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Orange City Council

Orange Drought Relief Connection

Preliminary Environmental Assessment

March 2011

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Glossary

CE&SM	Community engagement and stakeholder management program
CEMP	Construction Environmental Management Plan
Centroc	Central NSW Councils
CSC	Cabonne Shire Council
CWCMA	Central West Catchment Management Authority
DECCW	Department of Environment Climate Change and Water
DSEWPAC	Department of Sustainability, Environment, Water, Population & Communities
DoP	Department of Planning
EA	Environmental Assessment
EECs	Endangered ecological communities
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPI	Environmental Planning Instrument
ESD	Ecologically Sustainable Development
LG Act	Local Government Act 1993
LGA	Local Government Area
OCC	Orange City Council
PEA	Preliminary Environmental Assessment
POEO Act	Protection of the Environment Operations Act, 1997
REPs	Regional Environmental Plans
SEPP Infrastructure	State Environmental Planning Policy (Infrastructure) 2007
TSC Act	Threatened Species Conservation Act, 1995
WMP	Waste Management Plan

Executive Summary

This Preliminary Environmental Assessment (PEA) has been prepared by GHD Pty Ltd on behalf of the Orange City Council (OCC) for the proposed development of a pipeline and ancillary infrastructure to enable water supply augmentation from the Macquarie River to the City of Orange water supply system (the 'proposal').

This PEA has been prepared in accordance with the provisions under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Orange Local Government Area (LGA) covers an area of 286 km^2 and has a population of 38,685 people which is growing at a rate of 0.6% per annum (ABS, 2010). In the last 10 years, there have been low runoff levels into the water storage supplies which have exacerbated ongoing drought conditions. This has seen water restrictions imposed on city residents since February 2003. Currently Level 2 restrictions apply, although these are being reviewed in light of recent substantial rainfall across the state.

The Centroc Water Security Study completed by MWH (Centroc 2009) has undertaken a strategic assessment on Lake Rowlands and Macquarie River as potential water relief sources. Using an environmental, social and economic decision-making framework, this study recommended that, in the long term, Orange be connected via pipeline to the Central Tablelands Water (CTW) system and supplied from an augmented Lake Rowlands dam. It was recognised however, that until the dam augmentation is completed and fully operational, an alternative source is required in the intervening period and, despite the recent rains and exceptional runoff, water security planning and implementation for the next drought period must proceed.

After consideration of a range of different options, OCC proposes to construct a pipeline along an approximately 40 km route between the Macquarie River in the vicinity of Long Point near Ophir and Suma Park Dam. The pipeline and pumping system would be constructed to enable flow rates to be adjusted in accordance with flows in the Macquarie River. The pipeline will diversify the options available for water extraction to the residents of Orange, ensuring a secure water supply and not relying on Suma Park Dam and stormwater harvesting as water sources. A maximum of 1,800 megalitres per annum of water is proposed to be drawn from the Macquarie River for raw water supply to the City of Orange, in conjunction with the continued use of the City's other water sources. On average this represents approximately 1.3% of the flow in the river below the confluence with the Turon River.

The primary objectives of the proposal are to:

- Provide infrastructure solutions, involving the development of a diversified water supply within the city which avoid reliance on a single source and enables all sources to be managed and operated in a sustainable manner; and
- Deliver a secure through diversity water pipeline and ancillary infrastructure.

The proposed pipeline will be located within the LGAs of Orange and Cabonne. Subject to detailed design, the necessary ancillary infrastructure will likely include:

- A river off-take pumping station and transfer main;
- Two pumping stations and transfer mains;
- A gravity main;
- Power supply and controls; and

- A telemetry system.

This PEA describes the proposal and outlines the process of construction and pipeline operation that would likely be associated with the development. A preliminary environmental assessment has been undertaken and key environmental issues identified. The key issues considered to be associated with the proposal include:

- The presence and proximity of threatened flora and fauna adjacent to and within the proposed pipeline and power corridors;
- Potential changes to the hydrology and aquatic habitat value of the Macquarie River in proximity to and as a result of the proposed new off take structure and associated water extraction;
- Listed and potentially previously unidentified indigenous and non-indigenous heritage items located within and adjacent to the pipeline and power corridors;
- Social impacts associated with the acquisition of land and visual amenity of the pipeline and power structures;
- Disturbance of soil during bulk earthworks and clearing and potential for erosion and sedimentation of adjacent watercourses; and
- The creation of waste products during construction.

This Preliminary Environmental Assessment includes:

- Introduction to the proposal;
- Strategic justification for the proposal;
- Discussion of the proposal options;
- A detailed description of the proposal;
- Consideration of the planning and statutory requirements of the proposal;
- Consideration of the consultation requirements of the proposal; and
- Results and considerations arising from investigations into:
  - Flora and fauna;
  - Surface and groundwater;
  - Soils and geology; and
  - Land use and ownership.

1. Introduction

1.1 Preface

This Preliminary Environmental Assessment (PEA) has been undertaken by GHD Pty Ltd on behalf of Orange City Council (OCC) for the proposed development of a pipeline and ancillary infrastructure to enable water security augmentation from the Macquarie River to the City of Orange water supply system (the 'proposal'). This document incorporates the results of a feasibility assessment (July 2010) and concept investigation (January 2011) prepared by MWH.

This PEA has been prepared in accordance with the provisions under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.2 OCC as the Proponent

OCC is a local government body located in the Central West of NSW. The Council's role is to provide the functions and services that are listed in the *Local Government Act 1993* (LG Act) to the communities within its jurisdiction. As outlined in the LG Act, the provision of water supply services to country towns in New South Wales is the responsibility of local government. OCC is one of the leading regional water authorities in NSW, consistently being recognised as complying with the NSW State Government's Best Practice Guidelines for Water and Sewer.

The Orange Local Government Area (LGA) covers an area of 286 km^2 and has a population of 38,685 people which is growing at a rate of 0.6% per annum (ABS, 2010). The OCC area includes Orange City in addition to the surrounding villages of Lucknow, Shadforth, Spring Hill and March.

1.3 Background

The City of Orange is supplied by one main water storage, Suma Park Dam located on Summer Hill Creek, approximately 4 km east of Orange. The catchment for Suma Park Dam is relatively small at 179 km^2 and the dam has a surface area of 1.3 km^2 at full supply level and a storage capacity at full supply level of 18,073 ML (Orange City Council 2011).

The city's secondary surface water supply, Spring Creek Dam, is located at the junction of Spring Creek and Gosling Creek approximately 4 km south-east of Orange. This dam has a catchment area of 63 km^2, a surface area of 1.1 km^2 and a full storage capacity of 4,500 ML at full supply level.

In the last 10 years, there have been low runoff levels into the water storage supplies which have exacerbated ongoing drought conditions. This has seen water restrictions imposed on city residents since February 2003, with Level 2 restrictions currently in force. Orange has been an early leader in the area of water conservation and within the last nine years, annual water consumption has fallen by more than 3,000 ML or 43 per cent from a record high annual water usage of 7,100 ML in 2002 to 4,100 ML in 2009 (Orange City Council 2009).

OCC believes that it has undertaken a diligent and responsible approach to addressing its water security needs. This approach has involved a number of innovative solutions which have contributed to extending the life of the city's water supplies significantly including a stormwater harvesting scheme, extensive community water wise education programs and use of various groundwater bore sites across town in an attempt to augment supplies and meet already restricted demands.

A Regional Water Security Study funded by the NSW Office of Water (Centroc 2009) identified a range of actions to be undertaken to ensure adequate levels of water security for all local water authorities in the

central west. In particular the report specifically recommended, based on the development of an emergency situation, that a pipeline connection between Orange and the Macquarie River would be the best alternative to water supply to augment the LGA's current supplies

After consideration of a range of different options, OCC proposes to construct a pipeline along a 40 km route between the Macquarie River at Long Point near Ophir and the Suma Park Dam (Figure **1**). The pipeline would be constructed to enable flow rates to be adjusted in accordance with flows in the Macquarie River, reducing potential downstream impacts whilst still achieving a maximum flow of 7 ML/day over a sustained period to meet 50% of Orange's emergency water supply needs.

1.4 Objectives and overview of the proposal

The proposal is a pipeline scheme to transfer water from the Macquarie River to Orange passing initially through private property then connecting to Long Point Road reserve and onto Orange's Suma Park Dam. The primary objectives of the proposal are to:

- Provide a pipeline from the Macquarie River to Suma Park Dam to deliver water and relieve stress on the water supplies; and
- Deliver an operating pipeline and ancillary infrastructure by 2012.

The proposed pipeline will be approximately 40 km in length and will be located within the Local Government Areas (LGAs) of Orange and Cabonne. Subject to detailed design, the necessary ancillary infrastructure will likely include:

- A river off-take pumping station and transfer main;
- Two pumping stations and transfer mains;
- A gravity main;
- Power supply and controls; and
- A telemetry system.

The potential pipeline corridor is shown in Figure **1**. Investigations are continuing to determine the specific pipeline route within the corridor which, where possible, will be guided by an avoidance policy for sensitive landuses and environmental impacts.

The pipeline will be designed to accommodate a maximum flow of approximately 7 ML over 22 hours a day, taking into account flow variance in the river. The mode of operation of the system, whether it will be continuous or intermittent, is also under consideration.

1.5 Purpose of this Preliminary Environmental Assessment

This PEA provides a preliminary assessment of the key issues associated with the proposal and outlines broad methodologies for subsequent detailed environmental assessment. Key environmental features are discussed further in Section 8.

The purpose of this PEA is to describe the key elements of the proposal, with the view to seek formal Director General's Requirements from the Department of Planning (DoP), including requirements from other government agencies, as the basis for the detailed Environmental Assessment (EA) and further design development.

