day; (7 am to 6 pm) ◗ All the evening assessment background levels over the monitoring period for the evening; (6 pm to 10 pm) ◗ All the night assessment background levels over the monitoring period for the night. (10 pm to 7 am).
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.
rip rap	Also known as rock armour – consists of rock or other material used to protect shorelines, streambeds, abutments, banks etc against scour/erosion.
rock hammering	Construction equipment used to split and/or break rocks.
scouring	Erosion caused by the movement of water.
scour valves	Scour valves are installed at low points to permit water to be drained from the pipeline to allow maintenance. Scour valves are also used to flush dirty water and suspended solids from the pipeline.
secure yield	The annual demand that can be supplied from a water supply system while satisfying the following conditions (also known as the NSW security of supply basis or the 5/10/10 rule): ◗ Duration of restrictions does not exceed 5% of the time. ◗ Frequency of restrictions does not exceed 10% of years (that is, one year in 10 on average). ◗ Severity of restrictions does not exceed 10%. Systems must be able to meet 90% of the unrestricted water demand (that is, 10% average reduction in consumption due to water restrictions) through a repetition of the worst recorded drought, commencing with the storage drawn down to the level at which restrictions need to be imposed to satisfy a) and b) above. Secure yield is defined as the highest annual water demand that can be supplied from a water supply system while meeting the above.

Term	Definition
(NSW) security of supply basis	The NSW security of supply basis was developed for sizing water supply systems to ensure cost-effective systems are developed which can provide a supply in future droughts without the need for excessive frequency, severity or duration of drought water restrictions. See also 'secure yield' (above)
serpentinite/ serpentine rock	Serpentinite is a rock composed of one or more serpentine group minerals. Minerals in this group are formed by serpentinisation, which is a hydration and metamorphic transformation of ultramafic rock from the Earth's mantle. Serpentinite can contain chrysotile, the serpentine mineral that crystallizes in long, thin fibres. This is the mineral commonly known as asbestos.
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.
spoil	Material removed from and under the ground during construction, usually as a result of excavation.
study area	The project corridor/construction area and any additional areas likely to be affected, either directly or indirectly, by the project.
the assessment	This environmental assessment.
the project	The Macquarie River to Orange water pipeline project.
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 *Threatened Species Conservation Act 1995.*
vehicles per day	The number of vehicles passing a point on a road in both directions for 24 hours.
watercourse	A river, creek or other natural watercourse (whether modified or not) in which water is contained or flows (whether permanently or from time to time).

List of abbreviations

Abbreviation	In full
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
BoM	Bureau of Meteorology
CEMP	construction environmental management plan
CH	chainage
CO2-e	carbon dioxide equivalent emissions
CSIRO	Commonwealth Scientific and Industrial Research Organisation
dB	decibel
dB(A)	decibel A-weighting
DSEWPaC	(Commonwealth) Department of Sustainability, Environment, Water, Population and Communities
EEC	endangered ecological community
GHD	GHD Pty Ltd
GIS	geographical information systems
GL	gigalitre
ha	hectare
ISO	International Standards Organisation
kg	kilogram
km	kilometre
km/hr	kilometre/hour
kV	kilovolt
kWh	kilowatt hour
L	litre
m	metre
m^2	metre squared
m^3	metre cubed
m/s	metres/second
ML	megalitre
ML/day	megalitres per day
mm	millimetre

Abbreviation	In full
MW	mega watt
NSW	New South Wales
OCC	Orange City Council
PAD	potential archaeological deposit
PASA	potential archaeologically sensitive area
PM_{10}	particulate matter with a diameter less than or equal to a nominal 10 micrometres
PPV	peak particle velocity
sp.	species (singular)
spp.	species (plural)
t	tonnes
$\mu g/m^3$	micrograms per cubic metre
V	volts
°C	degrees Celsius

Executive summary

Overview of the project

Introduction

This environmental assessment has considered the potential impacts of the proposal to construct and operate the Macquarie River to Orange pipeline project (referred to as 'the project' for the purposes of this document).

It has been prepared by GHD Pty Ltd (GHD) on behalf of Orange City Council (Council) to assist the Minister for Planning and Infrastructure assess Council's application for project approval. The environmental assessment has been prepared in accordance with the provisions of (the now repealed) Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the requirements of the Director General of the Department of Planning and Infrastructure dated 24 March 2011 and 27 February 2012.

