# Appendix H

# Landscape and visual impacts assessment (Clouston Associates)







# MACQUARIE RIVER TO ORANGE PIPELINE PROJECT



PROPOSED PROJECT REFINEMENTS - MR5A

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').

Two route options have been suggested:

- Original route (assessed in a previous report Landscape Character and Visual Impact Assessment, CLOUSTON Associates March 2012)
- New route MR5A.

This report has been prepared to provide an assessment of the landscape character and visual impact of the proposed MR5A route, in comparison to the original route assessed.

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), a discharge structure and ancillary infrastructure (power supply).

#### 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.

This report assesses 6.5km of the MR5A route between the original route junction on Long Point Road and the Macquarie river (refer Figure 01). The proposed offtake structure would be located on the south side of the Macquarie River.

#### LANDSCAPE CHARACTER

The MR5A route analysed in this report passes through areas identified as:

- Steep Hillsides
- Open Farmland

Based on the results of the Landscape Character Assessment, it is concluded that both the original and MR5A option have a moderate/low impact on landscape character post pipeline construction.

### **EXECUTIVE SUMMARY**

#### VISUAL IMPACT ASSESSMENT

Three (3) additional receptors have been identified with the potential to be impacted by the MR5A route option compared to the original route. 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/high impact on one of the receptors, reducing to a low impact once construction is complete. The other two receptors receive an impact rating of moderate and low during construction, reducing to moderate/low post construction.

#### CONCLUSION

The remote location of the infrastructure, undulating terrain and sparse human population help to limit the visual and landscape character impacts of both route options. The MR5A route is shown to have a slightly higher visual impact than the original route due to the increased number of visual receptors. This impact is not found to be significantly different and both options are deemed to have a moderate/low overall visual 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.

# REPORT OVERVIEW

## DIRECTOR GENERALS REQUIREMENTS (DGRS)

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.

Ass	sessment 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

## REPORT OVERVIEW

The aim of this report is to:

- assess visual and landscape character impacts of the new route option in accordance with the original DGRs
- assess the visual and landscape character impacts of the current option compared to the proposed MR5a option, highlighting the difference between the two
- assess the overall impacts of the two routes.

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:

   a brief analysis of the existing landscape character that the MR5A route passes through.
- Visual Impact Assessment: identification and analysis of key viewpoints within proximity to the MR5A route.
- Conclusion & Mitigation:
   Comparison and summary of the impacts of the two proposed routes and the means by which the visual impacts identified can be precluded, reduced or offset.



The Upper Macquarie river

#### METHODOL OGY

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.)

#### THE PROJECT

Two route options have been suggested for the pipeline section between Long Point Road and the Macquarie River (refer Figure 01). The impacts of the original route were assessed within a previous report (*Landscape Character and Visual Impact Assessment* - CLOUSTON Associates March 2012). The second route option, MR5A, is assessed within this report.

Key Construction Activities for both route options

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 and pump station
- installation of 375 mm diameter pipeline
- installation of power supply to pumps and new transmission line.

#### Pipeline

The pipeline would commence at the offtake point on the bank of the southern bank of the Macquarie River. It would be located within the formation of an existing farm track for a distance of approximately 1,200 metres. This farm track has undergone previous vegetation clearing.

At chainage 1200, the pipeline would leave the farm track and traverse cleared paddocks to chainage 1800. The pipeline would be located within road reserves to chainage 6480 near Long Point Road. From chainage 6480 to the discharge structure, the route is as per the exhibited project (see Figure 01).

This section of pipeline is approximately 6.5 km in length.

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.

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 proposed access road would be located between Long Point Road and Cobs Hut Hole at the Macquarie River. The access road would be approximately 6 m wide and 1421m long.

## THE PROJECT

#### Offtake Structure and Pump station

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, located on the southern bank at Cobbs Hut Hole. The offtake structure includes a pump station.

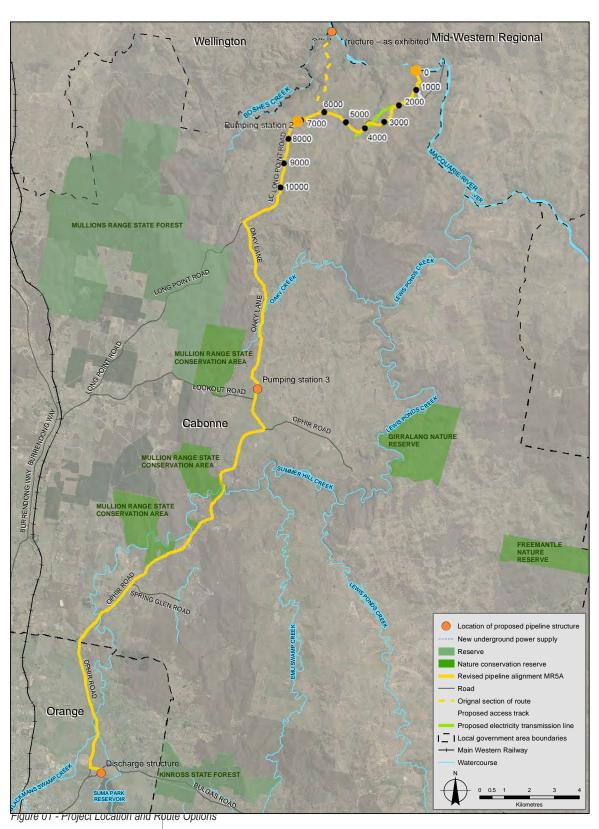
#### Transmission line

Construction of new overhead power supply would be required from approximately chainage 1200 to approximate chainage 4328.274. A further section of underground power would be installed from chainage 00 to 1200. The overhead power line would be installed through open paddocks and broadly parallel Long Point Road, avoiding large trees where possible. The underground power has been proposed to minimise the extent of clearing required and will be common trenched with the pipeline. Photo 01 is indicative of how the new overhead transmission line will look within the landscape.



Photo 01 - Example of proposed over ground transmission line

# **METHODOLOGY**



## LANDSCAPE CHARACTER

#### Landscape Character Zones

The landscape quality of the site is explained in the Landscape Character Zones section of this report, establishing a basis for determining any landscape impacts as a result of the new route. Landscape character zones are defined as having similar physical qualities.

#### 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
	High	High	High	Moderate-High	Moderate-High	Moderate	Negligible
	High/ Moderate	High	Moderate-High	Moderate-High	Moderate	Moderate	Negligible
SENSITIVITY	Moderate	Moderate-High	Moderate-High	Moderate	Moderate	Moderate-Low	Negligible
SEN	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



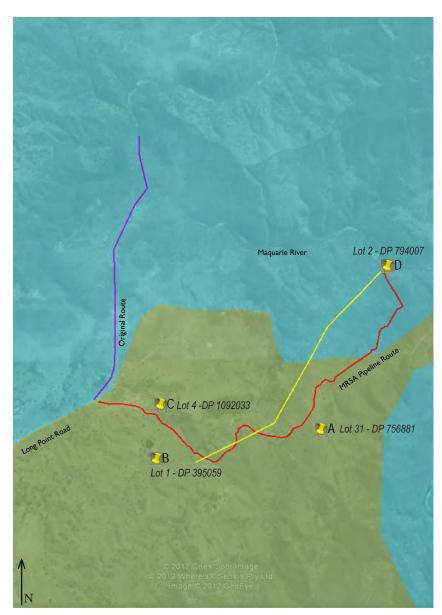


Figure 02 - Landscape Character Zones

## LANDSCAPE CHARACTER ZONE

#### LANDSCAPE CHARACTER ZONE 1 - STEEP HILLSIDES



Steep hillside near the Macquarie River

This character zone is remote and characterised by undulating terrain with steep slopes descending towards the Macquarie river catchment. There are no private properties present within this character zone in the study area. 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 sheds
Spatial	Primarily open in character with distant views from elevated positions