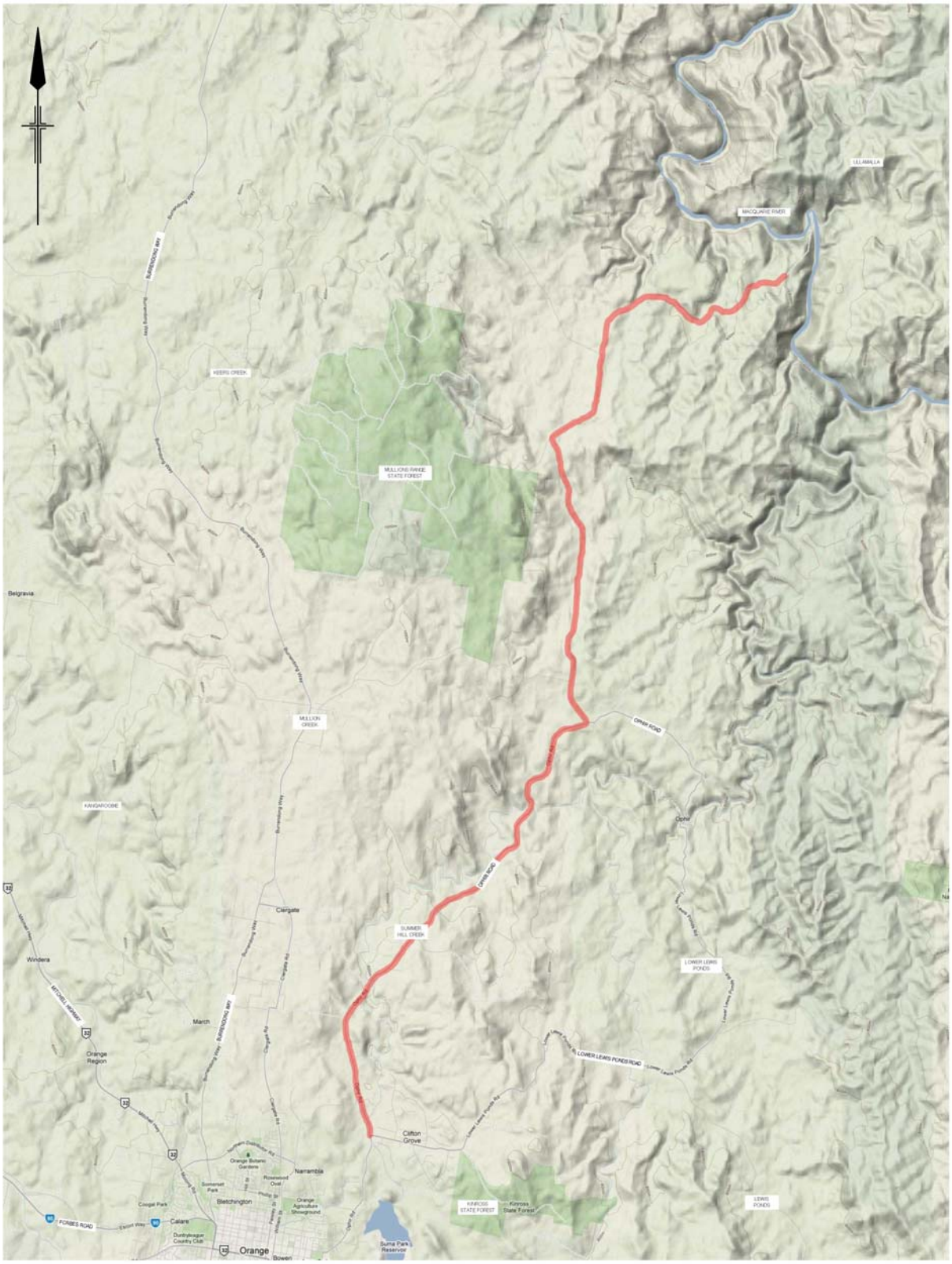

Figure 1 Preferred pipeline route (shown in Red – subject to concept and detailed design)

2. Strategic context and need

2.1 The need to augment Orange's water supply

Council has implemented water restrictions since February 2003 to consistently manage resident's use of water. The city's water supply was at its highest peak in late 2005, resulting in a progression to Level 5A restrictions in May 2008.

As evidenced by Figure 2, this has resulted in a sustained reduction in consumption across the city, with critical peak demands more than 50% less than in the years from 1998 to 2002. Annual consumption over this period has dropped from a peak of 7,123 ML in 2002 to less than 4,100 ML in 2009, a 42% drop in annual consumption. In 2010, the city's water consumption had been further reduced to 3,735 ML (MWH 2011).

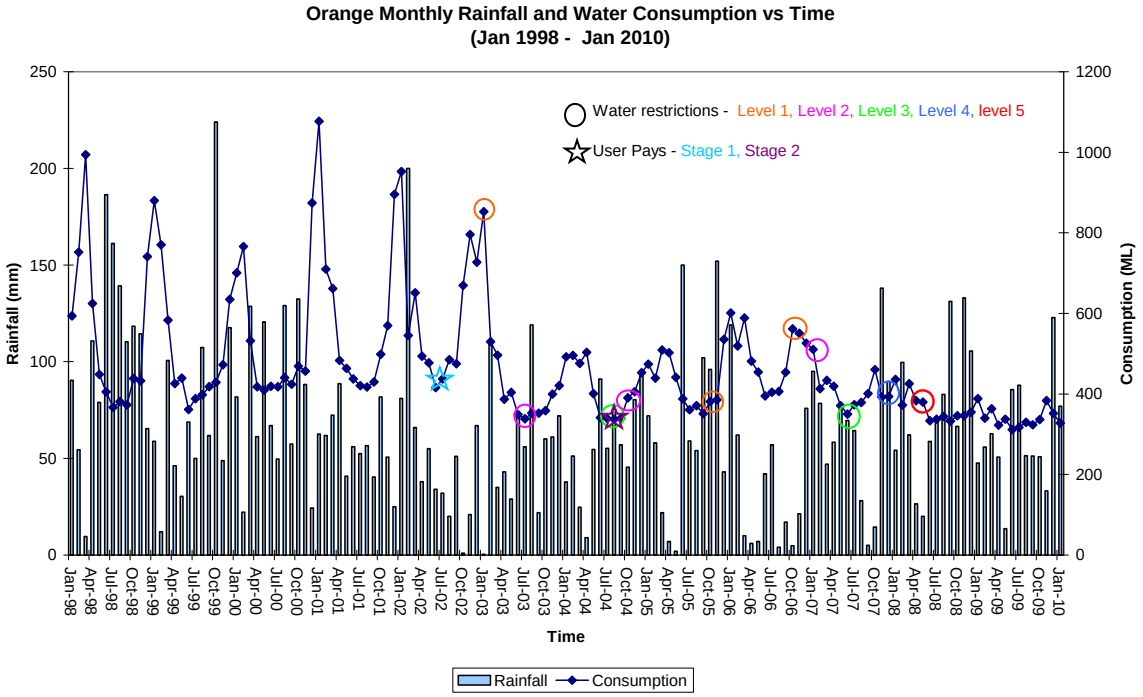

Figure 2 Orange water consumption 1998-2010

In May 2008, prior to the introduction of Level 5A water restrictions, the city's storages were at approximately 30% or 6,750 ML. In October 2008 inflows of around 15% or 3,375 ML occurred, which helped boost supplies. Since this time, as shown in Figure 3, there has been no significant runoff into the city's storages.

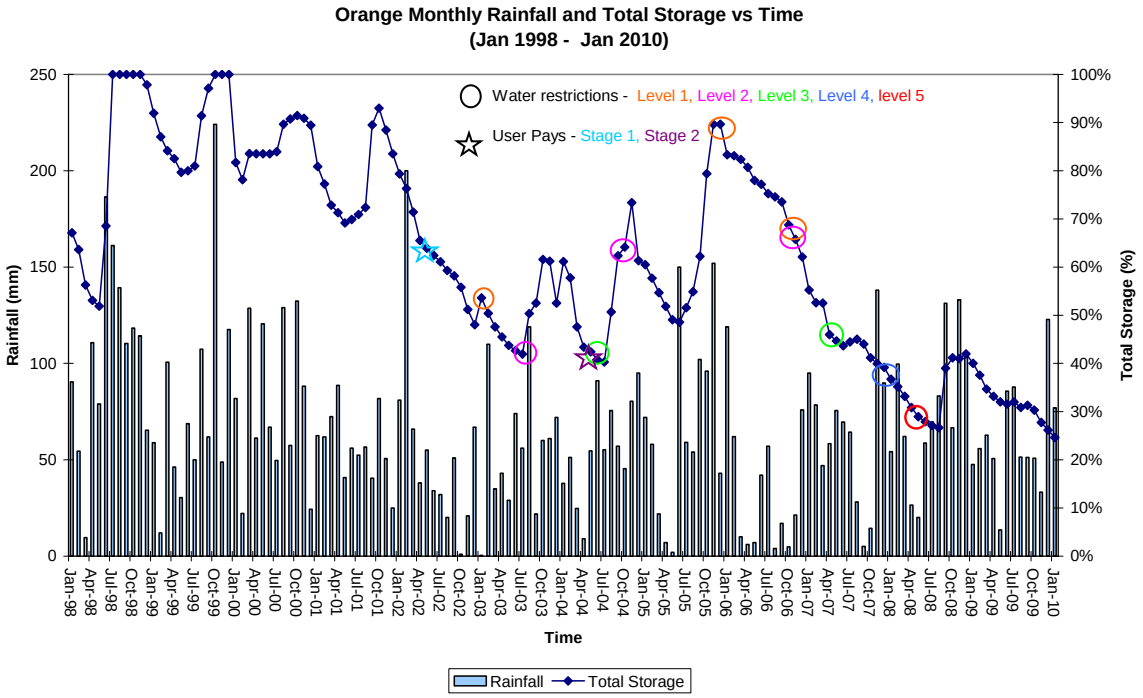

Figure 3 Orange water storage levels 1998-2010

Based on a long term average usage of around 6,000 ML/a, this would have seen the city's storages fail within around 18 months or by November 2009. Therefore, OCC has undertaken a significant amount of work over the past two years aiming to maximise the city's water supply through active demand management and the development of alternative water sources.

Approximately 20% of the city's water supply is currently sourced from alternative sources, specifically stormwater harvesting and bore supplies. By mid 2010, around 5.5 ML/day (approximately 50% of the city's water supply) was estimated to have been sourced from alternative sources through extensions to the current stormwater harvesting scheme, additional bore supplies and the re-connection of old city water storages.

In conjunction with ongoing water restrictions, and assuming no effective inflows, this would have resulted in storages falling to 5% within 18 months, leaving the city totally reliant upon alternative supplies within 2 years. This provides sufficient time for the development and implementation of a water security pipeline from the Macquarie River capable of delivering the remaining 50% of the city's emergency water needs.

Recent rains over July and August, 2010 have boosted the city's supply to 100%. Despite this relief, Orange City Council believes in the need to drought-proof the city through the implementation of this project, to mitigate against future drought and climate change impacts.

2.2 Oranges current water entitlements

Orange City Council currently has a total water allocation of 7,800 ML/annum.

The allocation is broken down as follows:

- Orange Water Supply (Suma Park Dam) 7,700 ML/annum
- Spring Hill/Lucknow Water Supply 100 ML/annum

The Council also has 5 bores that have a total of 80 ML/annum of allocation; three of the bores are located in Clifton Grove, one on Margaret Street and one at the Orange Showgrounds.

2.3 Strategic context

In 2009 a *Regional Water Security Study* was commissioned by Centroc, which identified a range of actions to be undertaken to ensure adequate levels of water security for all local water authorities in Central West NSW. In particular the report specifically identified the need for construction of a pipeline connection between Orange and the Macquarie River as an emergency water supply to augment the LGAs current supplies.

Subsequently, MWH carried out an *Emergency Water Supply Feasibility Assessment* on behalf of Orange City Council which investigated a range of different alternatives to carry this out. These included:

- Orange to the Macquarie River below Bathurst (4 routes investigated);
- Orange to the Macquarie River below the Turon River (3 routes investigated); and
- Orange to the Central Tablelands Water (CTW) system (2 routes investigated).

The routes were examined in respect to the length, elevation profile, delivery point, water availability at the various off take points, vegetation clearance requirements, hydrologic and water quality impacts and cost of construction and operation. MWH concluded that the most feasible off take point for water extraction was below the Turon River, with little advantage between the 3 routes investigated within this option. Orange City Council subsequently selected a preferred option for off take on the Macquarie River near Long Point, with water being transferred to Suma Park Dam prior to treatment. Detailed investigations into the exact route of the preferred option and off take point are ongoing.