Why is the project needed?

Orange has experienced water shortages for some time. In May 2010, the city was on the brink of level six water restrictions, which would have severely restricted business and industry activity within the city.

In response to ongoing concerns about the security of the city's water supply, Orange City Council adopted a strategy '*to establish a broad-based water supply strategy for the next 50 years and beyond which focuses on ongoing water conservation, quality and demand management and the provision of key water supply infrastructure at least 10 years in advance of projected demand'.*

Council has also undertaken an integrated water cycle management study, which has estimated Orange's future water demands. The various studies and modelling have shown that:

- there is an existing and immediate shortfall in water supply
- the gap between supply and demand will continue to widen in the future
- without significant augmentation of the city's water supply, population growth and development will stagnate.

To address the existing shortfall in supply and to provide certainty about future supply, Council is proposing to construct and operate the project. The design and development of the project has taken into account the existing and future water needs of the Orange community; projected population growth; secure water yields with demand management measures in place; and potential environmental, economic, community and climate change impacts. Once it is fully operational, the project would provide for the water supply needs of the Orange community until at least 2060 under a medium population growth scenario.

Council has a water supply entitlement that provides access to 7,800 ML/year of water for water supply purposes from the Macquarie River system. The existing water supply system cannot deliver this supply with security. The addition of the project would provide a diversified system, which would contribute to

water security for the Orange community. Adding independent water sources to the system increases security.

Development of the project has been guided by a taskforce consisting of representatives of various NSW government agencies.

What would the project involve?

The project involves construction and operation of the infrastructure required to transfer, on average, 1,616 mega litres (ML) of water per year a distance of approximately 37 km from the Macquarie River to the Suma Park Reservoir at Orange. On average, pumping would occur 135 days per year (when the operating rules are met), transferring approximately 12 ML per day over a 19 hour period.

The infrastructure required to transfer the water includes an offtake (inlet) structure and pump stations, an underground pipeline, a discharge (outlet) structure, and ancillary infrastructure. The project involves construction and operation of the following main infrastructure:

- a pipeline approximately 37 km in length and 375 mm in diameter, between the upper Macquarie River and Suma Park Dam
- an offtake structure and pump station buildings located at the water intake point at the Macquarie River
- two booster pump stations and break tanks along the pipeline corridor
- a water discharge structure at the Suma Park Dam
- a power supply to the pumps and other infrastructure
- telemetry controls to enable remote operation of the infrastructure, including the pumps and valves.

It is noted that the route and project components described in the environmental assessment are indicative and conceptual, and does not preclude Council from refining the design as part of the detailed design phase. This may occur due to the need to:

- avoid ground conditions or services that present significant construction difficulties in terms of logistics, time and/or cost
- reduce the construction timeframe
- avoid areas of environmental sensitivity identified following approval
- reduce impacts on local residents
- improve the operation of the project without increasing the potential environmental impacts.

Environmental features

The offtake structure would incorporate the following features to minimise the potential impacts on the aquatic environment. It is noted that these features would be further refined during detailed design:

- the structure would be located in a section of the river with relatively slower flows – minimising the potential for erosion impacts around the structure given there is also exposed bedrock around the banks
- a coarse screen to filter larger items from the intake structure and provide an initial barrier to prevent fauna entrainment

- a filter module including fine screens (2 mm) to minimise the uptake of smaller objects, including aquatic organisms (such as eggs or larvae of the identified threatened aquatic species)
- the sizing of the large screen would provide a start up velocity of 0.05 m/second and the sizing of the fine screen would provide a start up velocity of 0.15 m/second allowing aquatic fauna to escape
- an air purge system to clean the fine filters, which would also operate to scare fish from the pump chamber prior to system start up
- the proposed 19 hour pumping period would provide less mobile aquatic organisms the opportunity to escape the inlet
- scour protection in the form of rock rip rap around the intake structure to stabilise the embankment and mitigate erosion
- telemetry providing links to real time water quality monitoring, to ensure pumping does not occur during periods of poor water quality in the river.

Operating regime and rules

On average, the project would:

- deliver 1,616 ML/year of water to Suma Park Reservoir
- extract water from the Macquarie River 135 days of the year
- have a maximum extraction rate of 12 ML/day
- pump water over a period of 19 hours per day.

