Appendix K

Landscape and visual impact assessment and addendum

Environmental impact statement

watersecurity
MAJOR PROJECTS

Landscape & Visual Impact Assessment

Murrumbidgee to Googong Water Transfer

June 2009

ACTEW
CORPORATION

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Glossary of Terms & Abbreviations

Term	Definition
Built Form	The component features of buildings, streets and spaces that make up built structure/s.
Cumulative impact	The summation of impacts that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.
Element	A component, part or feature of the landscape (e.g. river, tree, hedges, bush). Groups of features of the soft landscape, for example roadside planting, street trees, open space.
Enhancement	Landscape improvement through restoration, rehabilitation, reconstruction or creation.
Heritage	Historic or cultural associations.
Indirect impact	Impacts on the environment that are not a direct result of the development but are often produced away from it or as a result of a complex association, such as off-site traffic movements.
Landscape	Soft features of the urban, suburban, rural or natural environment, such as vegetation and green open spaces.
Landscape baseline	A description of the environment as it is currently (year 2008) and as it could be expected to develop if the project were not to proceed (up to the planned opening year).
Landscape condition	Based on judgements about the physical state of a particular landscape/area, and about its visual and functional intactness. It also reflects the state of repair of individual features and elements that make up the character of any one place.
Landscape evaluation	The process of attaching value (non-monetary) to a particular landscape area, usually by the application of previously agreed criteria, including consultation and third party documents, in the context of the assessment.
Landscape impact	Change in the elements, characteristics, character and qualities of the landscape as a result of development. These impacts can be positive or negative.
Landscape feature	Prominent eye-catching elements, or example a church spire, monument, distinctive landmark building, significant mature specimen tree that contributes to landscape character through appearance or specific civic use.
Landscape quality	Largely subjective judgement based on particular characteristics that influence the way in which the environment is experienced, including special interests such as cultural associations or heritage interests, the presence and/or type of elements and condition.
Landscape resource	The combination of elements that contribute to landscape context, character and value.
Landscape sensitivity	The extent to which landscape can accept a change of a particular type and scale without unacceptable adverse impacts on its character.

Term	Definition
Landscape value	Areas of formally designated landscape that through national or local consensus, reflect the value placed by society on particular environments and/or their features.
Magnitude	A combination of the scale, extent and duration of an impact.
Methodology	The specific approach and techniques used for a given study.
Mitigation	Measures, including any process, activity or design to avoid, reduce, remedy or compensate for adverse landscape and visual impacts of a development project.
Perception (of landscape)	The psychology of seeing and possibly attaching a value and/or meaning (to landscape).
Public open space	Land provided in urban or rural areas for public recreation, though not necessarily publicly owned.
Receptor	Physical landscape resource, special interest or person and/or viewer group that will experience an impact.
Residual impact	An impact that occurs/persists after mitigation measures have been put in place.
Sense of place	The essential character and spirit (genius loci) of an area.
Sustainability	The principle that the environment should be protected in such a condition and to such a degree that ensures new development meets the needs of the present without compromising the ability of future generations to meet their own needs.
Landscape regeneration	The re-use or redevelopment of decaying or run-down parts of landscape/areas to bring them new life, vitality, quality and value.
Visual amenity	The value of a particular area or view in terms of what is seen.
Visual impact	Changes in the appearance of the landscape or in the composition of available views as a result of development, to people's responses to these changes, and to the overall impacts in regard to visual amenity. This can be positive (i.e. beneficial or an improvement) or negative (i.e. adverse or a detraction).
Visual envelope	Extent of potential visibility to or from a specific area, feature or proposal.
Zone of visual influence	Area within which a proposed development may have an influence or impact.

Abbreviations	
ACT	Australian Capital Territory
CMA	Catchment Management Authority (e.g. Murrumbidgee CMA)
CMP	Construction Management Plan
EEC	Endangered Ecological Community
EIA	Environmental Impact Assessment

Term	Definition
EMP	Environmental Management Plan
HLPS	High Lift Pump Station
LEP	Low Lift Pump Station
LGAs	Local Government Areas
LLPS	Low Lift Pump Station
Local area	According to the NSW Department of Environment and Climate Change guidelines for Section 5A of the *Environmental Planning and Assessment Act* 1979 (NSW) 'significance assessment tests' the *local area* is synonymous with the *study area*.
LVIA	Landscape and Visual Impact Assessment
M2G	Murrumbidgee River to Googong Dam raw water transfer project.
MRC	Murrumbidgee River Corridor
NSW	New South Wales
PCL	Parks, Conservation and Lands division of TAMS
sp.	Species (singular)
spp.	Species (plural)
study area	The area that is the subject of the study.
Sub-region	CMA Catchment sub-region (e.g. Monaro sub-catchment within the Murrumbidgee CMA)
TAMS	Territory and Municipal Services, ACT Government
UK	United Kingdom

1 Introduction

1.1 Purpose of this report

ACTEW Corporation Limited (ACTEW) proposes to undertake the Murrumbidgee to Googong Water Transfer Project (referred to in this report as 'the project'). This report has been prepared to provide an assessment of the landscape and visual impacts of the project as an input to the environmental impact assessment. The environmental impact assessment is being prepared in accordance with the requirements of Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and the ACT *Planning and Development Act 2007.*

The report addresses the requirements of the Director-General of the NSW Department of Planning (the Director-General's Requirements) dated 7 October 2008 and the Final Scoping Document prepared by the ACT Planning & Land Authority (the Scoping Document) dated 16 December 2008.