# LANDSCAPE CHARACTER ZONE

#### LANDSCAPE CHARACTER ZONE 2 - OPEN FARMLAND



Open farmland near Long Point Road

Either side of Long Point Road, the landscape is a cleared plateau characterised by gently undulating topography with disconnected stands of bush land retained in private ownership. Rural residential properties and farm buildings are scattered throughout the study area but the density remains low. Large single and small stands of trees are present throughout the landscape. Road access is sealed with some dirt tracks. 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 very low density of residential properties
Spatial	Primarily open in character with interrupted views

## LANDSCAPE CHARACTER ASSESSMENT

#### LANDSCAPE CHARACTER ZONE 1 - STEEP HILLSIDES

The offtake structure and pump station will be located within this landscape character zone. Part of the MR5A 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. 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 station, 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 station and transmission line will remain permanently visible elements within the landscape (although some of the transmission line will be underground in this area). These element's character and scale are at odds with the surrounding landscape although the remote nature of their location means that there are very few visual receptors. Screening vegetation will be required to help blend the pump station 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 ASSESSMENT

#### LANDSCAPE CHARACTER ZONE 2 - OPEN FARMLAND

The pipeline construction corridor and upgraded power line transmission are 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 farm buildings and other residential 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 transmission line and pipeline trench. Site compounds may also be present alongside the road corridor. These elements will be of a moderate/high magnitude during the construction phase.

Post construction - the upgraded transmission line will be a permanent feature of the landscape, although is not expected to have a major impact on the character of the zone. The pipeline construction trench will be re-vegetated with groundcover and is not expected to be visually prominent. 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 SUMMARY

#### Construction Phase

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

#### Post Construction Phase

	Steep Hillsides	Open Farmland
Magnitude	Moderate	Moderate/ Low
Sensitivity	Moderate	Moderate/ Low
Overall Rating	Moderate	Moderate/ Low

Landscape Character Impact Rating Table Summery

A desktop study was conducted using aerial mapping and site photos to identify key receptors that may be visually impacted by the MR5A route. Four (4) key receptor sites with the potential to be visually impacted by some element of the project were identified.

#### Key Viewpoint Analysis

Figure 03 and 04 indicate the location of the receptor sites studied in more detail in this report. In all 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.

Each viewpoint is 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 more detail in Appendix 01.

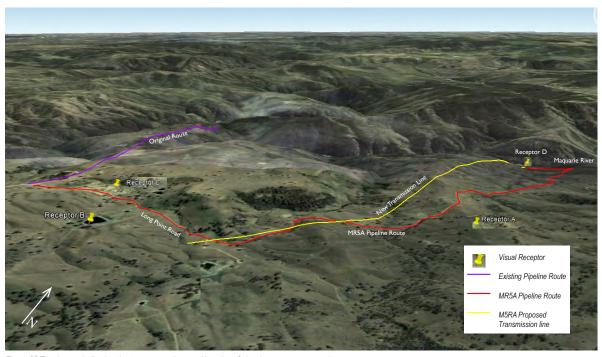


Figure 03 Terrain map indicating the two route options and location of visual receptors assessed

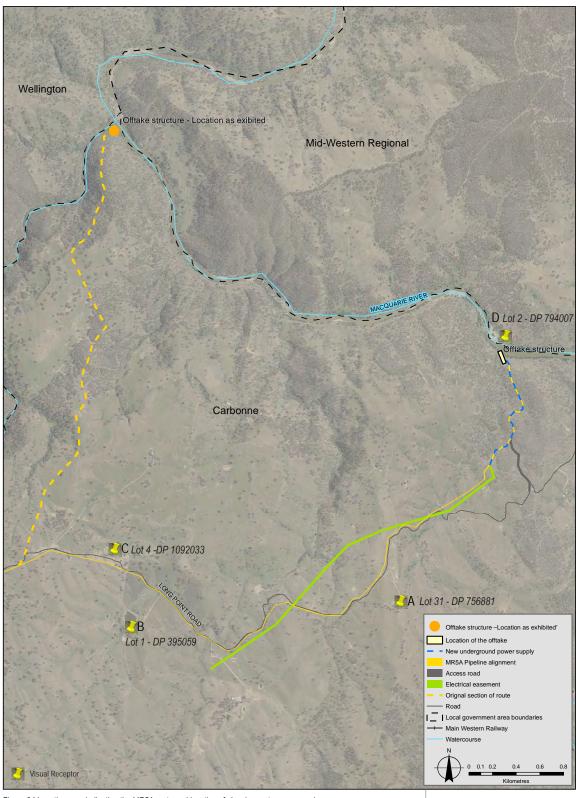
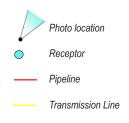


Figure 04 Location map indicating the MR5A route and location of visual receptors assessed CLOUSTON ASSOCIATES \* LANDSCAPE ARCHITECTS \* URBAN DESIGNERS \* LANDSCAPE PLANNERS

MR5A - RECEPTOR A - TEMPORARY RESIDENCE AND SHEARING SHED Lot 41 - DP 756881







THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Temporary Private Residence	М	M
	Importance of View	Private ownership with moderate frequency for viewing the site	М	М
Magnitude	Distance	210m	М	М
	Duration	Moderate exposure	М	L
	Magnitude of Change	Construction impact and potential views of transmission line	М	М
	Quantum of view	Partial view	М	L
Overall Impa	ct Rating		Moderate	Moderate/Low

Temporary residence and shearing shed located approximately 210m from the pipeline route. Construction impacts will potentially include views of the pipeline and transmission line installation, although these will be partially blocked by the undulating topography. There is limited requirement for vegetation removal in this area. Post-construction, distant, partial views of the completed transmission line may be available from the property.

MR5A - RECEPTOR B - RESIDENCE AND FARM SHEDS Lot 1 - DP 395059



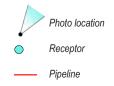




THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private Residence	Н	Н
	Importance of View	Private ownership with low frequency for viewing the site	L	L
Magnitude	Distance	350m	L	L
	Duration	Low exposure	L	L
	Magnitude of Change	None	L	L
	Quantum of view	View blocked by topography	L	L
Overall Impa	ct Rating	-	Low	Low

Permanent residence and farm sheds at a 350m distance to the pipeline route. Views of pipeline corridor and transmission line obscured by the undulating topography. No requirement for vegetation removal in this location.

MR5A - RECEPTOR C - TEMPORARY RESIDENCE AND SHEARING SHED Lot 41 - DP 756881





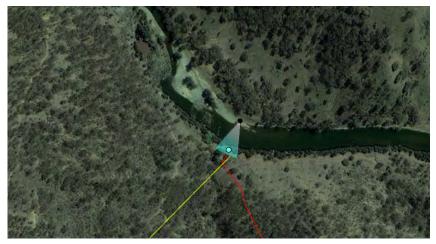


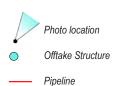
THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Temporary Private Residence	М	М
	Importance of View	Private ownership with moderate frequency for viewing the site	М	М
Magnitude	Distance	100m	Н	Н
	Duration	Moderate exposure	М	L
	Magnitude of Change	Construction impact only	Н	L
	Quantum of view	Oblique view	Н	L
Overall Impac	ct Rating		Moderate/High	Low

Temporary residence in close proximity (100m) to the pipeline route. The back of the residence faces the pipeline route so the view is not directly impacted on. Impact limited to construction phase only with no requirement for vegetation removal and no views of the proposed transmission line.