The project would extract up to 12 ML/day when the following conditions are met:

- the storage level in the Suma Park Reservoir is less than 90% full
- the flow in the Macquarie River exceeds 38 ML per day
- the water quality within the Macquarie River is acceptable for extraction purposes.

These are the proposed operating rules for the project.

What are the objectives of the project?

Council's comprehensive water supply management strategy for Orange has as its strategic objective: '*to establish a broad-based water supply strategy for the next 50 years and beyond which focuses on ongoing water conservation, quality and demand management and the provision of key water supply infrastructure at least 10 years in advance of projected demand'.*

In delivering the key water supply infrastructure component of this strategic objective, Council has set the following objectives for water supply augmentation projects:

- meet best practice secure yield guidelines consistent with the 'NSW Security of Supply basis' (commonly referred to as the '5/10/10 rule') for the next 50 years
- deliver a minimum of 1,000 ML of water per year as additional secure yield, to satisfy immediate supply needs in the short term
- deliver a minimum of 2,700 ML of water per year, to meet the expected demand to 2060

- diversify Orange's water supply sources in an environmentally sustainable way, to ensure resilience in times of drought
- consist of components which can be delivered in the required timeframe
- adapt to changes in demand and/or supply if they are impacted by climate change.

The overarching aim of the project is to be consistent with the above objectives.

What are the benefits of the project?

The project would augment Orange's existing water supply and contribute to the future water security of Orange. It would:

- enable the secure yield of Orange's water supply system to meet best practice guidelines for urban centres
- provide a level of water supply security for Orange that is consistent with that of surrounding regional centres, such as Bathurst and Dubbo
- ensure that Orange would have sufficient water to meet demands during any future drought more severe than the worst recorded drought
- ensure that there would be adequate future capacity in Orange's water supply system to respond to rapid increases in demand or decreases in yield due to climate change or other factors
- ensure that water supply security is not a constraint to Orange's continued growth as a regional centre.

Scope of the environmental assessment

On 13 January 2011 the (then) Minister for Planning declared the project to be a project to which Part 3A of the EP&A Act applies (refer Appendix A). The Minister for Planning and Infrastructure is the approval authority for the project and an environmental assessment (this document) is required to support the application for approval in accordance with the requirements of the EP&A Act.

This environmental assessment has been prepared in accordance with the EP&A Act and the Director-General's requirements for the project (Appendix A) to support Council's application for approval of the project. The environmental assessment provides:

- Information on the project, including the project need and alternatives considered.
- A description of the existing environment and an assessment of the potential key environmental impacts of the project identified by the Director-General's requirements.
- The proponent's commitments in terms of measures to minimise and manage potential environmental impacts.

The environmental assessment focuses on the key assessment requirements specified by the Director General's requirements. It is supported by a number of specialist technical studies, provided as appendices to the main document.

Summary of the findings of the environmental assessment

Hydrology and water security

Water security and system flow impacts

The hydrology and water security assessment indicates there is some flow in the Macquarie River at least 99% of the time, and in the Turon River at least 91% of the time. Modelling demonstrates that flows greater than the proposed level when extraction would be triggered (38 ML/day) are expected to occur for at least 71% of the time, which provides adequate opportunity for pumping in accordance with the proposed operating rules. On this basis, it is concluded that the Macquarie River provides a viable water source that could contribute to the water security of Orange without significantly impacting on flows in the river.

The potential impacts of the project on system flows were assessed based on the proposed 12/38 operating rule. The long term extraction volumes were also based on the assumption of continued water demand growth for the next 118 years. This is considered to provide a conservative basis for the assessment and presents a worst case scenario. Modelling was undertaken to assess the potential impacts of the project during dry and wet periods. During the three dry (drought) periods modelled, the average annual extraction was 1.0% to 2.4% of the total river flow, the project would have operated on average 149 to 237 days a year, and it would not have impacted on low flows.

During the two wet periods modelled, the average annual extraction was 0.11% to 0.2% of the total river flow, the project would have operated on average 59 to 79 days a year, and would have had a slight impact (in the 80th to 85th percentile flow range). There would not have been any impact on very low flows through the system and pumping would not have occurred below the cease to pump level (that is, the 95th percentile).

