

Appendix K

Landscape and visual impacts assessment (Clouston Associates)



CLOUSTON associates

**THE MACQUARIE RIVER TO ORANGE PIPELINE PROJECT
FINAL REPORT
LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT
FINAL REPORT S11-0091 R03 27.07.2012**

Cover Image: View south along Long Point Road near the Macquarie River

THE MACQUARIE RIVER TO ORANGE PIPELINE PROJECT

FINAL REPORT

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

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EXECUTIVE SUMMARY

INTRODUCTION

The city of Orange, NSW has concerns regarding the provision of an adequate water supply for its growing population. Orange City Council proposes to undertake the Macquarie Orange Pipeline Project (referred to in this report as 'the project'). This report has been prepared to provide an assessment of the landscape character and visual impact 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 24 March 2011.

THE PROJECT

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

The infrastructure required to transfer the water includes an offtake and pump stations, an underground pipeline (approximately 37 km in length with the potential for an above ground section down steep slopes to the river bank), 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 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.

THE SITE

Orange is located 206 kilometres west of Sydney at an altitude of 863 metres. The city has a population of approx. 40,000 and is a major provincial centre. The site of the project is a 37 kilometer stretch of land from the upper Macquarie river to the Suma Dam reservoir.

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).

EXECUTIVE SUMMARY

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.

LANDSCAPE CHARACTER

Orange is surrounded by agricultural land which is predominately used for agriculture and viniculture. Four landscape character zones are identified through which the pipeline passes:

- Steep Hillsides
- Wooded Areas
- Open Farmland
- Urban Fringe

Based on the results of the Landscape Character Assessment, it is concluded that the project has a moderate impact on landscape character during construction, which reduces to a limited, low impact post-construction.

VISUAL IMPACT ASSESSMENT

Private properties, public parks, reserves and public roads are located throughout the study area. 24 key receptors have been identified with the potential to be impacted by the project in some way. These impacts are rated in terms of magnitude and sensitivity, both during the construction phase and once construction has been completed. The Visual Impact Assessment concludes that the construction phase of the project has a moderate impact on many of the receptors, reducing to a limited impact once construction is complete.

MITIGATION

The mitigation measures applicable to the project include:

- reducing visual impacts by careful routing and siting of project elements
- alleviating impacts associated with detailed design features such as materials, finishes, reflectivity and screen planting.

CONCLUSION

The remote location of much of the infrastructure, sparse human population and the pipeline's routing along road reserves helps to limit the visual and landscape character impacts of the project. With the implementation of the mitigation measures outlined, the project can be deemed to be relatively compatible with the existing landscape and have a limited visual impact once construction is complete.

REPORT OVERVIEW

REPORT OVERVIEW

This report has been prepared to provide an assessment of the landscape character and visual impact of the project as an input to the environmental assessment.

The report addresses the requirements of the Director-General of the NSW Department of Planning and Infrastructure (the Director-General's Requirements) dated 24 March 2011. The DGRs addressed by this report are summarised in the table below, together with a reference to where they are addressed in the report.

Assessment requirements	Chapter in which addressed in report
Describe all project components and their locations	The Project
Provide a description of the landscape character of the study area	Landscape Character Zones
Provide a photographic assessment demonstrating the potential visual impacts of the project from key viewing points	Visual Impacts
Describe potential impacts and assess the significance of these impacts	Visual Impacts Visual Impacts Summary
Describe visual impact amenity mitigation and management measures	Mitigation Recommendations



Suma Park Dam Reservoir

REPORT OVERVIEW

This LCVIA report analyses and evaluates the impact of the project on the visual amenity of the area that it passes through. The report looks at both the construction and post-construction phase impacts on visual amenity and landscape character.

This assessment is an independent report and is based on a professional analysis of the landscape and the project at the time of writing. The viewers (visual receptors) themselves have not been consulted about their perceptions; the analysis and conclusions are based solely on a professional assessment of the anticipated impacts.

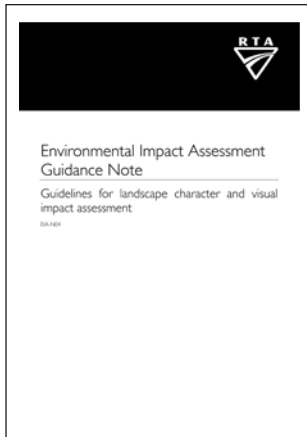
The report is structured in three parts:

- **Landscape Character Assessment:**
an analysis of the existing landscape that identifies landscape character zones according to their topography, drainage and urban form. Includes an assessment of likely visual impacts based on sensitivity and magnitude criteria.
- **Visual Impact Assessment:**
identification and analysis of key viewpoints for the project.
- **Conclusion & Mitigation:**
summary of the visual impacts and the means by which the visual impacts identified can be precluded, reduced or offset.



The Upper Macquarie river

INTRODUCTION



METHODOLOGY

This report has adopted the Guidelines for Landscape Character and Visual Impact Assessment (LCVIA) as published by the Roads and Maritime Service, RMS (RTA, 2009.)

Key components of the LCVIA methodology include;

- Site analysis and identification of landscape character zones
- Site visit
- Landscape character analysis
- Assessment of landscape character impacts
- Identification of key viewpoints (receptors)
- Assessment of visual impacts
- Development of a mitigation strategy

TERMS USED IN THE REPORT

The following provides a brief explanation of the terms and abbreviations commonly used in Visual Impact Assessment reports and which appear in this report:

View: The sight or prospect of some landscape or scene.

Visual Receptors: the public or community at large who would have views of the subject site either by virtue of where they live and/or work or from transport routes, paths, lookouts and the like.

Visual Impact: The impacts on the views from residences and other public places.

Sensitivity: The sensitivity of a landscape character zone or view and its capacity to absorb change. Combined with magnitude provides a measurement of impact.

Magnitude: The scale, form and character of a development proposal. In the case of visual assessment, also how far the proposal is from the receptor. Combined with sensitivity provides a measurement of impact.

Duration: The length of time the visual receptor is exposed to the view.

Magnitude of change: Magnitude of change is a quantitative assessment of the change in compositional elements of the view.

Quantum of view: The openness of the view and the angle of the view to the visual receptor.

Visual Impact Rating: Visual Impact Rating is determined by cross referencing sensitivity with magnitude.

Landscape Character: A distinct, recognisable and consistent pattern of elements, be it natural (soil, landform) and/or human (for example settlement and development) in the landscape that makes one landscape different from another.

THE PROJECT

THE PROJECT

The infrastructure required to transfer the water includes an offtake structure and pump stations, 37 km of mostly underground pipeline, a discharge structure and ancillary power supply. The proposed off-take point would be located north of Long Point on the upper Macquarie River.

The proposed route for the pipeline, shown on Figure 01, includes road reserves, including Ophir Rd and Long Point Rd. 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. The majority of the pipeline would be located in the Cabonne local government area (LGA). The pipeline would discharge to the discharge structure, located at the north end of the Suma Park Dam.

Key Construction Activities

Construction of the project will include these major components:

- establishing an all-weather track to the river for construction and maintenance
- installation of off take structure, 3 pump stations and discharge structure
- installation of 37 km of 375 mm diameter water rising
- construction of road and river crossings
- installation of power supply to pumps and upgrading existing transmission line.

Pipeline Route

The extraction point for the pipeline is on the Upper Macquarie river, immediately upstream of the confluence with Boshes Creek, before moving south to terminate at the Suma Dam Reservoir.

Pipeline Construction

The pipeline trench will be approximately 1m wide and excavated to a depth of about 1.5m using a trenching machine or excavator. The pipeline construction access corridor will be in the order of 20m wide and designed to avoid significant vegetation, although some tree clearing would be required at points along the route. It is not envisioned that all vegetation will need to be removed from within the 20m corridor.

It is likely that the clearance zone within the construction access corridor would be reduced to 6-10 m where possible in specific areas where additional constraints exist or more or less width is required (eg. creek crossings, vegetated areas). Following construction, an easement in the order of 6m wide will be maintained as a cleared landscape to allow access for maintenance activities. Rehabilitation of this corridor will include native grasses and other low vegetation.

Access road

The current dirt track leading from Long Point Road to the Macquarie river will be updated to an all weather road, with the construction of some new access track to allow for maintenance once the pipeline and pumping stations have been constructed.

Site Compounds

Site compounds are required for the construction phase of the proposal and would predominately be used for site office, amenities, storage of plant, equipment and materials. These are to be located within the pipeline corridor with intermittent pipe storage areas along the route. The compounds vary in size with the largest at 50m x 100m. The site compound design has not yet been finalised and so their visual impact is dealt with more generally in this report.

THE PROJECT

Offtake Structure

The offtake structure will consist of a river off-take pump station with submersible pumps housed in a pre-cast concrete well, built into southern bank of the Upper Macquarie river. A sketchup model demonstrating the approximate massing of the offtake structure has been overlaid on viewpoint 1.

Discharge Structure

The outlet point of the pipeline will be at the location of the saddle dam at the Suma Park Dam reservoir. It will be placed above the dam's top water level and will consist of a concrete head wall with two wing walls 3-5m in width and 1.5m high. A sketchup model demonstrating the approximate massing of the discharge structure has been overlaid on viewpoint 24 (in the Visual Impact Analysis section of this report), giving an indication of its expected visual impact.

Pumpstations

Three pump stations will be constructed at locations required by the hydrological design. Pump station 1 will be located approximately 20m above the river offtake and consist of a brick/masonry structure, 3 x 4m x 3.5m high. Pump station 2 and 3 will be located along the route and will consist of a pumping station approximately 8m x 8m x 3.5m high and a cylindrical break tank in the region of 6.5m diameter x 3m high. Sketchup models demonstrating the approximate massing of pump stations 1, 2 and 3 have been overlaid on viewpoints 1, 2 and 6 (in the Visual Impact Analysis section of this report) giving an indication of their expected visual impact.

Valves

A number of different types of valves would be located at regular intervals along the pipeline. The types of valves that would be used include section/isolation valves, scour valves and air valves.

Section valves are typically installed on either side of a major crossing, such as a waterway, buried in the ground at the same depth as the pipeline, and fitted with a spindle that rises to the surface which opens and closes the valve. The spindle is enclosed in a small valve box, of approximately 200 mm square.

Scour valves would be located at low points of the pipeline to facilitate maintenance and emergency drainage of the pipeline. Air release valves are designed to automatically release the small amounts of air which would accumulate in the pipeline during operation. Air release valves would be typically enclosed within 1.2 m² concrete pits with steel lids, and would be located below ground.

Some valves may need to be located on private properties. The final location and design of the valves would be determined during detailed design and their visual impact has not been analysed within this report. They are not expected to have a significant visual impact due to their limited size and flushness with the ground.

THE PROJECT

Transmission line

The pumping stations and offtake structure will require power. This will be provided by the construction of a new section of transmission line, as well as the upgrading of existing power infrastructure - as indicated on Figure 01.

The Project requires the construction of a new power supply from the northern end of Long Point road down to the river offtake structure. It is proposed to install this overhead power within a 20m wide construction corridor. The power and pipeline will be designed within the same construction corridor where possible to minimise the amount of vegetation clearing. Approximately 45 new poles will be required for this section. Photo 01 is indicative of how the new transmission line will look within the landscape.