MR5A - RECEPTOR D - RIVER BANK - OFFTAKE STRUCTURE, MAINTENANCE TRACK AND PUMPSTATION

Lot 2 - DP 794007





Receptor behind low rise

THEME	CRITERIA	DETAILS	RATING (construction phase)	RATING (post- construction)
Sensitivity	Visual Receptor Type	Private land	М	М
	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	Н	Н
	Duration	Moderate exposure	М	М
	Magnitude of Change	Sole built form in the landscape	Н	Н
	Quantum of view	Screened by some vegetation	М	L
Overall Impact Rating			Moderate	Moderate/ Low

Location of the river off-take, pump station and maintenance shed, located upstream on the Macquarie river. Construction of 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.

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, access road and intake from river level. Image A indicates approximate mass of elements within the landscape as viewed from the northern bank of the river.

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# VISUAL IMPACT ASSESSMENT

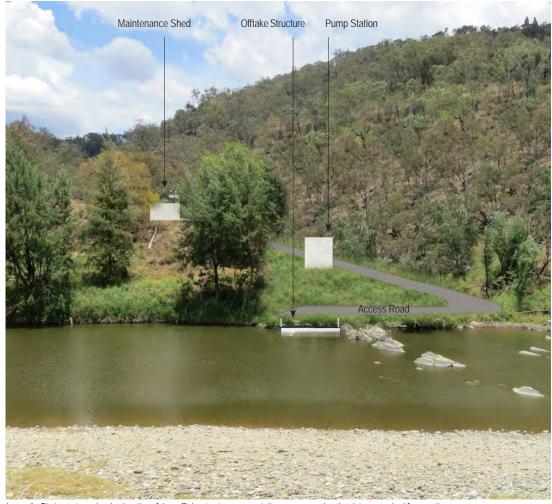


Image A - Photomontage showing location of river offtake structure, pump station, access road and maintenance shed from northern bank of River Maquarie.

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# VISUAL IMPACTS SUMMARY

The MR5A routing option passes within 500m proximity of 3 residential receptors.

The post-construction impacts on these 3 residential receptors associated with MR5A are judged to be low to moderate/low due to the nature of the undulating topography, distance from pipeline and lack of a requirement for vegetation removal. Receptor A and C are temporary residences, leading to a reduced sensitivity as the occupants will not be present all year round.

Receptor C receives a moderate/high construction impact due to its proximity to the pipeline construction corridor, although post-construction this reduces to low as the pipeline is underground and will not be visible.

Receptor A has potential views of a small section of the proposed transmission line, leading to a moderate/low post-construction impact rating.

The maintenance track, pumping station and offtake structure associated with route MR5A are not expected to have any additional visual impacts than those assessed within the LCVIA report for the original route option.

#### **Construction Phase**

Receptor	А	В	С	D
Overall Rating	Moderate	Low	Moderate/ High	Moderate

#### Post Construction Phase

Receptor	А	В	С	D
Overall Rating	Moderate/ Low	Low	Low	Moderate/ Low

Visual Impact Rating Table Summery

#### LANDSCAPE CHARACTER

The two routing options pass through the same landscape character zones - steep hillsides and open farmland. Route MR5A will require the removal of a slightly lesser quantity of vegetation than the original routing option although the quantum of impact (moderate and moderate/low) is the same for both options.

#### VISAL IMPACT

The MR5A routing option passes within 500m proximity of 3 residential receptors. This compares to 1 receptor with proximity to the original route option. Due to these additional receptors, the MR5A route can be said to have a marginally higher visual impact than the original route option. Due to the nature of the undulating terrain and receptors distance from the pipeline, post construction impacts range from low to moderate low for these additional receptors. The visual impact of the MR5A route is therefor not deemed to be significantly different from the original route option.

#### Offtake Structure

The visual impact of the offtake structure related to the MR5A option on the Macquarie river has been 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.

#### Pump Station and Access Road

The pump station and access road near the river will be two of the larger and more 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 the setting.

The site's remote location and lack of nearby residential receptors has, however, contributed to a 'moderate/low' impact rating post construction for the original and MR5A route option infrastructure. Mitigation planting will assist in reducing this impact further by screening views of these elements.

#### Pipeline

Due to the underground nature of the pipeline, the main visual impacts for both routes 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

## CONCLUSION

#### Transmission Line

The final few kilometres of the transmission line crosses land with no other transmission infrastructure in existence. The remote nature of the land and limited number of visual receptors within this area will reduce the visual impact to a low level. A further section of underground power would be installed from chainage 00 to 1200 with negligible visual impact once construction is complete. The transmission line impacts are assessed as being the same for both routing options.

#### Route Comparison

Overall, route MR5A can be said to have a marginally higher visual impact due to the increased number of receptors along the route and the more prominent location of the transmission line. The visual impact for both routes, however, is limited and the difference between the two routes is not judged to be significant.

## MITIGATION RECOMMENDATIONS

#### 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 Station**

- 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.
- 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.

#### 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.
- Stronger conductors will minimise line sag and provide a sleeker profile.

#### Screening Vegetation

Screening vegetation for pump station 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.

# **APPENDIX 01**

# The Visual Impact Rating System SENSITIVITY Rating

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.		
	Н	Private Residence/Business: view from dwelling or garden may experienced regularly over extended periods of time; residents r have chosen the location specifically for the view and/or develo strong familiarity and association with the view and have high sensiti 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.		
	М	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		
	Н	Frequent viewing from a key area of a private property		
	М	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 distant between the development and the visual receptor. The distances a from the centre of the pipeline or pump station and are categorised a		
	Н	< 100m		
	М	100 - 200m		
	L	> 200m		
Duration		The length of time the visual receptor is exposed to the view. The dura of view affects the impact of the development on the viewer – the lor the exposure the more detailed the impression of the proposed chan in terms of visual impact.		
	Н	Significant part of the day – high impact (key area of a residential property)		
	М	5 minutes – several hours. Moderate impact, usually from a roa 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.		
	Н	Elements within the view will be greatly at odds with existing features in the landscape.		
	М	Elements within the view will be at odds with existing features in the landscape.		

# **APPENDIX 01**

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 sigh 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 that the same element within a restricted or narrow view. The effects car be categorised as:		
	Н	A direct view of the development or its presence (sometimes in a vertical narrow or highly framed view).		
	М	A direct or slightly oblique view of the development or its presence in broader view where the development occupies a moderate proportio 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 transprofessional assessment of the combined totals of qualitative quantitative ratings and comments as outlined above:		
	Н	Highly adverse.		
	M/H	Moderately to Highly adverse		
	М	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.		
	Н	Elements within the view will be greatly at odds with existing features in the landscape.		
	М	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.		

# Appendix I

Contamination and soils assessment (Envirowest Consulting)

## Preliminary contamination investigation

Macquarie River to Orange pipeline project Proposed project refinements – MR5a

Ref: R11369c.3

Date: 16 January 2013



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## **Executive summary**

#### Background

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 39 km in length), a discharge structure, and ancillary infrastructure (power supply).

