6. Environmental Risk and Impact Assessment

The Project would have some impacts on the landscape character of site along the Project route and on the visual amenity of some sensitive receptors and may introduce new risks that would require careful management.

A detailed assessment of the identified impacts was undertaken by considering the risks that would be associated with them.

The risk assessment was conducted to:

1. prioritise the identified impacts in terms of the potential relative risk each may pose to the landscape and visual character and the consequences that may arise from any changes; and
2. identify targeted actions and initiatives that would need to be adopted to monitor and manage the risks during the proposed Project operations.

Visual impacts were considered within the social impacts during the Environmental Risk and Impact Assessment. As such, detailed discussion on the Risk Assessment is not included in this report. However it is discussed in Chapter 21 of the Environmental Assessment, and in the Environmental Risk and Impact Assessment section of the Social Impact Assessment (Appendix O).

In summary, the issues that would be a priority for management during the Project construction phase would be:

- For the raw water transfer option -
  - Unscreened views of the construction activity generally
  - Unscreened views of construction works at Iona Park Road Mittagong as seen by residents living in close proximity to the Project
  - Construction works including vegetation clearance, trench excavation and pipelaying impacting on the visual amenity of those living near the Goulburn Woodlands Reserve.
- For the treated water transfer option -
  - Unscreened views of the construction activity
  - Unscreened views of construction works at Iona Park Road Mittagong as seen by residents living in close proximity to the Project
  - The visual amenity of travellers on the Old Hume Highway for the creation of the new easement through bushland and the presence of the storage tank at Governor's Hill

The issues that would be a priority for management during the Project operation phase would be:

- For the raw water transfer option -
  - A cleared easement impacting on the visual amenity of those living near the Goulburn Woodlands Reserve
- For the treated water transfer option -

– Management of the extent of vegetation removal and revegetation for the new easement through bushland and the presence of the storage tank at Governor's Hill

7. Assessment of Landscape and Visual Impacts

7.1 Introduction

Significance of impacts have been assessed using the matrix contained in Table 7.1 and through both a whole of corridor assessment and assessment of the landscape and visual impact from viewing locations.

The visual elements of both the construction and operation phases of the project are the same for both assessments; however the construction impacts are assessed route wide due to their short term duration and similarity of impacts across the site. The operational landscape and visual impacts are assessed from viewing locations which are representative of the available views.

Table 7.1 Significance of Impact

		Landscape Impact			
		Large	**Moderate**	**Small**	**Negligible**
Visual Sensitivity	**High**	Major Significance	High Significance	Moderate Significance	Minor Significance
	Medium	High Significance	Moderate Significance	Minor Significance	Not significant
	Low	Moderate Significance	Minor Significance	Not significant	Not Significant
	Negligible	Minor Significance	Not significant	Not significant	Not significant

7.2 Construction phase

Project construction would create short-term visual impacts from the appearance of the construction operations and their impact on the surrounding landscape. The construction activities occurring during this stage are temporary in nature. The construction activities would affect the same areas as those affected by the operation phase however the visual impact and the magnitude of change is likely to be greater due to the nature of the works.

7.2.1 Route wide landscape impacts during construction

Activities that would represent a physical change in the existing landscape during construction have been outlined below.

- Site lay down areas, site facilities, site office, material (e.g. spoil) and pipe storage areas, haul roads, access roads along a right of way.
- Temporary fencing and access gates.

- Site clearance works incorporating: removal and stockpiling of vegetation; breaking out and restoration of existing hard surfacing (eg. road tarmac, rail crossing); and earthworks.
- General construction activities including: the addition of hoarding and protective fencing and signage; excavations; earthworks; site preparation; construction of the pipeline; construction and fit out of pump station, scour and air valves; soil stripping; soil stockpiling; trenching; drilling and blasting; installation of new pipeline infrastructure and any associated landscaping elements.
- Off-route impacts on landscape may also arise from physical changes and additional traffic to surrounding road network utilised during construction (eg. loss / trimming of trees to cater for increased road capacity and sight distance, road widening).

The prominence of the site wide construction works, vegetation clearance, earthworks and difficulty in mitigating impacts suggests that there would be a **moderate adverse landscape impact** during construction.

7.2.2 Route wide visual impacts during construction

The construction site would generally be experienced by a range of viewers, including:

- Residents with prolonged viewing opportunities that value the amenity of their landscape setting.
- Moderate numbers of motorists with a passing interest in their visual environment on the Hume Highway, Illawarra Highway, local roads and private roads.
- Outdoor workers (including farmers, maintenance workers) with a moderate interest in their environment.
- Nature recreation and activity focussed users (i.e. walking, mountain biking) and tourists that value the local visual amenity.

Receptors that would experience a change in their visual environment are generally likely to view construction activities from a short distance, through scattered vegetation across varying topography, as described, along the project corridor. Hilly terrain and areas of dense bushland would restrict and screen the scope of views in some areas. Construction activities would be viewed within the context of a largely modified agricultural or bushland landscape with existing transport and service easement corridors.

However, as there are a number of residential receptors within close proximity of the proposed alignment (some of which are immediately adjacent to the Project), this suggests that they are of **high sensitivity**.

The main visual impacts likely to be experienced during construction would include:

- Stockpiles (vegetation, topsoil, spoil).
- Vegetation clearance.
- Earth works, construction and installation of project elements.
- The presence of construction vehicles and workers.
- The pipeline construction corridor (up to 20 m width)
- Open cut creek crossings.

- Additional vehicular traffic generated by construction workers, materials delivery and disposal along adjacent transport routes and associated traffic management.
- Temporary traffic management.
- Rehabilitation / revegetation works.
- Movement of construction machinery, workers and large scale construction equipment.
- Fenced equipment storage compounds and the presence of major and minor site facilities such as temporary offices and washrooms; lay down areas; pipe stockpiles and associated hard standing. The location of these had not been determined at the time of writing this report.
- Off-route impacts (to the surrounding road network) utilized during construction such as traffic calming measures and additional vehicles.
- Vehicles moving materials to/from site, and between construction sites.
- Workers travelling to/from work, and moving between different areas of the site.

7.2.3 Significance of impacts during construction

The significance of impacts during construction is judged to be **Highly Significant Adverse Impact** primarily due to the proximity and presence of sensitive residential receptors and changes in the landscape. However, these impacts would be temporary and restricted to the construction period**.**

7.3 Operation Phase

7.3.1 Route wide landscape impacts during operation

The following landscape impacts would result route wide during operation:

- A new treeless linear pipeline corridor of 10m width – this cleared corridor would have a greater landscape impact in areas that are currently vegetated, in comparison with sections of the corridor that follow existing easements.
- Wider easements where service easements (e.g. Gas, Electricity) already exist.
- Replacement / reinstatement landscape planting during the establishment period immediately post-construction.
- Permanent loss of some vegetation.
- Addition of associated above ground pipeline infrastructure / structures including pump station, maintenance access, signage, air and scour valves (see) and any potential pipe bridges over river crossings.

7.3.2 Route wide visual impacts during operation

The majority of receptors identified within the desktop and site assessments would be motorists travelling along roads that cross the proposed pipeline corridor and residents that live in proximity to the project. Other receptors would include agricultural workers and passive and activity focussed recreation users.

