Appendix M

Traffic and transport assessment (Samsa Consulting)

ORANGE CITY COUNCIL

The Macquarie River to Orange Pipeline Project

Traffic & Transport Assessment

July 2012

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TRANSPORT PLANNING & TRAFFIC ENGINEERING

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EXECUTIVE SUMMARY

The following points summarise this Traffic and Transport Assessment for the proposed Macquarie River to Orange pipeline project:

- The project would consist of construction and operation of infrastructure required to transfer approximately 12 ML/day of water a distance of approximately 37 km from the Macquarie River to the Suma Park Dam at Orange.
- The construction phase would include establishment of some 15site compounds, pipeline construction, two break tanks, three pump stations and transmission line construction.
- Road transport is the preferred method of transport.
- The major road network provides road transport access to Orange from the major urban centres of the NSW eastern seaboard. The transport route would follow Great Western Highway to Bathurst and then Mitchell Highway to Orange.The construction of the North Orange Bypass, due for completion in mid-2012, will provide a dedicated bypass of the city centre and become part of the heavy vehicle transport route for the project.
- Due to constraints crossing Oaky Creek (along Oaky Lane) in wet weather, road transport routes are required to access the project site along two distinct sections in the south and the north:
  - Southern section access via Ophir Road, Lookout Road and Oaky Lane, south of Oaky Creek crossing as well as Bulgas Road near Suma Park Dam.
  - Northern section access via Burrendong Way, Long Point Road and Oaky Lane, north of Oaky Creek crossing.
- The major and minor road network to be utilised by project traffic all have significant spare capacity.
- There is no existing significant road safety issues along the road network proposed to be utilised by project traffic.
- Site access is proposed along the pipeline corridor off the public road network at various locations as the project progresses.
- During the construction phase, several tasks would generate traffic including initial site set-up and access construction, construction material delivery, reinstatement construction activities, and construction staff transport. These tasks would result in a maximum daily traffic generation of 138 light vehicle trips (during peak staffing periods) and 50 heavy vehicle trips during peak construction activities.
- Maximum traffic generation would occur along either the southern or northern section access routes, during any specific construction period.
- During peak construction activities, all affected roads on the road network would maintain their levels of service and adequately absorb construction-generated traffic.
- Short-term partial road closures would occur along Oaky Lane, Ophir Road and Long Point Road where the pipeline route crosses and/or encroaches onto the road carriageway. However, the roads would remain open with controlled single direction traffic flow past the works area.
- Sufficient off-road parking for construction staff, heavy vehicles and plant would be available in addition to suitable on-site manoeuvring areas.

- Traffic generation during operations would be minimal resulting in approximately 30 visits per year. Consequently, traffic and road network impacts would be negligible during the operational phase.
- Road infrastructure upgrades may be required at a number of locations including unsealed sections of Long Point Road and Oaky Lane to accommodate heavy vehicle transport and non-4WD vehicles, particularly during and after wet weather. In addition, an approximate 4 km long all-weather access road would be required from Long Point Road to the Macquarie River offtake point and pump station.
- A Construction Traffic Management Plan (CTMP) would be prepared and implemented in co-ordination with the local Councils and RTA. The CTMP would typically address:
  - Scheduling of transport deliveries;
  - Community consultation and issue logging;
  - Road infrastructure upgrade requirements;
  - Traffic management of transport operations;
  - Preparation of a ‘Transport Code of Conduct’ for all staff and contractors;
  - Consideration of adverse traffic conditions due to fog, snow and ice as well as stock crossings.
  - Procedure to monitor traffic impacts and respond to impacts rapidly; and
  - Reinstatement of pre-existing road conditions after construction is complete.
- This Traffic and Transport Assessment has addressed the Department of Planning & Infrastructure NSW’s Director-General’s Requirements for the construction and operational impacts of the project.
- It is considered the proposed Macquarie River to Orange pipeline project would not create any significant adverse impacts with respect to transport issues.
- Any required road upgrades or new road infrastructure will result in a positive impact by providing a legacy for the local community with the local road network being improved.

1. Introduction

1.1 Purpose of This Report

Orange City Council proposes to undertake the Macquarie River to Orange pipeline project (referred to in this report as 'the project'). This report has been prepared to provide an assessment of the traffic and transportation impacts of the project as an input to the environmental assessment. The environmental assessment is being prepared in accordance with the requirements of Part 3A of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act).

The report addresses the requirements of the Director-General of the NSW Department of Planning and Infrastructure (the Director-General's Requirements) dated 24th March 2011.

1.2 Project Overview

The project is one step to improving the water security for Orange. It involves construction and operation of infrastructure required to transfer approximately 12 ML/day of water a distance of approximately 37 km from the Macquarie River to the Suma Park Dam at Orange.

The infrastructure required to transfer the water includes an offtake structure and pump stations, an underground pipeline (approximately 37 km in length), a discharge structure, and ancillary infrastructure (power supply).

In summary, the project would involve construction and operation of the following infrastructure:

- 37 km of 375 mm diameter water rising main between the Macquarie River and Suma Park Dam.
- An offtake structure and pump station located at the upper Macquarie River.
- Two booster pump stations and break tanks along the pipeline route.
- Power supply to pumps and other infrastructure.
- Telemetry controls to enable remote operation of the infrastructure including pumps and valves, etc.
- A discharge structure at the Suma Park Dam.

1.3 Project Location

The proposed offtake structure would be located on the south side of the Macquarie River immediately upstream of the confluence with Boshes Creek. The water carried along the pipeline would discharge into the Suma Park Reservoir at Orange via the discharge structure, located approximately 10 m east of the existing saddle dam (at the north-west corner of the dam wall).

The proposed route for the pipeline contains road reserves, including Ophir Road and Long Point Road. In most (up to 70% of the route) areas the pipeline would need to cross private land. It is proposed that the majority of the pipeline would be underground and would not impact on farming or other land uses.

The project would be located in both the Orange and Cabonne local government areas. The majority of the pipeline would be located in the Cabonne local government area (LGA).

1.4 Assessment Scope & Methodology

The scope of the assessment covers construction impacts of the pipeline, ancillary facilities such as the pumping stations and break tanks, and transmission line provision. It also covers the operational phase of the project.

As part of the assessment, transport impacts during construction and operations have been addressed as follows:

- Desktop review of relevant documents and background information.
- Consultation with local Councils and RTA in regard to transport routes, traffic management and other pertinent traffic and transport related matters.
- Site visit of the proposed pipeline corridor and surrounding road network.
- Determination of existing traffic volumes on surrounding road network as well as traffic operations at intersections and road sections.
- Identification of construction transport routes for inbound material delivery and outbound spoil haulage (if applicable).
- Identification of nature / mode of traffic generated from the construction and operation of the project including construction material deliveries, employee travel, peak traffic (construction) periods, etc.
- Determination of potential impacts and assess the significance of these impacts on the local and regional road network and intersections, including:
  - impacts to road infrastructure and the potential for temporary detour routes for public traffic;
  - impacts to property accesses;
  - road safety issues;
  - direct impacts from traffic rerouting; and
  - any access restrictions to private property.
- Determination of potential site-specific transport impacts including construction site access, employee parking, etc.
- Assessment of impacts on any existing and proposed railway infrastructure.
- Identification and assessment of any cumulative impacts from other proposed nearby works / developments.
- Development of mitigation measures to address potential transport impacts including identified detour routes, construction traffic management and road safety issues.