Photo 01 - Example of proposed over ground transmission line

THE PROJECT

Along the rest of the route, power will be supplied by upgrading and refurbishing the existing transmission line infrastructure. This will not require the creation of additional easements.

The proposed refurbishment will commence from property 1173 Ophir Rd and from here the power line will be upgraded with new overhead cables and the majority of power poles will be replaced. In some areas the line would require a full replacement and conversion to a 3 phase line, including all insulators, cross arms, conductors and a large percentage of power poles.

2 voltage regulators (Photo 2) will be installed to control the voltage levels on the power line, located at Ophir Rd/Spring Glen Rd and at the intersection of Lookout Rd and Ophir Rd (see Figure 01). The total distance of the refurbishment works is 22.3km, with a total of 89 power poles to be replaced. Power poles are proposed to be the standard green copper-chrome-arsenic treated poles as per Essential Energy's standards (Photo 3).

The project would also involve the construction of new power lines for the 3 substation sites for the connection of the proposed pumping stations. The two booster pump sites, being located adjacent to the power lines, will require a short 1 span extension of the overhead power line and installation of the substation adjacent to the pump station buildings.

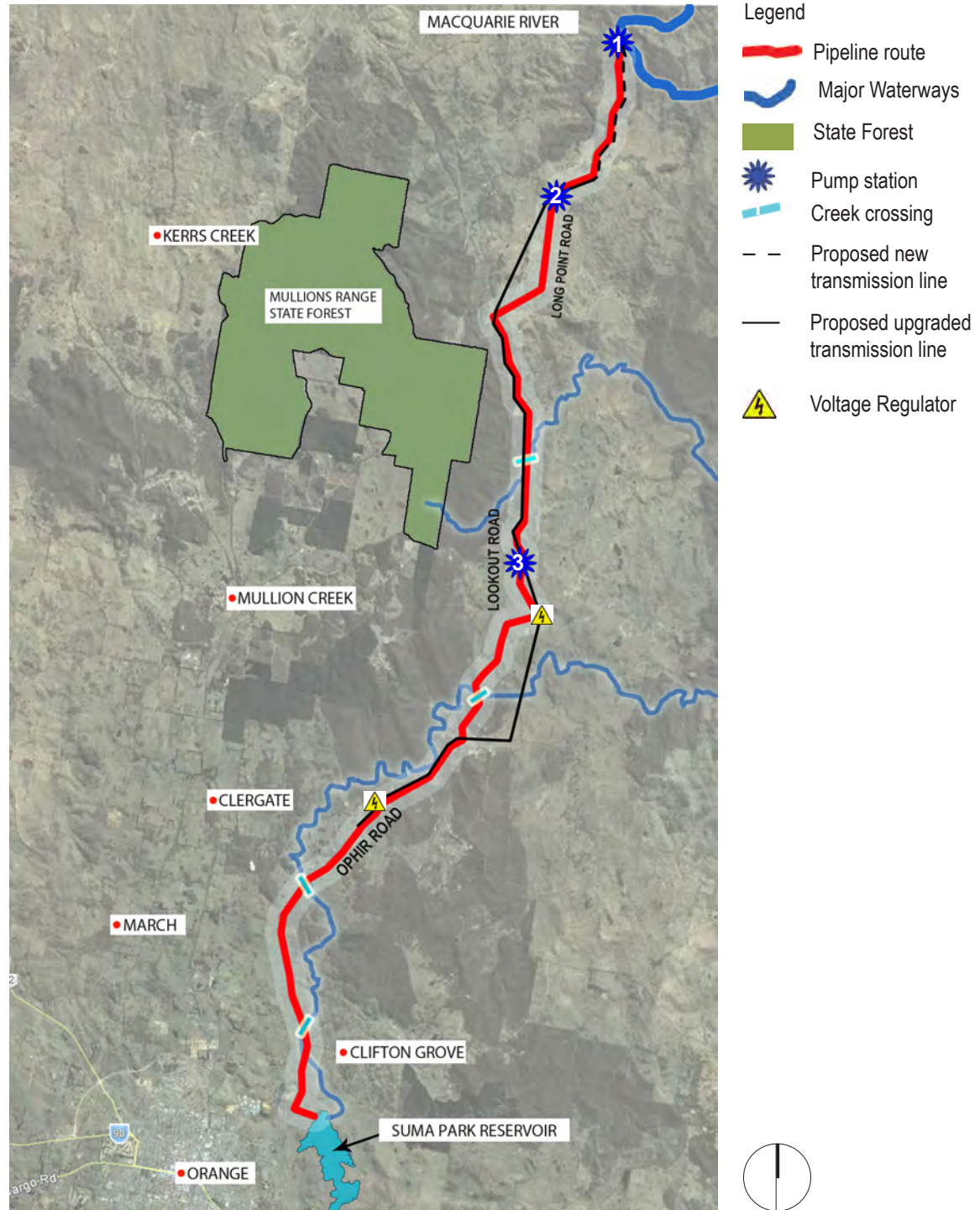


Photo 02 - Proposed voltage regulator



Photo 03 - Proposed Transmission pole

THE PROJECT



LANDSCAPE CHARACTER ANALYSIS

Greater Orange Area

Orange is surrounded by agricultural land on which orchards and wineries proliferate. Areas of remnant native vegetation remain in the Mt Canobolas State Conservation Area, Mullion Range State Forest and in many small parks and reserves, usually under the stewardship of the relevant local council. The landform is dominated by Mount Canobolas (altitude 1395m) to the south west of the site.

Detailed Study Area

The 37 kilometre pipeline runs through a varied landscape from its commencement on the Macquarie river to its termination at Suma Park Dam Reservoir. Along its lengths, the pipeline alternates between private property and road reserve, routed to reduce the impact on existing vegetation.

The area immediately surrounding the pipeline consists of large tracts of agricultural land, remnant bush land, cleared areas for small rural residential properties, the Mullion Range State Conservation Area and some denser urban settlement - see Figure 02.

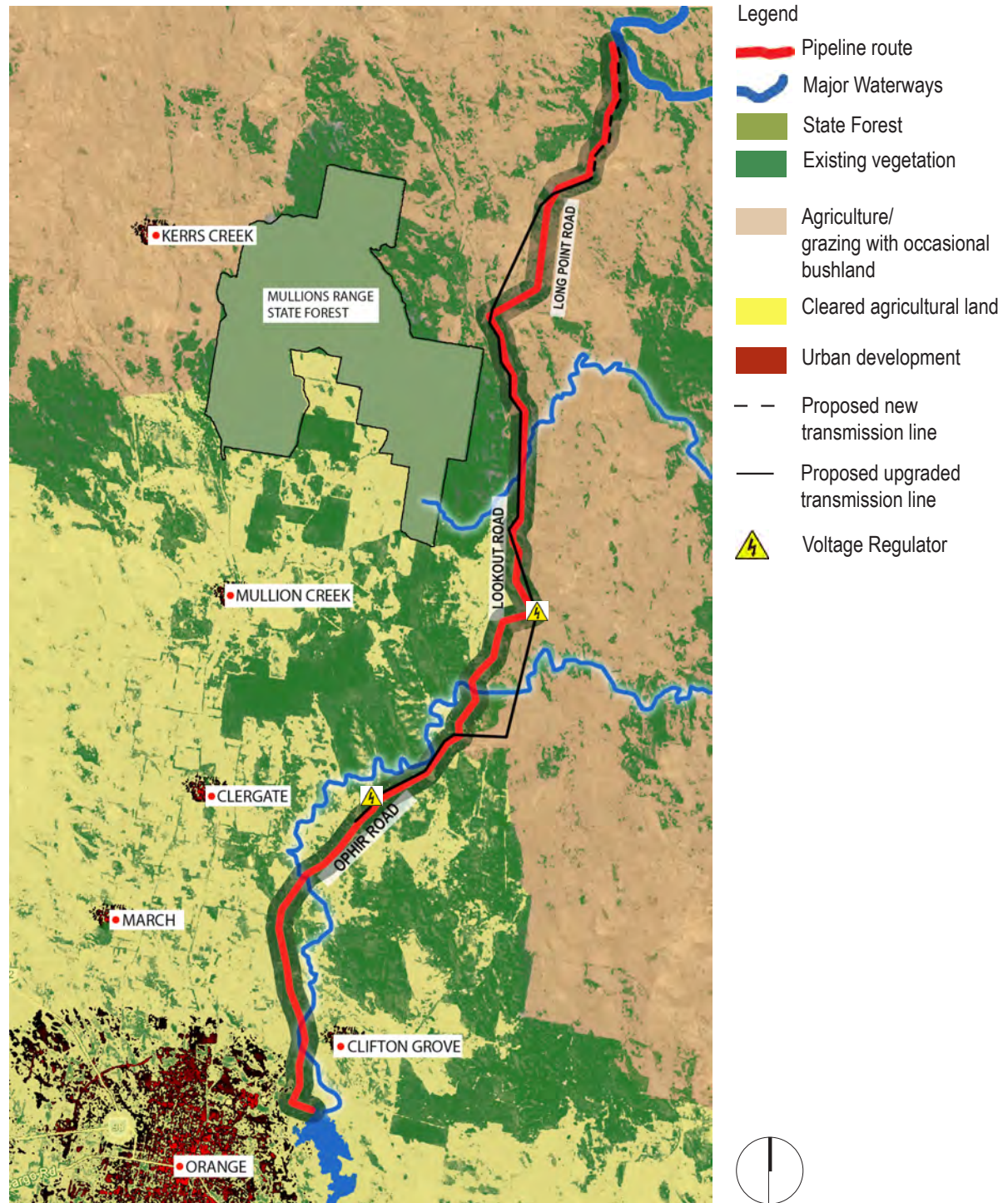
The Mullion Range State Conservation Area is situated within the central and northern sections of the Mullion Range and is to the western edge of the study area. The range extends from 8 kilometres north-east of Orange to 30 kilometres north of Orange towards Euchareena. Mullion Range State Conservation Area has an altitudinal range between 670 and 960 metres above sea level (ASL) and is a prominent regional landscape feature comprised of volcanic rhyolite, dacite and tuff. This results in an undulating and often steeply sloping hilly landscape, which is often rocky and has areas of low soil fertility.

Ophir Road, Lookout Road, Oakley lane and Long Point Road pass through the study area. These alternate between sealed and unsealed with light traffic volumes, reducing to very light towards the northern end of the study area.



Mount Canobolas State Conservation area

LANDSCAPE CHARACTER ANALYSIS



LANDSCAPE CHARACTER ZONES

Landscape Character Zones

The landscape qualities of the site and surrounding area are further explained in the Landscape Character Zones section of this report, establishing a basis for determining any landscape impacts as a result of the project. Landscape character zones are defined as having similar physical qualities. The four landscape character zones identified are shown in Figure 03.

Landscape Character Assessment

The overall impact rating of the project on any given landscape character zone is based on themes of magnitude and sensitivity. The severity of these impacts are calculated using Table 01 - based on a combination of magnitude and sensitivity, and a single rating inferred for construction phase and post-construction impacts.

Sensitivity - the degree to which a particular landscape type can accommodate change arising from a development, without detrimental effects on its character. This includes factors such as:

- existing land use
- the pattern and scale of the landscape
- visual enclosure, openness of views and distribution of visual receptors
- the value placed on the landscape.