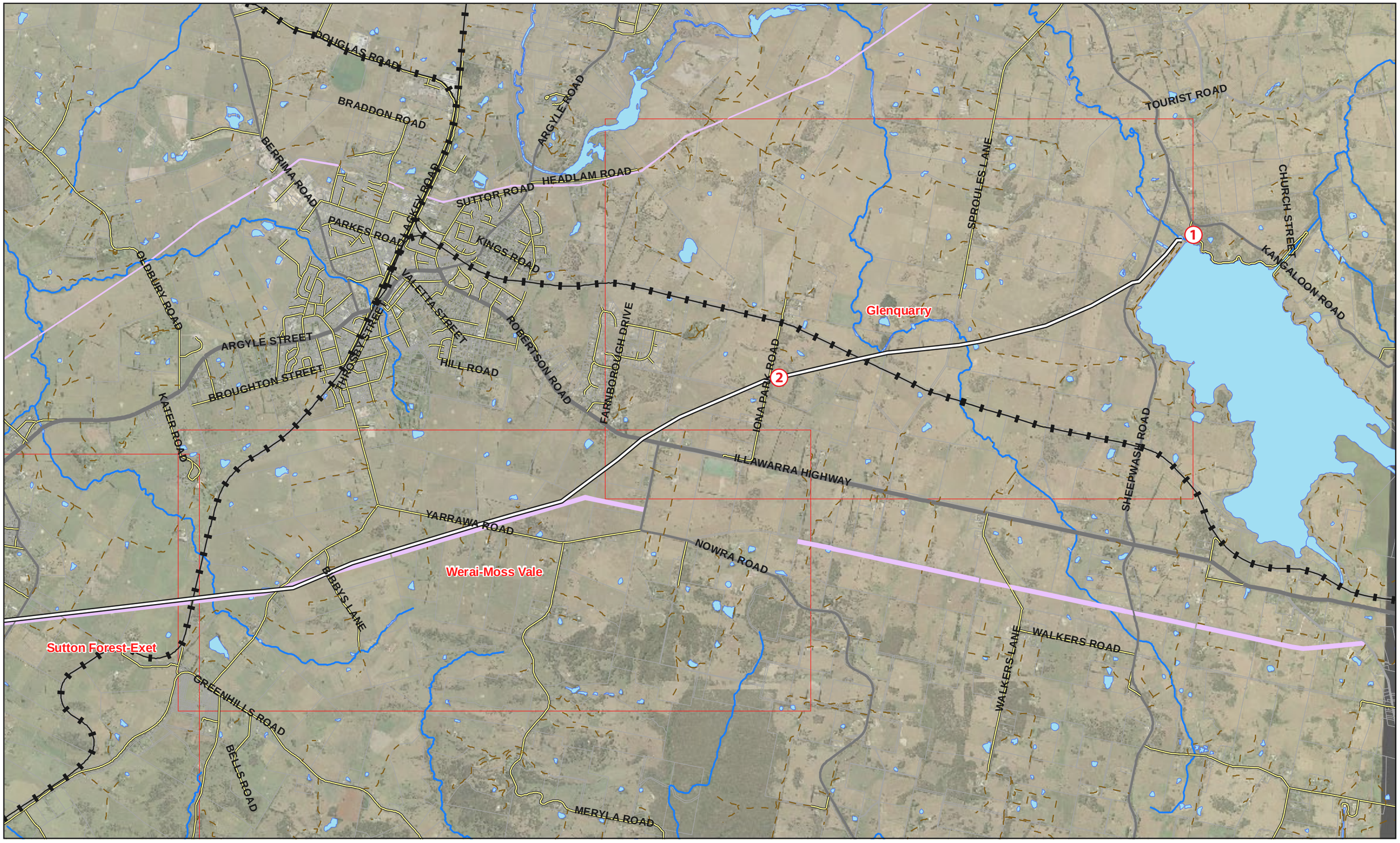
During operation, the pipeline would generally be an underground linear feature within a largely modified rural environment, much of which already features a cleared service easement. Landform surrounding the scheme and the elevation of built structures would be the key determinants of visibility of the project. Vegetation clearance would have a localized influence. Views of the project would generally be limited to close receptors and those crossing the pipeline corridor on roads.

Route wide elements or processes that would be visible and/or intrude upon existing visual amenity would include:

- The pump station site at Wingecarribee Reservoir.
- The treeless pipeline corridor width itself of 10 m – this cleared corridor would have a greater landscape impact in areas that are currently vegetated, in comparison with sections of the corridor that follow existing easements.
- Occasional access by maintenance vehicles and workers (vegetation, weed & pest management and repair works).
- Replacement planting and any landscape mitigation works (including earthworks).
- Air valves and scour valves (see Figure 3.2) at regular intervals along the pipeline.
- Landscape changes outlined above would impact upon the composition of the view.

7.3.3 Viewing locations

The landscape and visual impacts on the following viewing locations, shown in Figure 7.1 to Figure 7.6, have been assessed for the operational phase of the project.



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

Proposed Pipeline Route

Glenquarry Investigation Sectors

1 Viewing Location

Existing easements

Railways

River/Creek

CLIENTS | PEOPLE | PERFORMANCE

Goulburn Mulwaree Council
Highland Source Project

Job Number	23-13312
Revision	A
Date	01 DEC 2009

Landscape and Visual Impact Assessment
Viewing Locations — Figure 7.1

G:\31\0103035\NEW LA & UD FOLDER\Projects\Interstate Projects\Highlands Source Project - Goulburn NSW Pipeline\20091112_TimHyland_MelbOC_GISData\23_13312_A3_HSP LVIA viewing locs.mxd

Data Source: DECC: Scivi_sd9 - 2009; NSW Dept of Lands: roadsegments, railways, easments, cadastre - 2007. Created by: ccharalambou, thyland

Level 7, 16 Marcus Clarke Street Canberra ACT 2601 **T** 61 2 6113 3200 **F** 61 2 6113 3299 **E** cbrmail@ghd.com.au **W** www.ghd.com.au

1:45,000 (at A3)

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

Proposed Pipeline Route

Glenquarry Investigation Sectors

1 Viewing Location

Existing easements

Railways

River/Creek

CLIENTS|PEOPLE|PERFORMANCE

Goulburn Mulwaree Council
Highland Source Project

Job Number 23-13312
Revision A
Date 01 DEC 2009

Landscape and Visual Impact Assessment
Viewing Locations

Figure 7.2

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Data Source: DECC: Scivi_sd9 - 2009; NSW Dept of Lands: roadsegments, railways, easments, cadastre - 2007. Created by: ccharalambou, thyland

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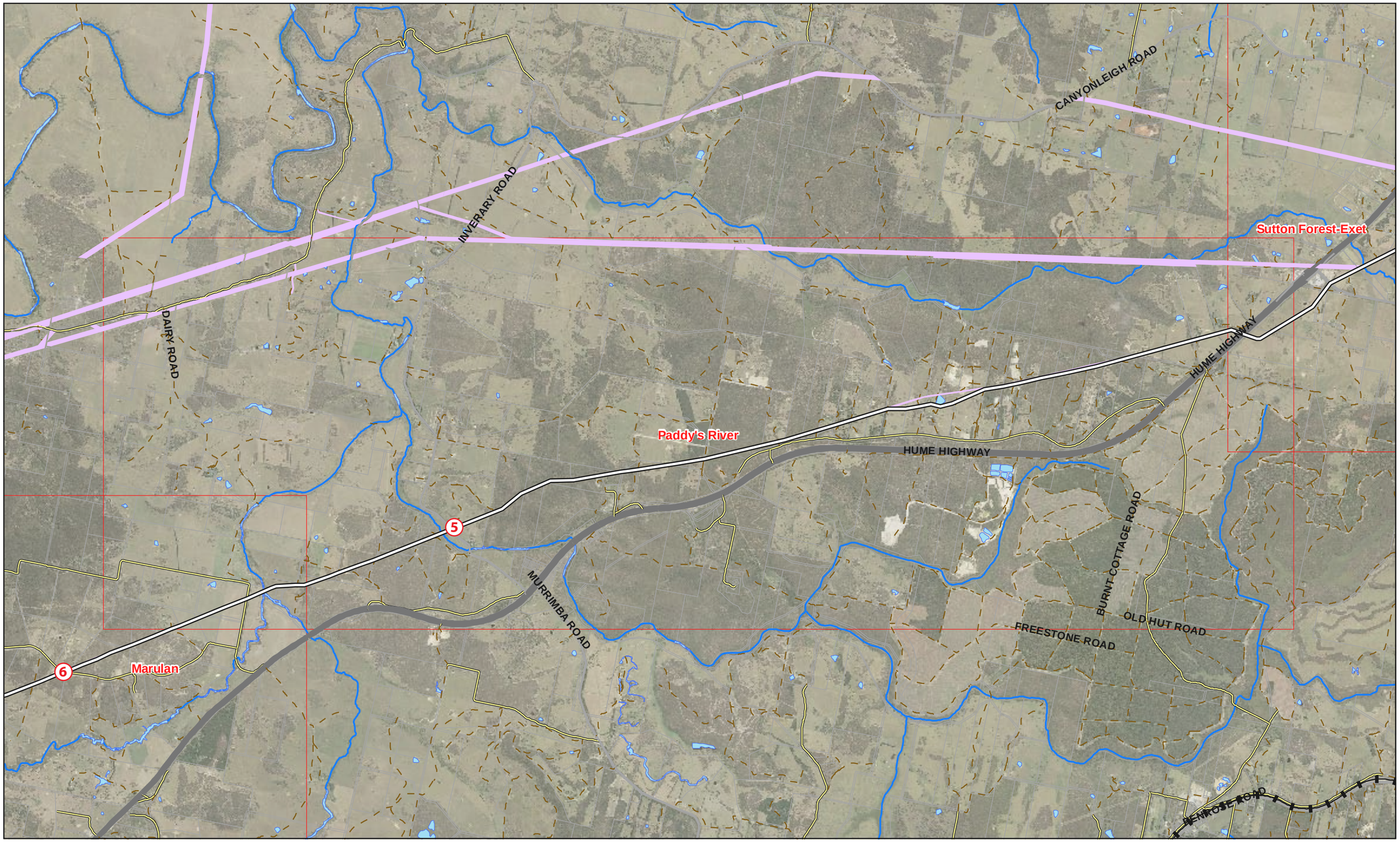