This finding is supported by Orange City Council's *Management Plan 2010-2014, Environmental Sustainability Action Plan, 2007* and the *Integrated Water Cycle Management Plan*, 2007 which outline the need for drought proofing and bolstering of the cities water supplies into the future.

3. Options

In a previous *Emergency Water Supply Further Feasibility Assessment* completed by MWH (2010), several potential pipe corridors to Orange were investigated including a pipeline from:

- Orange to the Central Tablelands Water (CTW) system (2 routes investigated);
- Orange to the Macquarie River below Bathurst (4 routes investigated); and
- Orange to the Macquarie River below the Turon River (3 routes investigated).

The feasibility study concluded that the most feasible solution was to bring water from the Macquarie River (identified in Figure **1**), as the CTW system was not recommended due to time constraints, presence of vegetation, terrain attributes, power access, issues with landuse and overall cost.

Orange City Council subsequently examined these options and considered them in light of aspects such as:

- Minimising the number of landholdings traversed;
- Potential pipe construction and operating costs as dictated by pipe length, number of creek and road crossings;
- Difficulty of construction (due to factors such as ground conditions and gradient); and
- Selecting the route that would likely result in minimal disturbance of local vegetation.

A more recent study completed by MWH, *Concept Investigation Report* (2011), assessed the routes from Orange to the Macquarie River below the Turon River. The *Concept Investigation Report* (2011) compares and evaluated the benefits of one pipe corridor over another to arrive at a recommended pipeline option to use in the detailed design process. The options (refer to Figure **1**) involved:

- Option 1: A pipeline Corridor 1: A pipeline extending from the Macquarie River and passing through private property and connecting to the Long Point Road reserve, onto the Oakey Lane Reserve, the Ophir Road Reserve and onto Suma Park Dam via various routes which require further optimisation. Potential river off-take points on this corridor are described as MR4, MR5a and MR5b.
- Corridor 2: A pipeline extending from a water hole below the confluence of Macquarie and Turon rivers via private land and intersecting with the Root Hog Fire Trail, then onto Gowan Road and Lower Lewis Ponds Road to Orange. The potential river off-take point on this corridor is described as MR6.

The following criteria determined Corridor 1 (Figure **1**) as the most appropriate option:

1. Capital and operating costs;
2. Constructability;
3. Environmental and heritage impacts;
4. Carbon footprint;
5. Landholder issues;
6. Suitability of off-take point;
7. Accessibility of off-take point;
8. Geotechnical issues; and
9. Power availability.

Through this process, Orange City Council selected a preferred option for off take from MR4 via option 1. Detailed investigations into the route of the preferred option within this corridor are ongoing. The preferred pipeline route corridor would be located where possible primarily adjacent to existing infrastructure easements that have previously been cleared, with easements into private property utilised where it represents a significant cost benefit or to minimise clearing impacts.

4. Proposal description

4.1 Regional context and site location

4.1.1 Region

The Proposal comprises approximately 40 km of trunk water main and ancillary infrastructure, extending from the Long Point area on the Macquarie River within the Cabonne LGA to Orange LGA.

The Orange LGA is located in the Central West NSW approximately 250 km west of Sydney. The majority of the LGA is elevated >700 m (above sea level). The Cabonne LGA surrounds Orange LGA to the north, east and west. The pipeline corridor follows an upward sloping gradient to Suma Park Dam, *ca.* 840 m (above sea level).

4.1.2 Environmental context

The proposed pipeline corridor lies within the Central Tablelands area of NSW. The plateaux have been entrenched by the meandering, north-westerly-trending course of the Macquarie River and its associated northward-trending drainage systems, particularly those of Summer Hill Creek, Oaky Creek, Lewis Pond Creek, Emu Swamp Creek and Coolumbala Creek. Site levels at the proposed Macquarie River pumping station sites range between approximately RL 400 and RL 450. The proposed pipeline corridor runs north and slightly east of the Suma Park Dam, bounded on the east by Kinross State Forest and Goldfields and Girralang Nature Reserves, and on the west by the Mullion Range State Forest and Conservation area and the South Mullion Reserve. The entire route is within the area managed by the Central West Catchment Management Authority (CWMA).

The area through which the proposed pipeline would traverse generally drains north-east through Spring Creek, Summer Hill Creek and Ophir Creek which drain naturally to the Macquarie River approximately 6 km upstream of Long Point. The off take point for the proposal would be located approximately 18 to 20 km downstream of the confluence of the Macquarie and the Turon Rivers.

The average annual rainfall for the Orange region is 810 mm, with rainfall at its highest between June and August (approximately 70 mm to 80 mm) and at its lowest between February and March (approximately 40 mm) (Douglas Partners, 2011). This figure has been significantly lower during the drought conditions experienced recently, with drought declaration over the region for 84% of the last 8 years.

The Mullion Range is a prominent regional landscape feature along the proposed pipeline route. The range is comprised of volcanic rhyolite, dacite and tuff resulting in an undulating and often steeply sloping hilly landscape, which is rocky and has areas of low soil fertility. Soils are skeletal sand and loams near outcrops, red podzolics in the mid slope, and yellow podzolics in drainage depressions and are susceptible to erosion. Girralang Nature Reserve located to the east of the proposed pipeline route largely consists of eastern and western facing slopes of Devonian/Silurian sedimentary rocks (DECC, 2007).

The natural ecosystems within the region have been extensively modified since European settlement and the extent of the component vegetation communities within the proposed development area has been dramatically reduced, restricted to reserves, state forest, roadside and riverine vegetation corridors.

4.2 Proposal outline

The proposal is to construct and operate a water supply scheme that would transfer water from an off take on the Macquarie River in the vicinity of Long Point to Orange. The scheme comprises approximately 40 km, and includes:

- A river off-take pumping station and transfer main;
- Two (2) pumping stations and transfer mains;
- A gravity main;
- Power supply and controls; and
- A telemetry system.

The proposal is to be jointly funded by the Federal and State Governments and the Orange City Council and if approved it is proposed to have the transfer scheme operational by 2013.

Key construction activities include:

- Establishing an all-weather track to the river which can be used for the construction and operation of the river pump station;
- Installation of off take structure and pump stations;
- Aboveground (less than 2 km) and below ground installation of pipeline;
- Excavating rock with minimum impact on the environment in an economically sustainable manner;
- Construction of road and river crossings; and
- Installation of power supply to pump stations via an approximately 30 km transmission line.

Key operational activities would include:

- Regular maintenance of the pumping station;
- Regular maintenance of the air valves and scour valves; and
- Less frequent maintenance of the pipeline (*e.g.* pigging to remove blockages, or repairing bursts as required).

4.3 Land acquisition and access options

At this stage OCC has not yet determined the approach that will be taken to acquire and/or access the pipeline route on private property. There are estimated to be approximately 100 landowners along the pipeline route. Discussions with the RTA for road easements will occur at a later date.

Wherever possible, Council would prefer to reach a negotiated agreement to acquire the easement. If all reasonable attempts to reach an agreement fail, compulsorily acquisition of the easement would likely need to occur. Implementation of a land access and easement acquisition process which gives certainty to accessing the land and provides some flexibility to the alignment of the pipeline in the event minor realignment is required in respect of environmental, design, construction or other constraints.

Ongoing access to the pipeline route would be required to allow for surveying and design, and for construction. It is under consideration whether access for route selection and design would be carried out as an *"authority to survey"* under the Section 5E (Clause 1) of the *Pipelines Act* 1967 i.e. *A person who proposes to construct a pipeline may apply to the Minister for an authority to survey.*

Under Section 5F of the Pipelines Act, where the Minister is satisfied that the applicant for an authority to survey has complied with the provisions of section 5E (2) in relation to the lands in respect of which the

authority is applied for or that non-compliance with any of those provisions was not in a material respect, the Minister may grant to the applicant an authority to survey in respect of the lands specified in the application under section 5E (1) or in respect of such of those lands as the Minister thinks fit.

If an "authority to survey" is granted, it authorises the holder, under Section 5G (subject to any conditions of the authority):

(a) to enter the lands specified in the authority, and

(b) to carry out surveys to investigate possible routes for the proposed pipeline and determine the pipeline route, the situation of any associated apparatus or works and of any lands to be used to get access to the pipeline, apparatus or works, and

(c) to take samples from the lands for examination and testing.

4.4 Construction

4.4.1 Site establishment (site compounds)

Primary and secondary site compounds would be required for the construction phase of the proposal. Primary compounds would predominately be used for site offices, amenities, storage of major plant and equipment and storage of materials. Primary compounds would be located in close proximity to major construction areas.

Secondary site compounds would be predominately used for storage of minor plant, equipment and materials. Nominal amenities may also be provided in these locations. Secondary site compounds would also be located in areas close to major construction works. However, the area of secondary site compounds would generally be smaller than primary site compounds.

Location of these site compounds will be determined at a later stage but are likely to be located within the investigation corridor.

4.4.2 Pipeline construction

The pipeline construction corridor would be in the order of 20 m wide while the pipeline is being constructed, with intermittent pipe storage areas established along the route which would be approximately 50 m x 70 m. Tree clearing would be required at certain points along the pipeline route to accommodate construction of the pipeline and power supply. Following construction, an easement will be maintained as a cleared landscape to allow access for maintenance activities.

The following construction activities will occur for the installation of the pipeline:

- Access road provision;
- Delivery and stringing of pipes along proposed route;
- Excavation and installation of pipeline support structures, with trench spoil mounded to one side;
- Installation of the pipe;
- Under-boring of major roads; and
- Commissioning and completion.

A range of heavy plant including excavators and trenchers would be required to access the pipeline route to enable installation.

4.4.3 Transmission line construction

The transmission line construction corridor would be in the order of 10-45 m wide while the power supply is being constructed. Tree clearing would be required at certain points along the route to accommodate construction. Following construction, an easement will be maintained as a cleared landscape to allow access for maintenance activities.

The following construction activities will occur for the installation of the transmission line:

- Access road provision;
- Excavation and installation of transmission line support structures, with trench spoil mounded to one side;
- Delivery and stringing of lines along proposed route;
- Under-boring of major roads; and
- Commissioning and completion.

A range of heavy plant including excavators and trenchers would be required to access the transmission route to enable installation.

4.4.4 Easement acquisition

Construction of the proposal would require the acquisition of easements over public (roads and other public lands) and private land within which the pipeline is located.

4.4.5 Crossings

The pipeline would cross municipal roads, small creeks and major creeks. Roads and Traffic Authority (RTA) controlled roads will be crossed by under-boring if required.

Crossings of major waterways will be made by either “hugging” bridge infrastructure, trenching, or a range of boring techniques. These techniques will be determined following consideration of technical and geological constraints during the detailed design phase.

4.4.6 Private property access during construction

Private vehicle access to surrounding private properties would be maintained throughout the construction program. If existing vehicle access routes are temporarily or permanently severed, alternate routes would need to be provided.