1.5 Director-General's Requirements

The Director-General's Requirements require the traffic and transport assessment to assess the construction and operational transport impacts of the project as follows:

The EA must include an assessment of impacts to the local and regional road network and intersections during construction, including direct impacts from traffic rerouting and any access restrictions to property, as well as details on the nature/ mode of traffic *generated from the project, transport routes and traffic volumes. Consideration must also be given to the impact of the project on any existing and proposed railway infrastructure in the area.*

This Traffic and Transport Assessment has addressed the Director-General's Requirements for the construction and operational impacts of the project as follows:

- Identify nature / mode of traffic generated from the construction and operation of the project – refer to *Section 4.1.1* and *Section 4.2.1*.
- Identify existing transport routes and current traffic volumes – refer to *Section 3.2* and *Section 3.3*.
- Identify potential impacts and assess the significance of these impacts on the local and regional road network and intersections, including:
  - Impacts to road infrastructure – refer to *Section 4.1.2*, *Section 4.1.3* and *Section 4.2.2*.
  - Direct impacts from traffic rerouting – refer to *Section 4.1.3* and *Section 4.1.5*.
  - Any access restrictions to property – refer to *Section 4.1.4*.
- Assess impacts on any existing and proposed railway infrastructure – refer to *Section 3.1* and *Section 4.1.6*.
- Outline proposed mitigation measures to avoid or minimise any impacts – refer to *Chapter 5*.

1.6 Report Structure

The remainder of this assessment report is presented as follows:

Chapter 2 provides an overall project description.

Chapter 3 describes existing transport conditions including transport routes and site access locations.

Chapter 4 assesses the transportation impacts during the construction and operation phases of the project.

Chapter 5 discusses mitigation measures to address potential transport impacts identified.

Chapter 6 provides conclusions to the assessment.

2. Project Details

2.1 Project Description

The proposed project involves construction and operation of infrastructure with the capacity to transfer up to 12 ML/day of water from the Macquarie River to the Suma Park Dam. The project would be jointly funded by the Federal and State Governments and Orange City Council (Council). Council is aiming to have the project operational by 2013.

The proposed pipeline corridor lies within the Central Tablelands area of NSW and 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 project comprises approximately 37 km of trunk water main and ancillary infrastructure, extending from near the Long Point area on the Macquarie River, within Cabonne LGA, to Suma Park Dam, east of Orange within City of Orange LGA. The City of Orange LGA is located approximately 250 km west of Sydney. Cabonne LGA surrounds Orange LGA to the north, east and west.

The infrastructure required to transfer the water includes an offtake structure and pump stations, an underground pipeline, a discharge structure and ancillary infrastructure (power supply). The proposed off-take point would be located west of Long Point on the upper Macquarie. The majority of the pipeline would be located in the Cabonne local government area (LGA). The proposed route for the pipeline includes road reserves, including Ophir Road and Long Point Road. In some areas the pipeline would need to cross private land. It is proposed that the majority of the pipeline would be underground and would not impact on farming or other land uses. Refer to *Figure 2.1* below for the pipeline route.

The project would involve construction and operation of the following main features:

- 37 km of 375 mm diameter water rising main between the Macquarie River and Suma Park Dam.
- An offtake structure and pump station located north of Long Point on the upper Macquarie River.
- Two booster pump stations and break tanks along the pipeline route.
- Power supply to pumps and other infrastructure.
- Telemetry controls to enable remote operation of the infrastructure including pumps and valves, etc.
- A discharge structure at the Suma Park Dam.

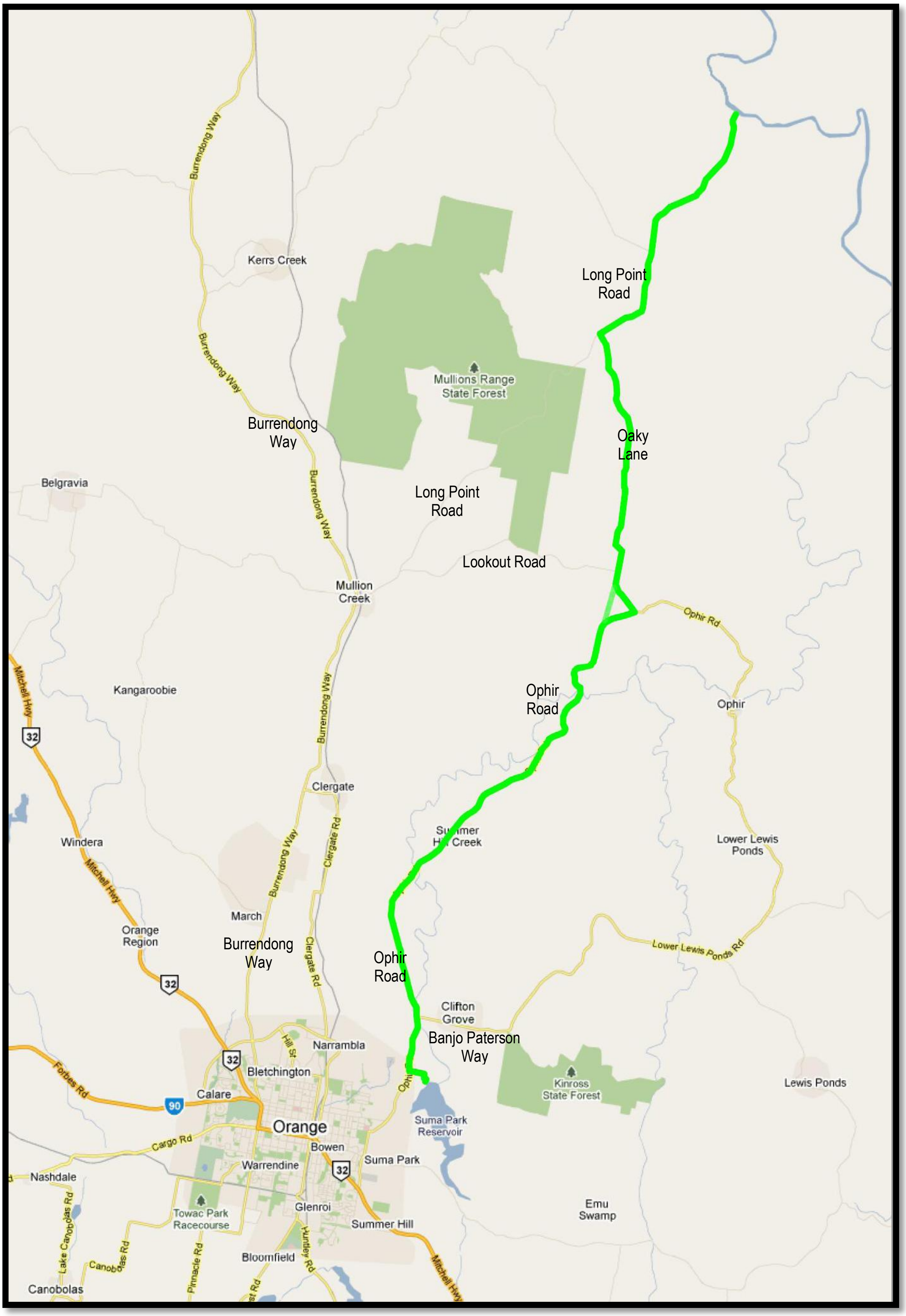

Figure 2.1: Proposed Pipeline Route

Key construction activities would include:

- Establishing an all-weather track to the river that can be used for the construction and operation of the river pump station;
- Installation of off-take structure and pump stations;
- Above-ground (less than 2 km length) and below ground installation of pipeline;
- Rock excavation;
- Construction of road and river crossings; and
- Installation of power supply to pump stations via approximately 30 km of 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.