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Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

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Proposed Pipeline Route

Glenquarry Investigation Sectors

1 Viewing Location

Existing easements

Railways

River/Creek

CLIENTS | PEOPLE | PERFORMANCE

Goulburn Mulwaree Council
Highland Source Project

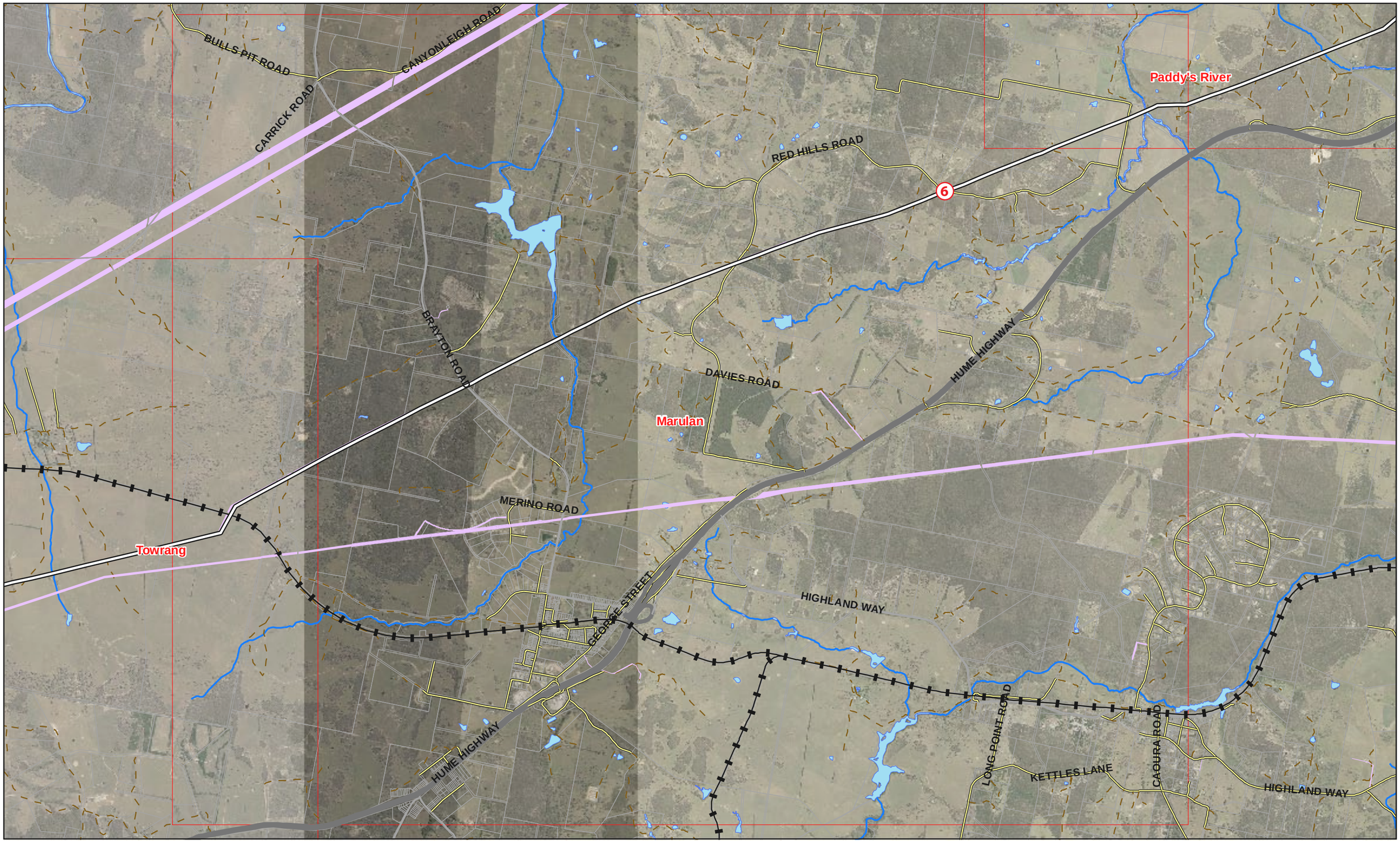
Job Number 23-13312
Revision A
Date 01 DEC 2009

Landscape and Visual Impact Assessment
Viewing Locations
Figure 7.3

G:\31\0103035\NEW LA & UD FOLDER\Projects\Interstate Projects\Highlands Source Project - Goulburn NSW Pipeline\20091112_TimHyland_MelbOC_GISData\23_13312_A3_HSP LVIA viewing locs.mxd

Data Source: DECC: Scivi_sd9 - 2009; NSW Dept of Lands: roadsegments, railways, easments, cadastre - 2007. Created by: ccharalambou, thyland

Level 7, 16 Marcus Clarke Street Canberra ACT 2601 **T** 61 2 6113 3200 **F** 61 2 6113 3299 **E** cbrmail@ghd.com.au **W** www.ghd.com.au