Magnitude - the magnitude of the effects of the development within the landscape. Consideration is given to existing built form in the landscape and how closely the development matches this in bulk, scale and form. Magnitude is a study of the scale or degree of change to the landscape resource, the nature of the effect and its duration including whether it is permanent or temporary.

		MAGNITUDE					
		High	High/ Moderate	Moderate	Moderate/ Low	Low	Negligible
SENSITIVITY	High	High	High	Moderate-High	Moderate-High	Moderate	Negligible
	High/ Moderate	High	Moderate-High	Moderate-High	Moderate	Moderate	Negligible
	Moderate	Moderate-High	Moderate-High	Moderate	Moderate	Moderate-Low	Negligible
	Moderate/ Low	Moderate-High	Moderate	Moderate	Moderate-Low	Moderate-Low	Negligible
	Low	Moderate	Moderate	Moderate-Low	Moderate-Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Table 01: Landscape Character Impact Rating as a combination of Sensitivity and Magnitude.

Source: RTA (2009) Guideline for Landscape Character + Visual Assessment

LANDSCAPE CHARACTER ZONES

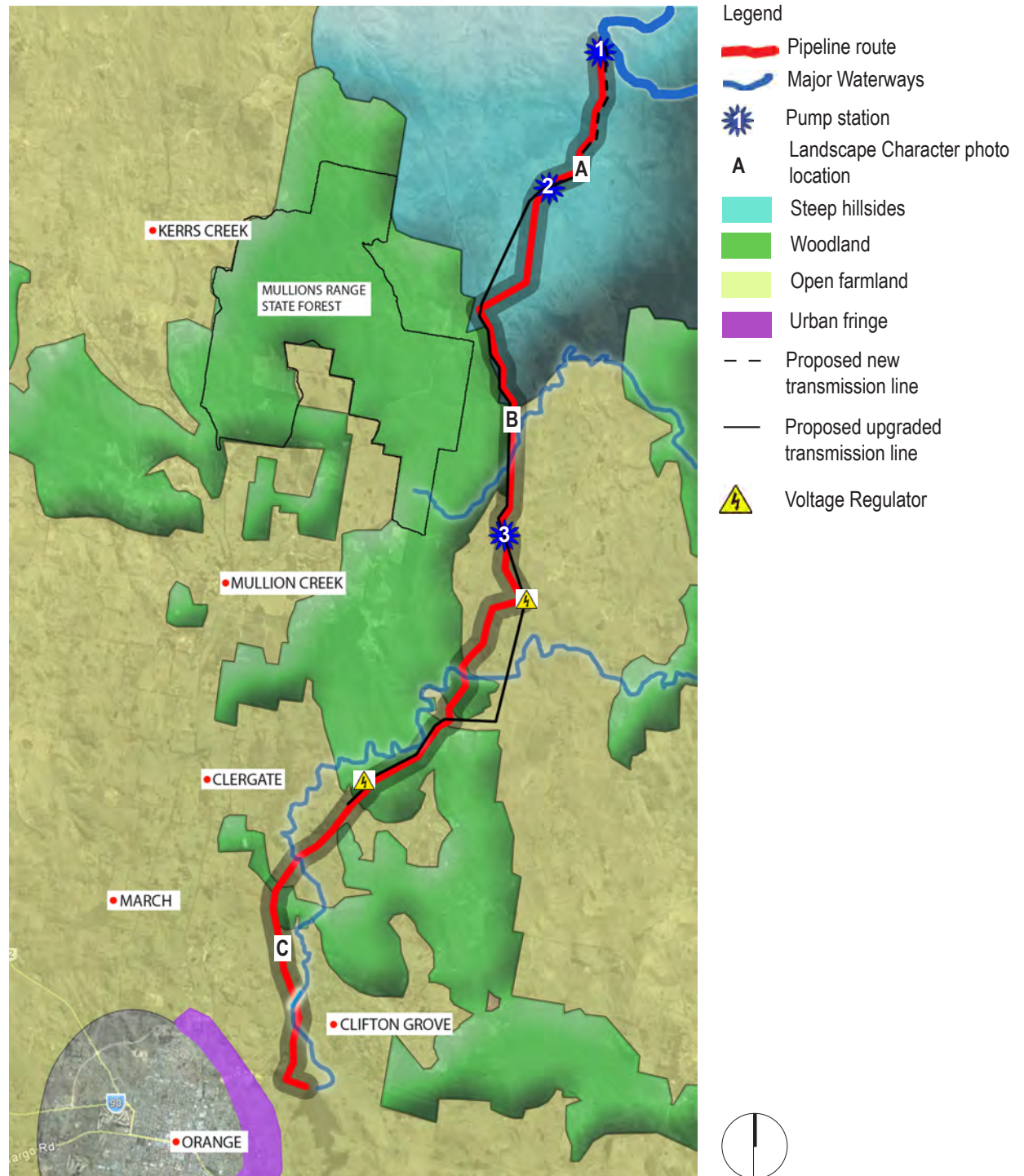


Figure 03 Landscape Character Zones (not to scale)

LANDSCAPE CHARACTER ZONES

LANDSCAPE CHARACTER ZONE 1 - STEEP HILLSIDES



Photo A - Steep hillside near the Macquarie River

To the north of the study area the terrain is remote and characterised by undulating hills with steep slopes descending towards the Macquarie river catchment. There are a limited number of private properties present, owning large tracts of the land. Road access is characterised by unsealed tracks with access to the river by 4-wheel drive only. The land has been cleared for grazing in many locations with small stands of trees and scrub, giving the landscape an open character. Larger stands of vegetation are present on less exposed slopes towards the river. Rocky outcrops exist where surface erosion has exposed the underlying geology, as well as scour erosion in gullies. Wide and extensive views are afforded from elevated sections of this landscape.

Landscape Character Elements

Element	Description
Topography	Mostly cleared with some areas of woodland and scrub vegetation
Hydrology	Natural gullies draining into riparian areas as well as local farm dams
Geology	Geological features include exposed basalt on steep hillsides
Ecology/vegetation	A mixture of patchy native vegetation and open pasture land
Land use	Primarily grazing
Built form	Isolated farm dwellings
Spatial	Primarily open in character with distant views from elevated positions

LANDSCAPE CHARACTER ZONES

LANDSCAPE CHARACTER ZONE 2 - WOODLAND



Photo B - Woodland off Long Point Road

An undulating densely vegetated landscape, with small hills and sheltered slopes. Low density of rural properties and farms with associated cleared areas of land. Tree cover is relatively dense, providing a sense of enclosure and seclusion. Several creeks run through the landscape with an associated increase in tree and shrub density. Road access alternates between sealed and unsealed. Some open views are afforded from the roadway where bush land has been cleared, although the majority of views are screened by vegetation.



Landscape Character Elements

Element	Description
Topography	Gently undulating with some steeper slopes
Hydrology	Crossed by several creeks
Geology	No obvious/exposed geological features
Ecology/vegetation	Primary native woodland with no understory. Cleared in some places for agriculture
Land use	Recreation (hiking) and agriculture (grazing)
Built form	Low density of farm dwellings and residential properties
Spatial	Primarily enclosed in character with few distant views

LANDSCAPE CHARACTER ZONES

LANDSCAPE CHARACTER ZONE 3 - OPEN FARMLAND



Photo C - Open farmland near Orange

Towards the southern area of the site, the landscape becomes a cleared plateau, characterised by a gently undulating topography with disconnected stands of bush land retained in private ownership. Rural residential properties and lifestyle blocks are scattered throughout the area but the density remains low. Some small scale tourism opportunities are present. Large single and small stands of trees are present throughout the landscape. Road access is sealed and some far reaching views are afforded from elevated points in the landscape.

Landscape Character Elements

Element	Description
Topography	Mostly cleared undulating landform above river corridors
Hydrology	Natural gullies draining into riparian areas as well as farm dams
Geology	No obvious/exposed geological features
Ecology/vegetation	Sparse/dotted tree cover - disconnected
Land use	Rural - cleared for grazing and agriculture
Built form	Farm dwellings and low density of residential properties
Spatial	Primarily open in character with interrupted views

LANDSCAPE CHARACTER ZONES

LANDSCAPE CHARACTER ZONE 4 - URBAN FRINGE



Photo D - Urban development on the outskirts of Orange

On the outskirts of Orange, the landscape is characterised by an increasingly urban form with a higher density of residential and commercial development and associated infrastructure. Vegetation is restricted to the road reserve and private gardens. Although the pipeline does not cross directly into this zone, the Suma Dam is visible from receptors within this zone.



Landscape Character Elements

Element	Description
Topography	Mostly cleared undulating landform above river corridors
Hydrology	Natural gullies draining into riparian areas
Geology	No obvious geological features
Ecology/vegetation	Sparse/dotted tree cover - disconnected
Land use	Semi-urban. Residential developments and some major infrastructure
Built form	Higher density of residential properties
Spatial	Primarily open in character

LANDSCAPE CHARACTER IMPACTS



LANDSCAPE CHARACTER ZONE 1 - STEEP HILLSIDES

The offtake structure, pump station 1 and pump station 2 will be located within this landscape character zone. The pipeline construction corridor will also move through this area with associated upgrading of the maintenance track. The new transmission line route will also be constructed in this area, taking power to the pumping stations.

Description of Sensitivity

The terrain is remote and characterised by undulating hills with steep slopes descending towards the river. There is very little built form within the landscape. Extensive views are afforded from higher elevations, although the undulating terrain limits sight lines within the valleys where the offtake and pump station will be located. Existing stands of trees and scrub will not be affected by the project. Given the undulating nature of the landscape, remote setting and lack of built form, it can be said that this landscape type has a moderate ability to absorb change, giving it a **moderate** sensitivity rating.

Description of Magnitude

Construction Phase - Development within this phase will involve construction activities related to the pump stations, break tank, offtake structure, pipeline trench, access roads and transmission line. Although temporary, these elements will be of a **moderate/high** magnitude during the construction phase.

Post construction - The offtake structure, pump stations, break tank and transmission line will be remaining permanently visible elements within the landscape. Their character and scale is at odds with the surrounding landscape character although the remote nature of their location means that there are few visual receptors. Screening vegetation will be required to help blend the pump stations and break tank into the landscape. These remaining elements are determined to be of a **moderate** magnitude within the landscape.

Landscape Character Impact Rating

From Table 01, the combination of the above sensitivity rating and magnitude ratings results in a **moderate/high** landscape character impact during construction and **moderate** post construction.



LANDSCAPE CHARACTER ZONE 2 - WOODLAND

The pipeline construction corridor, site compounds and upgraded power line transmission will be located within this landscape character zone.

Description of Sensitivity

The wooded nature of this landscape gives an enclosed quality to the area. This will permit natural screening of some of the project elements, although there will also be a requirement for permanent removal of some vegetation to maintain easement corridors. The rural nature of the zone offers opportunity for compensatory planting, if required. This landscape is given a **moderate** sensitivity rating.

LANDSCAPE CHARACTER IMPACTS

Description of Magnitude

Construction Phase - Clearing for construction purposes will have an impact on the character of this area although the quantum of vegetation removal is expected to be relatively low. Site compounds will temporarily adversely impact the landscape, giving the project a **moderate/high** magnitude rating in this landscape zone.