2.2 Construction Phase

2.2.1 Site Compounds

Site compounds would be required for the construction phase of the project. Some 15 site compounds are proposed along the length of the project route.

There is proposed to be 15compounds, which 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 and be sited within the pipeline corridor as far as practicable. Their total area would be approximately 29,350m^2.

2.2.2 Pipeline Construction

The pipeline construction corridor would be in the order of 20 m wide while the pipeline is being constructed. Intermittent pipe storage areas would be established approximately every 300 m along the route. The storage areas would typically be some 50 m x 20m.

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 is proposed to be maintained as a cleared landscape to allow access for maintenance activities. This would be in the order of 5m wide.

The following construction activities would typically occur for the installation of the pipeline:

- Access road provision;
- Delivery and connection 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 (as required); and
- Commissioning and completion.

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

2.2.3 Transmission Line Construction

The transmission line construction corridor would range from 10 m to 45 m wide while the power supply is being constructed. It would require similar activities to the pipeline construction with selective tree clearing to accommodate construction and the formation of an easement post-construction.

2.2.4 Easement Acquisition

Construction of the project would require the acquisition of easements over roads and other public lands as well as private land within which the pipeline is located. It is likely that the easements would be in the order of 6m wide.

2.2.5 Crossings

The pipeline would cross public roads at a number of selected locations, small creeks and major creeks. Road crossings include locations on Long Point Road, Oaky Lane, Ophir Road and possibly Lookout Road. Roads would be crossed via trenching methods under appropriate traffic control.

Crossings of major waterways would be made by either trenching or a range of boring techniques dependant on technical and geological constraints.

2.2.6 Private Property Access

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

2.2.7 Construction Hours

Typical hours of construction would be 7:00 am to 6:00 pm, Monday to Friday, and 8:00 am to 5:00 pm on Saturdays and Sundays.

Extended working hours may be required to ensure the project is completed within the allocated funding timeframe.

2.2.8 Workforce

The construction workforce would consist of on-site and off-site staff. Off-site staff would typically include professional and administration-related staff. The on-site construction workforce would likely be an average of 45 people (with a peak of 69 people) and typically consist of the following for each project component:

- Pipeline laying–three teams consisting of five persons per team. This would be spread over the whole of the pipeline route over the twelve-month construction period.
- Pump stations –four persons at each pump station (total of four pump stations). Pump stations would likely be constructed in sequence spread over a six-month period.
- Break tanks – four persons at each break tank (total of three break tanks). Break tanks would likely be constructed in sequence over a six-month period similar to the pump stations.

- Power supply –three teams consisting of four persons per team required to upgrade the power supply for a distance of 30 km spread over a nine-month construction period.

2.3 Operation Phase

2.3.1 Operation Philosophy

It is fully expected and recognised that the trigger for operating the pipeline would be ‘minimum flow’ conditions established by the NSW Office of Water. The pump stations would not be permitted to pump water from the river in periods of low flow. Extractions would only occur when the river is flowing, with the rate of extraction limited by the capacity of the pumps.

The minimum flow condition is yet to be confirmed, however, negotiations regarding this matter have commenced and it is expected that this would be determined as part of the project approval process.

2.3.2 Water Transfers

The pipeline would be designed and constructed to operate in an automated manner. The mode of operation of the system, whether it is continuous or intermittent, would be determined during detailed design and be subject to the water level of the river and a need to maintain minimum river flows.

The operating rules and licence conditions for the pipeline would limit or prohibit extractions at times of low flow in the river. Similarly extractions would only occur when the river is flowing, with the rate of extraction limited by the capacity of the pumps.

The exact location of the reservoir, the pipe and valve arrangements and further operating rules would be determined during the detailed design phase.

2.3.3 Maintenance

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

Minor ongoing maintenance on the project 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;
- Less frequent maintenance of the pipeline including scouring the pipeline to remove sludge build up or repairing breaks; and
- Less frequent maintenance of the transmission line.

2.3.4 Workforce

It is estimated that the operation workforce would consist of two persons per vehicle per visit. Visits would be required for:

- Regular maintenance of pump stations (once per week when operating – approximately 26 visits per year)

- Pipeline operation (annual inspection)
- Scour and air valves (annual inspection)
- Substations (annual inspection)
- Power poles would need to be inspected every 4½ years by energy authority staff.

3. Existing Conditions

3.1 Transport Mode

The assessment of transportation of pipeline and ancillary infrastructure components to site involves the separate consideration of the transport mode between:

- Origins of pipe manufacturing plants located in Australia to the project site;
- Transportation along the major and minor public road network, including through towns and urban areas along the transport routes; and
- Site access off the public road network onto the project site.

The location of pipe manufacturing plants has not yet been determined. However, it is likely that they would be located within the Sydney area or other major urban centres along the NSW east coast. Therefore, this assessment assumes potential transport routes from the east.

Both rail and road transport modes have been considered for transporting the major pipeline and transmission line components.

Rail Transport

Rail as a transport option is potentially possible via the Country Rail Infrastructure Authority (CRIA) rail network that runs to Orange Junction and then on to Mullion Creek and beyond. This could be accessed from the eastern seaboard via the RailCorp rail network. Flat bed cars and support systems are available to transport pipe loads and other ancillary components for the project.

There are however, problems of scheduling rail services and restriction on track capacity that may affect delivery and would require negotiation and confirmation with rail operators.

Moreover, the problem also exists of handling and transporting pipe and other project components from the rail hub to site, requiring road transport in any case. The extent of transportation handling is such that it would be less desirable to use rail transport.

Therefore, road transport is the most likely option for transporting the project components and for the purposes of this transport assessment, the use of rail transport has not been pursued any further.

Road Transport

All road routes to Orange from the east are via either National Routes or State Highways and can readily accommodate the proposed transportation of pipe components. The road network has the flexibility to provide a single transportation mode from origin to the project site without the need for additional loading and handling operations.

3.2 Road Transport Routes

3.2.1 Major Road Network

The major road network provides road transport access to Orange from the major urban centres of the NSW eastern seaboard. The transport route would follow Great Western Highway to Bathurst and then Mitchell Highway to Orange.

The major road network provides a relatively high standard of road infrastructure, suitable for transport by heavy vehicles as per current operations. The major road network has relatively wide carriageways and road formations, pavement linemarking, and controlled access to side roads. It generally has a 100 km/h speed limit.

On approaching Orange from the east, heavy vehicles currently need to travel through the city centre to continue west along Newell Highway to Dubbo or along The Escort Way (Forbes Road) to Forbes / Parkes. This would also be the case for travel north of Orange via Ophir Road or Burrendong Way.

However, the North Orange Bypass, which will provide a dedicated bypass of the city centre, is due for completion in mid-2012.The North Orange Bypass could also be utilised by the project's traffic and become part of the heavy vehicle transport route. When completed, the North Orange Bypass will turn north off Mitchell Highway at a channelised T-junction. The junction will be located east of Orange at a location known as Chinamen's Bend.

The North Orange Bypass will provide access to both Ophir Road and Burrendong Way at roundabout-controlled intersections. To the west of the Burrendong Way roundabout, the North Orange Bypass continues on to connect to Mitchell Highway, west of Orange, at another roundabout. Refer to *Figure 3.1* below for road network transport routes.

3.2.2 SurroundingMinor Road Network

Due to constraints crossing Oaky Creek (along Oaky Lane) in wet weather, road transport routes are required to access the project site along two distinct areas in the south and the north.