4.4.7 Construction hours

Typical hours of construction in NSW are 7:00 am to 6:00 pm, Monday to Friday, and 8:00 am to 1:00 pm on Saturdays. Extended working hours may be required to ensure the project is completed within the allocated funding timeframe. The need for extended working hours would be assessed as part of the assessment in accordance with the *Interim Construction Noise Guideline.*

4.5 Operation phase

4.5.1 Water transfers

The pipeline would be designed to accommodate a maximum flow of 7 ML/day. The mode of operation of the system, whether it will be continuous or intermittent, will also be determined during detailed design

and will be subject to the water level of the river and a need to maintain minimum flows. The terrain profile of the pipeline will require installation of two pumping stations along the route to Suma Park Dam.

The operating rules and licence conditions for the pipeline will limit or prohibit extractions at times of low flow in the river when potential downstream impacts are greater. Similarly extractions will only occur when the river is flowing, with the rate of extraction limited by the capacity of the pumps. In medium to high flow events the percentage of water extracted will be insignificant. The exact location of the reservoir, the pipe and valve arrangements and further operating rules shall be determined during the detailed design phase.

4.5.2 Maintenance

During the operation, Orange City Council staff will periodically traverse the route to undertake routine maintenance and ensure the pipeline is functioning adequately. The maintenance crews will remain in the cleared pipeline easement and cause minimal disturbance to the natural environment.

Minor ongoing maintenance on the proposal infrastructure would be undertaken throughout the life of the asset. Key operational activities would include:

- Regular maintenance of pumping stations;
- Regular visual inspection of the air valves and scour valves; and
- Less frequent maintenance of the pipeline including scouring the pipeline to remove sludge build up.

As part of the easement agreement, landholders may be requested to inform OCC of leakages that occur along the route.

5. Planning framework

This section provides a discussion of the relevant Acts, environmental planning instruments and approvals applicable to the proposal.

5.1 Approval process

5.1.1 Environmental Planning and Assessment Act 1979

The EP&A Act and the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) establish the statutory planning context for assessment and approval of the proposed works.

Part 3A. The assessment process under Part 3A of the EP&A Act applies to the most significant types of development that may potentially have an environmental impact. Development can be declared as a project to which Part 3A applies in certain circumstances, one of which is where the development is a major infrastructure that, in the opinion of the Minister for Planning, is "of State or regional environmental planning significance".

On 13 January 2011, the Minister for Planning declared the proposal to be a project to which Part 3A applies.

Under Section 75D, the Minister is the approval authority for Part 3A projects. Section 75D provides that:

"*(1) A person is not to carry out development that is a project to which the Part applies unless the Minister has approved the carrying out of the project under this Part.*

(2) The person is to comply with any conditions to which such an approval is subject."

Section 75E of the EP&A Act provides that a proponent may apply for approval from the Minister to carry out a major development. This document supports the project application for the proposal. Accordingly, the application will be subject to assessment by the Director General of the Department of Planning and determination by the Minister for Planning in accordance with the EP&A Act.

It is noted that under Section 75J(3) of the EP&A Act, the Minister cannot approve the proposed development if it is wholly or in part, prohibited under an environmental planning instrument. The proposal is not prohibited under any of the following relevant instruments:

- SEPP Infrastructure,
- SEPP Rural Lands, or
- the Local Environmental Plans (LEPs) of Orange and Cabonne Councils.

Land owner's consent. Clause 8F of the *EP&A Regulation* outlines the requirements for the consent and/or notification of the owner of land on which a major development is to be carried out. Consent of the owner is not required where the application is made by a public authority (Clause 8F(1)(a)) or relates to a linear infrastructure project (Clause 8F(1)(d)). For the purpose of Clause 8F of the regulation, "linear infrastructure project" is defined as development for the purposes of linear transport or public utility infrastructure. The proposal is considered a linear infrastructure project undertaken by a public authority. As such, there is an obligation under Clause 8F(3)(a) for the proponent to:

"*Give notice of the application… to the public by advertisement published in a newspaper circulating in the area of the project before the start of the public consultation period for the project.*"

Community consultation is due to commence shortly, and is discussed further in Section 6.

Approvals that do not apply. Section 75U(1) of the EP&A Act outlines the approvals and authorisations under other NSW legislation that do not apply to an approved Part 3A project. Specifically, these include:

- A permit under section 201, section 205 or section 219 of the *Fisheries Management Act 1994*;
- An approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977*;
- An Aboriginal heritage impact permit under section 90 if the *National Parks and Wildlife Act 1974*;
- An authorisation referred to in section 12 of the *Native Vegetation Act 2003* (or under any Act to be repealed by that Act) to clear native vegetation or State protected land;
- A permit under Part 3A of the *Rivers and Foreshores Improvement Act 1948*;
- A bush fire safety authority under section 100B of the *Rural Fires Act 1997*; and
- A water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the *Water Management Act 2000*.

Section 75U(2) of the EP&A Act also states that:

"*Division 8 of Part 6 of the Heritage Act 1977 does not apply to prevent or interfere with the carrying out of an approved project*."

The application of the Acts to the proposal will be determined as a part of the Environmental Assessment subsequent to this PEA.

Approvals to be applied consistently. Section 75V of the EP&A Act stipulates approvals and legislation that must be applied consistently to the approval of a project under Part 3A. Specifically, section 75V, as it relates to this project, states:

"*An authorisation of the following kind cannot be refused if it is necessary for carrying out an approved project and is to be substantially consistent with the approval under this Part:*

(a) an environment protection licence under Chapter 3 of the Protection of the Environment Operations Act 1997 (for any of the purposes referred to in section 43 of that Act),

(b) a consent under section 138 of the Roads Act 1993,

(c) a licence under the Pipelines Act 1967."

5.1.2 State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (SEPP Infrastructure) came into effect on 1 January 2008. The aim of SEPP Infrastructure is to facilitate the effective delivery of infrastructure across the State through increased regulatory certainty and improved efficiency and flexibility in the location of infrastructure and service facilities while providing adequate stakeholder consultation.

Division 24 of SEPP Infrastructure outlines provisions for water supply systems. In this division, different systems are defined as follows:

*"**water reticulation system** means a facility for the transport of water, including pipes, tunnels, canals, bores, pumping stations, related electricity infrastructure, dosing facilities and water supply reservoirs.*

***water storage facility** means a dam, weir or reservoir for the collection and storage of water, and includes associated monitoring or gauging equipment.*

water supply system *means a water reticulation system, water storage facility, water treatment facility, or any combination of these.*

water treatment facility *means a facility for the treatment of water (such as a desalination plant or a recycled or reclaimed water plant) whether the water produced is potable or not, and includes residuals treatment, storage and disposal facilities, but does not include a water recycling facility within the meaning of Division 18 (Sewerage systems).*"

The proposal is defined as a water reticulation system, and therefore forms part of a water supply system.

In relation to water reticulation systems and water supply systems, Clause 125 of SEPP Infrastructure states:

"(1) Development for the purpose of water reticulation systems may be carried out by or on behalf of a public authority without consent on any land.

...

(4) Development for the purpose of a water supply system may be carried out on land reserved under the National Parks and Wildlife Act 1974 only if it is authorised by or under that Act.

(5) In this Division, a reference to development for the purpose of a water supply system of any kind includes a reference to development for any of the following purposes if the development is in connection with the water supply system:

(a) dams, reservoirs, weirs, levees, spillways and fishways,

(b) catchment management works,

(c) groundwater investigation works, groundwater bore stations, borefields, minewater works and the like,

(d) access ways,

(e) water intakes, pumping stations, pipelines, channels, tunnels, canals and aqueducts,

(f) gauging and monitoring equipment,

(g) power supply to the water supply system,

(h) hydro-electric power generation equipment and associated connections to the electricity network,

(i) construction works,

(j) emergency works and routine maintenance works,

(k) environmental management works."

In the event of an inconsistency, SEPP Infrastructure overrides all environmental planning instruments with the exception of:

- State Environmental Planning Policy No 14—Coastal Wetlands (SEPP 14).
- State Environmental Planning Policy No 26—Littoral Rainforests (SEPP 26).
- SEPP Major Development.

Subject to Clause 14 of SEPP Infrastructure, if development carried out by or on behalf of a public authority:

"*(a) is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area, and*

(b) is development that this Policy provides may be carried out without consent."

then development must not be undertaken unless an assessment of the impact has been prepared. This assessment, in conjunction with notice of the development, must be provided to the relevant local council(s) and consideration given to any response. Issues with respect to heritage items are discussed at Sections 5.2, 8.3 and 8.12 of this PEA.

5.1.3 Regional Environmental Plans

As of 1 July 2009, Regional Environmental Plans (REPs) are no longer part of the hierarchy of environmental planning instruments in NSW. All existing REPs are now deemed State Environmental Planning Policies (SEPPs). In any case, there are no REPs applicable to the proposal.

5.1.4 Local Environmental Plans

The proposal is located in the LGAs of Orange and Cabonne, and the following Local Environmental Plans (LEPs) apply:

- Cabonne Local Environment Plan 1991; and
- Orange Local Environment Plan 2000.

In accordance with Clause 79 of SEPP Infrastructure, the proposal is permissible without the need for development consent, as SEPP Infrastructure over rides other environmental planning instruments (except those SEPPs listed at Section 5.1.1) in the event of an inconsistency.

Any other relevant provisions of the applicable LEPs will be addressed as part of the Environmental Assessment for the proposal.

5.2 Commonwealth legislative considerations

5.2.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) regulates actions that may have a significant impact on matters of National Environmental Significance, which include:

- World Heritage properties;
- National Heritage places;
- wetlands of international importance;
- listed threatened species and ecological communities
- migratory species protected under international agreements;
- Commonwealth marine areas; and
- nuclear actions (including uranium mines).

Under Part 6 of the EPBC Act, actions likely to impact on matters of National Environmental Significance require approval from the Commonwealth Minister for the Environment.

A Protected Matters search under the EPBC Act returned no records of World Heritage properties, National Heritage places, Commonwealth marine areas, Commonwealth heritage places or nuclear

actions. However the following matters of National Environmental Significance were identified as likely to occur within the Local Government areas associated with the proposal:

- Five (5) endangered ecological communities;
- eighty-three (83) threatened species;
- Twelve (12) migratory species; and
- Eleven (11) vegetation communities.

Consultation with the Department of Sustainability, Environment, Water, Population & Communities (DSEWPAC) will be undertaken to determine the need to refer the proposal under the Act based on the final pipeline route and the results of a detailed ecological investigation.

5.2.2 Native Title Act 1993

The *Native Title Act 1993* administers processes relating to the recognition, protection and determination of native title and dealings with native title land.

Native title is concerned with the rights and interests of Aboriginal and Torres Strait Islander peoples in relation to land and water in Australia and its territories. The Act is administered by DSEWPAC.

A desktop archaeological assessment was undertaken by GHD. There is currently one Native Title Claim application active for the study area. This claim is on behalf of the Wellington Valley Wiradjuri and covers parts of the Cabonne, Dubbo, Lithgow, Narromine, Orange, Parkes, Wellington, Bathurst, Mid-Western, and Warrumbungle LGAs. Though this application has not yet been determined, the impact of the proposal on the application should be assessed as part of the Environmental Assessment.