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

- 39 km of 375 mm diameter water rising main between the Macquarie River and Suma Park Dam.
- An off-take structure and pump station located at the upper Macquarie River at Cobbs Hut Water hole
- 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
- A discharge structure at the Suma Park Dam

#### Objectives of the investigation

A preliminary site investigation was conducted in accordance with the contaminated land management planning guidelines State Environmental Planning Policy No. 55 (SEPP 55) to determine the soil contamination status of The Macquarie River to Orange pipeline project corridor including land adjacent to and within the pipeline corridor.

#### Investigation

Inspections of the pipeline corridor were made in November and December 2011. Available records were also reviewed.

#### Conclusions

The private land-use was predominantly grazing. Road reserves were vacant or occasionally grazed. Historical mine workings were identified at several locations. The desk top study and site walkover identified six areas of known or potential contamination.

Naturally occurring asbestos (NOA) is known to occur along sections of the pipeline corridor. NOA was observed during the site walkover on the soil surface and is expected in the subsoil between chainages 34600m and 34950m (Summer Hill Creek first crossing to intersection of Banjo Paterson Way and Ophir Road. Disturbance of NOA during construction activities requires to be in accordance with Orange City Council *Naturally Occurring Asbestos Planning Procedures*.

Potential areas of contamination included historic mine workings, cattle yards and saline areas within drainage depressions and lines. Contaminants of concern are heavy metals, OCP and salt.

Spoil generation, erosion and sedimentation, dust generation, chemical contamination of soils and surface waters, salinisation and import of fill are potential contaminating activities during construction works. Implementation of management activities including spoil reuse, spoil off-site disposal, sediment and erosion control plans, protocols for actions if hydrocarbon spills and leaks are identified and classification of imported fill as Excavated Natural Material (ENM) will reduce the risk of these activities impacting on workers and the environment.

Contamination risk of the operation phase is expected to be low. Adoption and implementation of sediment and erosion control plans for exposed soils will reduce the risk of environmental impact.

#### Recommendations

Appropriate work procedures to protect the safety of workers within the NOA area.

Development of erosion and sedimentation plans are required to minimise the risk of salinisation, erosion and sedimentation during construction works and operation of the pipeline.

Waste classification of spoil generated from areas adjacent to mine workings.

Laboratory analysis of imported backfill material according to a sampling, analysis a quality plan is required to determine suitability and classification as ENM prior to use as backfill within the trench.

If potential contamination is discovered during site works, a soil sampling and analysis investigation should be undertaken by a suitably qualified person.

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## 1. Introduction

## 1.1 Location of the refined section

The location of MR5a is shown in Figure 1 and described below. Further information on the location, including figures showing the overall route of the refined project, is provided in volume 1.

#### 1.1.1 Offtake structure and pump station

The location of the offtake structure is shown in Figure 1. The offtake structure (which includes a pump station) would be located on the southern bank at Cobbs Hut Hole.

Access to the site is via an unsealed road. The site is surrounded by the river and sparsely wooded banks. Areas in the vicinity of the site are used informally for recreation purposes. There are no structures or residences in the vicinity of the site. Other than landowners there is no real public access to the site except by river craft.

The nearest residence to the offtake structure is 'Fleming's shed' which is a shearing shed located approximately 1.32 km to the south-east. This property has an informal residential component.

## 1.1.2 Pipeline

The pipeline would commence at the offtake point on the bank of the southern bank of the Macquarie River. It would be located within the formation of an existing farm track for a distance of approximately 1,200 metres. This farm track has undergone previous vegetation clearing.

At chainage 1200, the pipeline would leave the farm track and traverse cleared paddocks to chainage 1800. The pipeline would be located within road reserves to chainage 6480 near Long Point Road. From chainage 6480 to the discharge structure, the route is as per the exhibited project.

This section of pipeline is approximately 6.5 km in length.

The width of the construction trench and final easement are as described in sections 6.2.2 and 7.2.2 of the EA.

#### 1.1.3 Access road

The proposed access road would be located between Long Point Road and Cobbs Hut Hole at the Macquarie River. The access road would be approximately 6 m wide and 1421.40m long.

## 1.1.4 Power supply

Construction of new overhead power supply would be required from approximately chainage 1200 to approximate chainage 4328.274 a further section of underground power would be installed from chainage 00 to 1200. The overhead power line would be installed through open paddocks and broadly parallel Long Point Road avoiding large trees where possible. The underground power has been proposed to minimise the extent of clearing required and will be common trenched with the pipeline.

## 2. Scope of work

Envirowest Consulting Pty Ltd was commissioned by GHD to undertake a preliminary contamination investigation, in accordance with the contaminated land management planning guidelines, from the Contaminated Land Management Act 1997 and the State Environmental Policy No. 55 (SEPP 55), of the proposed Macquarie River to Orange pipeline project corridor. The objective was to identify past potentially contaminating activities adjacent to or within the pipeline corridor, identify potential contamination types, discuss the site condition and assess the health risk to workers and on-site personnel constructing the pipeline.

## 3. Site identification

The assessment area included land adjacent to and within The Macquarie River to Orange pipeline corridor. The pipeline corridor is approximately 37km long extending from the Macquarie River the Suma Park Dam (Figure 1) and includes road reserves and private land. The construction corridor is expected to be 6 to 20m wide with several pumping stations along the corridor.

The pipeline corridor is measured in chainages with 0m being the offtake point at the Macquarie River.

## 4. Site history

## 4.1 Zoning

The pipeline corridor is located within the local government areas of Orange and Cabonne. Zoning of land within Orange City Council is 1a General Farming, 1c Rural Residential and 6 Open Space under the Orange LEP 2000. Zoning of land within Cabonne Council is 1a, General Rural under the Cabonne LEP 1991.

## 4.2 Site visit and description

Site inspections were undertaken in November and December on foot and in vehicles by traversing the proposed pipeline corridor.

#### 4.3 Land-use

Land-use along the pipeline corridor includes road reserves and private land. Road reserves consist of maintained grassland areas and native woodlands adjacent to roads including Ophir Road, Lookout Road, Oaky Lane and Long Point Road. Land-use on private land ranges from rural-residential to rural and includes grazing of sheep and cattle on semi-improved grasslands.

#### 4.4 Council records

Orange City Council and Cabonne Council were contacted on 15 February 2012 regarding contamination issues associated with lots within the pipeline corridor. No contamination issues were identified within either Council's records.

#### 4.5 Information sources

Site inspection November and December 2011 by Greg Madafiglio, Andrew Ruming and Leah Desborough

Orange 1:25,000 topographic map Ophir 1:25,000 topographic map

Kerrs Creek 1:25,000 topographic map

NSW OEH records of public notices under the CLM Act 1997

WorkCover search of Dangerous Goods licences

NSW OEH groundwater and soil database

Department of Mineral Resources

#### 4.6 Chronological list of site uses

Historical land-use of the pipeline corridor is expected to be similar to that currently occurring. Mining activities are also known to have occurred in the locality and are expected to have impacted on sections of the pipeline corridor.

A review of the Orange, Ophir and Kerrs Creek 1:25,000 topographic maps all based on 1982 aerial photography with field revision in 1987 identified the pipeline corridor was not built-up. Vegetation ranged from scattered vegetation to medium vegetation.

One set of livestock yards and several areas of abandoned mine workings were identified along the pipeline corridor.

## 4.7 Buildings and infrastructure

No buildings were located within the investigation area. Several dwellings are nearby.

Infrastructure within the pipeline corridor includes bitumen and unsealed roads, driveways, farm fences and cattle yards.