An assessment was undertaken to determine how Council's combined water storage would have behaved if the project was in operation through the period from January 2000 to December 2010. There was sufficient flow in the Macquarie River for the project to have operated on 81% of days during this period if required. With the addition of the project, the combined storage level would not have fallen much below 50% and water restrictions would have remained at level two or less.

The assessment concluded that the average annual extraction from the Macquarie River under the proposed 12/38 operating rule is 1,616 ML/year which represents 0.52% of the average annual river flow. The project would substantially increase the city's secure yield and provide water security for the next 39 to 58 years (without the potential impacts of climate change) based on high and medium population growth projections respectively. Under the potential impacts of climate change, the project can provide water security for the next 26 to 37 years based on high and medium population growth projections respectively. Sensitivity analysis demonstrates that the project is a robust water supply option that is not significantly impacted by assumptions relating to low river flow.

Other impacts

Modelling was also undertaken to consider the potential impacts of extraction of water from the Macquarie River. The results of modelling show that the project would have minor impacts on streamflow and use through the regulated system. The reduction in streamflow in the Macquarie River (at Marebone Weir) would represent only 0.12% of the long term average annual flow, or up to about 0.80% of the flow during drier periods. This is because the direct impact of the proposed extraction would be buffered by

flow regulation through Burrendong Dam, and operation in accordance with the Macquarie-Cudgegong water sharing plan.

It is concluded that the project would not detrimentally impact on the ability of the regulated system to operate in accordance with the Macquarie-Cudgegong Water Sharing Plan. The potential impact of the project on downstream water users and the downstream flow regime (including the regime at the Macquarie Marshes) is likely to be negligible.

Modelling demonstrates that the increased flow in the Summer Hill Creek system caused by the increased spill would have insignificant impact on the creek system as the hydraulic changes are minimal and would be dampened by inflow from downstream tributaries.

Council can ensure it has proper access entitlement to water through the transfer of an unregulated licence from an upstream location on the Macquarie River to the proposed offtake point and temporary transfer of a portion of its existing water access licence from Summer Hill Creek to the Macquarie River on a year to year basis.

Surface water quality and groundwater impacts

Water quality

The main potential impacts on water quality that would require management are:

- construction of the project
- addition of a major new source of water to Council's drinking water system.

The potential impacts of construction works relate mainly to erosion and the generation of sediment, particularly during watercourse crossings. To mitigate the impacts of construction on water quality, various erosion and sediment control measures have been recommended, including measures for the main watercourse crossings. A surface water monitoring framework has also been prepared to assist with the implementation and monitoring of sediment and erosion control.

The introduction of water from the Macquarie River into the Suma Park Reservoir has the potential to impact on the quality of water within the reservoir, and the operation of the Icely Road Water Treatment Plant. However, the assessment concludes that there are unlikely to be significant overall changes in the quality of water in the reservoir.

An assessment was undertaken of the potential operational impacts of the project on the Icely Road Water Treatment Plant. The following conclusions were made about the future performance of the plant:

- Icely Road Water Treatment Plant is capable of treating all raw water quality parameters for the proposed new water supply.
- Additional testing would be undertaken to verify the water quality parameters including true colour and soluble iron.

The major parameters of concern for the new water supply are turbidity and bromide. To respond to this, a bromide process optimisation strategy would be developed for the treatment plant. Ongoing monitoring of the project would include measurement of bromide levels in the Macquarie River.

A scour water management plan would be developed to manage the release of scour water during operation. The preferred approach to the management of operational scour water would be to discharge water to the natural environment if the water quality standards and criteria defined by the scour water

management plan are met. Alternatively, water would be collected from the scour pits by tanker trucks and transferred to the stormwater holding pond or Council's sewage treatment plant.

Groundwater

Construction is not anticipated to impact on groundwater resources. Trenching would be relatively shallow compared to likely depth of the water table and is not likely to intercept groundwater aquifers or their flow systems.

Groundwater levels adjacent to the Macquarie River are unlikely to be materially affected by the project. Potential changes in groundwater levels are predicted to be minor, and are expected to diminish with distance from the river until they are negligible. There would be no upstream groundwater impacts as a result of the project.

Geomorphology and watercourse impacts

During construction, watercourses with less stable bed material (like silt, clay and gravel) are more prone to erode than watercourses with bedrock, boulders and cobbles. Watercourses that are most likely to experience minor changes as a result of the project are:

- Summer Hill Creek
- Cow Creek
- Oaky Creek.