Post construction - Easement requirements will have a lasting impact on the this area, as well as the replacement of transmission poles. A major affect on the quality of this landscape character type is not expected however, giving it a **moderate/low** magnitude rating.

Landscape Character Impact Rating

From Table 01, the combination of the above sensitivity rating and magnitude ratings results in a **moderate/high** landscape character impact during construction and **moderate** post construction.

LANDSCAPE CHARACTER ZONE 3 - OPEN FARMLAND

The pipeline construction corridor, upgraded power line transmission, pump station 3, break tank and Suma Dam Reservoir discharge structure are all located within this Landscape Character Zone.



Description of Sensitivity

The undulating nature of the topography has resulted in numerous low ridge lines which limit sight lines. The reduced density of vegetation will also limit the requirement for vegetation removal during construction, however, lack of natural vegetation limits the potential screening of project elements. Built form in the landscape is limited to individual farms and other properties. Overall this landscape is described as having a **moderate/low** sensitivity rating.

Description of Magnitude

Construction Phase - development within this area will involve construction of the pump station, discharge structure, transmission line and pipeline trench. Site compounds will also be present alongside the road corridor. These elements will be of a **moderate/high** magnitude during the construction phase.

Post construction - the pump station, break tank, discharge structure, easement corridors and upgraded transmission line will be permanent features of the landscape. The pump station is larger in terms of scale and bulk to typical built elements in this landscape zone. Due to the nature of the project type, it is determined as having a **moderate/low** magnitude in this landscape zone.

Landscape Character Impact Rating

From Table 01, the combination of the above sensitivity rating and magnitude ratings results in a **moderate/high** landscape character impact during the construction period and a **moderate/low** impact post construction.

LANDSCAPE CHARACTER IMPACTS



LANDSCAPE CHARACTER ZONE 4 - URBAN FRINGE

Although the pipeline does not cross directly through this zone, it is in close proximity to the Suma Dam and discharge structure.

Description of Sensitivity

The landscape is relatively well developed with a denser urban form, leading to a higher ability to absorb change. This zone is determined as having a **low** sensitivity rating.

Description of Magnitude

Construction Phase - There is limited post-construction impact in this area, with no vegetation removal. Construction activities are unlikely be visible from receptors within this landscape character zone. The project is determined as having a **low** magnitude rating in this area.

Post construction Phase - Once construction is complete there will be negligible changes to this landscape character zone, giving it a **low** magnitude rating.

Landscape Character Impact Rating:

From Table 01, the combination of the above sensitivity rating and magnitude ratings results in a **low** landscape character impact for both the construction and post construction phases.

LANDSCAPE CHARACTER IMPACTS

SUMMARY OF LANDSCAPE CHARACTER IMPACTS

The landscape character impacts vary from moderate/high to low. Whilst the construction phase impacts, such as land disturbance, site compounds, stockpiling and machinery have the greatest effect on landscape character, their existence is of a temporary nature and post-construction effects will be limited. The underground pipeline itself will not be visible post-construction, but some impact on the landscape remains given the requirement for a 6m easement corridor, removal of vegetation and the scale and character of the three pumping stations, break tanks and transmission line.

Construction Phase

The open and cleared nature of Landscape Character Zones 1 and 3 help limit the requirement for removal of existing vegetation in these zones, however, it also allows some far reaching views of the pipeline being built. Construction activities will have an impact on Landscape Character Zone 2, Woodland, as here removal of selected trees and shrubs will be required. Character Zones 3 and 4 have a greater ability to absorb construction changes such as site compounds and stock piling due to the existence of other built elements in the landscape.



Typical construction activities

Post-construction Phase

The pump stations, break tanks, offtake and discharge structures, transmission line and easement corridors will all be visible within the landscape once construction is completed. Pump stations 1 and 2 and the new transmission line to the river are located within landscape character zone 1, with their scale and character at odds with such a remote and rural setting. Mitigation through screening will help lessen the impact on landscape character. Pump station 3 is located in an area of open farmland – landscape character zone 3. Other built elements exist in the landscape here, reducing the magnitude of the impact, although the pump station will be visible from the road corridor.

The replacement of transmission poles outside character zone 1 is not expected to have significant effects on landscape character due the presence of existing transmission infrastructure in these areas. The refurbished power line will look more obvious due to the new conductors being clean and shiny but over time these will fade due to weathering.

LANDSCAPE CHARACTER CONCLUSION

LANDSCAPE CHARACTER CONCLUSION

The landscape character of the project route is varied and typical of the region. The undulating open farmland, wooded creeks and steeply sloped hillsides give this part of NSW an identity tied to its rural history. Figure 04 shows the change in elevation over the pipeline route in relation to landscape character, indicating the undulating nature of the terrain and the sharp drop in elevation towards the river. The impact of the project on landscape character varies over the four character zones, depending on the landscape's sensitivity and the magnitude of the project within the landscape.

Overall, the project can be said to have a moderate/high impact rating on landscape character during the construction phase and a moderate to moderate/low rating once construction is complete. The remote and rural nature of much of the study area reduces the number of potential receptors viewing the project, although any remaining built elements will be prominent in an otherwise undeveloped landscape. As the pipeline route moves south towards Orange, the landscape character changes and the sensitivity diminishes as other built elements appear in the landscape. Mitigation measures focused on helping to set the pump stations, transmission poles and easement corridor into the landscape will assist in reducing the proposals impact on landscape character.

Construction Phase

	Steep Hillsides	Woodland	Open Farmland	Urban Fringe
Magnitude	Moderate/High	Moderate/High	Moderate/High	Low
Sensitivity	Moderate	Moderate	Moderate/Low	Low
Overall Rating	Moderate/High	Moderate/High	Moderate	Low

Landscape Character Impact Rating Table Summary

Post Construction Phase

	Steep Hillsides	Woodland	Open Farmland	Urban Fringe
Magnitude	Moderate	Moderate/Low	Moderate/Low	Low
Sensitivity	Moderate	Moderate	Moderate/Low	Low
Overall Rating	Moderate	Moderate	Moderate/Low	Low

Landscape Character Impact Rating Table Summary

LANDSCAPE CHARACTER AND ELEVATION

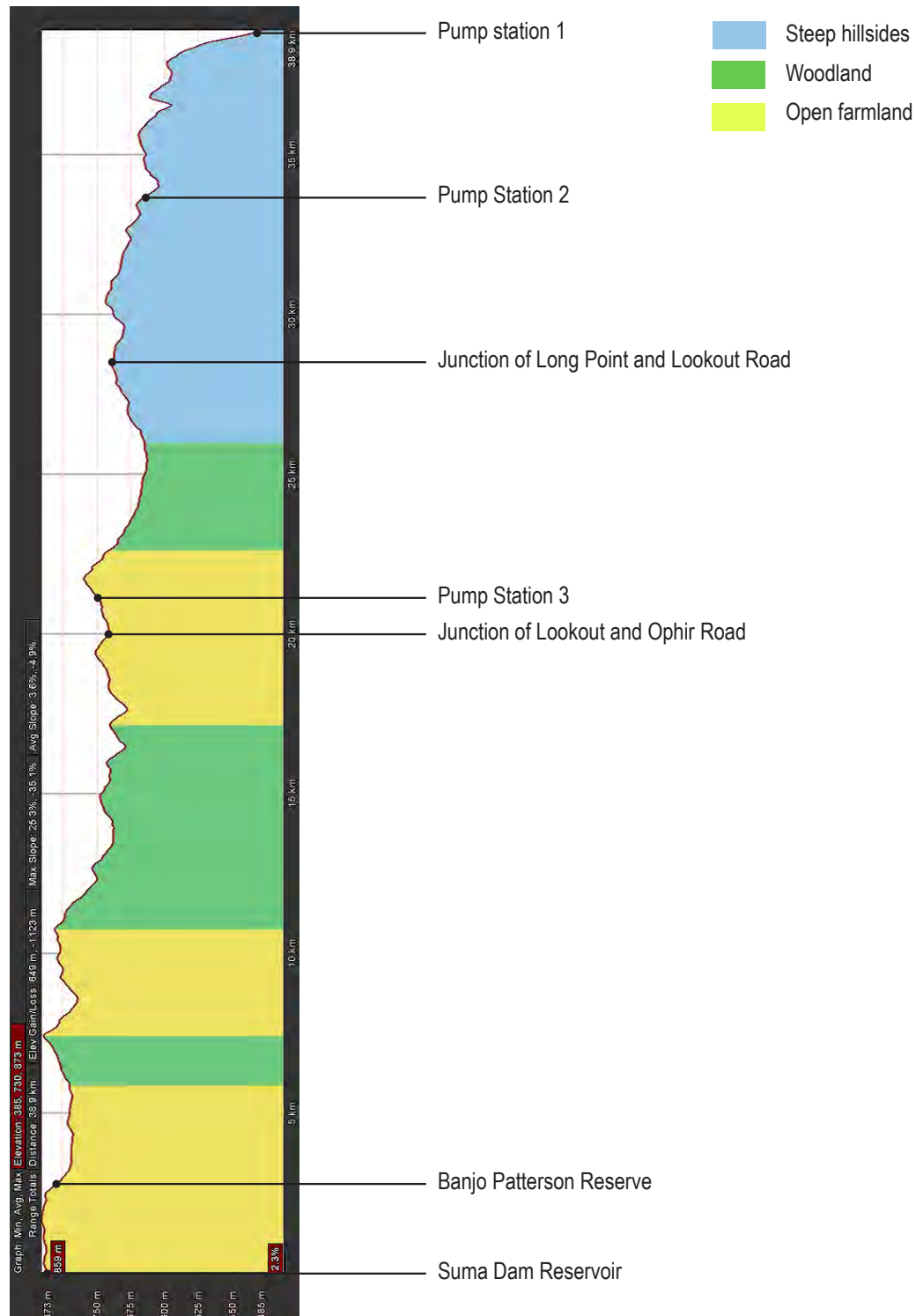


Figure 04 Elevation and Landscape Character along the pipeline route

VISUAL IMPACT ASSESSMENT

VISUAL IMPACT ASSESSMENT

Preliminary Visualisation

Prior to preparing the detailed visual receptor analysis, a desktop study was conducted using aerial mapping to identify key receptors that may be visually impacted by the project. A subsequent site inspection along the proposed pipeline route established a final list of 24 key receptor sites with the potential to be visually impacted by some element of the project.

Key Viewpoint Analysis

Figure 05 shows the location of the receptor sites studied in more detail in this report. In some cases, access to private property was not possible, so the photographic survey was conducted from the base of the property's driveway or other location that could give an indication of the potential impacts of the project. Properties determined as having no views of the construction corridor from the main dwelling have been excluded from this report.

To determine the accuracy of the Viewpoint Analysis a digital camera (Sony Cyber-shot DSC-HX9V) with in-built GPS and compass was used and then transferred onto a digital map to determine an accurate distance from the project site.

Each viewpoint was rated with factors related to the themes of sensitivity and magnitude, during both the construction and post-construction phases. This rating system is described in Table 03.