5.3 Relevant NSW legislation

The following NSW legislation may have relevance to the project, and, will be considered in the Environmental Assessment:

- *Contaminated Land Management Act 1997;*
- *Fisheries Management Act 1994;*
- *Heritage Act 1977;*
- *National Parks and Wildlife Act 1974;*
- *Native Title (New South Wales) Act 1994;*
- *Native Vegetation Act 2003;*
- *Pipelines Act 1967;*
- *Protection of the Environment Operations Act 1997;*
- *Roads Act 1993;*
- *Threatened Species Conservation Act 1995;*
- *Waste Avoidance and Resource Recovery Act 2001;*
- *Water Act 1912; and*
- *Water Management Act 2000;*

With respect to the above legislation, consideration will be given to clauses 75U and 75V of the EP&A Act for approved Part 3A projects.

5.4 Regional policies and strategies

In 2009 a *Regional Water Security Study* was commissioned by Centroc, which identified a range of actions to be undertaken to ensure adequate levels of water security for all local water authorities in the central west. In particular the report specifically identified the need for construction of a pipeline connection between Orange and the Macquarie River as an emergency water supply to augment the LGAs current supplies.

6. Consultation and stakeholder engagement

To date, consultation has been carried out with over 100 stakeholders who adjoin the proposed corridor. A Communications and Stakeholder Engagement Strategy has been developed to provide the local community, statutory and industry stakeholders with information about the proposal and provide them with clearly defined opportunities to provide informed feedback.

OCC proposes to undertake an appropriate level of consultation with relevant communities and stakeholders including:

- Department of Planning (DoP);
- Department of Environment, Climate Change and Water (DECCW);
- Department of Sustainability, Environment, Water, Population & Communities (DSEWPAC);
- NSW Office of Water;
- NSW Department of Industry and Investment (I&I);
- Roads and Traffic Authority (RTA);
- Cabonne Shire Council (CSC);
- Utilities management companies;
- Business community groups;
- Local Aboriginal Land Councils and Aboriginal stakeholder groups;
- Transport and emergency services;
- Road users (local and regional road network users, due to road works and changes to the network during both construction and operation); and
- The community, including all potentially affected land owners.

Consultation would be carried out during the preparation of the Environmental Assessment for the proposal, and would include appropriately timed publications, information sessions and landholder negotiations. Results of all consultation would be summarised, and outcomes of issues addressed through consultation would be included in the Environmental Assessment for the proposal.

7. Preliminary environmental assessment methodology

This section provides an overview of the methods used to conduct the PEA. The preliminary environmental assessment itself is provided in Section 8.

7.1 Scope

This PEA documents a preliminary assessment of the key issues associated with the proposal and outlines broad methodologies for undertaking a more detailed environmental assessment.

The scope of this PEA was to undertake a preliminary study aimed at describing the possible environmental impacts associated with the proposal.

7.2 General environmental issues

The general environmental issues associated with the proposal have been identified based on existing data and knowledge of the site held by OCC, preliminary investigations undertaken by the project team and an understanding of the statutory framework and general approvals requirements. The broad environmental areas identified that may be impacted by the proposal and that would require assessment and management include (in no particular order):

- Flora and fauna;
- Surface and groundwater;
- Soils and geology;
- Landuse;
- Traffic and transport;
- Social and economic considerations ;
- Noise and vibration;
- Air quality;
- Landscape and visual amenity;
- Aboriginal and non-indigenous heritage;
- Greenhouse gases; and
- Resource use and waste management.

7.3 Desktop study

A desktop-level study was undertaken to describe the existing environment and the broad potential impacts from the proposal in each of the areas listed above. The results from this desktop assessment are provided in Sections 8.2-8.12. The outcomes would be used to inform the development of future work and investigations that should be undertaken as part of the subsequent EA.

7.4 Concept investigation report

A concept investigation report was prepared for Orange City Council in January 2011. This report investigated the following factors to determine which of the pipe corridors (Corridor 1 – MR 4, MR5a, MR 5b and Corridor 2 – MR 6) were most suitable:

- Preliminary environmental and cultural heritage constraints
- Ability of the off-take point to provide a sustainable water supply over time
- Ability to connect potential pump sites to the power grid
- The ability to construct the pipeline within a reasonable budget

The multi criteria analysis that was used to evaluate which two pipeline corridors was the most appropriate for further detailed design resulted in Corridor 1 being chosen.

Limited field investigations were also undertaken by MWH for the Concept Investigation Report.

8. Preliminary Environmental Assessment

8.1 Introduction

This section provides a preliminary assessment of the environmental impacts that may be associated with the proposal. Key features of the existing environment, potential environmental issues resulting from the proposal, and proposed assessment methodologies have been presented.

8.2 Flora and fauna

8.2.1 Existing environment

Much of the land in the vicinity of the proposal is significantly altered through clearing for agriculture, and the route is predicted to occur within existing road corridors and/or power line easements wherever possible and feasible. Regionally the area has a number of significant reserve areas and state forests, and inevitably there are areas of intact roadside vegetation that the pipeline has the potential to traverse. Wherever possible these areas would be avoided via alternative routes, however it is envisaged that not all areas can be avoided. These may support a variety of flora and fauna, including threatened species, populations and ecological communities and further consideration of the impact of the proposal, once further design details are determined, is warranted.

Vegetation and endangered ecological communities

The proposal has the potential to traverse through approximately 11 vegetation communities known to be present in the study area (CWCMA, 2010). These include:

- Red Stringybark (*Eucalyptus macroryncha*) (+/- Brittle Gum (*E. mannifera*)) open-forest;
- Red Stringybark (*E. macroryncha*) and/or Ironbark (*E. crebra*) open-forest;
- River Oak (*Casuarina cunninghamiana*) riparian woodland/forest of the slopes and tablelands;
- Red Box (*E. polyanthemos*) (+/- Red Stringybark (*E. macroryncha*)) open-forest;
- Stringybark – Box – Gum woodland (*E. macroryncha, E. polyanthemos, E. goniocalyx and E.rossii)*;
- Tumbledown Red Gum (*E. dealbata*) – Black Cypress Pine (*Callitris endlicheri*)– Red Box (*E. polyanthemos*) low woodland on hills;
- Scribbly Gum (*E. rossii*) – Brittle Gum (*E. mannifera*) – Box (*E. albens, E. bridgesiana, E. blakelyi*) woodland;
- Red Stringybark (*E. macroryncha*) – Blakely's Red Gum (*E. blakelyi*) – Yellow Box (*E. melliodora*) woodland;
- Blakely's Red Gum (*E. blakelyi*) – Yellow Box (*E. melliodora*) open-woodland of the tablelands[3];
- White Box (*E.albens*) – Kurrajong (*Brachychiton populneus*) woodland[1]; and
- Slaty Box (*E. dawsonii*) woodland.

Additionally, five Commonwealth listed endangered ecological communities (EECs), and three State listed EECs are known to be present in the Orange/ Cabonne LGAs (DECCW, 2010). These include:

[1] This community has the potential to comprise an EEC listed under the TSC Act or the EPBC Act.

- White Box Yellow Box Blakely's Red Gum Woodland (EPBC Act - White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland);
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia;
- Weeping Myall Woodlands;
- Mt Canobolas Xanthoparmelia Lichen Community; and
- Natural Temperate Grassland of the Southern Tablelands (NSW and ACT).

MWH (2011) identified that the White Box Yellow Box Blakely's Red Gum Woodland (EPBC Act - White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland) is present in the vicinity of the pipeline route. This EEC is considered a rare example of the particular Box-Gum Woodland variant in the Cabonne LGA. Its significance is increased due to its proximity to the Mullion Range Nature Reserve and the absence of vegetation in adjacent farmland. It has not been determined at this stage what footprint the project would have in terms of vegetation clearance as it is still in the early stages of design and route selection.

Threatened species

A search was carried out on threatened species and populations in the Orange and Cabonne LGAs and the Orange and Hill End CMA subregions on the Atlas of NSW Wildlife, the NSW Threatened species website and the EPBC Protected Matters Search Tool. Results of this search are included in Appendix A. This search revealed the following suite of threatened flora and fauna recorded with the potential to occur in the study area:

- 20 flora species;
- 63 fauna species; and
- 12 migratory species.

MWH 2011 identified that threatened fauna species predicted to occur in the vicinity of the pipeline routes would include:

- Southern Bell Frog *Litoria raniformis;*
- Koala *Phascolarctos cinereus;*
- Brush-tailed Possum *Phascogale tapoatafa;*
- Eastern Pygmy-possum *Cercartetus nanus;*
- Spotted-tailed Quoll *Dasyurus maculates;*
- Squirrel Glider *Petaurus norfolcensis;*
- Barking Owl *Ninox connivens;*
- Freckled Duck *Stictonetta naevosa;*
- Powerful Owl *Ninox strenua;*
- Pink Robin *Petroica rodinogaster;*
- Square-tailed Kite *Lophoictinia isura;*
- Painted Honeyeater *Grantiella picta; and*
- Glossy Black-*Cockatoo Calyptorhynchus lathami.*

Regional corridors

The Mullion Range forms a large regional corridor of vegetation to the west of the proposed pipeline route, comprised of State forest, State conservation areas and reserves. The Girralang Nature Reserve and Goldfields Reserve also form a large vegetation corridor which links to the Macquarie River riverine corridor. The proposed pipeline has the potential to traverse close to the Mullion Range State Forest and Kinross State Forests.

There are also less significant corridors present along the riparian fronts of the Summer Hill Creek and Ophir Creek, in addition to fragmented roadside remnant vegetation. The pipeline is likely to traverse these features along the proposed route.

Aquatic ecology

The proposal will include the installation of an off take point in the Macquarie River approximately 18 - 20 km downstream of the confluence of the Macquarie and the Turon Rivers. The construction and management of this off take are considered key issues for the assessment. Additionally the proposed pipeline route traverses a number of waterways from rivers to small tributaries. The major creeks or rivers that would be crossed include Summer Hill Creek and Ophir Creek. Where possible, the pipeline would utilise existing infrastructure to cross tributaries e.g. “hugging” bridge structures. No listed wetlands are within the study area, although the Macquarie River Catchment eventually flows to the Macquarie Marshes, approximately 400 kilometres downstream of the proposed off take point.

8.2.2 Potential impacts

Potential impacts as a result of the proposal would arise predominately during the construction phase associated with potential clearing and construction activities such as traffic and earthmoving. Where the pipeline is to be constructed in existing cleared corridors, this is likely having minimal significant impact on the surrounding environment.

The following indirect and direct impacts have the potential to occur as a result of the proposal and the significant of the associated impacts would require further investigation as part of the Environmental Assessment:

- Clearance of vegetation leading to loss of habitat, fragmentation, isolation and increased edge effects on vegetation patches, loss of individual threatened plant species or EEC and disruption to ecological processes;
- Weed invasion from construction/ maintenance activities may lead to a loss of biodiversity or outcompeting of other species present;
- Direct injury to fauna species present through construction activities such as traffic movement, excavation or clearing; and
- Impacts on aquatic habitat as a result of the installation of an off take structure in the Macquarie River and subsequent flow dynamic changes.