Construction of the offtake structure is unlikely to result in stability impacts up or downstream as a result of the high strength of the river bed and bank materials, and the estimated hydrodynamic forces. Potential impacts would be limited to minor turbulence in the immediately vicinity of the structure, which would be readily mitigated by the design of the structure.

Terrestrial ecology

The main potential impacts of the project on terrestrial ecology would occur during the construction phase as a result of the clearing of vegetation and direct habitat loss and modification. Direct impacts have been avoided to a large extent by careful alignment of the project corridor. This has included, where possible, making use of existing road reserves and cleared land, avoiding large stands of vegetation, and the use of existing access tracks during construction and operation. Avoidance of the requirement to clear native vegetation as far as possible has significantly reduced the potential for adverse impacts of the project on biodiversity values.

The proponent is committed to minimising the environmental impacts of the project. The project corridor would be further refined during the detailed design process, with the aim of reducing the amount of vegetation clearing required as far as practicable. At this stage, it is estimated that the project would require the permanent removal of 19.5 hectares of native vegetation. This vegetation includes 7.8 hectares of the Box Gum Woodland threatened ecological community, listed under the TSC Act, of which 5.8 hectares is also listed under the EPBC Act, as well as potential habitats for threatened flora and fauna species. Assessments of significance completed for Box Gum Woodland conclude that the project is likely to impose a significant effect on this community. A range of pre-construction and construction mitigation measures would be implemented to lessen the severity of this impact. In addition, a biodiversity offset would be developed to address the residual impacts on Box Gum Woodland.

No threatened flora was recorded within the study area. Potential habitat for two species (Austral Toadflax and Silky Swainson-pea) is present within the project corridor and would be impacted during construction. A third species*, Euphrasia arguta*, was considered to have marginal potential habitat within the study area. In addition, potential habitat for threatened fauna species would be permanently removed during construction.

Assessments of significance prepared according to Part 3A and EPBC Act guidelines conclude that the project has the potential to result in a significant impact on one threatened fauna species, the Superb Parrot. To address the residual impacts on this species and on biodiversity in general, a biodiversity offset strategy would be implemented.

A biodiversity offset would be required to address the residual impacts of the project on biodiversity values, according to the requirements for Part 3A projects under the EP&A Act, and to offset impacts on EPBC Act matters. Council is committed to providing a satisfactory offset for project impacts in consultation with relevant agencies. Preliminary investigations undertaken in relation to potential biodiversity offsets indicate that there are potential offset sites currently available for sale. Additionally, Council owns land which may, subject to further investigations, provide suitable offset lands. Alternatively, Council may choose to purchase biobanking credits to offset the impacts of the project. These options, and the preferred approach to offsetting, would be documented in the offsets strategy, which would be finalised prior to construction.

Aquatic ecology

Five threatened fish species (Macquarie Perch, Trout Cod, Flathead Galaxias, Silver Perch, Purple-spotted Gudgeon), and one endangered fish population (Eel Tailed Catfish) listed under the FM Act, and three threatened fish species listed under the EPBC Act (Murray Cod, Macquarie Perch and Trout Cod), were identified as potentially occurring within the study area. Although it is considered unlikely that Flathead Galaxias and Purple-spotted Gudgeon would occur in the study area, potential impacts on these species were also assessed as a precautionary measure. No threatened species, endangered populations or communities listed under the FM Act are likely to occur at any of the proposed watercourse crossings or at the discharge site (in Suma Park Reservoir). Similarly, no threatened fish listed under the EPBC Act are likely to occur in these watercourses.

The main potential impacts on threatened fish species include the loss of a small area of potential feeding and spawning habitat within the Macquarie River as a result of construction of the offtake structure; potential entrainment during operation of the offtake; and indirect impacts on habitat as a result of any changes in water quality and flow. The project would incorporate various design features to minimise the potential impacts on the aquatic environment. These features would be further refined during detailed design. Potential impacts would be further mitigated and managed through the implementation of appropriate construction management measures; continuing to refine the design of the project; and the implementation of the proposed pumping regime. As a result, the project is unlikely to result in any significant impacts on threatened aquatic biota or their habitats.

The potential risk of the entrainment of aquatic organisms has been recognised by Council. The design of the offtake structure would include a number of design features to minimise this potential impact, including fine screens and low start up velocities to minimise the potential uptake of and/or fouling by smaller objects, including aquatic organisms.