- Southern section access via Ophir Road, Lookout Road and Oaky Lane, south of Oaky Creek crossing as well as Bulgas Road near Suma Park Dam.
- Northern section access via Burrendong Way, Long Point Road and Oaky Lane, north of Oaky Creek crossing.

The surrounding minor road network serving the project site is described following – refer to *Figure 3.1* below.

Southern Section

Ophir Road

Ophir Road is a local route that connects Orange to the village of Ophir to the north-east. It forms a loop with Lower Lewis Ponds Road to connect back to Banjo Paterson Way and the new residential area of Clifton Grove, on the eastern side of Orange.

Ophir Road varies in condition and standard along its length. In the southern section, particularly south of Banjo Paterson Way, it is at least 7 m to 8 m wide incorporating two travel lanes and an unmarked sealed shoulder area. In this section, pavement conditions are average to good and there is centreline and some edgeline markings. The speed limit is 80 km/h.

As it travels north, Ophir Road's carriageway narrows to a 6 m to 7 m width and the pavement conditions decline somewhat although they are still at least of average condition. There are some narrower carriageway sections at its northern end due to some tight alignments. Centreline marking is generally provided and the speed limit changes to 100 km/h approximately 1.4 km north of Banjo Paterson Way.

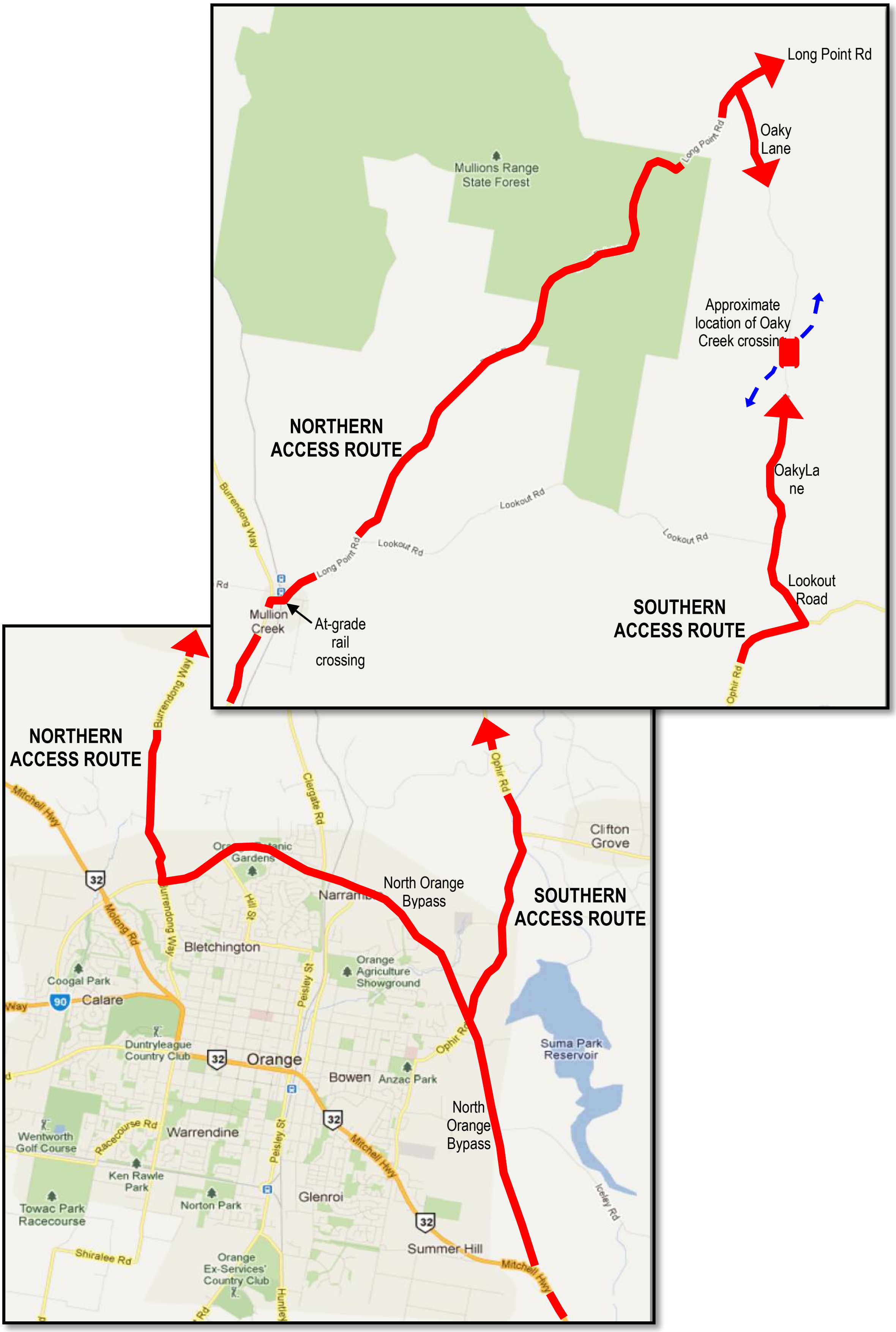

Figure 3.1: Proposed Transport Routes

The general road environment can be described as gently undulating in the southern section with increased rolling terrain in the north. Larger radius curves in the southern section defer to some shorter sections of sharper curves and crest alignments in the northern section. These latter alignments require lower advisory speeds within the background 100 km/h speed zone.

Traffic volumes along Ophir Road vary considerably. South of Banjo Paterson Way, traffic flows are approximately 2,500 vehicles per day (vpd) in 2010[1]. Further north they decrease to approximately 650vpd in 2009[2]. From site observations and spot counts, it has been estimated that current 2012daily traffic volumes are likely to be approximately the same as those recorded in recent years. There is a school bus route that runs along Ophir Road with bus stops often located in the 'throats' of access driveways or side junctions.

Lookout Road

Lookout Road is an unclassified local road connecting Long Point Road to Ophir Road. In relation to the project site, Lookout Road forms an extension south of Oaky Lane.

Lookout Road is unsealed, except for a short section at its junction with Ophir Road, which is uncontrolled. It is approximately 6 m wide with an average unsealed surface. The general road environment can be described as gently undulating along its length with large radius curves. It has a sharp bend at its junction with Oaky Lane where it turns to the west.

Lookout Road has no posted speed limit. Traffic volumes are less than 100 vpd[3].

Oaky Lane

Oaky Lane is an unclassified local road connecting Lookout Road in the south to Long Point Road in the north. Both junctions at either end of Oaky Lane are uncontrolled.

While Oaky Lane is unsealed, significant portions are effectively farm tracks with narrow carriageway width (less than 4 m), overhanging vegetation (tree branches and foliage) and poor pavement conditions. The relatively poor conditions along Oaky Lane are validated by warning signs and road closure during wet weather.

The general road environment can be described as undulating with numerous, relatively sharp curves, crests and sags along its length, including the Oaky Creek crossing, which is unpassable during wet weather except by suitable 4WD vehicles.

Oaky Lane has no posted speed limit. Traffic volumes are less than 50 vpd[4].

In its current condition, the road may not be suitable for heavy vehicle transport due to numerous sections of narrow carriageway caused predominantly by overhanging and encroaching trees (trunks and branches) and other vegetation. These conditions would need to be checked on site and confirmed as adequate by transport / delivery contractors and suppliers.

Moreover, during wet weather, sections of slippery unsealed surface along steep grades and sharp curves may hinder transport by heavy vehicles in particular. Road surface treatment, stabilisation or similar road upgrade is likely to be required to facilitate heavy vehicle transport along the more critical sections.