1.2 Project overview

In recent years the Australian Capital Territory (ACT) region has been experiencing severe drought conditions coupled with increased demand for water. Canberra and Queanbeyan have been subject to level three water restrictions since 2006. The current drought, together with predicted climate change and population growth, is driving the search for a more reliable water supply for the ACT. In response to this need, the ACT Government developed the Water Security Program, which identified a range of new water supply projects.

The project is one of the preferred options for delivering improved security to the ACT's water supply. It involves pumping water from the Murrumbidgee River (within the ACT) and transferring it via a pipeline to the Googong Reservoir via Burra Creek (in NSW). The Googong Reservoir supplies water treated to drinking quality standards to the ACT.

The project involves construction and operation of infrastructure required to transfer approximately 100 ML/day of water a distance of approximately 13 km from the Murrumbidgee River to Burra Creek.

The infrastructure required to transfer the water includes an intake/low lift pump station; a high lift pump station; an underground pipeline; a discharge structure and a power supply.

1.3 The location of the project

The intake/low lift pump station (LLPS) would be located on the east bank of the Murrumbidgee River, in the ACT, approximately 34 km south of Canberra. It would be located in an area known as Angle Crossing, approximately 4 km west of Williamsdale on the Monaro Highway.

The high lift pump station (HLPS) would be located within the ACT, approximately 290 m to the east of the intake/low lift pump station.

The pipeline would cross rural land in an east/north-east direction for approximately 13 km. It is located in the vicinity of Williamsdale and Burra Roads, within the districts of Williamsdale and Burra. The majority (approximately 10.2 km) of the pipeline would be located in NSW, with approximately 2.8 km located in the ACT.

The pipeline would discharge to the discharge structure, located on the banks of Burra Creek, just downstream of an existing flow measuring station approximately 10 km south of Googong Reservoir. The discharge structure is located within land know as the Googong Foreshores, which is Commonwealth land within NSW.

Refer to Figure 1 for project location.

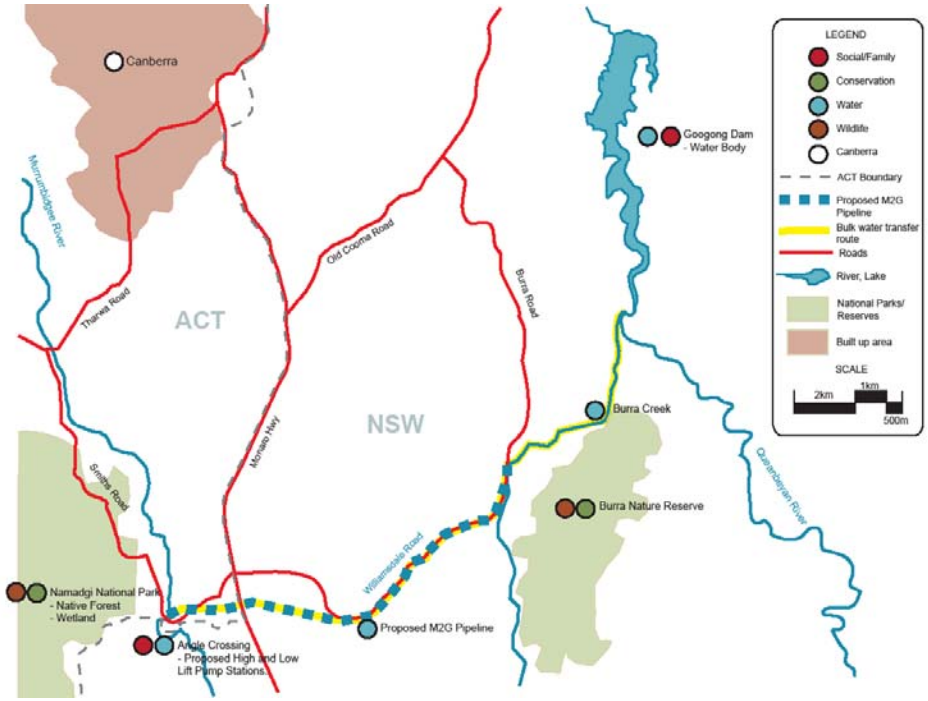

Figure 1 **Location of the Murrumbidgee to Googong pipeline, HLPS, LLPS and discharge site.**

2 Scope of Assessment

2.1 General

This section assesses the potential landscape and visual impacts associated with the proposed 'preferred' M2G pipeline (hereafter known as 'the project' or 'the proposal') alignment and associated infrastructure. This report includes:

- A description of the project design and visual components.
- A description of the relevant consultation, legislation, policies and guidelines that have been used to inform the assessment.
- Methodology adopted for the assessment of impacts upon landscape character and visual amenity.
- A description of the limitations and assumptions of this method.
- An evaluation of the baseline landscape and visual context.
- Discussion of visual receptor sensitivity within the study area through the use of representative publicly accessible viewpoints.
- An assessment of the significance of impacts upon landscape character and visual amenity as a direct result of the proposals based upon an evaluation of publicly accessible viewpoints.
- Proposed mitigation strategies.
- Discussion of residual impacts.
- A summary of the results of the assessment.

2.2 Assumptions of the Landscape and Visual Impact Assessment (LVIA)

A number of *assumptions* have been made for this assessment, as outlined below.

2.2.1 Construction Phase

- Some areas along the pipeline route will be required on a temporary basis to provide storage areas (stockpiles & equipment) to support construction. These will include: site compound at the LLPS; pipe lay down at Angle Crossing in the existing gravel car park area; site office and crib facilities at the proposed HLPS site; pipe lay down and storage facility on Angle Crossing Road; main office, pipe lay down and storage facility near to the corner of Angle Crossing Road and the Monaro Highway; three pipe lay down and / or spoil and pipe storage areas on Williamsdale Road, and; discharge structure lay down. Refer to the construction management plan for details.
- Only impacts associated with construction activities occurring (during the construction phase) within the project boundary have been considered, with the exception of site compound and lay down areas outlined above.
- The pipeline corridor will be rehabilitated post construction through earth works to tie in with the surrounding environment and grass and groundcover seeding appropriate to the local context and in line with ACT & NSW standards.
- The width of the construction corridor will not be more than 40m, and may be reduced in environmentally sensitive areas (eg. creek lines and forest).
- The LVIA is based on the BWA's proposed construction methodology.