Hydrological modelling conducted for the project indicates that the abstraction of water from the Macquarie River, as proposed, is not predicted to have any adverse impacts on the Macquarie Marshes Ramsar wetland (an EPBC Act matter) or on the Darling River endangered ecological community (listed under the FM Act). Potential downstream impacts between the offtake site and Burrendong Dam during operation of the project would include reduction in the inflows to the section of the river between the offtake site and Burrendong Dam. The changes in aquatic ecology associated with the decreased volumes of low to moderate, and moderate to high flows, are expected to be within the range of natural variability and much smaller than those that would occur periodically during droughts. It is considered that these changes would be unlikely to have a significant impact on the quality of aquatic habitat aquatic biota in this section of the river.

Changes in flows are predicted to occur downstream of Suma Park Reservoir as a result of the operation of project. These changes are predicted to be small in volume and frequency, and would not have a significant impact on the hydraulic characteristics of Summer Hill Creek. It is unlikely that the changes in availability of aquatic habitats associated with small changes in flows would be significant.

The assessment concludes that the project would be unlikely to result in a significant impact on any threatened aquatic flora and fauna or their habitats.

Air quality

Air quality issues include the generation of dust during construction, and the potential exposure of natural asbestos fibres as a result of disturbance of areas where the rock serpentinite is located. These issues would be managed through the implementation of air quality management controls and the naturally occurring asbestos management measures, as outlined in the construction environmental management plan. Any air quality impacts associated with operation of the project would be temporary, localised and minimal in nature, and would be limited to the generation of dust associated with the movement of maintenance vehicles.

The scale of the civil works for the construction of the offtake, pumping station and discharge structures present minimal risks that air quality criteria would be exceeded. There would therefore be no need for any measures beyond standard construction environmental management measures for these aspects of the project.

For the construction of the pipeline, additional dust control measures would be adopted where sensitive receptors fall within the range of worst-case predicted impacts (within 240 metres) or during dry conditions if visible dust plumes are moving off-site towards sensitive receptors. The impact assessment demonstrates that increased watering during haul road activities has the potential to reduce the area impacted by dust generation (under a worst-case scenario) to within 100 to 150 m of the construction works. Based on the findings of the assessment, it is expected that the generation of dust emissions due to construction works can effectively be mitigated by implementation of the mitigation measures.

Noise and vibration

There is the potential for construction noise to exceed the set criteria at various receivers along the route of the pipeline based on a worst case construction scenario. The noise levels at one receiver (at 494 Ophir Rd) were predicted to exceed the highly noise affected level of 75dB(A). In accordance with the requirements of the Interim Construction Noise Guidelines, respite periods may be required for this property.

The potential significance of the impacts would be minimised by the mobile nature of the majority of the construction works. Although construction noise would be temporary and localised in nature, the potential impacts would be managed through the implementation of noise control measures outlined in section 15.6, particularly for those sections of the project within close proximity of sensitive receivers (less than 50 m).

Construction vibration was assessed and buffer distances for plant and equipment causing high vibration levels have been provided to minimise the potential for significant vibration impacts.

Sensitive receivers within 80 m of Lookout Road, Oaky Road and Bulgas Road have the potential to exceed the noise criteria during peak construction traffic periods. Sensitive receivers within 120 m of Long Point Road have the potential to exceed the criteria during peak construction traffic periods.

The noise modelling predicted that the noise levels from operation would be below 20 dB(A) for the nearest receivers. This is well below both the background noise level and the nominated criteria. No operational traffic noise impacts are predicted.

Land use

The main potential impacts on land use would occur during the construction phase. Impacts include temporary disruption to land use along the construction corridor. These impacts would be short term and minimised with the implementation of mitigation measures.

Land use impacts during operation would mainly relate to restrictions on the use of land within the easement. Most agricultural activities, such as livestock grazing, would be able to continue. Maintenance access would be infrequent and localised to specific points along the pipeline, and would not impact on the use of the land.

Acquisition of privately owned land would be required along the corridor for the pipeline and new sections of power line, and at the locations of the offtake structure (and its access road) and the booster pump stations. Council would also need to negotiate an easement over a section of the Mullion Range State Conservation Area in accordance with the requirements of the National Parks and Wildlife Act. The final easement would be confirmed during detailed design. It is likely that the final pipeline easement would be, on average, 6 to 10 m wide. However, the pipeline easement may need to be wider in some areas. The maximum width of the pipeline easement would be 20 m. The easement for the proposed new sections of power line would be 20 m wide.