#### 4.8 Contaminant sources

Several areas of historical mine related activities were identified along the pipeline corridor. The mine workings were identified at:

- between chainages 21933m and 21957m at Summer Hill Creek fourth crossing where abandoned mine workings have been fenced;
- between chainages 24250m and 24350m opposite El Dorado homestead (Lot 130 DP44101);
- between chainages 30900m and 30910m at cuttings near Pearces Lanes where old mines with reported shafts and underground workings were identified; and
- between chainages 32760m and 32770m, 780m north of Kennett Place where abandoned mine workings were observed.

One set of yards were identified in close proximity to the pipeline corridor. The cattle yards were identified at:

chainage 34860m where cattle yards are 85m north of Summer Hill Creek first crossing.

Serpentinite which may contain naturally occurring asbestos (NOA) in the form of chrysotile is known to occur in the southern section of the pipeline corridor. Serpentinite gravel and rock containing NOA fibres was identified on the soil surface at:

• between chainages 36890m and 37010m on the eastern side of Ophir Road.

Serpentinite may also be present in the subsoil at:

• between chainages 34600m and 34950m located from Summer Hill Creek first crossing to intersection of Banjo Paterson Way and Ophir Road.

#### 4.9 Contaminants of concern

Contaminants of concern associated with the mine related activities are:

heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury).

Contaminants of concern associated with the yards are:

- heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury); and
- organochlorine pesticides (OCP).

Contaminants of concern associated with the serpentinite are:

asbestos.

Contaminants of concern associated with construction activities are:

sediment

- dust
- erosion
- salinity
- hydrocarbons (TPH C6-C36)

## 4.10 Relevant complaint history

Nil

## 4.11 Contaminated site register, licences

The site is not listed on the NSW OEH Contaminated Land: Record of Notices (accessed 19 December 2011).

The site is not listed on the NSW OEH Contaminated sites notified to the EPA (accessed 19 December 2011).

No WorkCover dangerous goods licences are known to be registered on the site.

## 4.12 Historical land-use of adjacent land

The Orange City Council Resource Recovery Centre is located on the western side of Ophir Road between chainages 35928m and 36260m. The recovery centre is operated according to an EPA license and contaminants are expected to be restricted to the site. No impact from the recovery centre is expected on the pipeline corridor.

Land-use adjacent to the remainder of the pipeline corridor is similar to that within the corridor. Adjacent land-use is not expected to impact on the contamination status of the pipeline corridor.

#### 4.13 Integrity assessment

The site history was obtained from a site inspection and history review. The information is consistent with the current site condition and to the best of the assessor's knowledge is accurate.

## 5. Site condition and environment

#### 5.1 Surface cover

Six types of surface cover were observed over the length of the pipeline corridor. These were:

- Bitumen identified along part of Ophir Road;
- Gravel identified along part of Ophir Road, Lookout Road, Oaky Lane and Long Point Road and residential driveways;
- Semi-improved to improved grasslands identified within road reserves and on private land.
   Grasslands comprise native and introduce pasture grasses and some weeds. Some water tolerant species such as Juncus were identified within drainage depressions;
- Woodlands grasses are sparse within the woodlands due to shading provided by native eucalypt trees. Surface cover is dominated by fallen leaf litter and twigs;
- Open woodlands groundcover within the open woodlands consisted of native grasses with some introduced species; and
- Riparian includes water tolerant species in permanent or ephemeral drainage lines.

## 5.2 Topography

The pipeline corridor traverses a series of crests, upper slopes, mid-slopes, lower slopes, flats and drainage lines. Elevation ranges from between 380 metres above sea level at the off-take point at the Macquarie River to 870 metres above sea level at chainage 36260m. Slopes on the decline to the Macquarie River are moderately inclined and range up to 70%. Aspect varies along the pipeline corridor.

## 5.3 Soils and geology

The pipeline corridor traverses the North Orange, Macquarie, Mookerawa, Panuara and Burrendong Soil Landscapes with the dominant landscape being Mookerawa (Kovac *et al.* 1990). Red podzolics and red earths occur on the mid-slopes to crests and yellow earths, yellow soloths, yellow solodics and brown solodics on the lower slopes and drainage lines.

Erosion hazard is high to very high in the Burrendong and Paunara Soil Landscapes, moderate in the Mookerawa and North Orange Soil Landscapes and low in the Macquarie Soil Landscape. Erosion was observed along the length of the pipeline corridor in disturbed areas, table drains, areas of concentrated flow and the exposed contact between basalt and siltstone.

Soil salinity risk is moderate to high in drainage depressions and drainage lines in the Mookerawa, Panuara and Burrendong Soil Landscapes on yellow soloths and yellow solodic soils (Kovac *et al.* 1990). Soil salinity problems are low on other topographic features. No evidence of salinity including salt crystals on surface, salt tolerant vegetation and road conditions, was observed during the site walkover.

The site walkover identified the pipeline corridor to primarily contain geological units comprising siltstone, basalt, rhyolite, monzonite, sandstone and ashstone.

#### 5.4 Surface water

The pipeline corridor forms part of the Macquarie River catchment with subcatchments comprising Emu Swamp Creek and Oakey Creek. The pipeline draws water from an offtake point in the Macquarie River (chainage 0m). The pipeline corridor traverses numerous ephemeral drainage lines and permanent creeks including Summer Hill Creek at first (chainage 34956m), second (chainage 34100m), third (chainage 29700m) and fourth (chainage 21956m) crossings, El Dorado Gully (chainage 24581m), Kittys Creek (chainage 20840m), Oakey Creek (chainage 14000m), an unnamed drainage line adjacent to Bulgas Road (chainage 36730m) and an unnamed drainage line north of Kennett Place (chainage 32774m).

Farm dams are located within the pipeline corridor at the following locations:-

- CH23200. Pipeline designed to avoid this farm dam to the west. Invert of proposed pipeline will be above the top water level (TWL) of dam
- 2. CH23330. Pipeline designed to avoid this farm dam to the west. Invert of proposed pipeline will be above the TWL of dam
- 3. CH28900. Pipeline designed to avoid this farm dam to the west. Invert of proposed pipeline will be below TWL of dam

#### 5.5 Groundwater

No operational bores are located within the pipeline corridor.

The Department of Natural Resources NSW Natural Resource Atlas (2011) identifies thirty bores within 1km of the site. These bores are licensed for domestic, stock and irrigation. Three bores were drilled as test bores.

Two bores are less than 10m in depth and water bearing zones are expected to be in an unconfined aquifer. The remainder of the bores are greater than 10m in depth in confined rock including basalt, quartz, schists, granite, rhyolite and shale. Standing water levels at the time of construction ranged between 9 to 30m.

#### 5.5 Evidence of contamination checklist

5.5 Evidence of contamination checklist						
Site layout showing	None known					
industrial processes						
, and a property of						
Sewer and service plans	Underground services are located along the pipeline corridor					
Sewer and service plans	Officer ground services are located along the pipeline contdor					
Manufacturing processes	None known					
Underground tanks	None known					
g						
Product spills and loss	None known, no pesticide mixing or storage areas on the site					
•	Notice known, no pesticide mixing of storage areas on the site					
history						
Discharges to land, water	None known					
and air						
Disposal locations,	Nil					
presence of drums, wastes						
and fill materials						
	Nil					
Soil staining	IVII					
Fill	Nil					
Visible signs of plant stress,	No bare areas due to contamination identified.					
bare areas						
Odours	Nil					
Outura	I VIII					
<u> </u>	API					
Ruins	Nil					
Other	-					

## 6. Sampling analysis plan and sampling methodology

Analysis of soil samples did not form part of the investigation scope.