2.2.2 Operation Phase

- As the project (during operation) is primarily underground within NSW, with a combination of above ground elements and underground pipeline within the ACT. Most landscape and visual impacts relate to the visual appearance of the construction works that will be phased, temporary and restricted to the construction period. Although phased, the type of impact will generally be consistent across the pipeline corridor and are therefore assessed on a site wide basis. Some key areas where the construction activity is likely to be more intense have been identified within the text.
- Baseline conditions have been assessed in October 2008.
- Project mitigation measures are addressed on a site wide basis, with key areas (LLPS, HLPS, pipeline & outlet) addressed separately.
- The intake site/LLPS and discharge structure will not be lit at night.
- The HLPS will be externally lit at night for security purposes to the building only, with internal lighting when personnel are present (night time emergency situations only).
- Night time lighting impacts have not been assessed within this LVIA chapter, but have been considered within the broader EIS mitigation strategies.
- Site specific operational impacts are detailed within the assessment as six (6) sites defined by landscape character and state / territory borders.
- During operation, maintenance and repair works will occur infrequently on restricted sections of the pipeline at any one time, during daylight hours.
- The operational pipeline corridor width (15m) will remain free of trees and shrubs during operation.
- The pipeline at creek crossings is assumed to be underground.
- The mini hydro power station will be located near the end of the proposed M2G pipeline, within the 40m wide pipeline construction corridor.

2.3 Limitations of the LVIA

There are a number of *limitations* associated with this assessment, as follows.

1. There is no guidance on the assessment of landscape and visual impacts specific to Australia. Therefore, United Kingdom (UK) publications have been referenced where relevant for LVIA.
2. For the purpose of this report, general assumptions have been made in order to appraise the impact of the construction works upon landscape resources and visual amenity based upon similar pipeline projects and specialist advice.
3. The LVIA process aims to be objective and describe any changes factually. Potential changes as a result of the project have been defined, however, the significance of these changes requires qualitative (subjective) judgements to be made. The conclusions to this assessment therefore combine objective measurement and professional interpretation.
4. The exact location of the mini-hydro power station and electrical sub-station had not been refined at the time of writing this assessment.

3 Methodology

3.1 General

The methodology used to undertake baseline environment documentation and assessment of landscape and visual impacts is outlined below.

Landscape and visual assessments are presented separately, but are strongly interrelated.

3.2 Baseline Environment

A description of the baseline (existing) landscape and visual environment has been documented as outlined below.

3.2.1 Desktop analysis

- GIS and aerial photography were initially applied to generate a viewshed map to define the area from which the project may be seen. However, the broad level of detail of available contour information was not sufficient to produce a useful result or influence the selection of viewpoints. Visibility information for a given viewpoint could only be identified with a low level of confidence using the viewshed map, therefore viewpoints were selected on site and represent potential receptors (i.e. residents, road users, nature recreation users).
- Representative (potentially) publicly accessible and representative viewpoints were identified in a range of locations from aerial photography & topographic maps.
- Identification and grouping of potentially affected receptors (residents, road users, recreation facility users, etc) from aerial photography.
- Identification of potential local landscape character and visual context areas for site assessment purposes from existing mapping information.
- A review of existing information and collation of planning and statutory data.
- Establishment of LVIA methodology.

3.2.2 Site Evaluation

- Undertaken by Landscape Architects and Environmental Scientists in October 2008 during conditions of good visibility.
- Establishment of the baseline environment.
- Verification of the desktop study, and provision of more detailed information about the site and likely impacts.
- Publicly accessible and representative viewpoints were confirmed, recorded and photographed and included in the appraisal of significance. Photographs of viewpoints within Section 5 represent a range of typical views possible from that locality to the project. These viewing situations reflect particular landscape and /or visual features of importance within the visual environment and local landscape character. Generally, they represent views from key visual receptors (residents & road users) where a potentially significant change in view may occur.
- Cross reference to ecology and cultural heritage assessments was made to identify sensitive locations.

3.3 Assessment of Impacts

A qualitative assessment of landscape and visual impacts has been undertaken.

The significance of impacts have been evaluated using a combination of two factors; *landscape impacts;* and *visual impacts,* as defined below.

3.3.1 Landscape Impact

Landscape impacts refer to the relative capacity of the landscape to accommodate changes to the physical landscape of the type and scale proposed, that would occur as a direct result of the project, through the introduction of new features or loss/modification of existing features. Impacts have been assessed from a publicly accessible and representative viewpoint and consider (through professional judgement) the scale, or magnitude, of change including:

- The extent to which the change (modification, removal and / or addition) of landscape features alters the existing landscape character.
- The extent of area within which the effect is evident.
- The duration of the effect (short / medium / long term, permanent/temporary).
- The physical state (or condition) of the landscape and its intactness from visual, functional, and ecological perspective. This includes consideration of the condition of landscape elements (eg. groups of features within the soft landscape including roadside planting, open space, recreational facilities, creek lines, tree, bush blocks), or features (eg. prominent eye-catching elements such as a distinctive building and/or its setting, significant mature specimen tree, lookout point, etc) and their contribution to landscape character. Individual features and elements make up the character of a place and influence how the landscape is experienced.
- The effectiveness of any proposed mitigation.