8.3 Aboriginal and non-Aboriginal heritage

8.3.1 Existing environment

Aboriginal heritage

The presence of artefacts of Aboriginal origin could be expected in the study area given that previous studies have recorded indigenous sites in the locality, such as around Suma Park Dam. Additionally,

throughout the region, sites of Aboriginal heritage significance are associated with major creek lines, foothill and high points of ridge lines (MWH, 2010). The study area is within Wiradjuri country and is within the boundaries of the Orange Local Aboriginal Lands Council. It is likely that Summer Hill Creek, Ophir Creek and the Macquarie River were part of a travel route from west and north-west to Mount Canobolas, which was a very important area to the Wiradjuri, as travel routes often followed watercourses (DECC, 2007).

An Aboriginal Heritage Information Management System (AHIMS) search was undertaken to identify recorded sites within a 15-kilometre radius of the proposed corridors. A total of 162 sites were listed. Of these, the majority (106) were sites associated with artefacts or isolated artefact finds. Of the remainder, 17 were stone quarries, 15 were modified (carved or scarred) trees, five were burial sites, three were stone arrangements, two were hearths, two were Aboriginal Ceremony or Dreaming sites, two were earth mounds, one was art (pigment or engraved) and one was a habitation structure.

Additionally, there is an active claim applicable to the study area that is currently being assessed by the Native Title Tribunal for the Wellington Valley Wiradjuri.

Non-Aboriginal heritage

A search of the Orange and Cabonne LEPs, the State Heritage Register and the Commonwealth Register of the National Estate revealed:

Orange LGA:

- 51 local heritage items;
- 23 State listed heritage items; and
- 16 places on the Register of the National Estate.

Cabonne LGA:

- 42 local heritage items;
- 5 State listed heritage items; and
- 17 places on the Register of the National Estate.

The study area also supports a history of mining, with an area near Ophir Reserve the site of the first payable gold in Australia in the 1950's (MWH, 2010).

8.3.2 Potential impacts

Where possible, items of heritage significance would be avoided. However it is possible that pipelineand transmission line construction could result in some impact on these items. Potential impacts that may result from the proposal include:

- Direct or indirect disturbance to items of heritage significance; and
- Effect on the amenity of heritage artefacts within close proximity of the pipeline and transmission line corridor, during construction and (for example near pump stations or air valves) during operation.

During operation, impacts to heritage items are expected to be negligible.

8.3.3 Considerations for Environmental Assessment

The assessment of Aboriginal heritage impacts would be undertaken in accordance with the *DECC Interim Community Consultation Requirements for Applicants* and *Guidelines for Aboriginal Heritage Cultural Heritage Assessment and Community Consultation*. The following key tasks would be undertaken to further assess the heritage impacts associated with the proposal:

- Review of existing data to identify the location of the listed heritage items and assess the likelihood of the proposal to impact on them;

- Consultation with the local aboriginal community;
- Investigations into the impact of the proposal on the active native title claim;
- Targeted field investigations of the investigation corridor by archaeologists and with input from representatives of the local aboriginal community;
- Provide input to design team on significance of the heritage items and any issues identified as having the potential to impact on the items; and
- Prepare a report/ reports assessing the significance of any identified and affected items, the significance of any impacts and recommending mitigation measures.

8.3.4 Considerations for Environmental Assessment

A field investigation was undertaken by MWH in 2011 to identify Corridor 1 as the corridor with the least impact on flora and fauna. The proposal does however have the potential to directly and indirectly impact on the habitat of threatened species populations and ecological communities. OCC aims to locate the majority of the proposed pipeline within existing utility easements and cleared areas. The potential impacts of any clearing requires further targeted field investigations in order to make informed decisions about the potential impacts of the proposal and identify mitigation measures that would minimise the risk to the existing environment.

The ecological investigation should be undertaken in accordance with the draft DECCW *Guidelines for Threatened Species Assessment* under Part 3A of the EP&A Act 1979 and any other guidelines issued within the Director General's Requirements. Targeted field surveys conducted during the preparation of the EA should allow for development of mitigation measures and biodiversity offset requirements for cleared vegetation including threatened ecological communities. Targeted field surveys would be required to:

- Validate existing vegetation mapping along the pipeline route:
- Validate the extent of impact to ecological communities in areas where clearing is required;
- Identify the location and condition and validate the extent of impact to threatened ecological communities listed under the TSC Act and EPBC Act;
- Identify known and potential habitat areas for threatened flora species and where appropriate conduct targeted species specific field surveys to identify individual threatened flora populations that are likely to occur in the subject site;
- Identify habitat types within the subject site and study area in order to conduct targeted investigations in suitable habitat types including:
  - Woodland habitats – surveys for avifauna, nocturnal birds, mammals (including bats) and reptiles;
  - Ephemeral and permanent watercourses and depressions – surveys for amphibians, waterbirds and some reptiles;
  - Rocky outcrops and caves – surveys for bats and reptiles; and
  - Hollow bearing trees – surveys for hollow dependent fauna such as owls, some birds, mammals and bats.
- Identify the flora and fauna species occurring within the study area at the time of survey and determine the habitat potential within the study area for any additional flora and fauna species including threatened species listed under the TSC Act and EPBC Act;

- Identify the potential direct and indirect impacts of the proposed activity on fauna and biodiversity values of the area;
- Identify potential habitat areas for aquatic fauna including riffles, pools etc;
- Identify any aquatic ecology constraints associated with the chosen off-take point;
- Identify any issues associated with the proposal with regards to:
  - General waterway morphology (e.g. permanent or ephemeral; gully / stream / river / wetland; presence of pools; width of waterway; etc);
  - Flow regime (intermittent / permanent / freshwater; slow / rapid);
  - Water quality (such as turbidity and presence of aquatic macroinvertebrates) and surrounding and upstream land use;
  - In stream and riparian vegetation; and
  - Fish habitat (refuge areas - snags / undercut banks / reedbeds; potential breeding areas – gravel beds and fallen trees).
- Develop mitigation measures to reduce the potential direct and indirect impacts of the proposal; and
- Determine if the biodiversity principles of 'improve or maintain' would be met as a result of the proposed construction and operation of the works and in line with the accepted mitigation measures of the project.

8.4 Surface and groundwater

8.4.1 Existing environment

The Macquarie River

The Macquarie River is formed where the Campbells and Fish Rivers join. These rivers drain a high plateau near Oberon, about 900 m to 1,000 m above sea level. The Macquarie River flows north through steep gorge areas in the Hill End area and into Burrendong Dam, upstream of Wellington. The proposal would involve installation of an off take point in an unregulated section of the Macquarie River upstream of Wellington and approximately 18 km downstream of the Macquarie River intersection with the Turon River. The Macquarie River forms part of the wider Central West Catchment Management area which includes the Cudgegong and Bogan Rivers (CWCMA, 2010).

Surface water along the pipeline corridor

The area through which the proposed pipeline would traverse generally drains north-east through Spring Creek, Summer Hill Creek and Ophir Creek which drain naturally to the Macquarie River approximately 6 km upstream of Long Point. A number of other smaller tributaries would be intersected by the proposed pipeline route.

Groundwater

A search of the NSW Natural Resource Atlas database of groundwater works maintained by the NSW Office of Water (part of DECCW) was undertaken to gather information on bore water extraction in the area. The proposal would likely traverse through Groundwater Management Area 811: Central West Fractured Rocks, which has an indicative depth to the water table of approximately 20-80 m. There are a number of groundwater bores within the vicinity of the pipeline corridor.

8.4.2 Potential impacts

The Macquarie River

During construction, an area may be excavated to form a pool for the off take structure to draw from. In addition, during operation, water would be drawn from the Macquarie River. These actions have the potential to cause impacts that will decrease the quality and quantity of the water in the Macquarie River if not carried out responsibly. An agreement would be developed between the OCC and the NSW Office of Water in relation to how the proposal would be operated and a range of mitigation measures should be developed to minimise any potential negative impacts associated with construction and operation of the proposal.

Surface water along the pipeline corridor

During construction, potential impacts on surface hydrology and water quality may include:

- Erosion from exposed soils and sediments and material stockpiles caused by inadequate management measures, resulting in an increase in sediments in watercourses;
- Spills of fuels, greases and other chemicals from inadequate storage, handling and disposal procedures;
- Blockage of flow paths affecting low flows through construction within creek lines and through erosion and sedimentation control structures; and
- Alteration of flows during periods of high flow as a result of larger obstructions within and adjacent to creek and drainage lines.

These would require sediment and flooding control measures to be in place during the construction phase.

The proposed pipeline would be installed aboveground to minimise soil disturbance, clearing and decrease construction and maintenance costs. The pipeline would be located at a height that will not impede runoff or flows in tributaries and would utilise existing infrastructure wherever possible to avoid any potential flow impediments. If this is not practical, under boring would be utilised to minimise associated impacts. Following the restoration of disturbed areas, the operational impacts of the proposal on the floodway's and hydrology of the region would be largely insignificant.

Groundwater

Groundwater aquifers and management units may be disturbed by the trenching and excavation activities during construction, however the depth to the watertables in the region that were indicated in the former DWE Natural Resource Atlas database indicates that this may be unlikely. Nevertheless the potential for groundwater interference to occur during excavation and the mitigation measures required would require more detailed assessment.

8.4.3 Considerations for Environmental Assessment

As part of the Environmental Assessment, surface and groundwater issues should be assessed as part of determining the significance of the impact of the proposal and relevant mitigation measures to avoid negative impacts developed. The following specific considerations apply:

- Assessment of the hydrologic impact of the proposal on the Macquarie River water quality and quantity; and
- Assessment of the impacts of the proposal on flow dynamics and potential for contamination of surface and groundwater resources.

Any risks and mitigation measures associated with construction should be included in the Construction Soil and Water Management Plan. The operational impacts on surface and groundwater would be insignificant.

8.5 Soils and geology

8.5.1 Existing environment

The Mullion Range is a prominent regional landscape feature that runs through the western and southern sections of the study area. The range is comprised of volcanic rhyolite, dacite and tuff, resulting in an undulating and often steeply sloping hilly landscape, which is rocky and has areas of low soil fertility. Soils are skeletal sand and loams near outcrops, red podzolics are found in the mid slope, and yellow podzolics appear in drainage depressions (DECC, 2007).

The Girralang Nature Reserve is located to the east of the study area, which largely consists of eastern and western facing slopes of Devonian/Silurian sedimentary rocks (DECC, 2007). 1998 soil classification indicates the soils in this area are red and yellow texture contrast soils (DIPNR, 1998).

The valley running through the centre of the study area is comprised of undulating alluvial flats and is characterised by incised drainage lines (DIPNR, 1998).

MWH (2010) identified that the erosion potential of the landscape is particularly high in the northern sections of the study area where the terrain is steeply sloping and runoff velocities have the potential to be high. This report also identified that the area has a medium salinity hazard, showing evidence of salinity in the catchment through tree death and vegetation changes.

Potential contaminants in the soil may be present from agricultural or urban activities; however these would generally be confined to specific locations and activities including those used for storage and use of pesticides and/or hydrocarbons, machinery storage and vehicle maintenance areas.