## 7. Results and discussion

#### 7.1 Identified contamination

## Naturally occurring asbestos

Serpentinite gravel and rock containing NOA fibres was identified at:

 between chainages 33890m and 37010m (from Summer Hill Creek first crossing to intersection of Banjo Paterson Way and Ophir Road) on the soil surface and in profile.

Disturbance of NOA during construction activities requires specific safety management and approvals. Management of the site during excavation works will be in accordance with Orange City Council *Naturally Occurring Asbestos Planning Procedures* and include appropriate personal protection equipment (PPE), air monitoring and site clearance following works. Excavated material may require removal and off-site disposal to an appropriately licensed landfill.

#### 7.2 Potential contamination

#### 7.2.1 Mine workings

Evidence of mine workings was identified at:

- between chainages 21933m and 21957m at Summer Hill Creek fourth crossing where abandoned mine workings have been fenced;
- between chainages 24250m and 24350m opposite El Dorado homestead (Lot 130 DP44101);
- between chainages 30900m and 30910m at cuttings near Pearces Lane where old mines with reported shafts and underground workings were identified; and
- between chainages 32760m and 32770m, 780m north of Kennett Place where abandoned mine workings were observed.

The pipeline corridor is located adjacent to mine workings and is potentially impacted by mine workings. The depth of mine workings is expected to be confined to less than 200mm below the surface.

Mine related activities are likely to be a source of significant contamination. Potential contaminants associated with the mine workings are heavy metals.

## 7.2.2 Stock management facilities

Cattle yards were identified at:

chainage 34860 (85m north of Summer Hill Creek first crossing).

The cattle yards are not within the pipeline corridor and are unlikely to be a source of significant contamination. Potential contaminants associated with the cattle yards are stock drenches which are identified by analysis for heavy metals and OCP.

No sheep yards or dips were identified within the pipeline corridor.

#### 723 Salinity

Saline soils may potentially be present in the drainage depressions and drainage lines traversed along the pipeline corridor.

Soil disturbance works within drainage depressions and drainage lines should be managed in accordance with the Landcom *Managing Urban Stormwater: Soils and Construction* ("Blue Book") manual which will include management of saline soils and groundwater ingress into trenches.

#### 7.3 Potential construction impacts

## 7.3.1 Spoil generation

Spoil material will be generated during construction of the main project elements including pump stations, the offtake to the river, access roads and the pipeline trench. Spoil generated from the construction of the pump stations and offtake will be reused locally for backfill, noise attenuation, landforming and screening. Excess spoil is unlikely to be generated.

Access roads will be primarily in cut with some sections in fill. As much of the spoil will be reused on-site where possible although excess spoil is expected. Excess spoil will be reused or disposed to an appropriate landfill.

Spoil generated from pipeline trench construction will be reused as backfill. Approximately 60% of the spoil generated is expected to be used as backfill in the trench. Excess spoil generated from trench excavations and is proposed to be stored for reuse by Orange City Council or Cabonne Council or appropriately disposed off-site.

Spoil generated from areas of NOA (Section 7.1) will be considered asbestos waste. NOA spoil will be managed in accordance with Orange City Council *Naturally Occurring Asbestos Planning* Procedures. Spoil generated from areas adjacent to mine workings (Section 7.2.1) to a depth of 200mm will require analysis for waste classification to enable appropriate reuse or disposal. All other spoil material is expected to be classified as either general solid waste (DECC 2009), virgin excavated natural material (VENM) (DECC 2009) or excavated natural material (ENM) under the ENM exemption (2008).

#### 7.3.2 Erosion and sedimentation

Soils along the length of the pipeline corridor have a moderate to very high erosion hazard. Existing erosion was identified resulting from concentrated flows, disturbed areas and the exposed point of contact between siltstone and basalt. Construction activities will result in disturbed areas in an increase risk of erosion potentially resulting in sedimentation of waterways.

Erosion and sedimentation for the development should be managed in accordance with the Landcom *Managing Urban Stormwater: Soils and Construction* ("Blue Book") manual which will include rehabilitation and maintenance of disturbed areas following construction activities.

#### 7.3.3 Dust generation

Construction activities have the potential to create dust from excavation works, stockpiles and bare areas. Dust creation has the potential to impact on surrounding vegetation and neighbouring properties.

Dust creation from the development should be managed in accordance with the Landcom *Managing Urban Stormwater: Soils and Construction* ("Blue Book") manual which will include rehabilitation and maintenance of bare areas following construction activities.

#### 7.3.4 Salinity

Saline soils may potentially be present in the drainage depressions and drainage lines traversed along the pipeline corridor.

Soil disturbance works within drainage depressions and drainage lines should be managed in accordance with the Landcom *Managing Urban Stormwater: Soils and Construction* ("Blue Book") manual which will include management of saline soils and groundwater ingress into trenches.

#### 7.3.5 Chemical contamination of soils and surface waters

Hydrocarbon spills and leaks from construction vehicles have potential to contaminate soils and surface and groundwater.

A management plan is recommended to be implemented which describes protocols for hydrocarbon storage and actions to be taken if spills or leaks are identified.

### 7.3.6 Import of fill

Fill will be imported to the pipeline corridor and used in the construction trench around the pipe. Potential exists for the fill to be contaminated.

It is recommended the fill material be classified as ENM under the NSW Excavated Natural Material Exemption 2008 (ENM).

#### 7.4 Potential operational impacts

#### 7.4.1 Erosion and sedimentation

The risk of operational activities resulting in contamination is expected to be low. Activities which expose soil will increase the risk of erosion and potentially resulting in sedimentation of waterways.

Erosion and sedimentation for the development should be managed in accordance with the Landcom *Managing Urban Stormwater: Soils and Construction* ("Blue Book") manual which will include rehabilitation and maintenance of disturbed areas during operation.

#### 8. Site characterisation

#### 8.1 Environmental contamination

Areas containing NOA are known to occur within the pipeline corridor.

Potential areas of heavy metal and OCP contamination exist within the pipeline corridor. Drainage depressions and drainage lines may contain saline soils.

## 8.2 Chemical degradation production

Heavy metals, OCP and NOA do not degrade.

#### 8.3 Exposed population

Exposure by humans to the potential and known contaminants is unlikely under the current management practices. Disturbance of the NOA during construction activities may result in exposure of workers to the contaminants.

#### 9. Conclusions and recommendations

#### 9.1 Summary

The private land-use was predominantly grazing. Road reserves were vacant or occasionally grazed. Historical mine workings were identified at several locations. The desk top study and site walkover identified six areas of known and potential contamination.

Naturally occurring asbestos (NOA) is known to occur along sections of the pipeline corridor. NOA was observed during the site walkover on the soil surface and is expected in the subsoil between chainages 36890m and 37010m (Summer Hill Creek first crossing to intersection of Banjo Paterson Way and Ophir Road. Disturbance of NOA during construction activities requires to be in accordance with Orange City Council Naturally Occurring Asbestos Planning Procedures.

Potential areas of contamination included historic mine workings, cattle yards and saline areas within drainage depressions and lines. Contaminants of concern are heavy metals, OCP and salt.

Spoil generation, erosion and sedimentation, dust generation, chemical contamination of soils and surface waters, salinisation and import of fill are potential contaminating activities during construction works. Implementation of management activities including spoil reuse, spoil off-site disposal, sediment and erosion control plans, protocols for actions if hydrocarbon spills and leaks are identified and classification of imported fill as ENM will reduce the risk of these activities impacting on workers and the environment.

Contamination risk of the operation phase is expected to be low. Adoption and implementation of sediment and erosion control plans for exposed soils will reduce the risk of environmental impact.