1Orange City Council data (December 2010)

2Cabonne Council data (November 2009)

3Cabonne Council data (April 2009)

4Cabonne Council data (May 2010)

Any required road upgrade will provide a legacy for the local community in that the local road network would be improved.

Bulgas Road

Bulgas Road is an unclassified local road running east off Ophir Road around Suma Park Dam to Kinross State Forest. It would be required for access to the Suma Park Dam section of the works.

Bulgas Road has a section of sealed pavement east of Ophir Road, which is in average to poor condition. Further east, the road becomes unsealed. Carriageway width varies from approximately 5 m to 6 m.

Bulgas Road connects to Ophir Road at an uncontrolled T-junction. It has no posted speed limit. Orange City Council has advised that traffic volumes are likely to be less than 100 vpd.

Northern Section

Burrendong Way

Burrendong Wayis a classified Main Road (MR573) providing an alternative route to the Mitchell Highway between Orange and Wellington.

Burrendong Way has a carriageway width of approximately 6 m to 7 m with centreline marking. Pavement conditions are at least of average condition with some newer sections of good pavement, eg. short section north of Clergate Lane, which has centreline and edgeline marking also. There are some intermittent poorer sections of pavement due to patching and rutting.

The speed limit is generally 100 km/h except on the approaches to Orange (Northern Distributor) and Mullion Creek where 80 km/h speed limits exist.

The general road environment can be described as flat to gently undulating along its length with large radius curves.

Traffic volumes along Burrendong Way in 2005are approximately 5,050 vpd north of Mitchell Highway[5]outside of Orange, approximately 1,300 vpd at Cabonne Shire boundary[6] further north and reduce to approximately 900 vpd at Mullion Creek[7]. From site observations and spot counts, it has been estimated that current daily traffic volumes are likely to be approximately the same as those recorded in 2005. The road is well used by logging trucks to access Long Point Road and the nearby State Forest areas.

Long Point Road

Long Point Road is an unclassified local road connecting Mullion Creek at Burrendong Way to the Long Point area on Macquarie River.

Long Point Road varies in condition and standard along its length. In the western section, west of Oaky Lane, it is approximately 6 m to 7 m wide incorporating two travel lanes. In this section, pavement conditions are at least of average condition and there is centreline marking. The road becomes unsealed approximately 800 m west of Oaky Lane.

The general speed limit is 100 km/h except through the Mullion Creek area where an urban

5 RTA counting station no.93.228 (north of Mitchell Highway): derived from an axle pair count of 5,260

6 RTA counting station no.93.850 (at Cabonne Shire boundary)

7Cabonne Council data (July 2010)

50 km/h speed zone and a 40 km/h school speed zone exist.

The general road environment can be described as undulating with some tighter radius curves requiring lower advisory speeds within the background 100 km/h speed zone.

East of Oaky Lane, along the unsealed section of Long Point Road, pavement conditions deteriorate and the carriageway width narrows. Pavement rutting is frequent and the unsealed surface is particularly poor during wet weather. This section requires some tight and steep alignments to traverse the topography.

Traffic volumes along Long Point Road are less than150 vehicles per day (vpd) in 2010[8].These decrease significantly along the unsealed section to the east. From site observations and spot counts, it has been estimated that current daily traffic volumes are likely to be approximately the same as those recorded in 2010. As mentioned previously, there is a school zone at Mullion Creek. The road is well used by logging trucks.

In its current condition, the road may not be suitable for heavy vehicle transport during wet weather due to sections of slippery unsealed surface along steep grades and sharp curves. Surface treatment and/or stabilisation or similar road upgrade is likely to be required to facilitate heavy vehicle transport along the more critical steep grades and sharp curved sections.

In addition to any road upgrade of Long Point Road, an approximate 4 km long all-weather access road would be required from Long Point Road to the Macquarie River offtake point and pump station. This access road would be maintained for future operational use of the pipeline project infrastructure.

The above road infrastructure upgrades will provide a legacy for the local community in that the local road network would be improved.

Oaky Lane

See existing condition description above in *Southern Section*.

3.3 Traffic Volumes and Operations

Existing traffic volumes were obtained from NSW Roads & Maritime Services (RMS) data or from Orange City / Cabonne Councils (where available). RMS data is generally in the form of average annual daily traffic (AADT) and is predominantly based on traffic volumes from 2005 counts for two-way flows.

Site observations and spot counts on most sections of the roads were undertaken to confirm that current 2011 traffic flows were of the same order as those recorded in previous years. Peak hour traffic flows have been assumed to be between 10% and 15% of daily traffic flows for the more heavily trafficked roads.

Existing traffic volumes in vehicles per day (vpd) and vehicles per (peak) hour (vph) for the surrounding road network are shown in *Table 3.1* below.

8Cabonne Council data (May 2010)

Table 3.1: Existing Traffic Volumes

Road	Vehicles Per Day (vpd)	Vehicles Per Hour (vph)	Traffic Volume Source
Southern Section Access			
Ophir Road			
– between Bulgas Road and Banjo Paterson way(near Banjo Paterson's birthplace memorial)	2,577	280	Orange City Council data (December 2010)
– south of Cullya Road	655	<100	Cabonne Council data (November 2009)
Lookout Road	55	<10	Cabonne Council data (April 2009)
Oaky Lane	14	<10	Cabonne Council data (May 2010)
Bulgas Road	<100	<20	Orange City Council estimate – numbers confirmed by on-site observations
Northern Section Access			
Burrendong Way			RTA counting station
– north of Mitchell Highway	5,050	550	93.228 (2005)
– at Cabonne Shire boundary	1,286	200	93.850 (2005)
– south of Belgravia Road, Mullion Creek	900	150	Cabonne Council data (July 2010)
Long Point Road	136	<30	Cabonne Council data (May 2010)

As expected from the relatively moderate to low traffic volumes throughout the minor road network, intersection performance is adequate at all intersections along the transport routes to both the southern and northern project sections. During site visits, observation of all intersections and the surrounding road network during peak background traffic periods indicates that the road network is operating adequately and has significant spare capacity.

3.4 Road Safety

Crash statistics were obtained by Orange City Council from the NSW Roads and Traffic Authority (RTA) crash database for Orange and Cabonne Local Government Area (LGA) from 2005 to 2009.

Burrendong Way

There were 27 crashes on Burrendong Way with almost half (13) occurring in the village of March. Crash analysis in the village of March identified six vehicles crashed on a bend and seven crashed leaving a straight stretch of road.

At Mullion Creek on Burrendong Way three vehicles crashed, one at the intersection with Long Point Road.

In Orange LGA, six vehicles crashed on Burrendong Way. They were located near or at the intersections of Beer Road, Waridjuri Place, Casey Crescent and Springbank Lane.

The crash analysis identified that the crashes occurred in fine weather, on a dry surface during daylight hours.

For the five-year period, a crash rate of some 18.5 crashes per 100 million vehicle kilometres travelled (100 mvkt) was evaluated for the section of Burrendong Way under consideration. This crash rate is relatively low for a rural road such as Burrendong Way and does not indicate any overall road safety issues.

Ophir Road

A total of 15 crashes were identified on Ophir Road, with over half (eight) of these located in Cabonne Shire.

Data identified 60% of vehicles crashed on a curve and 47% of vehicles crashed at night. The weather did not appear to influence vehicle crashes on Ophir Road with 80% of vehicle crashes on a dry surface in fine weather. There was a higher incidence of crashes related with wildlife or straying animals, which occurred at dawn, dusk and at night.

For the five-year period, a crash rate of some 22.8 crashes per 100 mvkt was evaluated for Ophir Road. This crash rate is relatively low for a road section such as Ophir Road and does not indicate any overall road safety issues.