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

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Proposed Pipeline Route

Glenquarry Investigation Sectors

1 Viewing Location

Existing easements

Railways

River/Creek

CLIENTS | PEOPLE | PERFORMANCE

Goulburn Mulwaree Council
Highland Source Project

Job Number 23-13312
Revision A
Date 01 DEC 2009

Landscape and Visual Impact Assessment
Viewing Locations
Figure 7.4

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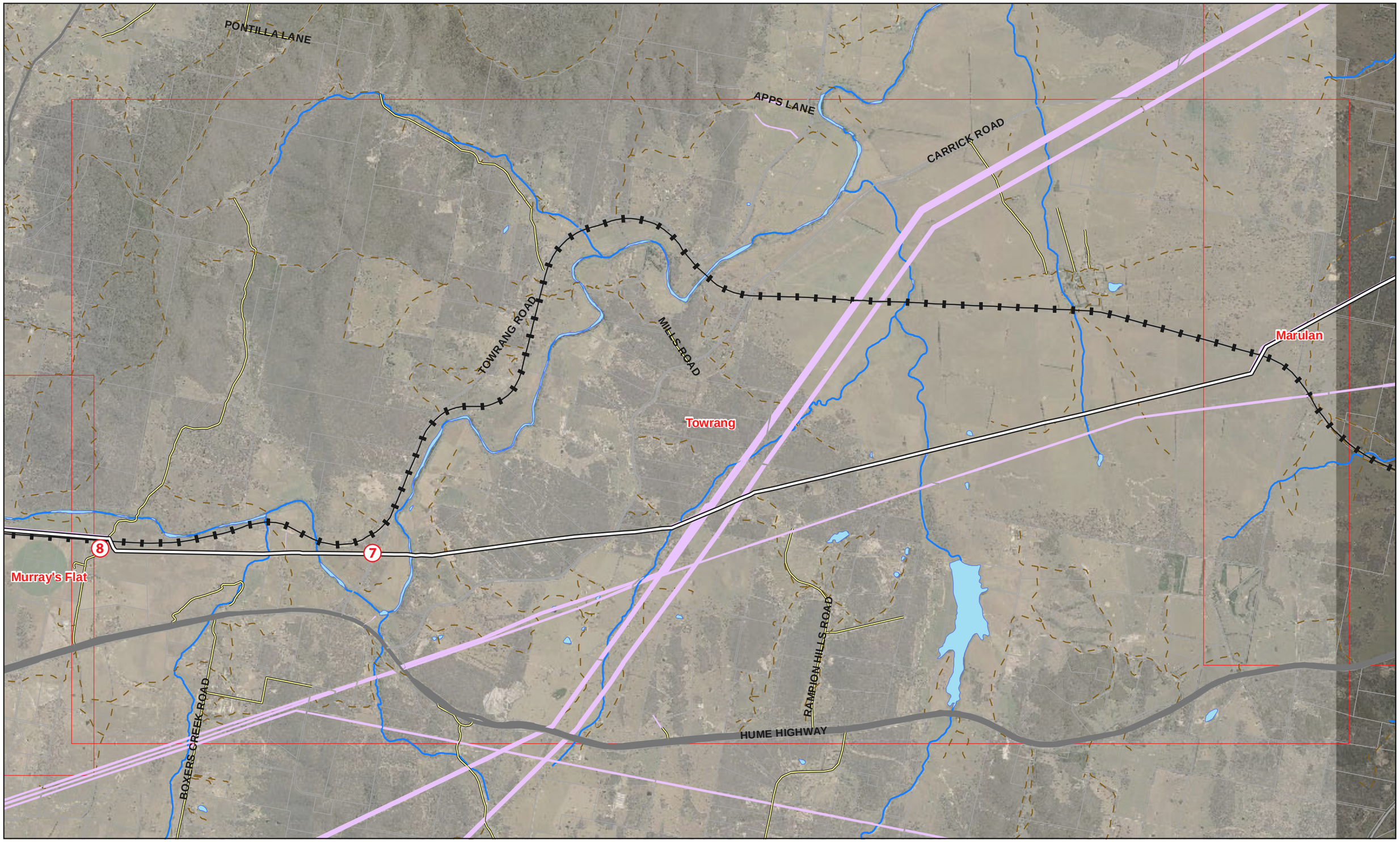
Data Source: DECC: Scivi_sd9 - 2009; NSW Dept of Lands: roadsegments, railways, easments, cadastre - 2007. Created by: ccharalambou, thyland

Level 7, 16 Marcus Clarke Street Canberra ACT 2601 **T** 61 2 6113 3200 **F** 61 2 6113 3299 **E** cbrmail@ghd.com.au **W** www.ghd.com.au



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

Proposed Pipeline Route

Glenquarry Investigation Sectors

1 Viewing Location

Existing easements

Railways

River/Creek

CLIENTS | PEOPLE | PERFORMANCE

Goulburn Mulwaree Council
Highland Source Project

Job Number 23-13312
Revision A
Date 01 DEC 2009

Landscape and Visual Impact Assessment
Viewing Locations
Figure 7.5

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Data Source: DECC: Scivi_sd9 - 2009; NSW Dept of Lands: roadsegments, railways, easments, cadastre - 2007. Created by: ccharalambou, thyland

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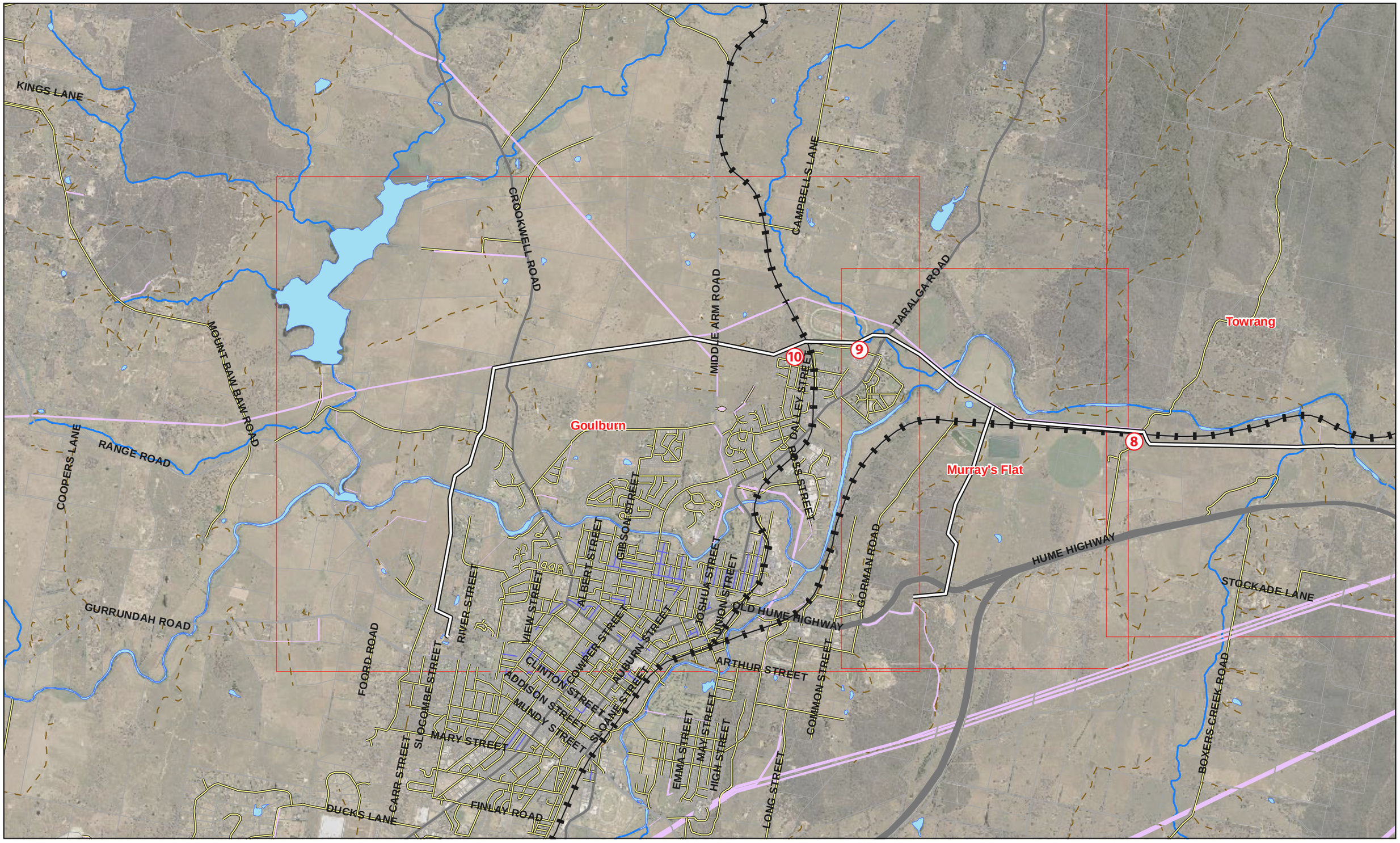

1:45,000 (at A3)

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

Proposed Pipeline Route

Glenquarry Investigation Sectors

① Viewing Location

Existing easements

Railways

River/Creek

CLIENTS | PEOPLE | PERFORMANCE

Goulburn Mulwaree Council
Highland Source Project

Job Number 23-13312
Revision A
Date 01 DEC 2009

Landscape and Visual Impact Assessment
Viewing Locations
Figure 7.6

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Data Source: DECC: Scivi_sd9 - 2009; NSW Dept of Lands: roadsegments, railways, easments, cadastre - 2007. Created by: ccharalambou, thyland

Viewing Location 1 – Wingecarribee Reservoir

Table 7.2 Viewing Location 1 - Wingecaribee Reservoir Assessment

Photo 17 - View south west from publicly accessible carpark at Wingecarribee Reservoir

Visible Project Elements	***Pump Station*** Rectangular building, approximately 8 x 15 m in size, 5 m height. ***Pipeline*** Pipeline (300-375 mm diameter, located underground) and associated infrastructure, scour valves, air valves.