A 4-wheel drive vehicle was used to access remote sections of the site

VISUAL IMPACT ASSESSMENT

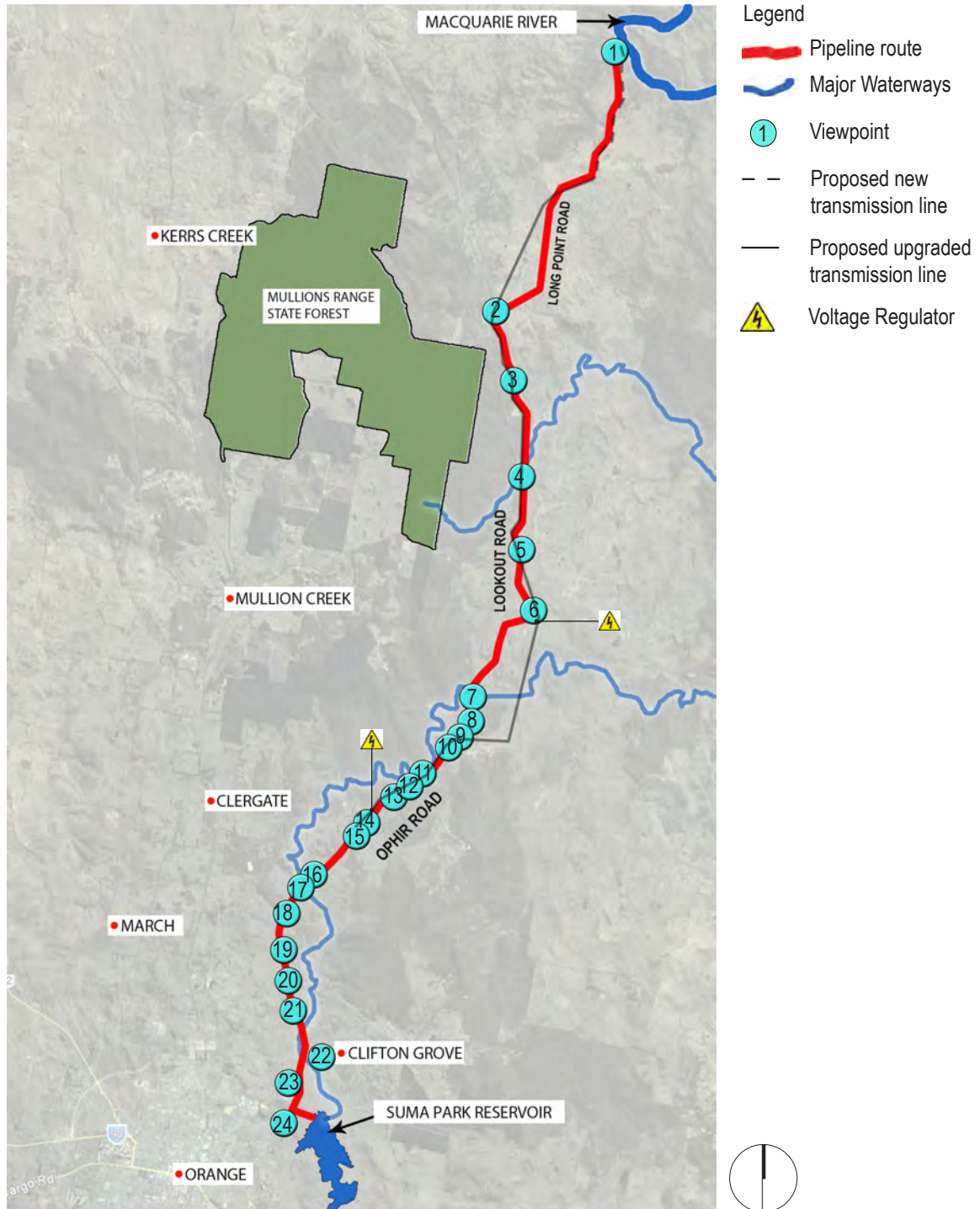


Figure 05 Location of key viewpoints (not to scale)

VISUAL IMPACT ASSESSMENT

Table 03 - The Visual Impact Rating System

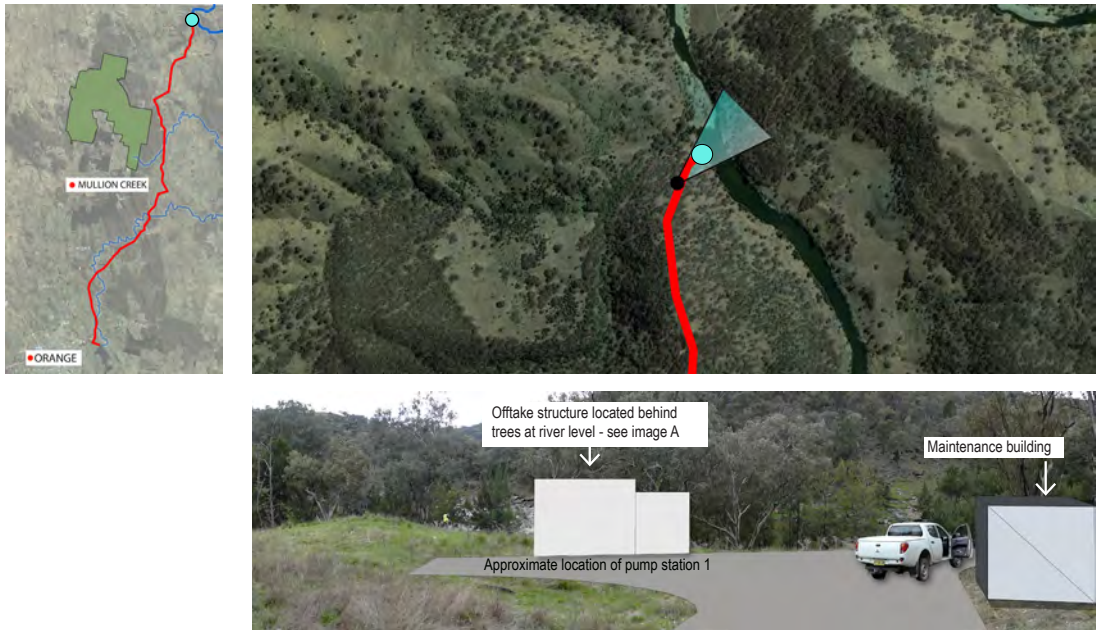
SENSITIVITY	Rating	Description
Receptor sensitivity		Each visual receptor type has an inherent and varied sensitivity to change in the visual scene based on their personal context in which the view is being experienced. This will have a direct bearing on the perception of visual impact experienced by the receptor.
	H	Private Residence/Business: view from dwelling or garden may be experienced regularly over extended periods of time; residents may have chosen the location specifically for the view and/or develop a strong familiarity and association with the view and have high sensitivity to change.
	M/H	Public Reserve Parks, Reserves, Public walkways: the purpose of visiting and using reserves largely relates to an enhanced sense of wellbeing. Receptor is more sensitive to both positive and negative visual experiences, especially where the reserve is the destination for leisure and relaxation.
	M	Public Roads: the view experienced can be important to the driver/passenger but is sometimes a brief experience and the driver is usually focused on the road.
	L	Public Roads – infrequently accessed
Importance of View		The visual accessibility and frequency that the view is observed
	H	Frequent viewing from a key area of a private property
	M	Moderate frequency of viewing from a private property or public park.
	L	Infrequent and inaccessible view.

MAGNITUDE	Rating	Description
Distance		The effect the development has on the view in relation to the distance between the development and the visual receptor. The distances are from the centre of the pipeline or pump station and are categorised as;
	H	< 100m
	M	100 - 200m
	L	> 200m
Duration		The length of time the visual receptor is exposed to the view. The duration of view affects the impact of the development on the viewer – the longer the exposure the more detailed the impression of the proposed changes in terms of visual impact.
	H	Significant part of the day – high impact (key area of a residential property)
	M	5 minutes – several hours. Moderate impact, usually from a road/driveway/entrance or fringe area of a property.
	L	5 to 30 seconds – low impact from a road or walking past
Magnitude of Change		Magnitude of change is a quantitative assessment of the change in compositional elements of the view. If the proposed development is largely similar in nature and scale to that of existing elements in the vicinity, the magnitude of change is low. If the development radically changes the nature or composition of elements in the view, the magnitude of change is high. Distance from the development will accentuate or moderate the scale and variety of visible elements in the overall view and hence influence this rating.
	H	Elements within the view will be greatly at odds with existing features in the landscape.
	M	Elements within the view will be at odds with existing features in the landscape.
	L	Elements and composition of the view will remain largely unaltered.

VISUAL IMPACT ASSESSMENT

MAGNITUDE	Rating	Description
Quantum of view		The Quantum of view relates to the openness of the view and the angle to the visual receptor. A development located in the direct line of sight has a higher impact than if it were located obliquely at the edge of the view. Whether the view of the development is filtered by vegetation also affects the impact, as does the nature of the view (panoramic, restricted etc.). A small element within a panoramic view has less impact than the same element within a restricted or narrow view. The effects can be categorised as;
	H	A direct view of the development or its presence (sometimes in a very narrow or highly framed view).
	M	A direct or slightly oblique view of the development or its presence in a broader view where the development occupies a moderate proportion of the view cone. Some screening may be present.
	L	An oblique or highly filtered view of the development
Summary of Ratings		A summary rating that combines all of the ratings, based on a transparent professional assessment of the combined totals of qualitative and quantitative ratings and comments as outlined above:
	H	Highly adverse.
	M/H	Moderately to Highly adverse
	M	Moderately adverse
	M/L	Slightly adverse
	L	Very limited impact
Magnitude of Change		Magnitude of change is a quantitative assessment of the change in compositional elements of the view. If the proposed development is largely similar in nature and scale to that of existing elements in the vicinity, the magnitude of change is low. If the development radically changes the nature or composition of elements in the view, the magnitude of change is high. Distance from the development will accentuate or moderate the scale and variety of visible elements in the overall view and hence influence this rating.
	H	Elements within the view will be greatly at odds with existing features in the landscape.
	M	Elements within the view will be at odds with existing features in the landscape.
	L	Elements and composition of the view will remain largely unaltered.

VIEWPOINT 1 - OFFTAKE STRUCTURE AND PUMP STATION



Description

Location of the river off-take, pump station and maintenance shed, located upstream on the Macquarie river. Construction off off-take structure will consist of submersible pumps housed in pre-cast concrete well built into southern bank of the river, with the pump station located approximately 20m up the bank. Approximate mass of pump station and maintenance building has been overlaid on image above to give an indication of visual impact.

Meandering topography of the river valley limits distant views of the development, with closer views toward the site partially screened by vegetation. Direct views are afforded from elevated sections of the northern bank of the river. Direct users of the river (such as kayakers) will have closer and more direct views of the pump station and intake from river level (see image A).