Long Point Road

There were seven vehicle crashes on Long Point Road during the five year period. The crashes were all single vehicle with five vehicle crashes located on a curve. The incidents occurred during daylight, on a dry surface on unsealed road.

For the five year period, a crash rate of some 76.7 crashes per 100 mvkt was evaluated for Long Point Road. While this crash rate is somewhat above average for a rural road section, it is considered that the rate is skewed by the very low traffic volumes along Long Point Road and that there is not any overall road safety issue along this road section.

Oaky Lane

No crash data was available for Oaky Lane.

4. Impact Assessment

Potential traffic and transport impacts include the following issues:

- During construction, the project has the potential to increase levels of traffic on local access roads.
- Some roads may require temporary closure to enable construction of the pipeline, which would require traffic management measures to be implemented during construction.
- Operational traffic would generally be minimal, although if repairs are necessary, more frequent access would be required.

4.1 During Construction

During the construction phase, several tasks would generate traffic including:

- Initial site set-up and access construction during the pre-construction period;
- Construction staff movements, pipe and transmission line deliveries, concrete material deliveries and other general deliveries during construction works; and
- Reinstatement construction activities.

Construction is proposed to commence in mid-2012 and anticipated to be completed by late 2013. Construction would be staged into pipeline, pump stations and reservoirs with the above tasks proposed to occur over the approximate one-year construction period.

4.1.1 Traffic Generation

Typically, the chosen project contractor would use plant and equipment such as excavators, backhoes, skid steers, tip-trucks, low-loaders, rock hammers, concrete trucks, cranes, bulldozers, rollers, utilities and compressors.

Materials Deliveries

Delivery of the following construction material would be required:

- Pipe sections and fittings;
- Ready-mix concrete;
- Select bedding material;
- Pre-cast concrete pump station components, bricks and other building materials;
- Pumps, electrical cabinets and switchgear;
- Steel reinforcement;
- Fencing materials;
- Steel for break tanks;
- Power poles and ancillary electrical supply equipment;
- Road base; and
- Construction plant.

It is estimated that the project would require the following heavy vehicle (truck) movements:

- 20 low-loader loads (40 vehicle movements) for plant deliveries;

- 125 semi-trailer loads (250 vehicle movements) for pipe and fitting deliveries;
- 25 ready-mix concrete truck loads (50 vehicle movements);
- 600truck’n’dogloads (1,200 vehicle movements) for select bedding materials;
- 200 truck’n’dog loads (400 vehicle movements) if overburden (spoil) has to be removed (assumed as a worst case for highest traffic generation);
- 25flat bed truck loads (50 vehicle movements) for delivery of building materials, pumps, electrical equipment, etc;
- 110 re-fuelling truck loads (220 vehicle movements); and
- 200 power authority trucks (400 vehicle movements).

The above totals some 2,610 heavy vehicle movements along the length of the project site (ie.37 km) over approximately 220 working days. This averages approximately 12 heavy vehicle movements per day.

Over the duration of the project, transport of materials to site via the southern and northern access routes is assumed to be split according to the proportion of pipeline north and south of the Oaky Lane crossing of Oaky Creek. The length of pipeline north of Oaky Creek is approximately 13 km while the length south of Oaky Creek is approximately 24 km. This results in an approximate transport split of 35% of deliveries to be delivered via the northern access route (approximately 914 heavy vehicle movements) and 65% via the southern access route (approximately 1,696 heavy vehicle movements).

Because the majority of material deliveries would be relatively steady over the duration of the project, it is anticipated that peak traffic generation would occur during tasks such as concrete pours when ready-mix concrete trucks would need to arrive during a short time period. Assuming that other project transport activities peak at double the average traffic generation (24 heavy vehicle movements per day) and that half of the ready-mix concrete arrives on a given day (26 ready-mix concrete truck movements[9]), a peak daily traffic generation for materials deliveries would be some 50 heavy vehicle trips per day. It is assumed that this peak daily traffic generation would occur along either the northern or southern access routes on any given day.

For peak hourly traffic generation, it is assumed that half the daily ready-mix concrete truck movements would arrive / depart in any one peak hour in conjunction with some of the other materials deliveries. As a worst case, it is estimated that the peak hourly heavy vehicle generation would be 18 trips during any given hour.

The origin of the pipe deliveries is likely to be from the Sydney area to the east, requiring transport via Mitchell Highway. Other materials such as the pump station components, pumps, electrical cabinets and switchgear would also likely originate from the Sydney area. The remainder of materials deliveries (eg. building materials, steel reinforcement, fencing materials, road base select bedding material) could potentially be sourced locally. Regardless of the origins, materials deliveries would still need to travel along either the southern or northern access routes as per *Figure 3.1* above.

It is unlikely that the pipeline project would require the use of any oversize vehicles. All project deliveries are envisaged to be able to be delivered to site via standard dimension heavy vehicles up to semi-trailer in size. The upgrade of power supply may require some

9Rounded up from 25 trips to allow for total return trips new power poles to be delivered as over-length loads, however, it is anticipated that these could be transported by low-loaders or semi-trailers. Transformers would fit onto standard sized heavy vehicles.

Given the scale of the project, it is anticipated that there would be minimal waste material to be exported from the site during construction. There may be some internal transport of waste material between sites along the pipeline corridor where it may be utilised for erosion control, batter construction or general fill on surrounding rural land. It is understood that Council will consult with soil conversation representatives to advise and confirm this aspect of the project work.

Additionally, some waste material may be transported to nearby Orange City Council stockpiles or, if suitable, to Cabonne Council roads and/or stockpile sites for future use.

Construction Staff

During peak construction periods, when construction tasks for all project components may overlap (eg. pipeline laying, pump station and break tank construction, power supply) it is anticipated that on-site construction staff numbers would likely average 45 staff (with a peak of 69 staff) for an approximate six-month period coinciding with the construction of pump stations and break tanks. Assuming that each construction employee uses their own vehicle to travel to and from the site (as a worst case for traffic generation purposes), this would generate some 69 light vehicles (cars) or 138 light vehicle trips/day along the surrounding road network during peak staffing periods.

As a worst case, it is assumed that construction staff trip distribution would occur along either the northern or southern access routes on any given day depending on the work area, resulting in 138 construction staff vehicle movements per day along either of the northern or southern access routes.

Total Construction Traffic Generation

The above sections provide the basis for estimating the average total traffic generation over the construction period. Traffic generation used in this transport assessment is based on a conservative (high) scenario that peak construction staff numbers would coincide with other peak traffic generating activities such as concrete pours.

Traffic generation is shown in *Table 4.1* below and has been classified into daily movement trips (ie. two-way trips), shown as vehicles per day (vpd) and peak hour trips, shown as vehicles per hour (vph).

Table 4.1: Project Traffic Generation

Traffic Generating Activity		Southern Section Access [1]	Northern Section Access [1]
General materials deliveries (heavy vehicles)	vpd	24	24
	vph	5	5
Ready-mix concrete deliveries (heavy vehicles)	vpd	26	26
	vph	13	13

Traffic Generating Activity		Southern Section Access [1]	Northern Section Access [1]
Construction staff (light vehicles only)	vpd	138	138
	vph	69	69
TOTAL Light vehicles	**vpd**	**138**	**138**
	vph	**69**	**69**
Heavy vehicles	**vpd**	**50**	**50**
	vph	**18**	**18**

1. Maximum traffic generation along either southern or northern section access routes, NOT along both.

4.1.2 Effect of Construction Traffic

In order to assess the potential impacts on road capacity, the maximum traffic generation of heavy vehicles and the staff traffic generation (refer to *Table 4.1* above) have been added to existing daily and peak hour traffic flows to obtain maximum future traffic flows along the affected road network.