Landscape Impact	***Pump Station*** The proposed pump station would be located amongst the existing building forming part of the treatment and pumping infrastructure at this location. This landscape, with dam wall and maintained pasture shows much evidence of human modification. The building will be visible within the landscape but will not appear out of character with the existing buildings and infrastructure. ***Pipeline*** The pipeline route, as seen from this viewing location, runs through cleared areas. With the possible exception of valves, it is not expected that the pipeline would be visible in the operations phase of the project From this location the project will not have a significant impact on the existing landscape character and, with the presence of similar water treatment buildings, the landscape does have a capacity to absorb this change. It is therefore assessed as having a small adverse landscape impact.
Visual Impact	Views towards of the pump station would be available from the Wingecarribee Reservoir observation point. Dependant on the siting of the pump station, views could also be available to travellers on Sheepwash Road, however these views are expected to be screened by existing vegetation on the site and are transient in nature. This view would be experienced by: ◗ Visitors to the Wingecarribee observation point; and ◗ Travellers on Wingecarribee Road. The sensitivity of these receptors is assessed as being of **low sensitivity.**
Significance of Impact	**Not Significant**

Viewing Location 2 - Iona Park Road

Table 7.3 Viewing Location 2 - Iona Park Road Assessment

Photo 18 – Panoramic view east from Iona Park Road

Photo 19 - View west from Iona Park Road

Photo 20 - View north along Iona Park Road

Visible Project Elements	Pipeline (300-375mm diameter, located underground), scour valves, air valves. Clearing of the corridor including roadside trees and scattered trees within would occur during the construction phase, however vegetation clearance would be minimised as far as practicable. This impact would carry on into the operations phase.

Landscape Impact	The pipeline route, as seen from this viewing location, would cross Iona Park Road. Some roadside vegetation (**Photo 20**) would be cleared during the construction phase, however measures would be taken to minimise the width of this clearance as much as practicable. The pipeline is proposed to run through scattered groups and planted lines of indigenous vegetation, to the east of Iona Park Road (visible in the background of **Photo 18**). This includes one section in close proximity (approximately 60m from pipeline centreline) to a residence. Measures would be taken at this location to reduce tree clearance as much as practicable. With the possible exception of valves, it is not expected that the pipeline itself would be visible in the operations phase of the project. The clearance of some existing roadside vegetation, and scattered trees within view of this location leads to the assessment of a **minor adverse landscape impact.**
Visual Impact	Construction works at this viewing location will impact on the visual amenity of residents living in close proximity to the Project (residence located approximately 60m from pipeline centreline), with unscreened views. These impacts would be temporary and primarily limited to the construction phase of the project. The clearance of trees in close proximity to the residence located approximately 200m north east of this viewpoint could affect the visual amenity of residents , however measures would be taken to minimise the width of this clearance. Air and scour valves would be located in the two properties north-west of this viewing location, including one air valve approximately 60m from a residence. This will be a permanent visual element and may affect the visual amenity of residents. This view would be experienced by: ◗ Residents of Iona Park Road, particularly the residence located approximately 200m north east of this viewpoint. ◗ Travellers on Iona Park Road The sensitivity of these receptors (residence in close proximity to works) is assessed as being of **high sensitivity**.
Significance of Impact	**Moderate Significance**

Viewing Location 3 - Mount Broughton Road

Table 7.4 Viewing Location 3 - Mount Broughton Road Assessment

Photo 21 - View west from Mount Broughton Road. Proposed pipeline alignment follows powerline easement.

Visible Project Elements	Pipeline (300-375 mm diameter, located underground), scour valves, air valves. Proposed pipeline alignment would follow the existing high voltage (HV) electricity easement.

Landscape Impact	The pipeline route, as seen from this viewing location, would run through the cleared grazing land along the existing HV electricity easement. With the possible exception of air and scour valves located beyond the farm dams, seen in Photo **21**, and the clearance of some scattered vegetation in the construction phase, it is not expected that the pipeline would be visible in the operations phase of the project. Where the pipeline alignment intersects the railway line (visible in the middleground of the above image), it would be situated between the HV transmission tower and the vegetation to the left. There will be few elements of the project visible within the landscape from this viewing location and with the existing power lines any pipeline infrastructure would be absorbed into the visual landscape. These changes would not have a pronounced impact on the wider landscape and the any changes would be expected to be absorbed into the rural cleared landscape. It is assessed that the project will have a **negligible adverse landscape impact** from this viewing location**.**
Visual Impact	During the construction phase, pasture clearing and pipelaying works will form a part of the view from this location and will impact on the visual amenity of receptors, however these views will be temporary and will change as works progress. Whilst several air and scour valves would be located on the properties adjoining Mt Broughton Road, it is expected that these would be partially screened from residences by existing vegetation or be located more than 100m from residences. At this distance, these valves would be visually insignificant. The existing powerlines running across the valley form a dominant element in the view and would be expected to continue to do so during the construction and operations phases of the Project. This view would be experienced by: ◗ Residents on Mount Broughton Road (there is a residence behind this viewing location). ◗ Travellers on Mount Broughton Road (transient views) The sensitivity of these receptors is assessed as being of **medium sensitivity**.
Significance of Impact	**Not Significant**

Viewing Location 4 - Old Argyle Road

Table 7.5 Viewing Location 4 - Old Argyle Road Assessment

Photo 22 - View east from Old Argyle Road. Proposed pipeline alignment runs parallel to existing powerline easement.

Visible Project Elements	Pipeline (300-375 mm diameter, located underground), scour valves, air valves, and stop valves. Proposed pipeline alignment would run to the south of the existing high voltage (HV) electricity easement.

Landscape Impact	The pipeline route, as seen from this viewing location, would run through cleared agricultural pasture, to the south (right of image) of the existing HV electricity easement. With the exception of proposed valves, both in the property visible in Photo **22** and in the property immediately behind this view, and the clearance of some scattered vegetation in the construction phase, it is not expected that the pipeline would be visible in the operations phase of the project. A cleared easement would remain of approximately 15 m width. It is expected that additional works may be required in the construction phase to cross the creek / drainage line visible in the middleground of this photo. These works may be noticeable in the operations phase e.g. rock beaching. These changes would not have a pronounced impact on the wider landscape and the any changes would be expected to be absorbed into the rural cleared landscape over time. The landscape impact from this location is assessed to be a **small adverse landscape impact.**
Visual Impact	During the construction phase, pasture clearing and pipelaying works will form a part of the view from this location and will impact on the visual amenity of receptors, however these views will be temporary and will change as works progress. This view would be experienced by: ◗ Residents on Old Argyle Road (there is a residence in close proximity to the works on the west side of the road (behind this viewing location). ◗ Travellers on Old Argyle Road (transient views) The sensitivity of these receptors is assessed as being of **medium sensitivity**.
Significance of Impact	**Minor Significance**

Viewing Location 5 - Inverary Road, Paddy's River

Table 7.6 Viewing Location 5 - Inverary Road, Paddy's River Assessment

Photo 23 - View south west from Inverary Road, Paddy's River. Proposed pipeline alignment follows existing gas easement. Proposed crossing of Paddy's River seen in foreground.

Visible Project Elements	Pipeline (300-375 mm diameter, located underground, scour valves. Creek crossing earthworks and rock beaching. Proposed pipeline alignment would follow the existing gas easement.