8.5.2 Potential impacts

Activities associated with construction of the proposal would comprise ground excavations for pipeline support structures and road/creek crossings, and lowered groundcover in high machinery impact areas. This exposure of soil and the associated spoil may have the potential to increase the risk of an erosion and runoff hazard. The majority of areas that would encounter soil disturbance are likely to have received some level of disturbance in the past due to current landuse. In summary:

- Soils exposed during excavation and vegetation removal may result in erosion;
- Watercourses within the project corridor may be impacted through an increase in sediment loads during rainfall events that would lower existing water quality. Other pollutants could potentially be introduced to waterways during construction, through chemical spills;
- Erosive soils that exist in the area may create stability issues during construction;
- Compaction of soils during construction could lead to decreased permeability;
- Wind erosion may occur from unsecured stockpiles or soil mounds created during the earthworks or mobilisation of fill material.

The MWH (2010) report also identified the potential for saline areas and unidentified mine shafts to be present in the study area. These issues would require further investigation.

If contamination is present it may pose a health risk to workers and onsite personnel constructing the pipeline. However given the nature of the surrounding landscape and landuse, this is considered to be a low risk.

8.5.3 Considerations for Environmental Assessment

Further investigation into the susceptibility of soils present along the proposed pipeline route to erosion, salinity, contamination and the presence of mine shafts should be carried out and mitigation measures implemented to minimise the risk to construction workers and the surrounding environment.

Erosion potential can be identified and limited by application of appropriate controls and by development of a Soil and Water Management Plan in consultation with guidelines for soils and construction (*e.g.* Landcom, 2004). Key features of such a plan would include: appropriate timing to minimise areas with exposed soils, appropriate location of stockpiled soils; engineering measures to prevent and retain sediment migration; and prompt rehabilitation of disturbed areas.

8.6 Land use

8.6.1 Existing environment

The land use in the study area is primarily agricultural, with large reserve areas and state forests present. The Macquarie River at Long Point is a popular local recreational fishing location. Other land uses include infrastructure (roads, powerlines), urban (villages of Ophir and outskirt suburbs of Orange) and mining (there is a history of mining in the Mullion Range State Conservation Area, and around Ophir Reserve).

8.6.2 Potential impacts

Where practicable the proposal would be located within existing infrastructure easements use. This would be confirmed during detailed design.

The impact of the proposal on existing land uses in the study area and the ability to continue these is expected to be minimal.

8.6.3 Considerations for Environmental Assessment

The EA should address the following with regard to the land uses and properties potentially affected by the proposal:

- Identification of the properties and land uses directly affected by and adjacent to the pipeline route, including identification of any areas identified as regional and State significant farmland;
- The potential impacts on the viability of these land uses caused by the proposal;
- Impacts on connectivity and access resulting from the proposal; and
- Rehabilitation measures to address potential impacts on land use and properties.

8.7 Air quality

8.7.1 Existing environment

Ambient air quality along the proposed pipeline route is expected to be good due to the area being predominately rural. Air quality may decline slightly where the proposed route is in proximity to urban areas.

8.7.2 Potential impacts

Impacts to air quality are expected to be limited to the construction phase with no impacts to air quality from the constructed pipeline expected. Minor impacts on air quality may arise from construction activities including dust and emissions from vehicles or plant. These may be:

- Plant, equipment and vehicles utilised during construction and operation would increase localised traffic levels and are likely to generate greenhouse gas emissions and impact on local air quality;
- Energy usage required for construction activities would result in the release of greenhouse gas emissions; and
- Dust emissions may be generated from earthmoving equipment activities, vegetation loss and wind erosion of stockpiled excavated material during construction.

The greenhouse gas emissions of the construction phase of the proposal are primarily associated with clearance of vegetation, energy consumption and construction materials.

The greenhouse gases that would be emitted during the construction of the proposal include:

- Carbon dioxide (CO_2);
- Carbon monoxide (CO);
- Oxides of nitrogen (NOx); and
- Non-methane volatile organic compounds (NMVOC).

The pumping of water through the proposed pipeline will require the use of electricity and this would be sourced from the main electricity grid increasing demand for burning of fossil fuels and consequent greenhouse emissions. The level of emissions generated per year would depend upon the level and extent of extraction.

8.7.3 Considerations for Environmental Assessment

The significance of these impacts are considered to be minor, although further assessment in accordance with *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DECC, 2005) would quantify the scale of these impacts.

A qualitative desktop air quality assessment would be undertaken as follows:

- Existing local air quality would be determined, project emissions predicted (for construction and operation), and potential impacts assessed. Greenhouse gas emissions for the construction of the project would be in line with government guidelines (such as the *NSW Greenhouse Plan 2005*); and
- Standard soil and water mitigation measures for pipeline projects would be adopted.

The Environmental Assessment would consider various elements of design for efficient energy use, including:

- Ecological Sustainable Development (ESD): The EA would give consideration to how the proposal and its elements address the principles of ESD; and
- Sustainability in Design: Advice would be provided to the design team as to how sustainability considerations can be incorporated into the proposal design.

8.8 Noise and vibration

8.8.1 Existing environment

Aside from the portions of the pipeline route that take in parts of the Ophir and Orange suburban fringe, the majority of the pipeline is proposed to be constructed in rural areas, although the number of homesteads (*i.e.* noise receptors) in the vicinity of the corridor, is significant at the Orange end.

8.8.2 Potential impacts

The construction of the pipeline would increase noise and vibration levels at receivers closest to the corridor. Construction noise would result from actual works and traffic.

During operation (pumping and discharge of flows) any associated noise levels are likely to be minimal, limited to air release events from air valves, pumping stations and maintenance activities. Those activities likely to create regular noise as part of operation would be located away from sensitive receivers.

8.8.3 Considerations for Environmental Assessment

The impacts associated with noise and vibration from the proposal would not be considered significant. Assessment and management of the construction noise would be undertaken in accordance with relevant guidelines (*e.g.* DECC, 2009). This would involve:

- A construction noise and vibration assessment would be undertaken for the project. Occupants of noise sensitive properties would be consulted as part of this assessment. This would involve:
  - Identification of noise sensitive receivers;
  - Noise monitoring for baseline noise levels (if required); and
  - Modelling and predictions of noise levels.
- Planning to ensure that activities would be organised so that noise and vibration impacts are minimised during construction.

8.9 Traffic

8.9.1 Existing transport infrastructure

The proposal would include several road crossings with the majority across unsealed local roads including, but not limited to:

- Oakey Lane;
- Long Point Road; and.
- Ophir Road.

8.9.2 Potential impacts

During construction the proposal has the potential to increase levels of traffic on local access roads. This is an important consideration given the current state of repair and condition of some of these roads

Some roads would also require temporary closure to enable construction of the pipeline. RTA-controlled roads will be crossed by under-boring if required. Traffic management measures will need to be implemented during construction.

Operational traffic impacts would be minimal.

8.9.3 Considerations for Environmental Assessment

Traffic management and works scheduling plans would be required prior to construction to ensure minimal disturbance to traffic on local and regional roads throughout the construction phase. Safety would be a significant factor to take into account if there is to be a mix of local traffic and construction traffic, particularly through the presence of large vehicles where there have not previously been. The following should be addressed in the Environmental Assessment:

- Condition of roads to handle traffic types and volumes during construction;
- Consultation with residents and road authorities regarding traffic and access alternatives and issues;
- Controls and management measures for the use of oversized vehicles; and
- Requirement for the development of a traffic management plan.

8.10 Resource use and waste management

8.10.1 Existing environment

The existing land use pattern is predominantly rural residential, with some urban areas near Orange. Existing waste in the vicinity of the corridor is largely from scattered litter blown by wind around the proposal area and waste generated from livestock.

8.10.2 Potential impacts

Possible waste streams generated during the construction phase are presented in Table 1.

Table 1 Potential waste generated during the construction phase

Waste source	Composition	Classification[2]
Site clearing and ground preparation Site excavation and bulk earthworks	Foliage, excess fill materials, excavated material (spoil) such as soil or rock.	General Solid Waste (Non Putrescible)
Construction of pipeline and associated facilities Erection of security fencing along the working width and the installation of safety measures	Scrap wood, metals and concrete spills. Packaging from materials received at facility, such as foam, strapping and lumber. Concrete, metal rods/pipes and timber.	General Solid Waste (Non Putrescible)
Construction phase liquid waste from plant and machinery maintenance	Fuels, oils, paints and chemicals.	Hazardous and/or non-hazardous

[2] DECC *Waste Classification Guidelines*

Waste source	Composition	Classification[2]
Wastewater from various construction activities	Water from concrete mixing and curing, site clean up, etc.	Non-hazardous
Site office	Used paper, boxes, cartridges, toners.	General Solid Waste (Non Putrescible)
Kitchen waste from site canteen or food preparation area	Food waste.	General Solid Waste (Putrescible)

8.10.3 Considerations for Environmental Assessment

The *Waste Avoidance and Resource Recovery Act 2001*, the *POEO Act 1997* and relevant regulations and applicable industry guidelines should be used to classify any wastes and where possible, determine measures to handle, store and appropriately dispose of the waste. Proper waste handling and management minimises the risk of causing harm or loss of vegetation, animal, aquatic or human life or contamination of the environment.

Mitigation measures should include a recommendation to prepare a detailed Waste Management Plan (WMP) as part of the Construction Environmental Management Plan (CEMP). The WMP would classify and quantify all the wastes likely to be produced and recommend appropriate handling, storage, recycling and disposal methods.

8.11 Social considerations

8.11.1 Existing environment

Some relevant points are that:

- The Macquarie River is a popular local recreational location for fishing and swimming, *etc;*
- The pipeline corridor is predominantly located on rural land, either public owned or used for agriculture;
- Orange has been on high level water restrictions for a number of years; and
- The additional water supply for the city would be beneficial for the local community. The pipeline construction would create local jobs.

8.11.2 Potential impacts

During construction, road access to the popular recreational area of the Macquarie River will be limited. There would be some land acquisition requirements associated with this proposal, and some above ground structures that may be located on private property and other land would require purchase of the easement.

8.11.3 Considerations for Environmental Assessment

- A comprehensive community engagement and stakeholder management program will be implemented;
- A review of socio-economic issues for the area would be undertaken to more fully assess the impacts of the project; and
- Stakeholder views and community responses would be considered in the assessment.

8.12 Landscape and visual amenity

8.12.1 Existing environment

The visual envelope of the study area is characterised by expanses of open, undulating, rural land. Farming activities, predominantly grazing, water storage dams and rural homesteads are scattered throughout the landscape.

8.12.2 Potential impacts

It is proposed that the pipeline will be constructed as a belowground structure. This aids in maintenance and operation of the pipeline, allows more flexibility in alignment and lowers construction costs and impacts. Therefore, the entire structure will be visible, including air valves and pump stations. However, as most of the alignment is proposed to be located alongside existing linear infrastructure such as roads and power line easement, such visual impacts are expected to limited. Construction of a power line to the pump stations and off take structure will also have a visual impact on the landscape.

Construction activities, including security fencing, plant and stockpiles may impair the visual amenity of surrounding lands. These impacts would be relatively short (approximately one year for the entire pipeline and, therefore, significantly less for each constructed section) and are considered to be minor.

8.12.3 Considerations for Environmental Assessment

Issues relating to visual amenity would be considered during detailed design and there will be early consultation to communicate the proposed design solution. The following would be considered as part of the Environmental Assessment:

- Issues raised as part of the stakeholder engagement and community consultation program. Responses would be incorporated in a database and considered in site design and location;
- The impact of the pipeline and infrastructure on the visual amenity of the surrounding landscape;
- In assessing visual amenity impacts, consideration would be given to land use, heritage, recreational and precinct character, and open space networks; and
- Urban and landscape vision and design objectives would be documented where appropriate.