## 9.2 Assumptions in reaching the conclusions

An accurate history has been obtained and typical past farming practices were adopted.

## 9.3 Suitability for proposed use of the site

Areas identified as containing NOA require specific safety measures to ensure worker health is not impacted during disturbance.

Areas identified as potentially containing contaminants require additional investigations prior to determination of suitability.

Drainage depressions and drainage lines require implementation of appropriate sediment and erosion control plans to minimise risk on waterways and surrounding soils from potentially saline soils.

The remainder of the pipeline corridor is not expected to impact on the health of on-site workers.

#### 9.4 Limitations and constraints on the use of the site

Works in areas containing NOA require specific safety management and approvals.

Activities which may result in erosion and sedimentation require to be managed by an erosion and sediment control plan.

#### 9.5 Recommendation for further work

Work on NOA is required to be undertaken in accordance with Orange City Council policies and procedures.

Development of erosion and sedimentation plans are required to minimise the risk of salinisation, erosion and sedimentation during construction works and operation of the pipeline.

Waste classification of spoil generated from areas adjacent to mine workings.

Laboratory analysis of imported fill according to a sampling, analysis a quality plan (EPA 1997) is required to enable classification as ENM prior to use as backfill within the trench.

If potential contamination is discovered during site works, a soil sampling and analysis investigation should be undertaken by a suitably qualified person.

## 10. Report limitations and intellectual property

This report has been prepared for the use of the client to achieve the objectives given the clients requirements. The level of confidence of the conclusion reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained.

#### 11. References

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Orange City Council (2006) Naturally Occurring Asbestos Planning Procedures Orange City Council, Orange City, NSW

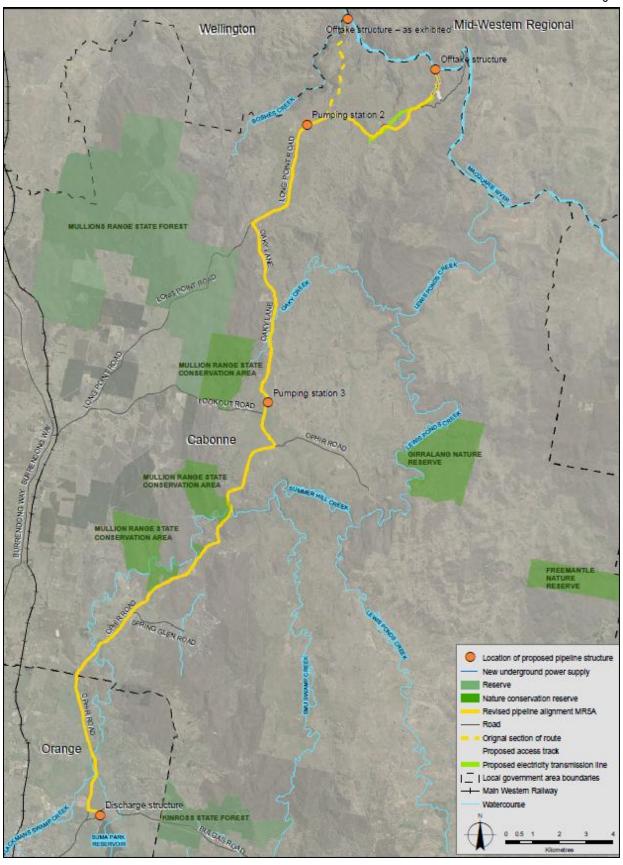
## **Figures**

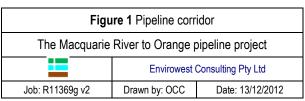
Pipeline corridor

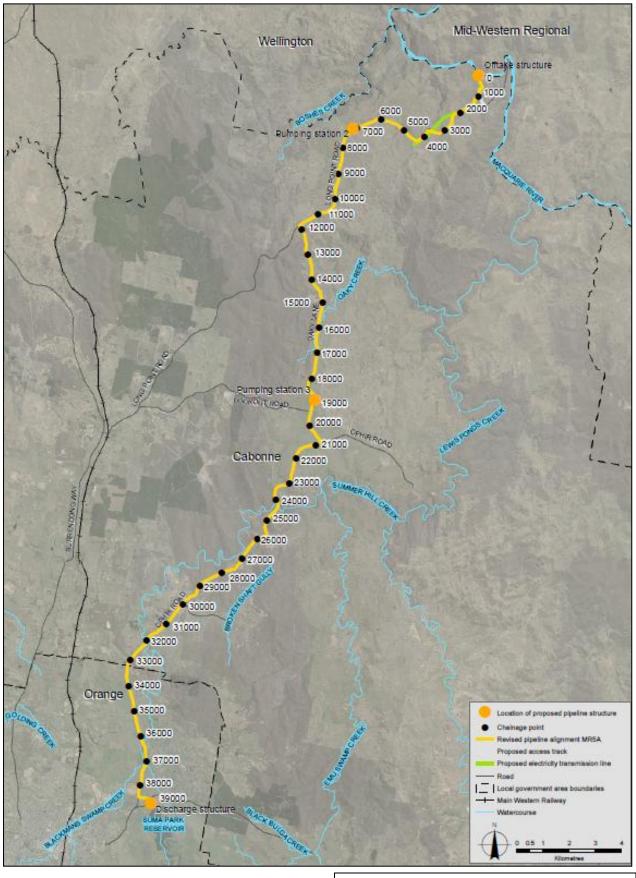
Figure 1. Figure 1.1. Pipeline corridor with chainages

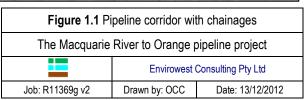
Sit locality

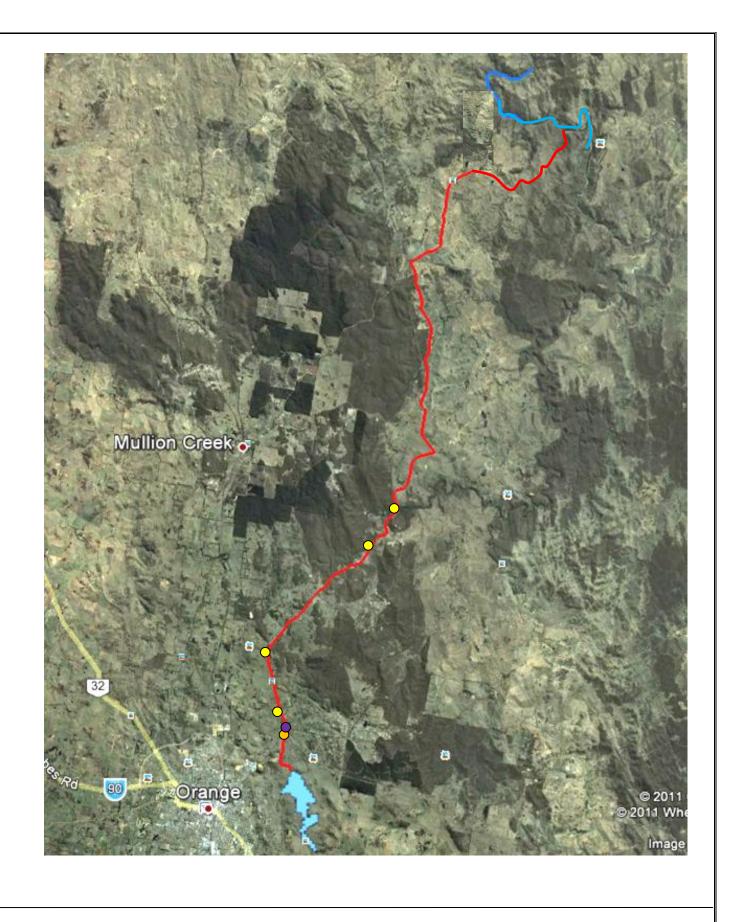
Figure 1.2. Figure 2. Photographs of the site