Future traffic volumes in vehicles per day and vehicles per hour for roads along the northern and southern access routes are shown in *Table 4.2* and *Table 4.3* following. The traffic volumes are also broken up into light vehicles (LV) and heavy vehicles (HV) with the heavy vehicle proportion assumed to be between 10% and 15% of the total traffic volume.

Table 4.2: Future Traffic Volumes – Southern Section Access

Traffic Scenario		Ophir Road	Lookout Road	Oaky Lane (south)	Bulgas Road
Daily Traffic – vehicles per day					
Existing traffic[1]	LV	2,300	50	10	90
	HV	277	5	4	10
Project traffic generation	LV	138	138	138	138
	HV	50	50	50	50
Combined future traffic	LV	2,438	188	148	228
	HV	327	55	54	60
Hourly (Peak) Traffic – vehicles per hour					
Existing traffic[1]	LV	250	9	9	18
	HV	30	1	1	2
Project traffic generation	LV	69	69	69	69
	HV	18	18	18	18
Combined future traffic	LV	319	78	78	87
	HV	48	19	19	20

1. Existing traffic derived from *Table 3.1*. HV % assumed to be between 10% and 15% of total traffic volume.

Table 4.3: Future Traffic Volumes – Northern Section Access

Traffic Scenario		Burrendong Way	Long Point Road	Oaky Lane (north)
Daily Traffic – vehicles per day				
Existing traffic[1]	LV HV	4,550 500	120 16	10 4
Project traffic generation	LV HV	138 50	138 50	138 50
Combined future traffic	LV HV	4,688 550	258 66	148 54
Hourly (Peak) Traffic – vehicles per hour				
Existing traffic[1]	LV HV	500 50	25 5	9 1
Projecttraffic generation	LV HV	69 18	69 18	69 18
Combined future traffic	LV HV	569 68	94 23	78 19

1. Existing traffic derived from *Table 3.1*. HV % assumed to be between 10% and 15% of total traffic volume.

Road capacity can be expressed and qualified along a section of the rural road network as its 'level of service' (LoS). Typically, the LoS is based on road capacity analysis as described in Austroads' "*Guide to Traffic Engineering Practice, Part 2 – Roadway Capacity*". Road capacity can be expressed in total vehicles per day and/or vehicles per hour.

The level of service descriptions are as follows:

LOS A: Free flow conditions, high degree of freedom for drivers to select desired speed and manoeuvre within traffic stream. Individual drivers are virtually unaffected by the presence of others in the traffic stream.

LOS B: Zone of stable flow, reasonable freedom for drivers to select desired speed and manoeuvre within traffic stream.

LOS C: Zone of stable flow, but restricted freedom for drivers to select desired speed and manoeuvre within traffic stream.

LOS D: Approaching unstable flow, severely restricted freedom for drivers to select desired speed and manoeuvre within traffic stream. Small increases in flow generally cause operational problems.

LOS E: Traffic volumes close to capacity, virtually no freedom to select desired speed or manoeuvre within traffic stream. Unstable flow and minor disturbances and/or small increases in flow would cause operational break-downs.

LOS F: Forced flow conditions where the amount of traffic approaching a point exceeds that which can pass it. Flow break-down occurs resulting in queuing and delays.

Road capacity for two-lane, two-way sections of a rural road network is largely based on a combination of design speed, travel lane and shoulder width, sight distance restrictions, traffic composition, directional traffic splits and terrain[10]. This provides a basic level of service and associated service flow rate under prevailing road and traffic conditions. Based on their road and traffic characteristics, the levels of service and flow rates for the affected sections of the rural road network along the northern and southern access routes are shown in *Table 4.4*following.

Table 4.4: Rural Road Network Service Flow Rates

	Level of Service (LoS)				
Road Section	**A**	**B**	**C**	**D**	**E**
Northern Access Route					
Ophir Road	120 vph 1,100 vpd	300 vph 2,800 vpd	550 vph 5,200 vpd	850 vph 8,000 vpd	1,550 vph 14,800 vpd
Lookout Road (unsealed)	not applicable	not applicable	not applicable	not applicable	not applicable
Oaky Lane (unsealed)	not applicable	not applicable	not applicable	not applicable	not applicable
Bulgas Road (partially sealed)	not applicable	not applicable	not applicable	not applicable	not applicable
Southern Access Route					
Burrendong Way	250 vph 2,200 vpd	450 vph 4,400 vpd	750 vph 7,200 vpd	1,250 vph 12,200 vpd	2,100 vph 20,800 vpd
Long Point Road (west)	120 vph 1,100 vpd	300 vph 2,800 vpd	550 vph 5,200 vpd	850 vph 8,000 vpd	1,550 vph 14,800 vpd
Long Point Road (east – unsealed)	not applicable	not applicable	not applicable	not applicable	not applicable

Based on the above service flow rates and the existing and additional project generated construction traffic volumes along transport routes, 'before and after' levels of service (existing and during construction) can be expected as shown in *Table 4.5* following.

Table 4.5: Levels of Service – Existing and During Construction

Road Section		**Existing**	**During Construction**
Ophir Road		B	B / C
Burrendong Way	north south	A C	B C
Long Point Road (west)		A	A

10Austroads "*Guide to Traffic Engineering Practice: Part 2 – Roadway Capacity*", Section 3

From the above table, it is clearly evident that operating conditions (levels of service) along the rural road network would not be adversely affected to any significant degree from existing conditions after the addition of project generated construction traffic.

The majority of the rural road network under consideration has significant spare capacity and is operating at high levels of service (A or B). The southern section of Burrendong Way on the outskirts of Orange (with level of service C) is the exception, although its level of service is still acceptable as it approaches a major urban centre.

In the case of Burrendong Way, the addition of construction-related traffic to existing traffic volumes is a small percentage (approximately 3%), which would be well within any daily or seasonal variations of its average daily traffic flows. Similarly, additional construction-related traffic loaded onto existing traffic along Mitchell Highway constitutes a relatively minor increase well within any daily or seasonal variations it may experience.

For minor unsealed roads such as Oaky Lane, Lookout Road and the eastern section of Long Point Road, service flow rates are not applicable as these roads do not have formed lanes and carriageways. However, they all currently operate at high levels of service with significant spare capacity, due to their very low traffic volumes. The addition of construction-related traffic generation is able to be readily absorbed by these minor roads.

In summary, the addition of heavy vehicles and construction staff traffic during peak construction periods is able to be readily absorbed by the road network and transport access routes to be used.

4.1.3 Road Network Impacts

Short-term partial road closures would occur along Oaky Lane, Ophir Road and Long Point Road where the pipeline route crosses and/or encroaches onto the road carriageway. Lookout Road may also potentially experience a road closure (depending on the final pipeline alignment) due to the pipeline route crossing the road.

For works in Ophir Road and Long Point Road, pipeline installation across or within the road carriageway would be carried out under traffic control. The roads would remain open with controlled single direction traffic flow past the works area.

Where practicable, for works in Oaky Lane, traffic flow would be maintained under traffic control as for Ophir and Long Point Roads. However, there is some flexibility for Oaky Lane as it is not normally used as a through road and traffic flows are very low, so disturbance would be mainly to local land owners. If short-term full road closures are required, all affected land owners would be fully notified of all road closure details and alternative access routes provided.