9. Proposed Environmental Assessment scope

During the detailed design of the pipeline route and structural features, the issues listed below would be considered and potential impacts would be avoided wherever possible. Where impacts as a result of the proposal are unable to be avoided, mitigation measures would be identified to reduce the potential impacts. These measures would be identified in the Environmental Assessment for the proposal.

Additionally, the Environmental Assessment would include:

- Further consideration of the planning and statutory requirements of the proposal;
- Strategic justification for the proposal;
- A detailed description of the proposal;
- Discussion of the proposal options;
- The scope, methods and results from detailed investigations (key issues in bold) into:
  - **Flora and fauna;**
  - **Aquatic ecology;**
  - **Noise and vibration;**
  - **Aboriginal and non-Aboriginal heritage;**
  - **Landscape and visual impacts;**
  - Soils and geology;
  - Land use;
  - Air quality;
  - Surface and groundwater;
  - Traffic;
  - Resource use and waste; and
  - Social and economic considerations.
- An interpretation of the results from these investigations to develop:
  - Mitigation measures to manage negative impacts; and
  - A Statement of Commitments.
- Consideration of the principles of sustainability in the context of the proposal.

10. References

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Appendix A

Online database search results

NSW and Commonwealth listed threatened species for Orange and Cabonne LGAs.

Scientific Name	Common Name	Category	Ranking	Presence	NSW listed	Comm listed
Crina sloanii	Sloanes Froglet	Animal>Amphibians	Vulnerable	Known	NSW	
Litoria aurea	Green and Golden Bell Frog	Animal>Amphibians	Endangered	Known	NSW	
Litoria booroolongensis	Booroolong Frog	Animal>Amphibians	Endangered	Known	NSW	Comm
Litoria castanea	Yellow-spotted Bell Frog	Animal>Amphibians	Critically Endangered	Predicted	NSW	
Chalinolobus dwyeri	Large-eared Pied Bat	Animal>Bats	Vulnerable	Predicted	NSW	Comm
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Animal>Bats	Vulnerable	Known	NSW	
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Animal>Bats	Vulnerable	Predicted	NSW	
Nyctophilus timoriensis	Greater Long-eared Bat (SE form)	Animal>Bats	Vulnerable	Known	NSW	Comm
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Animal>Bats	Vulnerable	Known	NSW	
Scoteanax rueppellii	Greater Broad-nosed Bat	Animal>Bats	Vulnerable	Predicted	NSW	
Anseranas semipalmata	Magpie Goose	Animal>Birds	Vulnerable	Predicted	NSW	
Botaurus poiciloptilus	Australasian Bittern	Animal>Birds	Vulnerable	Predicted	NSW	
Burhinus grallarius	Bush Stone-curlew	Animal>Birds	Endangered	Predicted	NSW	
Cacatua leadbeaterii	Major Mitchell Cockatoo	Animal>Birds	Vulnerable	Known	NSW	
Callocephalon fimbriatum	Gang-gang Cockatoo	Animal>Birds	Vulnerable	Known	NSW	
Calyptorhynchus lathami	Glossy Black-cockatoo	Animal>Birds	Vulnerable	Known	NSW	
Circus assimilis	Spotted Harrier	Animal>Birds	Vulnerable	Known	NSW	
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspec	Animal>Birds	Vulnerable	Predicted	NSW	
Daphoenositta chrysoptera	Varied Sittella	Animal>Birds	Vulnerable	Known	NSW	
Epthianura albifrons	White fronted chat	Animal>Birds	Vulnerable	Known	NSW	
Glossopsitta pusilla	Little Lorikeet	Animal>Birds	Vulnerable	Predicted	NSW	
Grantiella picta	Painted Honeyeater	Animal>Birds	Vulnerable	Known	NSW	
Grus rubicunda	Brolga	Animal>Birds	Vulnerable	Predicted	NSW	
Hieraaetus morphnoides	Little Eagle	Animal>Birds	Vulnerable	Known	NSW	
Lathamus discolor	Swift Parrot	Animal>Birds	Endangered	Predicted	NSW	Comm
Leipoa occelata	Malleefowl	Animal>Birds	Endangeres	Known	NSW	
Limosa limosa	Black-tailed Godwit	Animal>Birds	Vulnerable	Predicted	NSW	
Lophoictinia isura	Square-tailed Kite	Animal>Birds	Vulnerable	Predicted	NSW	
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Animal>Birds	Vulnerable	Known	NSW	
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern s	Animal>Birds	Vulnerable	Predicted	NSW	
Neophema pulchella	Turquoise Parrot	Animal>Birds	Vulnerable	Known	NSW	
Ninox connivens	Barking Owl	Animal>Birds	Vulnerable	Predicted	NSW	
Ninox strenua	Powerful Owl	Animal>Birds	Vulnerable	Predicted	NSW	
Oxyura australis	Blue-billed Duck	Animal>Birds	Vulnerable	Known	NSW	
Pachycephala inornata	Gilbert's Whistler	Animal>Birds	Vulnerable	Known	NSW	
Petroica boodang	Scarlet Robin	Animal>Birds	Vulnerable	Known	NSW	
Petroica phoenicea	Flame Robin	Animal>Birds	Vulnerable	Known	NSW	
Polytelis swainsonii	Superb Parrot	Animal>Birds	Vulnerable	Known	NSW	Comm
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subs	Animal>Birds	Vulnerable	Predicted	NSW	
Pyrrholaemus saggitatus	Speckled Warbler	Animal>Birds	Vulnerable	Known	NSW	
Rostratula benghalensis	Painted Snipe	Animal>Birds	Endangered	Predicted	NSW	Comm
Stagonopleura guttata	Diamond Firetail	Animal>Birds	Vulnerable	Known	NSW	
Stictonetta naevosa	Freckled Duck	Animal>Birds	Vulnerable	Known	NSW	

Scientific Name	Common Name	Category	Ranking	Presence	NSW listed	Comm listed
Tyto novaehollandiae	Masked Owl	Animal>Birds	Vulnerable	Known	NSW	
Xanthomyza phrygia	Regent Honeyeater	Animal>Birds	Endangered	Known	NSW	Comm
Maccullochella macquariensis	Trout Cod	Animal>Fish	Endangered	Predicted		Comm
Maccullochella peelii peelii	Murray Cod, Cod, Goodoo	Animal>Fish	Vulnerable	Predicted		Comm
Macquaria australasica	Macquarie Perch	Animal>Fish	Endangered	Predicted		Comm
Paralucia spinifera	Purple Copper Butterfly (Bathurst Co	Animal>Invertebrates	Endangered	Known	NSW	
Bettongia lesueur graii	Boodie, Burrowing Bettong (mainland	Animal>Marsupial	Endangered	Known	NSW	
Cercartetus nanus	Eastern Pygmy-possum	Animal>Marsupials	Vulnerable	Predicted	NSW	
Dasyurus maculatus	Spotted-tailed Quoll	Animal>Marsupials	Vulnerable	Known	NSW	Comm
Petaurus australis	Yellow-bellied Glider	Animal>Marsupials	Vulnerable	Predicted	NSW	
Petaurus norfolcensis	Squirrel Glider	Animal>Marsupials	Vulnerable	Known	NSW	
Petrogale penicillata	Brush-tailed Rock-wallaby	Animal>Marsupials	Vulnerable	Predicted		Comm
Phascogale tapoatafa	Brush-tailed Phascogale	Animal>Marsupials	Vulnerable	Predicted	NSW	
Phascolarctos cinereus	Koala	Animal>Marsupials	Vulnerable	Known	NSW	
Pseudomys fumeus	Konoom, Smoky Mouse	Animal>Marsupials	Endangered	Predicted		Comm
Pteropus poliocephalus	Grey-headed Flying-fox	Animal>Marsupials	Vulnerable	Predicted		Comm
Aprasia parapulchella	Pink-tailed Worm-lizard	Animal>Reptiles	Vulnerable	Predicted	NSW	
Hoplocephalus bungaroides	Broad-headed Snake	Animal>Reptiles	Endangered	Known	NSW	
Suta flagellum	Little Whip Snake	Animal>Reptiles	Vulnerable	Predicted	NSW	
Varanus rosenbergi	Rosenberg's Goanna	Animal>Reptiles	Vulnerable	Known	NSW	
Mt Canobolas Xanthoparmelia Lichen Community	Mt Canobolas Xanthoparmelia Licher	Community>Threatened Eco	Endangered Ecological Community	Known	NSW	
Natural Temperate Grassland of the Southern Tableland	Natural Temperate Grassland of the S	Community>Threatened Eco	Not listed	Known	NSW	
White Box Yellow Box Blakely's Red Gum Woodland	Box-Gum Woodland	Community>Threatened Eco	Endangered Ecological Community	Known	NSW	
Philotheca ericifolia		Plant	Vulnerable	Predicted		Comm
Thesium australe	Austral Toadflax	Plant	Vulnerable	Predicted		Comm
Pultenaea campbellii	New England Bush-pea	Plant>Forb	Vulnerable	Predicted		Comm
Austrostipa metatoris		Plant>Grass	Vulnerable	Predicted		Comm
Austrostipa wakoolica		Plant>Grass	Endangered	Predicted		Comm
Swainsona sericea	Silky Swainson-pea	Plant>Herbs and Forbs	Vulnerable	Predicted	NSW	
Tylophora linearis		Plant>Herbs and Forbs	Vulnerable	Known	NSW	Comm
Eucalyptus pulverulenta	Silver-leafed Gum	Plant>Mallees	Vulnerable	Predicted	NSW	
Diuris sheaffiana	Tricolor Diuris	Plant>Orchid	Vulnerable	Predicted		Comm
Derwentia blakelyi	Derwentia blakelyi	Plant>Shrubs	Vulnerable	Known	NSW	
Grevillea divaricata	Grevillea divaricata	Plant>Shrubs	Endangered	Predicted	NSW	
Persoonia marginata	Clandulla Geebung	Plant>Shrubs	Vulnerable	Known	NSW	
Pomaderris queenslandica	Scant Pomaderris	Plant>Shrubs	Endangered	Known	NSW	
Prostanthera cryptandroides subsp. Cryptandroides	Wollemi Mint-bush	Plant>Shrubs	Vulnerable	Known	NSW	
Zieria obcordata	Zieria obcordata	Plant>Shrubs	Endangered	Predicted	NSW	
Eucalyptus aggregata	Black Gum	Plant>Trees	Vulnerable	Predicted	NSW	
Eucalyptus cannonii	Capertee Stringybark	Plant>Trees	Vulnerable	Known	NSW	
Eucalyptus canobolensis	Silver-Leaf Candlebark	Plant>Trees	Vulnerable	Known	NSW	Comm
Eucalyptus robertsonii subsp. hemisphaerica	Robertson's Peppermint	Plant>Trees	Vulnerable	Known	NSW	Comm
Eucalyptus saxicola	Mt Canobolas Box	Plant>Trees	Endangered	Predicted	NSW	

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