Pipeline corridor

Yards

Suma Park Dam

Mines

Macquarie River

Naturally occurring asbestos

The Macquarie River to Orange pipeline project NSW

Envirowest Consulting Pty Ltd

Job – R11369c.3 Drawn by: LD Date: 19/12/2011

Figure 2. Photographs of the site taken November and December 2011



Looking north east across area of known surface NOA



Mine workings between chainages 24250 and 24350



Mine workings and abandoned mine shafts between chainages 21933m and 21957m



Cattle yards at chainage 34860m

# Appendix J

Traffic and transport assessment (Samsa Consulting)

# SAMSA CONSULTING

## TRANSPORT PLANNING & TRAFFIC ENGINEERING

16th January 2013

GHD Pty Ltd 72 McNamara Street ORANGE NSW 2800

Our Ref: MR5A route n submissions\_transport
Direct line: 0414 971 956

Attention: Daniel Mees

Dear Daniel,

# MACQUARIE RIVER TO ORANGE PIPELINE PROJECT: PROPOSED PROJECT REFINEMENTS – MR5A

Traffic & Transport Assessment of New MR5A Route Option & Response to Submissions of Original Proposal

#### **NEW MR5A ROUTE ASSESSMENT**

This letter report addresses the impact assessment of the new MR5A route option for the pipeline with consideration of:

- 1. the existing environment of this section;
- 2. the impacts of the new section;
- 3. a comparison of the impacts compared with the original section;
- 4. the overall impacts of the project as a whole (compared to the original assessment); and
- 5. mitigation measures (for the new section).

#### Location of the refined section

The location of new MR5A route is shown in *Figure 1* and described below. Further information on the location, including figures showing the overall route of the refined project, is provided in Volume 1 of the Preferred Project Report (PPR).

#### Offtake structure and pump station

The location of the offtake structure is shown in *Figure 1* below. The offtake structure (which includes a pump station) would be located on the southern bank at Cobbs Hut Hole.

Access to the site is via an unsealed road. The site is surrounded by the river and sparsely wooded banks. Areas in the vicinity of the site are used informally for recreation purposes. There are no structures or residences in the vicinity of the site. Other than landowners, there is no real public access to the site except by river craft.

The nearest residence to the offtake structure is 'Fleming's shed' which is a shearing shed located approximately 1.32 km to the south-east. This property has an informal residential component.

#### Samsa Consulting Pty Ltd

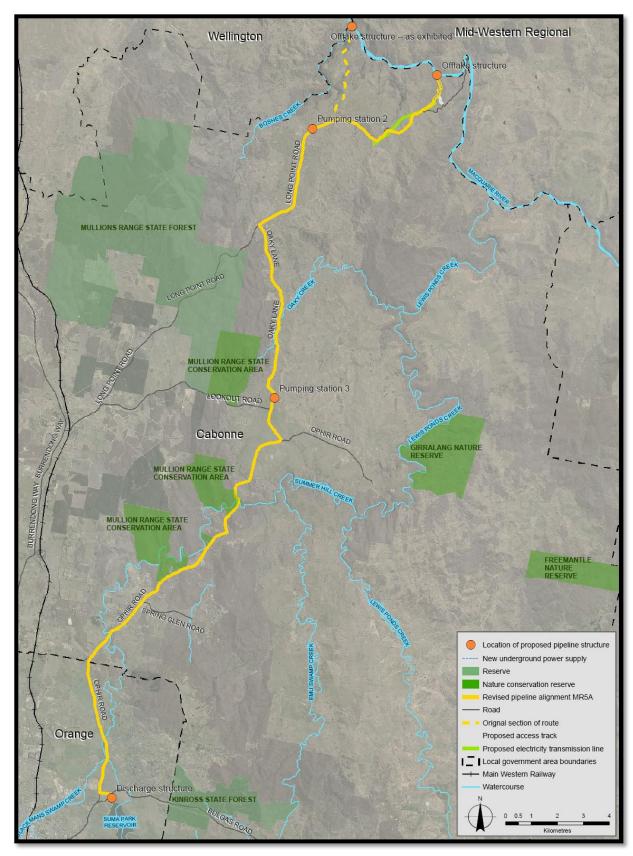


Figure 1: New MR5A Route

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## **Pipeline**

The pipeline would commence at the offtake point on the southern bank of the Macquarie River. It would be located within the formation of an existing farm track for a distance of approximately 1,200 metres. This farm track has undergone previous vegetation clearing.

At chainage 1200, the pipeline would leave the farm track and traverse cleared paddocks to chainage 1800. The pipeline would be located within road reserves to chainage 6480 near Long Point Road. From chainage 6480 to the discharge structure, the route is as per the exhibited project.

This section of pipeline is approximately 6.5 km in length.

The width of the construction trench and final easement are as described in Sections 6.2.2 and 7.2.2 of the EA.

#### Access road

The proposed access road would be located between Long Point Road and Cobs Hut Hole at the Macquarie River. The access road would be approximately 6 m wide and 1421.40m long.

## Power supply

Construction of a new overhead power supply would be required from approximately chainage 1200 to approximate chainage 4328.274. A further section of underground power would be installed from chainage 00 to 1200. The overhead power line would be installed through open paddocks and run broadly parallel to Long Point Road avoiding large trees where possible. The underground power has been proposed to minimise the extent of clearing required and will be common trenched with the pipeline.

#### Assessment issues

For the traffic and transport assessment of the new MR5A pipeline route, the following assessment issues are pertinent:

- The MR5A route (from existing chainage 4000 to new offtake point) is considered to be no better or no worse than the current route (from Long Point Road to Gardiners Hole) from a traffic & transport point of view.
- While the MR5A route is longer and affects Long Point Road to a greater extent, in that it travels along and across it, any impacts can be readily managed via traffic management plans as detailed in the original Traffic & Transport Assessment Report.
- The additional length along Long Point Road for the MR5A route may require localised upgrades on steep grades, particularly for heavy vehicle transport during wet and inclement weather. These measures are similar to what would be required along Long Point Road for the current route.
- For the MR5A route, all impacts and mitigation measures as detailed in the original Traffic & Transport Assessment Report are relevant.

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## **RESPONSE TO SUBMISSIONS**

Submissions were made on the original pipeline proposal. The submissions relating to traffic and transport issues and their responses follow.

Submission issue: Take into consideration local school bus routes and times and ensure haulage / transport operations relating to the proposal on local roads takes this into account with the traffic management plan to be updated accordingly (RMS)

Response: The TMP would restrict haulage / transport operations to outside local school bus operational hours to prevent impacts on local school bus routes and bus stops.

I hope the above information will suffice. If you have any queries, please do not hesitate to contact the undersigned.

Yours faithfully,

**ALAN SAMSA** 

Member Institute of Engineers Australia (MIEAust)

Chartered Professional Engineer (IEAust): NPER (1151361)

Fellow, Australian Institute of Traffic Planning & Management (FAITPM)

Certified Transport Planner (CTP)

RTA Certified Road Safety Auditor: Level 3 – Lead Auditor Member Institute of Transportation Engineers (ITE)

MR5A route n submissions\_transport