Landscape Impact	The pipeline route, as seen from this viewing location, would run through cleared grazing land with some scattered vegetation. The pipeline would be located within the easement running parallel to the fence line in this photo. It is anticipated that additional works (e.g. earthworks, rock beaching) will be required to cross the creek (shown on the above photo). Existing disturbance of the bank is evident from installation of the existing gas main. With the possible exception of scour valves, which would be located in the foreground of Photo **23** and at the creek, and the clearance of some scattered vegetation in the construction phase, it is not expected that the pipeline would be visible in the operations phase of the project. The Project would be easily absorbed into the landscape at this viewing location, due to the highly disturbed nature of the current landscape, with cleared easement and degraded creek crossing. It is anticipated that there would be a **negligible adverse landscape impact.**
Visual Impact	Situated out of the visual catchment of nearby residences, it is not expected that the Project will impact on the visual amenity of receptors, apart from occasional travellers on Inverary Road who will obtain transient views of the works. This view would be experienced by: ◗ Travellers on Inverary Road (Transient views) The sensitivity of these receptors is assessed as being of **low sensitivity**.
Significance of Impact	**Not Significant**

Viewing Location 6 Red Hills Road, Marulan

Table 7.7 Viewing Location 6 Red Hills Road, Marulan Assessment

Photo 24 - View north east from Red Hills Road, Marulan. Proposed pipeline alignment follows existing gas easement.

Visible Project Elements	Pipeline (300-375 mm diameter, located underground), scour valves, air valves. Proposed pipeline alignment would follow the existing gas easement.
Landscape Impact	The pipeline route, as seen from this viewing location, will run adjacent to the existing cleared gas easement. Additional vegetation will be cleared to accommodate the pipeline resulting in a widening of the cleared area. With the possible exception of air and scour valves, one of which would be located within the easement, adjacent to Red Hills Road, and the clearance of vegetation in the construction phase, it is not expected that the pipeline would be visible in the operations phase of the project. The widening of the cleared corridor is unlikely to result in a significant increase in the prominence of the corridor in the visual landscape. It is therefore assessed as having a **small adverse landscape impact.**

Visual Impact	During the construction phase, pasture and vegetation clearing and pipelaying works along the existing easement will form a part of the view from this location and will impact on the visual amenity of receptors, however these views will be temporary and will change as works progress. Any visual impacts in the operations phase would be expected to be very low. This view would be experienced by: ◗ Residents on Red Hills Road (there is a residence on the western side side of the road, behind this viewing location). ◗ Travellers on Red Hills Road The sensitivity of these receptors is assessed as being of **medium sensitivity**.
Significance of Impact	**Minor Significance**

Viewing Location 7 Towrang Road

Table 7.8 Viewing Location 7 Towrang Road Assessment

Photo 25 - View east from Towrang Road. Scattered rural residences and scattered vegetation in agricultural landscape shown.

Photo 26 - Indicative photomontage visualisation showing construction phase works from Towrang Road

Photo 27 – Wide panoramic view east from Towrang Road. Scattered rural residences and scattered vegetation in agricultural landscape shown.

Visible Project Elements	Pipeline (300-375 mm diameter, located underground, scour valves, air valves. Proposed pipeline alignment would follow the existing gas easement. Major waterway crossing (Wollondilly River)
Landscape Impact	The pipeline route, as seen from this viewing location, would run through cleared grazing land and the existing gas easement. Whilst additional works (e.g. earthworks, rock beaching) would be required to cross the Wollondilly River (Identified in this image by the line of riparian vegetation in the middleground view), existing disturbance is evident at this crossing and on the far side of this creek from the works associated with the gas easement. It is expected that, with rehabilitation as a part of this Project, the landscape quality at this site would be improved or, at least, be made no worse as a result of this Project. With the exception of air, scour and stop valves and the clearance of some scattered vegetation in the construction phase on the far side of the Wollondilly River, it is not expected that the pipeline would be visible in the operations phase of the project. The landscape in this location contains existing fencing and markers associated with the gas easement with any visible infrastructure associated with the project unlikely to have a significant impact on the visual landscape. Therefore, it is therefore assessed as having a **negligible adverse landscape impact.**

Visual Impact	Several residences near this viewing location will have unscreened views of the construction activity, including pasture clearing and pipe laying works. Whilst visual impacts as a result of these works will be limited to the construction phase, these impacts would carry through to the operations phase until vegetation has been reinstated. Visual impacts as a result of pipeline valves are expected to be minimal, with valves located away from residences. This view would be experienced by: ◗ Residents on Towrang Road (there are two residences located on either side of the easement, visible in the panoramic image above). ◗ The residence visible on the eastern (far) side of the Wollondilly River. This house is accessed from Carrick Road and has views over the Wollondilly River and existing easement. ◗ Travellers on Towrang Road The sensitivity of these receptors is assessed as being of **high sensitivity**.
Significance of Impact	**Minor Significance**

Viewing Location 8 - Murray's Flat Road

Table 7.9 Viewing Location 8 - Murray's Flat Road Assessment

Photo 28 - View north from end of Murray's Flat Road. Railway line and agricultural land shown with steep, vegetated hillside as backdrop.

Visible Project Elements	Pipeline (300-375 mm diameter, located underground), scour valves, air valves. Proposed pipeline alignment would run between the existing gas easement and the rail corridor.

Landscape Impact	The pipeline route, as seen from this viewing location, would run through the cleared grazing land between the existing gas easement and the rail corridor. With the possible exception of valves, it is not expected that the pipeline would be visible in the operations phase of the project. Air and scour valves would be located several hundred metres from this viewing location and would not cause a noticeable landscape impact. The pipeline would cross the railway line to the east (right of image) of this viewing location using thrust boring and some additional construction works would be required, including an entry and exit pit. The steep ridgeline, seen in Photo **28**, dominates the background of the view in this location, with rail infrastructure (i.e. rail tracks, batters, gates) is a dominant element in the foreground. This would assist in the landscapes ability to absorb impacts as described at this location. The project from this location is therefore assessed as having a **negligible adverse landscape impact.**
Visual Impact	Construction works would be visible from the property located behind this viewing location however these views would be screened by vegetation on the property. This view would be experienced by: ◗ Residents on Murray's Flat Road (there is a residence behind this viewing location). The sensitivity of these receptors is assessed as being of **medium sensitivity**.
Significance of Impact	**Not Significant**

Viewing Location 9 - Racecourse Drive

Table 7.10 Viewing Location 9 - Racecourse Drive Assessment

Photo 29 - View north east from Racecourse Drive showing Goulburn Racecourse.

Photo 30 – Wide panoramic view north west from end of Racecourse Drive showing Goulburn Racecourse main buildings and entry.

Visible Project elements	Pipeline (300-375 mm diameter, located underground), scour valves, air valves.
Landscape Impact	This viewing location is representative of views from both Racecourse Drive (Photo 29) and the Goulburn Racecourse main buildings (Photo 30). The pipeline route, as seen from this viewing location, would run through cleared grass land, between the creek (identifiable in the top image by riparian vegetation) and the fence in the foreground. The pipeline would run through or in close proximity to decorative fencing and gardens in front of the main racecourse buildings (Photo **30**). Air and scour valves would be located between Racecourse Drive and the racetrack fence. These structures would not have a significant landscape impact. With the exception of these valves, it is not expected that the pipeline would be visible in the operations phase of the project. The existing structures and fencing in the visual landscape in this location will assist in absorbing the impact of any visible infrastructure associated with the project. It is therefore assessed as having a **small adverse landscape impact.**
Visual Impact	Construction works at this viewing location will impact on the visual amenity of residents with some views to the Project,. These impacts would be temporary and primarily limited to the construction phase of the project. This view would be experienced by: ◗ Residents on Racecourse Drive; ◗ Visitors to Goulburn Racecourse; and ◗ Workers at Goulburn Racecourse and associated facilities. The sensitivity of these receptors (particularly residents) is assessed as being of **medium sensitivity**.
Significance of Impact	**Minor Significance**

Viewing Location 10 - Goulburn Woodlands Reserve

Table 7.11 Viewing Location 10 - Goulburn Woodlands Reserve Assessment

Photo 31 - View north from end of Progress Street looking across Goulburn Woodlands Reserve.