Assessment definitions used to describe this assessment are presented below in Table 2. Colour codes shown in the 'Landscape Impact' column have also been replicated in Section 6 Assessment to highlight the magnitude of change for each character area.

Table 1 Assessment of Landscape Impact

Landscape Impact	Definition
Large	A substantial / obvious change to the landscape due to total loss of, or change to, elements, features or characteristics of the landscape. Cannot be mitigated.
Moderate	Discernible changes in the landscape due to partial loss of, or change to the elements, features or characteristics of the landscape. May be partly mitigated.
Small	Small / minor changes in the landscape due to minor loss of, or change to the elements, features or characteristics of the landscape. Change may be mitigated.
Negligible (no perceivable impact)	Almost imperceptible or no change in the view as there is little or no loss of / or change to the elements, features or characteristics of the landscape.

3.3.2 Visual Impact

Visual impacts arise from changes in views of the landscape that occur as a result of the project. Visual impact is determined through the objective assessment of *sensitivity* of the visual receptors (i.e. residents, transport route users, outdoor recreational facility users) and the magnitude (scale)

of the change in view. Sensitivity is dependent upon receptors': location; the importance of their view; their activity (i.e. working, recreating, passing through) and expectations; available view, and; the extent of screening of this view.

Factors that have been considered in assessing the magnitude of change in view/visual amenity of receptors include:

- Interest in the visual environment and their distance/angle of view to the source of the impact.
- The extent of screening / filtering of the view.
- Magnitude of change in the view (i.e. loss/addition of features that change the view's composition).
- Integration of changes within the existing view (form, mass, height, colour and texture).
- Duration of the effect (temporary/ permanent, intermittent/ continuous).
- Effectiveness of proposed mitigation.

Receptor sensitivity definitions used to describe this assessment have been outlined in Table 3 below. Colour codes shown in the 'Sensitivity' column have also been replicated in Section 6 Assessment to highlight the magnitude of change for each character area.

Table 2 Assessment of Receptor Sensitivity

Sensitivity	Definition
High	Occupiers of residential properties with long viewing periods, within close proximity, whose interest is focussed upon their surrounding landscape and its amenity, and who value their landscape setting. Users of outdoor recreational facilities including nature reserves, and nature recreation (walking, horse riding trails, water based activities such as swimming and fishing) where their attention is focussed on the landscape and its amenity. These viewers go to such sites specifically for their perceived value of its views and amenity. Communities that place value upon the landscape and enjoyment of views of their landscape setting.
Medium	Workers on farms with a focus on their activity / work, and that may have discontinuous/intermittent views of the study area. Outdoor recreation facility users (i.e. sporting ovals, tennis courts, cricket nets, children's play equipment) where their attention is focussed upon a particular activity (i.e. sport). Occupiers of residential properties with long viewing periods, at a distance from or screened from the study area.
Low	Road users in motor vehicles, trains or on transport routes that are passing through/adjacent to the study area and therefore have short term views and are generally not focussed on the landscape. Viewers indoor at their place of work/volunteering where they are engaged and focussed on a particular activity (e.g. the Bushfire Brigade).

3.4 Simulations

Indicative simulations within Section 6 have been prepared from key locations to illustrate potential changes in the existing view as a direct result of the project. Simulations indicate new visual components in the first year of operation, any landscape mitigation proposals, the loss of existing features and the fit, type and scale of proposals within the existing physical landscape. Locations have been selected to represent changes (potential impacts) to landscape character and/or visual amenity that have been considered important by this assessment.

Images have been generated using computer aided design software including digital data (aerial photo, survey information), 3D building model (SketchUp) information and Adobe Photoshop software.

3.5 Significance of Impact

For the purposes of this report, predicted impacts as a direct result of the project have been described according to their significance (severity). Significance of impact has been determined in accordance with the criteria outlined in Table 4 below that reflect the landscape and visual impact assessment outcomes defined above. Only impacts judged to be of '*major significance (adverse)'* or '*highly significant (adverse)'* have been considered as 'significant' for the purposes of this project. Significance of impact may be beneficial or adverse.

Table 3 Significance of Impact

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

4 Planning, Statutory Requirements & Guidance

Relevant legislation, policy and guidance with only direct relevance to landscape character and visual amenity are outlined below.

4.1 ACT

4.1.1 Googong Foreshores Draft Plan of Management, Territory and Municipal Services, 2007

This document acknowledges the Googong Foreshores are valuable and attractive. It states that biological diversity, cultural heritage and recreational opportunities are to be retained. The Plan requires that a best practice approach be adopted for the management of the reservoir and water quality. The landscape character and visual amenity outcomes of the project are to be influenced by values of natural heritage, with particular focus on biodiversity and landscape values.

4.1.2 Territory Plan, ACT Planning & Land Authority, R14, January 2009

Development is subject to the requirements of the Territory Plan, which must not be inconsistent with the requirements of the National Capital Plan. The Territory Plan is the ACT Government's primary planning tool. The proposed development works pass through zones NUZ4 (River Corridor) and NUZ2 (Rural). Part B, Element 3 of the Non-Urban Development Code has the intent of ensuring development is in character with the rural setting and views from public places to regional features are maintained, and to protect the amenity of users with regard to safety, access and security measures. Relevant River Corridor Zone objectives include conserving the ecological and cultural values of ACT major river corridors. Relevant Rural Zone Objectives include conserving the "distinctive rural landscape setting of Canberra…" and "reinforcing a clear definition between urban and rural land".