4.1.4 Access& Parking

Construction traffic is proposed to access the various project sites (compounds and pipeline route) via the public road network. Site access locations would be confirmed where adequate sight distance is available to/from the public road network.

Sufficient parking for construction staff, heavy vehicles and plant would be available within the site compounds. No parking would be necessary along the adjacent public road network.

Suitable on-site manoeuvring areas would be available so that larger vehicles are able to safely manoeuvre into the site off the public road network, around the site and out of the site onto the public road network.

All vehicles would enter and exit the site area to/from the public road network in a forward direction only. All vehicles generated by construction staff would be accommodated within on-site parking areas at the various compounds.

As construction of the pipeline progresses, it may be necessary to temporarily close some property access roads for a short period. Any affected property owners would be fully notified in advance and the closure would typically be less than one day. Where practicable, alternative access arrangements would be provided.

4.1.5 Road Safety

Road closures in Oaky Lane would result in additional traffic using the Mullion Creek level crossing via the Long Point Road access route to the project's northern section. This level crossing is fitted with boom gates and flashing signals providing advance warning of approaching trains. Although traffic across the level crossing would increase, it is considered the current level crossing treatment would be adequate and any road safety impacts would be minimal.

To ensure adequate road safety is maintained across the whole project generally, a comprehensive Construction Traffic Management Plan (CTMP) would be prepared by the chosen project contractor in conjunction with relevant road authorities. The CTMP would detail appropriate construction traffic controls and management measures and all aspects would be implemented in co-ordination with the Councils and RTA. The CTMP would include, but not be limited to, provisions for:

- Scheduling of transport deliveries outside peak background travel periods and outside school zone periods.
- Undertaking community consultation before and during all transport and haulage activities, including contact details to ensure community concerns are logged and addressed.
- Upgrading road infrastructure including surface treatment and/or stabilisation of unsealed road sections, as appropriate.
- Managing transport operations including provision of warning and guidance signage, traffic control devices, temporary construction speed zones and other temporary traffic control measures.
- Compliance with a 'Transport Code of Conduct' for all staff and contractors detailing designated transport routes, road behavioural requirements, speed limits, etc.
- All heavy vehicles shall travel along the nominated transport routes.
- All heavy vehicles shall travel within daylight hours, where practicable.
- Mud and other debris shall be removed from the wheels and bodies of construction vehicles and equipment prior to leaving the project site and before entering the sealed public road network.
- Consideration of property accesses that have sub-standard sight distances onto the road network due to tight horizontal and vertical road alignments.
- Consideration of adverse traffic conditions due to fog, snow and ice on the road network.
- Consideration of surrounding stock crossings and the potential for stock on the road network.

- Procedure to monitor traffic impacts and respond to impacts rapidly.
- Reinstatement of pre-existing road conditions, if required, after construction phase is complete.

4.1.6 Rail Infrastructure Impacts

The use of rail transport is considered to be less desirable than road transport for reasons outlined previously in *Section 3.1*.Therefore, it has been assumed that rail transport would not be used and hence, there would not be any direct impacts to rail infrastructure.

As mentioned above, road closures in Oaky Lane would result in additional traffic using the Mullion Creek level crossing via Long Point Road. Although traffic across the level crossing would increase, it is considered the current level crossing treatment would be adequate and any potential impacts to rail infrastructure would be minimal.

4.1.7 Cumulative Impacts

At present there are no known nearby major developments or projects that would result in cumulative impacts when combined with the subject project. If and when future major projects arise in the general surrounding area, the cumulative impact of multiple projects would need to be considered with respect to transport and traffic operations.

4.2 During Operations

4.2.1 Traffic Generation

Plant and equipment that would typically be used during maintenance and operation tasks would be maintenance vehicles, utilities, cranes, mowers, and trucks (up to approximately 3-tonne).

Pump station maintenance tasks would typically consist of 26 visits per year by technicians using 4WD utilities (weekly visits when pump stations are operating) and four visits per year by technicians using 3-tonne trucks.

Pipeline maintenance would typically consist of two visits per year to inspect the pipeline and exercise scour and air valves using a 4WD utility.

Power line maintenance would typically consist of one visit by an energy authority technician every 4½ years to inspect power poles using a 4WD utility. Substations would also be inspected annually.

Unplanned maintenance may also be required from time to time. An allowance of one visit per year has been assumed by a maintenance team using a 3-tonne truck and backhoe (note: this is not anticipated to occur for at least 5 to 10 years after commissioning).

4.2.2 Effect of Operations Traffic

Based on the relatively minor traffic generation during operations described above, traffic and road network impacts would be negligible. The current road network has significant spare capacity and is currently used regularly by the types of vehicles that are proposed to be used for servicing the various sites.

All vehicles generated by operations staff would be accommodated within on-site parking areas.

5. Recommended Mitigation Measures

5.1 General Management of Potential Impacts

The management of potential impacts caused by the project covers the construction and operation phases of the project.

For management of potential impacts during the construction phase, the following general measures would need to be undertaken:

- Develop a Construction Traffic Management Plan (CTMP) in conjunction with relevant road authorities and implement all aspects of the CTMP in co-ordination with the local Councils and RTA. Refer to previous *Section 4.1.5* for typical details to be included in the CTMP.
- Undertake road infrastructure upgrade works to allow heavy vehicle transport along the proposed transport routes. Details of upgrade works follow in *Section 5.2* below.
- Prepare road dilapidation reports covering pavement, drainage and bridge structures in consultation with relevant road authorities for all of the proposed transport routes before and after construction. Any damage resulting from construction traffic, except that resulting from normal wear and tear, would be repaired to pre-existing conditions.
- Consider establishing a ‘car pool’ initiative for construction staff from nearby centres to minimise construction staff trips.

For management of potential impacts during the operations phase, the following general measures would need to be undertaken:

- Establish a procedure to ensure the ongoing maintenance of the internal on-site access roads and access points during the operation phase. This maintenance may include sedimentation and erosion control structures, where necessary.

5.2 Potential Road Infrastructure Upgrades

Road upgrade works are likely to be required at a number of locations to accommodate the heavy vehicle transport in particular. These road upgrades will provide a legacy for the local community in that the local road network would be improved.

The potential road infrastructure upgrades that may be required include the following.

Long Point Road

The road may be unsuitable for heavy vehicle transport and non-4WD vehicles during wet weather due to sections of slippery, unsealed surface along steep grades and sharp curves. Surface treatment and/or stabilisation or similar road upgrade is likely to be required to facilitate travel along the more critical steep grades and sharp curved sections.

In addition to any road upgrade of Long Point Road, an approximate 4 km long all-weather access road would be required from Long Point Road to the Macquarie River offtake point and pump station.

Oaky Lane

The road may be unsuitable for heavy vehicle transport due to its numerous sections of narrow carriageway caused predominantly by overhanging / encroaching trees (trunks and branches) and other vegetation.

Moreover, during wet weather, sections of slippery, unsealed surface along steep grades and sharp curves may hinder transport by heavy vehicles and non-4WD vehicles. Road surface treatment, stabilisation or similar road upgrade is likely to be required to facilitate travel along the more critical sections.

6. Conclusions

It is considered the proposed Macquarie River to Orange Pipeline project would not create any significant adverse impacts with respect to transport issues such as traffic operations, road capacity on the surrounding road network, site access and road safety. The management of heavy vehicle movements during construction would be appropriately covered by a CTMP to be prepared prior to construction starts, while any sections of the road network unsuitable for heavy vehicle transport would be appropriately upgraded.

Any required road upgrades or new road infrastructure will provide a legacy for the local community in that the local road network would be improved.