Aboriginal heritage

The cultural heritage assessment has identified Aboriginal sites and considered the potential for impacts to these sites. It is noted that the majority of the study area has been disturbed in the past by clearing, mining related activities, forestry practices, rural uses (pasture improvement and grazing), residential and infrastructure development.

During the assessment two existing and 17 new sites were identified in the study area for the project. A significance assessment of these sites was undertaken. One site (MPA5 – possible scarred tree) was assessed as having high scientific significance at the local level. Four sites (MPA6, MPA9, MPA14 and Oaky Creek 2) were assessed as having moderate to high scientific significance at the local level.

Where practicable, construction activities would be designed and located to minimise the potential for impacts to significant Aboriginal sites. There is flexibility to reduce the width of the area of direct

construction impact to around 6 to 10 m where significant environmental issues and potential impacts have been identified.

The assessment concludes that, with the implementation of the mitigation measures, it is unlikely that Aboriginal heritage would pose a significant constraint to the project.

Historic heritage

The cultural heritage assessment has identified historic heritage sites and considered the potential for impacts to these sites. The pipeline corridor intersects the curtilage of two heritage listed items ('Rosedale' homestead and Templar's Mill and 'Narrambla'), however no direct impacts to these items are predicted.

Five historic heritage sites were identified during the field survey. These comprise three sites related to mining, a 20th century structure and an old alignment of Ophir Road. Where practicable, construction activities would be designed and located to minimise the potential for impacts to potentially significant historic heritage sites. There is flexibility to reduce the width of the area of direct construction impact to around 6 to 10 m where significant environmental issues and potential impacts have been identified.

Implementation of the mitigation measures would ensure that the potential for impacts are avoided where practicable, and that where impacts are unavoidable, the potential significance of impacts to historic heritage are minimised.

Visual amenity

The construction of the project would generate visual impacts during the construction period. Impacts would be experienced at the sites for the structures and along the length of the pipeline corridor. Construction impacts would be mainly due to the proximity and presence of sensitive residential receivers. However, the impacts would be temporary and limited to the construction period.

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

- introduction of new structures in the landscape (mainly the offtake, booster pump stations and discharge structures and the new/upgraded power supply infrastructure) and associated access arrangements
- linear pipeline easement, which would need to remain free of trees and large shrubs, with the width varying for an average width of 6 to 10 m, to a maximum width of approximately 20 m
- linear power supply easement (approximately 4 km long), which would need to remain free of trees and large shrubs to maximum width of approximately 20 m
- addition of associated pipeline infrastructure/structures, including maintenance access, signage and scour valves, which would increase the number of permanent built elements in the natural landscape.

The pump stations and the easements would be the main visual elements of the project and would have moderate landscape and visual impacts. The project has been designed to minimise the potential impacts as far as possible, through careful routing and siting of project elements, and by minimising clearing in areas of significant vegetation. A number of mitigation measures have been developed to further reduce the visual impacts of the project. These would be implemented during the detailed design and construction phase.

Contamination and soils

Potential areas of contamination include historic mine workings, cattle yards and saline areas within drainage depressions and drainage lines. In addition, serpentinite, which may contain naturally occurring asbestos in the form of chrysolite, is known to occur in the southern section of the pipeline corridor. A naturally occurring asbestos management plan would be prepared as part of the construction environmental management plan, to manage construction in areas where serpentinite is located. Council officers are experienced in working with and/or providing advice regarding management of this material.

Construction of the project has the potential to result in erosion and sedimentation and contamination of soils and surface waters. A number of management activities would be implemented to minimise these risks, including the implementation of a soil and water management sub-plan, and implementation of protocols for construction in areas of potentially contaminated soils.

Implementation of the project environmental controls and the construction environmental management plan would reduce the risk of potentially contaminating activities impacting on workers, surrounding residents and the environment.

The risk of contamination associated with the operation of the project is expected to be low. Sediment and erosion control plans for exposed soils would be adopted and implemented, which would reduce the risk of environmental impact.