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private land	M	M
	Importance of View	Remote location within an area of private ownership with low frequency for viewing the site.	L	L
Magnitude	Distance	Varied - 10-30m	H	H
	Duration	Moderate exposure	M	M
	Magnitude of Change	Sole built form in the landscape	H	H
	Quantum of view	Screened by some vegetation	M	L
Overall Impact Rating			Moderate	Moderate/ Low

VISUAL IMPACTS

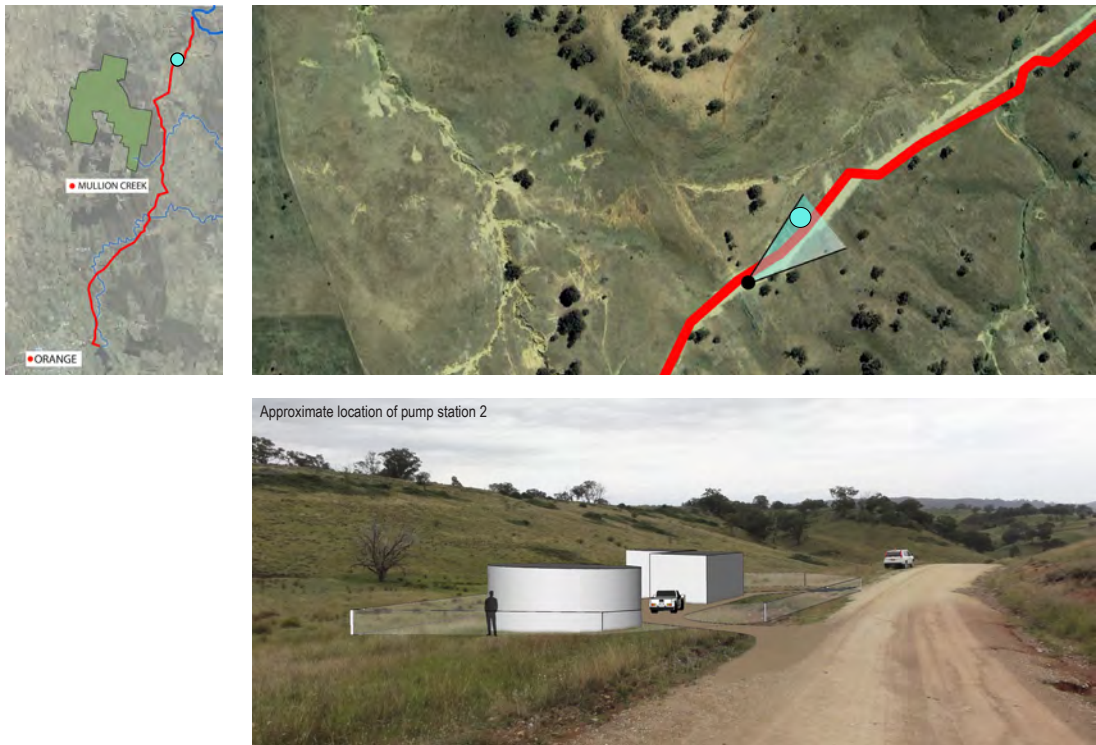
VIEWPOINT 1 - OFFTAKE STRUCTURE AND PUMP STATION AS VIEWED FROM RIVER



Image A - Approximate location of offtake structure, maintenance building and pump station 1, as viewed from the Macquarie River

VISUAL IMPACTS

VIEWPOINT 2 - PUBLIC ROAD (PUMP STATION 2)



Description
Public un-surfaced road with direct views of pump station 2. Construction to include pumping station, break tank and transmission line extension. Approximate mass of pump station and break tank has been overlaid on image to give an indication of visual impact. The undulating nature of the local topography helps limit long distance views to the pumping station.

This site is located on private land, directly adjoining Long Point Road. The nearest residence (1829 Long Point Road) is located approximately 1600m to the east.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Public road	M	M
	Importance of View	Lightly trafficked dirt track	L	L
Magnitude	Distance	10m	H	H
	Duration	Short exposure	L	L
	Magnitude of Change	Sole built form visible in landscape	H	H
	Quantum of view	Direct view in open landscape with no screening vegetation	H	M
Overall Impact Rating			Moderate/ High	Moderate

VISUAL IMPACTS

VIEWPOINT 3 - PRIVATE PROPERTY



Description

View form junction of Long Point and Lookout road, looking towards private property with double frontage to pipeline route. Pipeline is located within road reserve and on private property, avoiding significant vegetation. Slightly elevated position of property affords direct views of pipeline construction phase from residence and driveway.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with high frequency for viewing the site	H	H
Magnitude	Distance	102m	M	M
	Duration	Long exposure	H	H
	Magnitude of Change	Construction impact with limited vegetation removal	H	L
	Quantum of view	Direct view on two sides of property	H	L
Overall Impact Rating			Moderate/ High	Moderate/ Low

VISUAL IMPACTS

VIEWPOINT 4 - PRIVATE PROPERTY



Description
View taken from base of driveway looking towards pipeline route as access to private property not available. Distant and filtered views of pipeline construction corridor will be available from this private residence. Pipeline is located in private property on opposite side of the road to avoid tree removal in road reserve.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with low frequency for viewing the site	L	L
Magnitude	Distance	290m	L	L
	Duration	Long exposure	M	M
	Magnitude of Change	Construction impact with possible vegetation removal	M	L
	Quantum of view	Direct view partially screened by vegetation	M	L
Overall Impact Rating			Moderate	Moderate/ Low

VISUAL IMPACTS

VIEWPOINT 5 - PRIVATE PROPERTY



Description

View taken from Lookout Road towards a private property adjacent to pipeline route on opposite side of construction corridor. Pipeline route travels through private land with the possibility of some vegetation removal.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with high frequency for viewing the site	H	M
Magnitude	Distance	37m	H	H
	Duration	Long exposure	H	M
	Magnitude of Change	Construction impact with possible vegetation removal	H	M
	Quantum of view	Direct view partially screened by vegetation	M	L
Overall Impact Rating			Moderate/ High	Moderate

VISUAL IMPACTS

VIEWPOINT 6 - PUBLIC ROAD (PUMP STATION 3)



Description
View of pump station 3 from Lookout Road - consisting of building shed, break tank and transmission line extension. Approximate mass of pump station and break tank has been overlaid on image to give an indication of the visual impact. No tree removal required in this location. No properties overlook the pump station but it will be prominent in the landscape due to its exposed setting.

The nearest residence (206 Lookout Road) is located approximately 600m to the west.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Public Road	M	M
	Importance of View	Un-sealed road, lightly trafficked.	L	L
Magnitude	Distance	10m	H	H
	Duration	Short exposure	L	L
	Magnitude of Change	New built element in the landscape	H	H
	Quantum of view	Direct view	H	H
Overall Impact Rating			Moderate/ High	Moderate

VISUAL IMPACTS

VIEWPOINT 7 - PRIVATE PROPERTY



Description

View taken from junction of Lookout and Ophir Road towards private property, close to pipeline corridor. Route located within private property, with filtered, oblique views of construction phase available, partially screened by vegetation.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with low frequency for viewing the site	L	L
Magnitude	Distance	67m	H	H
	Duration	Occasional exposure	L	L
	Magnitude of Change	Construction impact only	M	L
	Quantum of view	Oblique, screened by vegetation	L	L
Overall Impact Rating			Moderate/ Low	Low

VIEWPOINT 8 - PUBLIC RESERVE



Description
View from public reserve with toilet facilities and picnic tables. Filtered but direct views of construction corridor. Pipeline within road reserve. Some permanent vegetation removal may be required in this location.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Public Reserve	H	H
	Importance of View	Public reserve with moderate frequency of use	H	H
Magnitude	Distance	15m	H	H
	Duration	Moderate exposure	M	M
	Magnitude of Change	Construction impact with associated removal of vegetation and damning of creek	H	M
	Quantum of view	Oblique, screened by vegetation	M	M
Overall Impact Rating			Moderate/ High	Moderate

VISUAL IMPACTS

VIEWPOINT 9 - PRIVATE PROPERTY



Description

View from private property/business providing accommodation in a series of secluded cabins. The cabins closest to the road have a direct view of construction phase works with some screening provided by vegetation. Pipeline is located within the road reserve and private property within this area..

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence/Business	H	H
	Importance of View	Private ownership with high frequency for viewing the site	M	M
Magnitude	Distance	60m	H	H
	Duration	Long exposure	H	H
	Magnitude of Change	Construction impact with limited vegetation removal	M	L
	Quantum of view	Direct with some screening by vegetation	M	L
Overall Impact Rating			Moderate/ High	Moderate/ Low

VIEWPOINT 10 - PRIVATE PROPERTY



Description
View looking north towards private property from Ophir Road (as access to property not available). Filtered views available from this private property of the pipeline construction corridor, heavily screened by trees. Dotted line indicates pipeline behind vegetation within private land.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with low frequency for viewing the site	L	L
Magnitude	Distance	70m	H	H
	Duration	Low exposure	L	L
	Magnitude of Change	Construction impact only	M	L
	Quantum of view	Direct view, heavily screened by vegetation	L	L
Overall Impact Rating			Moderate/ Low	Low

VISUAL IMPACTS

VIEWPOINT 11 - PRIVATE PROPERTY



Description

View from base of driveway looking back towards private property. Pipeline route moves through private land before exiting into road reserve through existing gate. Distant, elevated views of pipeline construction corridor available from this property.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with moderate frequency for viewing the site	M	M
Magnitude	Distance	220m	M	M
	Duration	Long exposure	H	L
	Magnitude of Change	Construction impact only	M	L
	Quantum of view	Direct view	M	L
Overall Impact Rating			Moderate	Low

VIEWPOINT 12 - PRIVATE PROPERTY



Description
View from base of driveway towards pipeline corridor located within private land, on opposite side of road. Filtered views of the pipeline construction corridor from this private property, partially screened by vegetation. Possibility of limited vegetation removal.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with moderate frequency for viewing the site	M	M
Magnitude	Distance	30m	H	H
	Duration	Moderate exposure	M	M
	Magnitude of Change	Construction impact with limited removal of vegetation	M	L
	Quantum of view	Direct view partially screened by vegetation	M	L
Overall Impact Rating			Moderate	Moderate/ Low

VISUAL IMPACTS

VIEWPOINT 13 - PRIVATE PROPERTY



Description

View from driveway of private property, looking towards Ophir Road with the pipeline corridor located on opposite side of road. Topography partially limits view of construction corridor from this property. Some vegetation removal will be required.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with moderate frequency for viewing the site	M	M
Magnitude	Distance	30m	H	H
	Duration	Moderate exposure	M	M
	Magnitude of Change	Construction impact with removal of vegetation	H	M
	Quantum of view	Direct view screened by vegetation and topography	L	L
Overall Impact Rating			Moderate	Moderate/ Low

VIEWPOINT 14 - PRIVATE PROPERTY

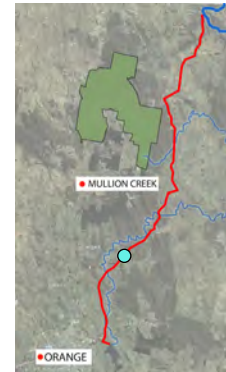


Description
View from driveway of private property. Distant views of pipeline construction from several private residences situated in an elevated position above the pipeline route. Pipeline located in private land to avoid sensitive vegetation.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with high frequency for viewing the site	M	L
Magnitude	Distance	148m	M	M
	Duration	Long exposure	M	L
	Magnitude of Change	Construction impact only	M	L
	Quantum of view	Direct view	M	L
Overall Impact Rating			Moderate	Low