4.2 NSW

4.2.1 Pipelines Act (1967), New South Wales Government, 1 July 2008.

This act relates to the construction, operation and maintenance of pipelines, under which this project will apply for a pipeline licence to acquire land and / or easements over which the pipeline and associated infrastructure would be located. This licence must not be refused if the project is approved under Part 3A of the EP&A Act. Conditions of licence (Section 15) include taking measures as the Minister may require for conserving and protecting scenic attractions and other values. This includes the reinstatement, levelling, regressing, re-foresting and contouring of any lands that may be damaged or deleteriously affected by the licensee.

4.2.2 Yarrowlumla Local Environment Plan (LEP) 2002, (Palerang Council, NSW Government Environmental Planning and Assessment Act, 6th July 2007).

The Yarrowlumla LEP was developed to introduce planning controls that will encourage ecologically sustainable development. The land management authority within the Palerang local government area is guided by the requirements of this plan. Of direct relevance to this report as set out within the LEP is consideration of visual impacts to:

- Streams and Rivers (Division 3).
- Vegetation (Division 5).
- Zone 1(a) General Rural Zone.

- Zone 1(d) Rural Residential Zone – objectives of the zone are to conserve natural landscape qualities, protect and enhance attractive views from main roads and other vantage points, and to ensure landscaping complements the natural scenic quality of the area.
- Land development within 400 metres of the Monaro Highway (Schedule 1) is required to consider the impact to the visual corridor of regional importance and viewed from the Highway, including the consideration of mitigation measures.

4.2.3 ACT and NSW Regional Planning Framework for Natural Ecosystems of the ACT and NSW Southern Tablelands (Fallding *et al*, 2001)

Developed to provide a strategic framework that addresses the uncertainties of the planning process and provides effective habitat conservation for the region. Part 5 of this document outlines a framework for natural ecosystem planning for the region under which some areas of habitat fall within various planning settings.

4.3 Commonwealth

4.3.1 Australian Capital Territory (Planning and Land Management) Act (1988), National Capital Authority, 13 May 2007.

The primary purpose of this Act is to prepare and administer a National Capital Plan, which represents the Commonwealth interest in the Territory. Works within some areas of the ACT will require approval according to special requirements dictated by the National Capital Plan, despite the areas of interest not being within a designated area. Specifically, these requirements relate to the associated visual impacts of the works on the land flanking the Monaro Highway (outside the road reserve but within 200 metres of the road centreline) and those for the Murrumbidgee River Corridor (MRC).

4.4 General Standards & Guidance for LVIA

There is no guidance on the assessment of landscape and visual impacts specific to Australia. However, the industry typically refers to guidance offered by the British Institute of Landscape Architects in the United Kingdom. This assessment has been conducted in accordance to the Guidance for Landscape and Visual Impact Assessment (2002) published jointly by The Landscape Institute and the Institute for Environmental Management and Assessment (UK).

5 Project Description & Existing Environment

5.1 General

Landscape character and visual context are described both on a regional level and at a local level, as set out below.

5.2 Regional Landscape Character

5.2.1 Landscape Character & Landform

The study area falls into two local Landscape Units as used by Fallding *et al* (2001): Tharwa and Royalla units. Units are identified on the basis of similar ecological, social, economic and administrative characteristics (Fallding *et al* 2001) using a range of parameters including: topography; climate; vegetation type and cover; conservation values; land use; tenure; and, catchment and management issues.

The landform associated with M2G pipeline corridor is variable, with an elevation range of between approximately 600m on the Murrumbidgee River at Angle Crossing to over 1,120m at Gibraltar Hill. The western extent (Angle Crossing and Murrumbidgee River) is characterised by deeply incised hills and gorges carved by the Murrumbidgee River. To the east surrounding Burra Creek the topography is undulating, to gently undulating.

The rural land to the east and west of Monaro Highway, as well as that east of the Gibraltar Rise is characterised by broad low lying plains of the Jerrabomberra and Tuggeranong Valleys and smaller flood plains associated with Jerrabomberra Creek. Gibraltar Rise, an abruptly rising ridge line with dense vegetation, physically and visually dissects these areas.

5.2.2 Soils

The study area is situated within the Murrumbidgee Valley on Williamsdale Soil Landscape, Burra soil Landscape and Campbell Soil Landscape – soils are generally well drained (Biosis, 2007). Minor and moderate sheet erosion is widespread, mass movement is evident on steep slopes, and gully erosion is common along drainage lines (Biosis, 2007).

5.2.3 Land Use

The project is largely located within a highly modified agricultural landscape. Local land uses include mostly livestock grazing and small scale cropping with scattered rural residential properties.

Small rural centres occur at Williamsdale on the Monaro Highway, and Burra on Burra Road to the eastern most reach of the route. Individual rural residential properties are scattered throughout.

Utilities include road, power, water and communications easements, mining (Williamsdale Quarry).

In the region there are a number of conservation and nature reserves, including:

- MRC and Gigerline Nature Reserve in the ACT.
- Approximately 2km north east of Burra is the Burra Creek Nature Reserve in NSW.
- Approximately 5km to the west of Angle Crossing within the ACT is the eastern-most boundary of the nationally significant Namadgi National Park.
- Approximately 10km to the south of Burra is the Tinderry Nature Reserve, forming part of the Southern Tablelands under NSW state legislative protection.

- The Burra discharge site and mini-hydropower station fall within the western-most boundary of the Googong Foreshores, on Commonwealth land but within NSW, and is approximately 100m east of the Lagoon Road/Burra Road intersection. Googong Foreshores are both a regional and national resource.
- A number of other small conservation areas are listed on the Register of the National Estate, including: the Bombala Railway corridor; Braidwood Rural Lands Protection Board Travelling Stock Reserve (TSR), and; various other parks and road reserves.