Photo 32 - Signage at entry to Goulburn Woodlands Reserve

Photo 33 - View north west from Ivy Lea place showing typical new residential street. Proposed pipeline alignment is situated behind these houses.

Visible Project Elements	Pipeline (300-375 mm diameter, located underground) New cleared easement through Goulburn Woodlands Reserve
Landscape Impact	This viewing location is representative of views from the Goulburn Woodlands Reserve, accessed via Progress Street, Goulburn (Photo **31**, Photo **32**), and the residences on Ivy Lea Place which back onto the Reserve (Photo **33**). The pipeline route, as seen from this viewing location, would create a cleared easement running diagonally through this reserve, which is currently criss-crossed by a series of small bushwalking paths. This site is classified as an endangered ecological community (EEC) and used by locals for recreation purposes (e.g. bushwalking and dog walking). With views over the surrounding landscape, a network of small walking paths and a mix of indigenous trees and grasses, the proposed elements outlined above would be in contrast to the existing landscape character of the site. Therefore, it is anticipated that there would be a **moderate adverse landscape impact.**
Visual Impact	Construction works, including vegetation clearance, trench excavation and pipelaying would have adversely impact on the visual amenity of those living near this viewing location and those using the Goulburn Woodlands Reserve. Views into the Goulburn Woodlands Reserve are available from residences on the northern side of Ivy Lea Place. Several of these residences have balconies which overlook the bushland reserve This view would be experienced by: ◗ Residents on Ivy Lea Place ◗ Visitors to Goulburn Woodlands Reserve The sensitivity of these receptors (particularly residents) is assessed as being of **high sensitivity**.
Significance of Impact	**High Significance**

8. Mitigation Measures

8.1 General

The intent of this section is to highlight project wide mitigation measures that would reduce and/or manage adverse impacts of construction and operation upon landscape character and visual amenity.

A summary of specific mitigation measures relating to the assessed viewing locations is included in Table 10.1 Summary of Significance of Impacts

Further specific measures for key areas (i.e. pump station and storage tank site) will be further considered within concept design, with a Construction Management Plan (CMP) being developed prior to commencement on site.

8.2 Construction phase

The CMP will aim to achieve construction without causing undue disruption to existing receptors. It would also allow plans and systems to be put in place to minimise potential environmental impacts of the construction works. The CMP would allow works to be carried out in accordance with statutory legislation, to an acceptable quality and to keep disruption to a minimum.

The CMP would contain the following standard project controls related to the management of landscape character and visual amenity:

- Avoid loss or damage to landscape features, including minimisation of vegetation clearance, particularly in environmentally sensitive areas (e.g. forest, creek crossings, trees that contribute to landscape setting, endangered habitat). Where possible, protect trees prior to construction and/or trim trees to avoid total removal. This includes vegetation that makes a significant and positive contribution to landscape character and/or has significant value in terms of biodiversity;
- Temporary hoardings, barriers, traffic management and signage would be removed when no longer required;
- Lighting of compounds and works sites would be restricted to negotiated working hours and those that are necessary for safety and security only;
- Storage facilities, construction plants, stockpiles and access roads would be located away from residences and recreational areas, where practicable;
- Materials and machinery would be stored tidily during the works;
- Roads providing access to site compounds and works areas would be maintained free of dust and mud as far as reasonably practicable;
- Where possible re-use spoil on site. Alternatively, upon completion of construction, all remaining spoil and construction materials would be removed to a suitable location;
- Appropriate soil erosion prevention techniques would be employed;
- Appropriate measures will be taken in order to minimise airborne dust and associated visual impacts;

- ‘Making good’ at the end of construction would include grading of earthworks to tie into the existing site contours to ensure new earthworks integrate as seamlessly as practicable with the existing landform; and
- Vegetation rehabilitation, replacement planting and encouragement of natural regeneration to the pipeline corridor extents (i.e. to the edge of the 10m tree clearance zone) and at key locations *outside* the pipeline corridor (to be negotiated with land owners). This would optimise visual protection of receptors from above ground structures (i.e. screening and integration). New planting would consider appropriateness to local character and to enhance local biodiversity and habitat value.

8.3 Operation Phase

Mitigation of landscape and visual impacts as a result of the Project seeks to achieve a balance between all design disciplines to achieve an optimal outcome. The mitigation strategy for the LVIA focuses on screening visible Project elements from viewing locations and designing the pipeline components in a way that minimises detrimental effects on visual amenity and landscape character. Mitigation measures are detailed below.

8.3.1 General (Site Wide)

- Consideration of the appearance of new permanent features such as signage, fencing and gates so that visual intrusion is minimal;
- Appropriate revegetation of the study area as soon as possible after construction. Revegetation would need to be conducted in accordance with a weed management plan for the corridor. Revegetation works within the pipeline corridor would incorporate naturalistic infill planting of appropriate indigenous vegetation. This measure will form a part of the CMP.
- Works that may damage areas of significant *off site* vegetation (including the root zone) are to be avoided;
- Above ground structures are to be designed and located to be as visually unobtrusive as can be technically achieved.
- Where pipeline valves must be located in close proximity to residences and there is a resulting adverse impact on landscape character or the visual amenity of residents, consider screening of valve structure using low shrubs and grasses.
- Consider the potential landscape and visual impacts on important cultural sites and residences (e.g. views from garden settings, wider views of landscape).

8.3.2 Pump station

There are opportunities for mitigation measures to the pump station, as outlined below. However, these sites cannot be completely mitigated from visual impacts due to their nature and location within the landscape. Desired results (rehabilitation planting, and marginal planting) would take time to establish.

The pump station should be designed and located to be as visually unobtrusive as can be technically

achieved. Sensitive visual and architectural design would reinforce landscape character and distinctiveness, and minimise visual intrusion.

Landscape Plan

Provision of a landscape design and landscape management plan that would aim to reinforce local landscape character and sense of place, environmental values (e.g. biodiversity, habitat value, water quality, soils, ecological systems) visual amenity and local distinctiveness.

A landscape management plan would outline management of trees and landscape across the site, post construction, reinforcing enhancement and rehabilitation strategies. This may include: tree works; mulching; reinstatement and site preparation; and; treatment of weed control areas.

This landscape plan would address the requirements of the Wingecarribee Shire Council's Development Control Plan (DCP) No. 53, related to the 'Siting, Design and Landscaping of Rural Developments' (See section 2.3).

Structures & Road Works

- Any additional fencing at the pump station site should have a low visual profile; and
- Any new access roads should be within the existing topography to minimise visibility within the landscape.

9. Residual Impacts

9.1 Construction

It is not anticipated that there would be any residual landscape or visual impacts arising from the construction phase. Contractors will be required to 'make good' and rehabilitate all work sites prior to/at the end of the construction period. The extent of landscape and visual impacts arising from 'making good' would be dependent upon the level of disturbance required for construction of the scheme. This is particularly pertinent to the first year of operation where impacts resulting from 'making good' would be the most evident (e.g. establishment of new seeding and planting).

9.2 Operation

9.2.1 General

Some impacts resulting from the project are unavoidable and cannot be mitigated for during operation. The project would alter the surrounding landscape and the visual experience of some receptors. However, these changes would be seen within the context of the existing local environment. Foremost amongst residual impacts is the addition of pipeline infrastructure (pump station, air valves and scour valves), permanent removal of trees along parts of the pipeline corridor, new landscape and rehabilitation planting/seeding. These would primarily impact upon visual amenity.

This assessment of residual impacts assumes that mitigation measures described in Section 8 above would be implemented. Route wide impacts are outlined below, with impacts around the Pump Station covered in more detail.