VISUAL IMPACTS

VIEWPOINT 15 - PRIVATE PROPERTY



Description

View from base of driveway looking towards private property. Tenant has requested that pipeline is routed through garden to avoid removal of trees in road reserve. Direct views from the property of the construction corridor and some permanent vegetation removal required.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with high frequency for viewing the site	H	M
Magnitude	Distance	10m	H	H
	Duration	Long exposure	H	M
	Magnitude of Change	Construction impact and removal of vegetation	H	M
	Quantum of view	Direct view partially screened by vegetation	H	M
Overall Impact Rating			High	Moderate

VIEWPOINT 16 - PRIVATE PROPERTY



Description
View from base of driveway of pipeline route. Direct views of pipeline construction corridor available from this private property. Pipeline route will run down the road median at this location.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with moderate frequency for viewing the site	M	L
Magnitude	Distance	50m	H	H
	Duration	Moderate exposure	M	L
	Magnitude of Change	Construction impact only	M	L
	Quantum of view	Direct view partially screened by fence and single trees.	M	L
Overall Impact Rating			Moderate	Low

VISUAL IMPACTS

VIEWPOINT 17 - PRIVATE PROPERTY

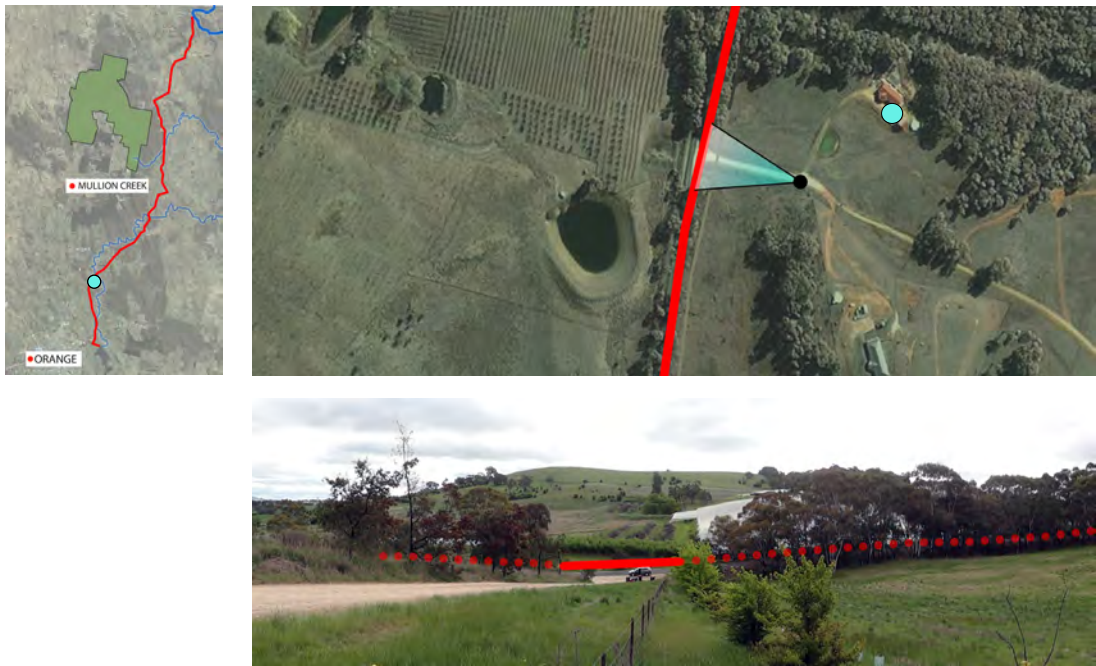


Description

View from centre of driveway looking towards pipeline route. Dotted line indicates pipeline in on opposite side of the road. Filtered views of pipeline construction corridor available from this property, partially screened by vegetation. The pipeline is routed through the road reserve in this location. Due to the density of vegetation, some permanent removal will need to take place within the construction corridor.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with moderate frequency for viewing the site	M	M
Magnitude	Distance	45m	H	H
	Duration	Long exposure	H	M
	Magnitude of Change	Construction impact and removal of vegetation	H	M
	Quantum of view	Direct view partially screened by vegetation	H	M
Overall Impact Rating			High	Moderate/ High

VIEWPOINT 18 - PRIVATE PROPERTY



Description
View from driveway looking towards pipeline route, located within road reserve. Direct view of construction corridor from this property, partially screened by vegetation. Some limited vegetation removal may be required in this area.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with high frequency for viewing the site	M	M
Magnitude	Distance	172m	M	M
	Duration	Long exposure	M	L
	Magnitude of Change	Construction impact and some removal of vegetation	M	M
	Quantum of view	Direct view partially screened by vegetation	M	L
Overall Impact Rating			Moderate	Moderate/ Low

VISUAL IMPACTS

VIEWPOINT 19 - PRIVATE PROPERTY



Description

View from driveway of private property with direct but filtered views of pipeline construction corridor behind trees. Route located within private land, avoiding significant vegetation in road reserve.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with high frequency for viewing the site	M	M
Magnitude	Distance	130m	M	M
	Duration	Long exposure	H	M
	Magnitude of Change	Construction impact only	M	L
	Quantum of view	Direct view partially screened by vegetation	M	L
Overall Impact Rating			Moderate	Low

VIEWPOINT 20 - PRIVATE PROPERTY



Description
View looking south down Ophir Road towards Ophir Bed and Breakfast, adjacent to pipeline corridor route. Oblique views of construction phase available from this property, heavily screened by vegetation. Pipeline route located within road reserve.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence/Business	H	H
	Importance of View	Private ownership with low frequency for viewing the site	L	L
Magnitude	Distance	82m	H	H
	Duration	Short exposure	L	L
	Magnitude of Change	Construction impact only	M	L
	Quantum of view	Oblique view heavily screened by vegetation	L	L
Overall Impact Rating			Moderate/ Low	Low

VISUAL IMPACTS

VIEWPOINT 21 - PRIVATE PROPERTY



Description

View of private property adjacent to pipeline corridor. Direct views, slightly screened by tree planting available from property. Pipeline route located within road reserve.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with high frequency for viewing the site	H	H
Magnitude	Distance	10m	H	H
	Duration	Long exposure	H	L
	Magnitude of Change	Construction impact only	H	L
	Quantum of view	Direct view partially screened by vegetation	M	L
Overall Impact Rating			High	Low

VIEWPOINT 22 - PRIVATE PROPERTY

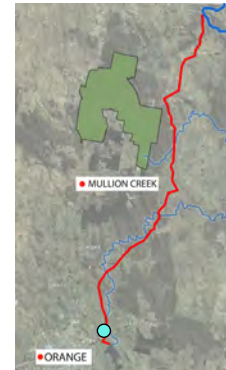


Description
View from base of driveway of private property with direct and distant views of pipeline corridor within a wider panoramic view. Pipeline route located within road reserve.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with moderate frequency for viewing the site	M	M
Magnitude	Distance	700m	L	L
	Duration	Moderate exposure	M	L
	Magnitude of Change	Construction impact only	M	L
	Quantum of view	Direct view within larger panorama	L	L
Overall Impact Rating			Moderate/ Low	Low

VISUAL IMPACTS

VIEWPOINT 23 - BANJO PATTERSON PUBLIC PARK



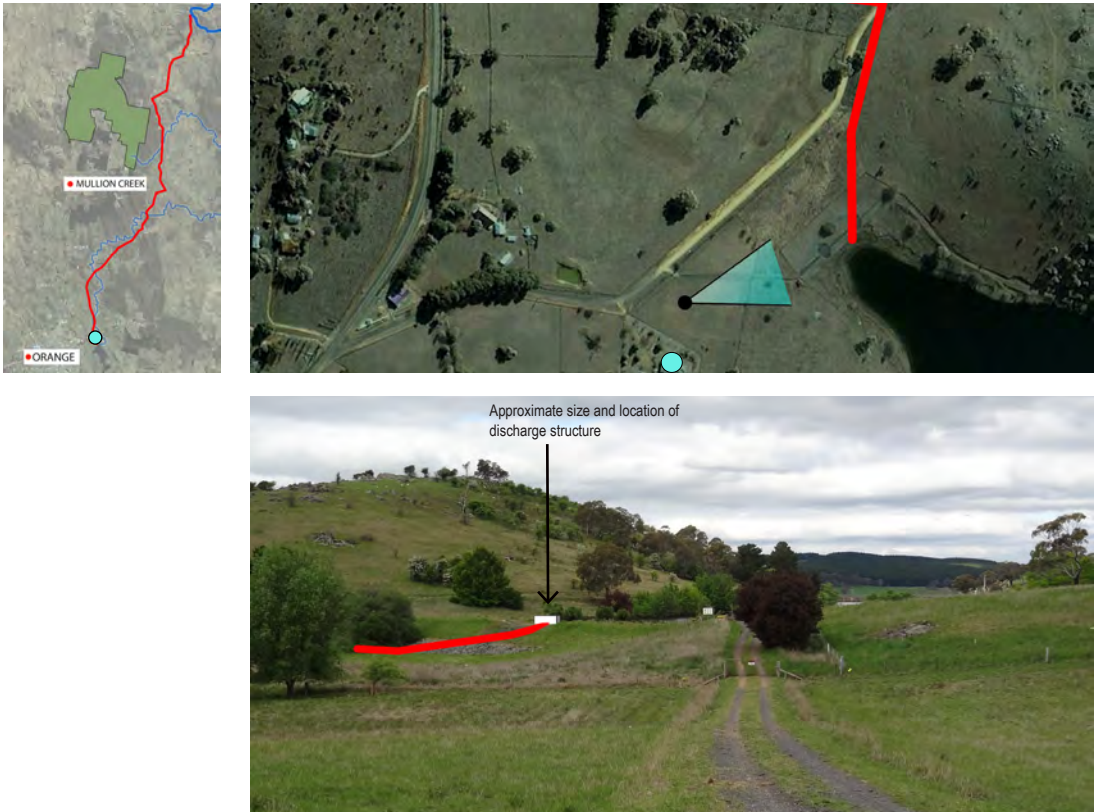
Description

View across Ophir Road towards Banjo Patterson Public Park. Pipeline corridor runs in front of the park, with direct views of the construction phase available from park entrance. Pipeline route located within road reserve.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Public park	M	M
	Importance of View	Public park with moderate use	M	M
Magnitude	Distance	10m	H	H
	Duration	Moderate exposure	H	L
	Magnitude of Change	Construction impact only	H	L
	Quantum of view	Direct view from entrance to park	M	L
Overall Impact Rating			Moderate/ High	Low

VISUAL IMPACTS

VIEWPOINT 24 - PRIVATE PROPERTY



Description
View from field below private property close to the termination of the pipeline at Suma Dam Reservoir. Filtered view of pipeline construction corridor within wider panorama available from property. Discharge structure will be visible within this view and is modelled on the image above, indicating approximate location and scale of structure. Pipeline route located within private land.