5.2.4 Vegetation

Vegetation varies according to aspect, soil, topography, drainage and disturbance and is generally open to sparse, consisting of shrubs, grasses, and tree canopy. Pockets of remnant vegetation communities exist, some of which are recognised as endangered ecological communities (EEC) including box gum grassy woodlands and natural temperate grassland. Noxious weed species are also prevalent in some areas including *Eragrostis curvula, Rubus rubiginosa, Echium plantaginum, E. vulgare, Hypericum perforatum and Marrubium vulgare (*Biosis, 2007).

Non-native pasture and weed affected areas occur widely across the study area and are associated with agricultural activity, poor weed management practices and a range of development, infrastructure and erosive disturbances (Biosis, 2007).

Detailed vegetation assessments have been undertaken as part of the EIA report.

5.3 Local Landscape Character & Visual Context

For the purposes of this assessment the project has been divided into six (6) areas based upon local landscape character and State / Territory borders, as indicated on the map and described in section 5.4 and 5.5 below, including photos of existing conditions. Refer also to Figure 2 and Figure 3.

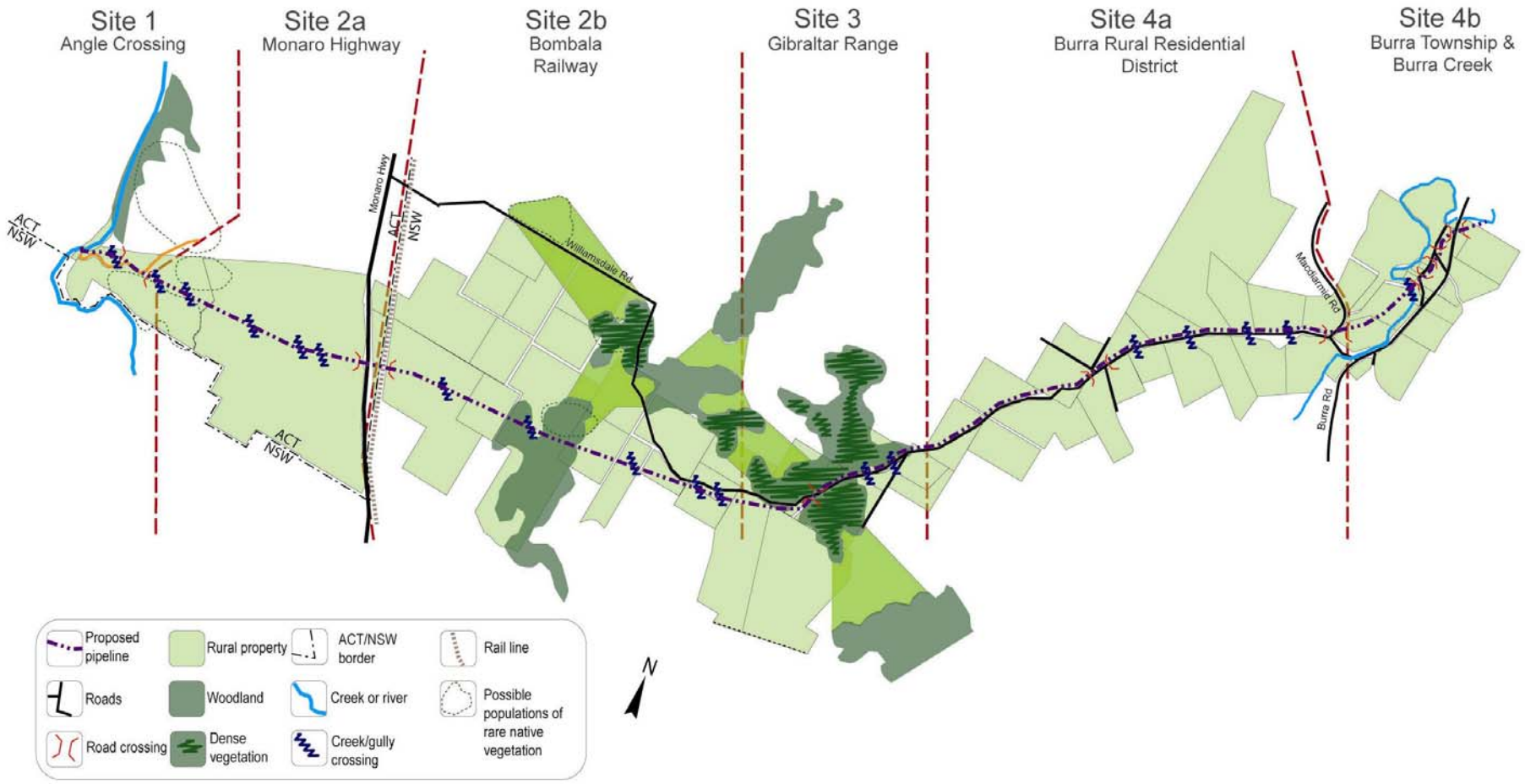

Figure 2 Location of the six sites based upon landscape character and ACT / NSW borders