Initially, the new pipeline elements and infrastructure at key sites (eg. pump station) would have an impact upon the viewing experience of few visual receptors. The visual amenity of the area would be, in parts, affected by the project intruding into views. Residential receptors, outdoor recreation facility users and road users alongside / crossing the route would experience the most significant changes due to their respective viewing opportunities and proximity to the project.

The change in view would be permanent and initially prominent. However, it would become less dominant over time as the scheme would become part of the landscape and views as vegetation naturally regenerates, or screening matures. Site wide, in terms of the assessment criteria this equates to a **small adverse residual landscape impact**. The presence of residential receptors along the route, mostly at some distance from the study area, but with partial views of the pipeline route, suggests they would generally be of **low sensitivity**. Therefore, the assessment of significance of *residual* impacts would be considered as **Not Significant**.

9.2.2 Pump Station

The proposed pump station at Wingecaribee Reservoir would continue to have a **small adverse residual landscape impact** due to its visual prominence however this impact would be lessened due to

the pump stations proximity to similar existing structures.

Assuming an appropriate maintenance regime over time (for landscaped areas, weed control, building maintenance, access road maintenance) receptors (i.e. recreation facility users, road users, workers) would view new elements integrating with the pre-existing environment over time as a result of visually sensitive design and screen planting, suggesting they are of **low sensitivity**.

This would result in a landscape and visual *residual* impact that is **Not Significant**.

10. Conclusions

The construction effects of the project on landscape and visual amenity would primarily be related to site clearance and general construction activities that would occur during the limited duration of the construction activities. These would be controlled through mitigation measures set out within a CMP to ensure that any adverse impacts resulting from the construction of the project on landscape and visual amenity are avoided, minimised or mitigated.

Landscape and visual impacts once the project becomes operational are generally likely to be **Not Significant** through to being of **Minor Adverse Significance**. Exceptions to this do occur at several locations along the Project alignment, as described below:

- Viewing Location 2 (Iona Park Road) **Moderate Adverse Significance**
- Viewing Location 11 (Goulburn Woodlands Reserve) **High Adverse Significance**

These exceptions are due to the potential for permanent removal of visually significant vegetation or landscape elements combined with the close proximity to residences and receptors that place value on the scenic quality of the landscape. Measures will be taken, however, to minimise the width of any vegetation clearance as much as practicable.

It is expected that the significance of these impacts on receptors, as explained in 4.4, would decrease in time as built structures and areas of vegetation clearance become an accepted part of the landscape and are not seen as new elements.

Mitigation measures in relation to operation are proposed in order to minimise these impacts and should be further detailed within concept design.

In view of the separation distance of built structures and proposed areas of vegetation clearance in this Project, there is unlikely to be any cumulative visible impact.

A summary of the significance of impacts, along with recommended mitigation measures and residual (post-mitigation) impacts is provided in Table 10.1.

Table 10.1 Summary of Significance of Impacts

Site	Impact Description	Mitigation	Significance of Impact	Residual Impact
Viewing Location 1 **Wingecarribee Reservoir**	Introduction of built elements (pump station, fencing) and associated infrastructure into the landscape. Earthworks to raise building site above 1 in 100 year flood level	Site selection to minimise visual intrusion. Visually sensitive design of structure including building style, materials and colours. Screen planting. Built form to sit within existing topography.	Not significant	Not significant
Viewing Location 2 **Iona Park Road**	Some roadside vegetation to be cleared. Some windrow planting to be cleared adjacent to residence Air and scour valves above ground. Minor earth works.	Recommend construction corridor avoids windrow planting and residence. If vegetation around residence must be removed, minimise width of clearance and replant as close to pipe as possible. Pinch point techniques. If mature roadside planting must be cleared to cross Iona Park Road, construction corridor width to be minimised as much as possible. Pinch point techniques. Mitigation planting around air/scour valves situated near residences e.g. long grasses, shrubs	Moderate Significance	Minor Adverse Significance

Site	Impact Description	Mitigation	Significance of Impact	Residual Impact
Viewing Location 3 **Mount Broughton Road**	Pipeline corridor with grass seeding rehabilitation through existing cleared agricultural landscape Existing HV powerline easement. Air and scour valves. Residential receptors experience negligible change in view.	Rehabilitation of grass within corridor, and vegetation and trees adjacent to corridor to form a screen to properties. Minimise area of vegetation clearance.	Not significant	Not Significant
Viewing Location 4 **Old Argyle Road**	Pipeline corridor with grass seeding rehabilitation through existing cleared agricultural landscape Existing HV powerline easement. Some clearance of small trees and shrubs. Additional construction works around creek crossing. Air and scour valves. Residential receptors experience negligible change in view.	Natural regeneration and / or rehabilitation of grass and vegetation to pipeline corridor margin. Minimise area of vegetation clearance. Minimise disturbance at creek crossing and rehabilitate to 'as is' or better standard.	Minor Adverse Significance	Minor Adverse Significance

Site	Impact Description	Mitigation	Significance of Impact	Residual Impact
Viewing Location 5 **Inverary Road, Paddy's River**	Pipeline corridor with grass seeding rehabilitation through existing cleared agricultural landscape Existing gas easement. Some clearance of small trees and shrubs. Additional construction works around creek crossing. Air and scour valves.	Natural regeneration and / or rehabilitation of grass and vegetation to pipeline corridor margin. Minimise area of vegetation clearance. Minimise disturbance at creek crossing and rehabilitate to 'as is' or better standard.	Not Significant	Not Significant
Viewing Location 6 **Red Hills Road, Marulan**	Pipeline corridor with grass seeding rehabilitation through existing cleared agricultural landscape Existing gas easement. Potential widening of easement with vegetation clearing Additional construction works around creek crossing. Air and scour valves. Close to residence	Natural regeneration and / or rehabilitation of grass and vegetation to pipeline corridor margin. Minimise area of vegetation clearance along side of existing easement.	Minor Adverse Significance	Minor Adverse Significance

Site	Impact Description	Mitigation	Significance of Impact	Residual Impact
Viewing Location 7 **Towrang Road**	Pipeline corridor with grass seeding rehabilitation through existing cleared agricultural landscape Existing gas easement. Clearing of some trees on far side of Wollondilly River Additional construction works around Wollondilly River crossing. Air and scour valves. Close to residences	Natural regeneration and / or rehabilitation of grass and vegetation to pipeline corridor margin. Minimise area of vegetation clearance. Minimise disturbance at river crossing and rehabilitate to 'as is' or better standard.	Minor Adverse Significant	Not Significant
Viewing Location 8 **Murray's Flat Road**	Pipeline corridor with grass seeding rehabilitation through existing cleared agricultural landscape Existing railway line between works and residence. Air and scour valves. Close to residences	Natural regeneration and / or rehabilitation of grass and vegetation to pipeline corridor margin. Minimise area of vegetation clearance.	Not Significant	Not Significant
Viewing Location 10 **Racecourse Drive**	Pipeline corridor with grass seeding rehabilitation through existing cleared agricultural landscape Clearing / disturbance of landscaped area in front of Goulburn Racecourse main buildings Air and scour valves. Close to residences	Shift construction corridor to run adjacent to racecourse landscaped areas, rather than through. Use road corridor. Natural regeneration and / or rehabilitation of grass and vegetation to pipeline corridor margin. Minimise area of vegetation clearance.	Minor Significance	Minor Significance

Site	Impact Description	Mitigation	Significance of Impact	Residual Impact
Viewing Location 11 **Goulburn Woodlands Reserve**	Pipeline corridor with grass seeding rehabilitation through existing densely vegetated bushland hillside Air and scour valves. Close to residences with views oriented towards reserve Recreational walkers	Shift construction corridor to run around north side of reserve, rather than through. If corridor runs through reserve, reduce width as far as practicable. Natural regeneration and / or rehabilitation of grass and vegetation to pipeline corridor margin. Minimise area of vegetation clearance.	Highly Significant	Minor Significance

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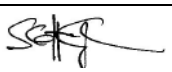
A	T Hyland	T Hooper		S Graham		221209
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