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	H	H
	Importance of View	Private ownership with moderate frequency for viewing the site	M	M
Magnitude	Distance	200m	M	M
	Duration	Moderate exposure	M	L
	Magnitude of Change	Construction impact only	M	L
	Quantum of view	Direct view within larger panorama, partially screened by vegetation.	L	L
Overall Impact Rating			Moderate/ Low	Low

VISUAL IMPACTS SUMMARY

SUMMARY OF IMPACTS ON VIEWPOINTS 1 - 24

VIEWPOINT	VISUAL IMPACT CONSTRUCTION PHASE	VISUAL IMPACT POST-CONSTRUCTION PHASE
1	Moderate	Moderate/Low
2	Moderate/High	Moderate
3	Moderate/High	Moderate/Low
4	Moderate	Moderate/Low
5	Moderate/High	Moderate
6	Moderate/High	Moderate
7	Moderate/Low	Low
8	Moderate/High	Moderate
9	Moderate/High	Moderate/Low
10	Moderate/Low	Low
11	Moderate	Low
12	Moderate	Moderate/Low
13	Moderate	Moderate/Low
14	Moderate	Low
15	High	Moderate
16	Moderate	Low
17	High	Moderate/High
18	Moderate	Moderate/Low
19	Moderate	Low
20	Moderate/Low	Low
21	High	Low
22	Moderate/Low	Low
23	Moderate/High	Low

Table 04 Summary of Landscape Visual Impacts

VISUAL IMPACTS SUMMARY

Table 04 summarises the overall visual impact on receptors along the route of the pipeline - viewpoints 1 - 24. The visual impacts range from 'high' to 'low', with a significant reduction in impact between the construction and post-construction phases. This is due to the temporary nature of many of the construction impacts and the underground nature of the completed pipeline.

Offtake Structure

The offtake structure on the Macquarie river has been assessed in viewpoint 1. The visual impact is rated as 'moderate' during the construction phase, dropping to 'moderate/low' post construction. The intake structure will be partially submerged within the river and the pipe-work will be positioned within the sloping bank, limiting views from above. The most significant views of the off-take will be from water level by users of the river itself. These types of receptors are likely to be infrequent and will not remain in the area for an extended period of time. The visual impact of the structure can be further reduced by the use of appropriate screening vegetation planted on the river's banks.

Pipeline

Due to the underground nature of the pipeline, the main visual impacts will be experienced during the construction phase. Construction activities involving the pipeline will include;

- clearing
- grading
- trench excavation
- storage of topsoil
- equipment storage
- movement of construction vehicles within construction corridor

Three private properties (viewpoints 15, 17, 21) have received a visual impact rating of 'high' during this phase. This is due to their proximity to the construction corridor, the direct and unfiltered nature of their views and the removal of vegetation close to the property.

Post construction, the pipeline will continue to have a limited impact on the visual amenity of some receptors due to the requirement for a maintenance easement corridor. Viewpoint 17 is the only private property receptor to retain an impact rating of 'moderate/high' post construction. This is due to the proximity of the 6m easement corridor to the property and the associated loss of vegetation. It is hoped that some compensational planting outside the corridor will help mitigate the significance of this impact. Three private property receptors (viewpoints 5, 8 and 15) are shown to have a 'moderate' impact rating post-construction. This level of impact is due to the vegetated nature of the receptor sites and the permanent loss of vegetation associated with the 6m maintenance easement corridor.

Pump Stations

The three pump stations assessed in viewpoints 1, 2 and 6 will be the largest and most visible permanent infrastructure components of the project. Once constructed they will stand out in the landscape with their scale, form and bulk at odds with local development. Their remote setting and lack of nearby residential receptors has contributed to their

VISUAL IMPACTS SUMMARY

'moderate' to 'moderate/low' impact rating post construction. Mitigation measures will also assist in reducing their visual impact.

Transmission Line

The visual impact of the transmission line infrastructure is likely to be moderate to low as the majority of power being supplied will be by an upgraded version of the current line. The refurbished power line will look more obvious due to the new conductors being clean and shiny. Over time, however, these will fade due to weathering and become indistinguishable from the existing line.

The final few kilometres of the transmission will have the most significant visual impact as it crosses land with no other infrastructure in existence. The remote nature of the land and lack of visual receptors within this area, however, will limit the visual impact to a moderate/low level.

The two proposed voltage regulators will have a low visual impact due to their positioning on public roads. Views of the regulators will be limited to road users and will be brief in duration.

Site Compounds

Site compounds will also be present along the pipeline route during the construction phase. Their impact on visual amenity will be relatively high, especially where they are located within sight of a property. Where located next to roads, their impact will be less as the duration of view is much shorter. Their impact will only be relevant during the construction phase and by following recommendations within the mitigation section of this report, their temporary visual impact can be reduced.

Discharge Structure

The discharge structure will be located at the northern end of the Suma Dam Reservoir. The reservoir is located within a rural landscape of undulating topography, overlooked by a limited number of properties. The discharge structure is likely to be in scale and character with existing dam infrastructure and will have a low visual impact due to its relatively remote setting.

CONCLUSION

VISUAL IMPACT ASSESSMENT

Visual impact ratings range from 'high' to 'moderate/low' during the construction phase and 'moderate/high' to 'low' post-construction. The majority of post-construction impacts are within the 'moderate/low' and 'low' ranges. As can be seen in Figure 06, there is a significant reduction in the severity of the visual impact post-construction.

Construction of the pipeline will affect all receptors studied to a certain degree, with the level of impact predominantly related to the receptors distance to the pipeline, the quantum of view and whether vegetation will need to be removed. The nature of the project means that many of the impacts in the construction phase are temporary. The private property receptors that still have a 'moderate/high' or 'moderate' rating post construction are impacted by the removal of vegetation permanently for the easement corridor. It is envisaged that rehabilitation planting will reduce this impact, although permanent loss will be a factor where the maintenance easement corridor passes through densely vegetated areas.

CONCLUSION

The remote location of much of the infrastructure, sparse human population and the pipeline's routing, alternating between road reserves and private property, helps limit the visual and landscape character impacts of the project. With the implementation of the mitigation measures outlined, the project can be deemed to be relatively compatible with the existing landscape and have a limited visual impact once construction is complete.

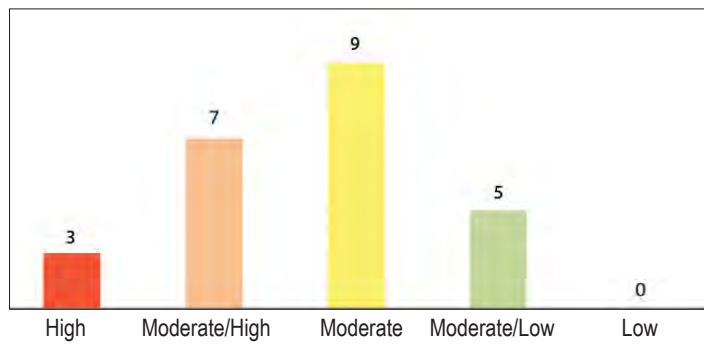
Response to Director General's Requirements

The DGRs have been addressed within this report including:

- a full description of the project components and their locations within the Orange area
- a study of landscape character and project affects, identifying four key landscape zones - steep hillsides, woodland, open farmland and urban fringe
- a photographic assessment demonstrating the potential visual impacts on 24 selected receptor sites during both the construction and post-construction phases
- a description of the potential impacts of each project component, describing their significance to each receptor and how the level of impact changes within the post-construction period
- mitigation recommendations covering all major project components.

CONCLUSION

CONSTRUCTION PHASE



POST-CONSTRUCTION PHASE

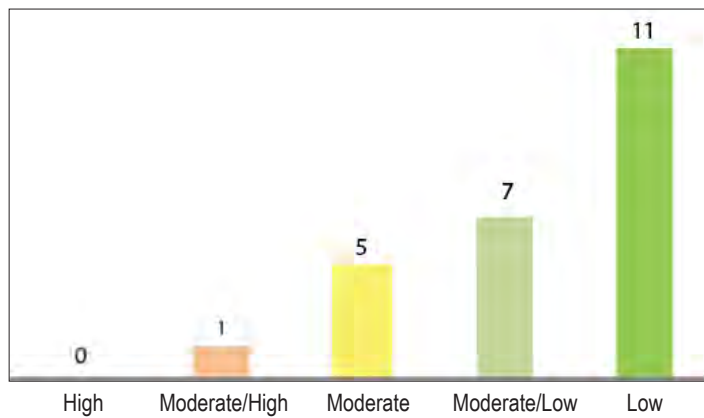


Figure 06 Graphs showing total number of receptors in each visual impact category

MITIGATION RECOMMENDATIONS

The most effective mitigation measures for potential impacts are those that avoid impacts in the first place. This could be through appropriate site selection, reactive design or reduction through site and built form design, rather than through responses such as screening. The principal forms of mitigation typically employed in this respect are set out below. Orange City Council have demonstrated intent to restore and rehabilitate areas effected by the construction of the pipeline (*Orange Pipeline Project Fact Sheet 2, 3 and 6, v2*).

Avoidance

The location for this project has been subject to significant regional analysis and accordingly many of the potential significant visual impacts have been avoided through careful route selection. For example, the route often crosses from the road reserve to private property to avoid significant stands of vegetation. The council also intend to employ an arboriculturalist to preform a full tree survey along the pipeline route. This will help identify significant trees, so they can be retained through route modifications.

Reduction and Alleviation

The principal forms of reduction are associated with refinements and modifications that address siting, bulk and articulation of built form. Options to alleviate impacts are usually associated with detailed design features such as materials, finishes, reflectivity and planting character.

Pump Stations and Break Tanks

- Siting and orientation of the structures to avoid large stands of vegetation and utilise natural landform to help limit views.
- Preference to cut into the site rather than fill, reusing surplus material for earth mounding.
- Planting of screening vegetation at varied heights to break up form and help filter views of structures from road. Effective screening will involve planting with low, medium and high elements.
- Careful selection of finish and materials to blend structure with surrounding landscape and fit in with local vernacular.
- Roof design to match local vernacular.
- Attention paid to level of reflectivity to avoid unnecessary reflective properties.

Pipeline

- Routing to avoid areas of dense vegetation and significant trees.
- Where route travels through private property, pipeline should follow path of existing boundary fence helping to match horizontal elements in the landscape.
- Rapid rehabilitation of disturbed ground with native vegetation, including native grasses within the easement corridor.
- Where vegetation is removed for pipeline construction consideration should be given to supplementary planting outside of the corridor to help reduce visual impact.

MITIGATION RECOMMENDATIONS

Transmission Line

- Careful consideration to be given to pole design and colour to match existing transmission line infrastructure. Colour choice assists with blending pole into landscape. Darker colours will help pole blend with forested/vegetated backgrounds.
- Utilising natural topography to aid reduction in visual impact. Siting poles in geographical depressions and avoiding placement on ridge lines where there impact will be more visible.
- Planting vegetative screens assist in blocking certain views of the transmission line.
- Stronger conductors will minimise line sag and provide a sleeker profile.

Site Compounds

- Siting and orientation of the structures and associated construction phase items such as stockpiles to minimise visual impact.
- Avoid areas of dense vegetation that may require clearing
- Earth mounding might help set site compounds into landscape and reduce some visual impact.
- Set sites close to existing access routes and breaks/gates in fencing.

Screening Vegetation

Screening vegetation should include a selection of local, native species where possible. These will be a mix of deciduous and evergreen species with varying heights, including native shrubs, grasses and trees. Ongoing maintenance including long term weed control, erosion control and growth monitoring is recommended.