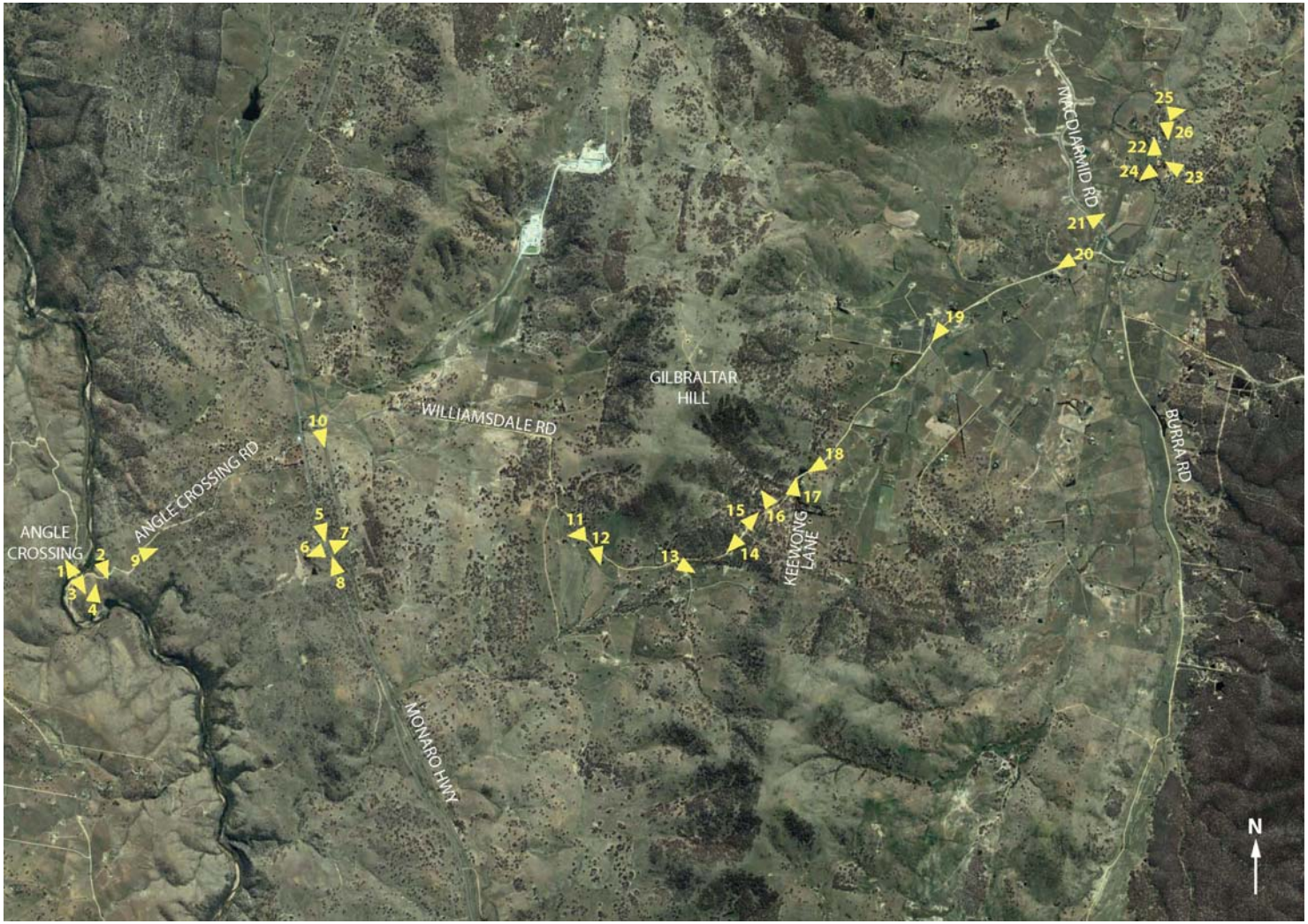

Figure 3 – Location of photos taken as shown in Baseline Conditions below.

5.4 ACT

5.4.1 Site 1 Angle Crossing

Table 4 Site 1 Angle Crossing Baseline Conditions

Typical local landscape character (from publicly accessible viewpoints)	 Photo 1 – View north across the MRC and the river crossing from Angle Crossing Road  Photo 2– View south from Angle Crossing Road to the Boat Harbour recreation area within MRC across a fire affected and modified agricultural landscape.  Photo 3 – View south east from the northern edge of the Murrumbidgee River to the beach and river crossing on Angle Crossing Road. The character of the locale comprises deeply incised hills and gorges, a riparian zone scarred by fire and with a mix of indigenous and European planting, parking area, informal paths and restroom facilities.  Photo 4 – View north of Angle Crossing Road and the MRC across a fire affected and modified agricultural landscape with deeply incised MRC.
Landform	This site forms the western-most extent of the pipeline and is associated with deeply incised hills and gorges formed by the Murrumbidgee River. The landform in the vicinity of the proposed HLPS and intake site is characterised by deeply incised hills and gorges along the Murrumbidgee River valley, and smaller drainage lines along Guises and Lobbs Hole Creek.
Vegetation	**LLPS** Generally, Angle Crossing is a highly disturbed site due to vegetation clearing, fires, road construction and recreation and associated activities. Riparian vegetation along the MRC is a relief in this highly modified, sparsely vegetated landscape, consisting of shrubs, grasses and occasional trees. Emergent vegetation is common along the river edge and is in good condition. Generally, vegetation is regenerating after damaging bushfires in