Traffic and transport

The project would not result in any significant adverse impacts with respect to traffic and transport issues such as traffic operations, road capacity on the surrounding network, site access and road safety. During construction, traffic and transport would be managed by a construction traffic management plan prepared prior to the commencement of construction.

The road network has significant spare capacity to cater for the estimated construction and operation traffic, and no significant impacts are predicted. The review of road condition has indicated that some sections of road are unsuitable for heavy vehicle transport and may need to be upgraded in consultation with the construction contractor.

Infrastructure impacts

A number of existing services and infrastructure would be crossed or potentially impacted during construction of the project. Council has consulted service providers during the concept design process. The main potential impacts relate to construction in vicinity of the Telstra fibre optic cable and water and electricity supplies. Standard precautions and any protection measures specified by service providers would be implemented to minimise the potential impacts on infrastructure. Additional mitigation measures would be implemented in consultation with Telstra where construction is to be undertaken in close proximity to the optic fibre cable. Any impacts to infrastructure (such as disruptions or relocations) would be temporary and short-term, and would be undertaken in consultation with the service provider and local residents/service users. The project would benefit electricity customers in the vicinity of the sections of new/refurbished power supply, by improving the infrastructure and minimising future maintenance requirements and outages.

Spoil handling and waste management

The main wastes that would generated during construction of the project include excess spoil, vegetation, construction materials, and general waste. It is estimated that approximately 60% of the spoil generated would be reused on site as backfill and for restoration works. Options for the excess spoil include reuse by property owners, and storage for future reuse by Council. Any spoil that cannot be reused or stored would need to be disposed of to landfill.

Potential operation wastes include wastewater and sediments generated by infrequent cleaning and dewatering requirements. These wastes would be managed in accordance with the scour water management plan.

Socio-economic issues

Both positive and negative socio-economic impacts would result from the construction and operation of the project. It is estimated that construction of the project would cost approximately $47 million. Based on the type of expenditure and its geographical distribution, it is estimated that construction would generate almost 200 full time equivalent jobs in the region. Approximately 37% of these jobs would be in the local areas of Orange and Cabonne. It is estimated that construction of the project would contribute an additional $23.5 million to the regional economy, which translates to an increase in the local economy of almost $9 million.

Beneficial impacts as a result of the operation of the project include improved water security and resultant local and regional economic benefits. Increased water security means increased security for beneficial users of water and regional economic growth.

Where potential impacts may result (such as impacts to individual properties and amenity impacts during construction), it is considered that these could be managed by the implementation of best practice construction management and appropriate mitigation measures.

The acquisition of land for permanent easements is recognised as an impact to individual landowners. Council would work with community members to identify potential individual mitigation measures. This would offset to a degree the potential negative impacts of the project on individual property owners.

4 Draft statement of commitments

The environmental assessment provides Council's commitments for environmental mitigation, management and monitoring. The draft statement of commitments includes recommended mitigation measures to reduce and avoid identified impacts, management measures (such as the preparation of construction and operation environmental management plans) to ensure a high level of environmental performance against identified criteria, and measures to monitor performance. The statement of commitments would be finalised following exhibition.

5 Conclusion

There is a justified need for the project to deliver water security to Orange. The project was developed as an outcome of an extensive range of studies, investigations and strategy options. These studies, as outlined in the environmental assessment, considered a range of possible alternatives to the project.

Environmental investigations were undertaken during the preparation of the assessment to assess the potential environmental impacts of the project. These included specialist assessments on ecology; heritage; soils and groundwater; hydrology, geomorphology, landscape and visual amenity; air, noise and vibration; and traffic. The assessment has documented the potential environmental impacts of the project, considering both potential positive and negative impacts, and identifies mitigation and management measures to protect the environment where required. The project forms part of local and regional water security planning. The consequences of not proceeding are summarised below:

- Orange's future water security would not be assured, and it would be difficult to meet the water needs of current and future populations without extensive water restrictions. Orange could run out of water, even if severe and onerous water restrictions are applied.
- The identified need to plan for a secure water supply, confirmed by various strategic planning documents and endorsed by Council, Centroc, various NSW government agencies and the Australian Government, would not be met.
- If the project did not proceed, there would be less diversity of water sources in Orange, and a higher risk of more severe water restrictions.
- If the project did not proceed, other water supply alternatives would need to be implemented at a higher community cost and longer timeframe.
- The net cost to the community would be substantial due to the significant social and economic costs associated with water restrictions.