	2003. Significant vegetation areas have been outlined Riparian and fringing vegetation along the river flats and sand wash areas of the Murrumbidgee River including dense stands of *Typha orientalis* and *Juncus* sp. rushlands, *Carex apressa* sedgelands and *Phragmites australis* reedlands (Biosis, 2007). The riparian vegetation of the MRC (adjacent to the intake site) has been impacted by fire and is regenerating. The vegetation is dense close to the river becoming more sparsely vegetated on some of the upper slopes. There is also substantial weed growth within this corridor. Natural Temperate Grassland EEC within the MRC. Yellow Box *Eucalyptus melliodora*, Blakely's Red Gum *Eucalyptus blakelyi* woodland on the lower slopes and flats north and south of Angle Crossing. HLPS The HLPS site is sparsely vegetated, dominated by grass and weed species with some smaller shrubs. This vegetation has low habitat value potential (Biosis, 2007). *Kunzea ericoides*, *Acacia dealbata* and *Bursaria spinosa* shrub land along the lower slopes of the MRC with Brittle Gum *Eucalyptus mannifera* on steep rocky gully slopes of the MRC up river of Angle Crossing (Biosis, 2007). Various associations of dry sclerophyll forest including Broad-leaved Peppermint *Eucalyptus dives,* Apple Box *E. bridgesiana* and *E. mannifera* on rocky mid slopes and dry drainage gullies east of the MRC. Site 1 Pipeline The majority of the vegetation between Angle Crossing and the ACT/NSW border at Bombala Railway comprises grassy woodland that meets the floristic requirements of Box Gum Grassy Woodland Endangered Ecological Community (EEC). Highly modified woodland and non-native pasture. Along Angle Crossing Road moderate to good quality grassland and woodland communities with a moderate to high diversity of native species exist, including grasses *Themeda australis, Austrodanthonia sp*., forbs *Chrysocephalum apiculatum, Wahlenbergia stricta, Swainsona sericea, Leptorhyncos squamatus, Leucochrysum albicans var.tricolor* (Biosis, 2007).
Land Use	Local land uses include have been identified below. **LLPS** The MRC in the vicinity of Angle Crossing is located within the Gigerline Nature Reserve. This area is managed by Parks, Conservation and Lands within the ACT Government Department of Territory and Municipal Services. Land located on the southern side of the Murrumbidgee River is under the ownership of the Mogo Aboriginal Land Council. Road, power and communications infrastructure. The LLPS site is located adjacent to the Murrumbidgee River and is in the vicinity of pools, flowing water and small rapids. Vehicle access across the Murrumbidgee River is provided at Angle Crossing. ACT Parks Conservation and Lands advises that the Angle Crossing area is visited by an average of 15,000 to 25,000 people per year. Visitors pursue fishing recreation during the fishing season, utilising primarily the boat-hole area of the Murrumbidgee River. The remainder of recreation-pursuing visitors come to the Angle Crossing area to swim and picnic at the beach

	site. The main recreation area located near the vehicle crossing is supported by a car parking area and toilet facility. Additionally, informal 4WD tracks, parking areas, lookout points on Angle Crossing Road, access roads and walking trails exist within the local area. **HLPS** A parking area and lookout points currently exists at the proposed HLPS site on Angle Crossing Road affording views north and south along the MRC. **Site 1 Pipeline** Rural land uses such as cattle grazing and pasture improvement. Conservation Land Management. Road, power and communications infrastructure.
Visual Context	Views within Site 1 are experienced by: **LLPS** Users of the MRC nature appreciation and recreation. The winding nature and vegetation of the river edges in this location affords users a variety of spaces including: quiet areas separated by vegetation and open beach areas for socialising. The surrounding steep topography encloses views to the river corridor itself. Users come to the site for the specific purpose to recreate and enjoy the natural landscape, and therefore have a high interest in their visual environment and the amenity it provides. The MRC has a strong public interface with views important to both local and regional users. However, the surrounding landscape is not pristine and is generally degraded as a result of fire damage, modifications for agriculture, human use (informal walking and car trails, car parking, toilet block, road river crossing, etc) and introduction of exotic plant species to the MRC. Road users passing through the MRC on the informal 4WD access track to the Boat Harbour. **HLPS** Recreational drives who stop at lookout points on Angle crossing road, with long uninterrupted views north, south and west along/across the MRC. The visual landscape is generally dominated by treeless hills, or scattered trees in native and/or modified grasslands. The river and its topography is a key element of local character providing visual and landscape relief from the surrounding environment. Distant views of surrounding mountains and foreground views of the MRC are also key parts of the visual environment from a variety of locations from within the local area. However, these views are limited due to the surrounding hills. **Site 1 Pipeline** Outdoor farm workers / farmers focussed upon a particular activity. Road users passing through the study area on Angle Crossing Road.

5.4.2 Site 2a Monaro Highway (to the western edge of the Bombala Railway corridor defining the NSW/ACT border)

Table 5 Site 2a Monaro Highway Baseline Conditions

Typical local landscape character (from publicly accessible viewpoints)	 Photo 5 – View south along the Monaro Highway to the pipeline (underground) /highway intersect indicating adjacent open bushland roadside character.  Photo 6 – View west from Monaro Highway into modified scattered woodland habitat.  Photo 7 – View east from Monaro Highway towards the Bombala Railway line into modified open bushland.  Photo 8 – View north from a residence's driveway on the Monaro Highway through open bushland towards the pipeline route.  Photo 9 – View north east from Angle Crossing Road through open forest along the proposed pipeline alignment.
Landform	The western extent of the pipeline route is characterised by broad, elevated, flat to undulating plains.
Vegetation	This site (within the pipeline corridor) is generally associated with significant, but modified (for agriculture), open forest with a low understorey of scattered shrubs and grasses. Mature trees (20-25m in height) are present with natural forest regeneration occurring in some areas. Significant vegetation areas include (Biosis, 2007): ◗ Angle Crossing Road Reserve and the Bombala (also known as

	Michelago or Canberra to Cooma) Railway Reserve – consists of highly diverse grasslands and threatened species such as Small Purple-pea *Swainsona recta* and Silky Swainson-pea *Swainsona sericea*. ◗ The majority of the vegetation between Angle Crossing and the ACT/NSW border at Bombala Railway comprises grassy woodland that meet the floristic requirements of box gum grassy woodland EEC. ◗ Vegetation between the Monaro Highway and the Bombala Railway corridor comprises: good quality Box Gum Grassy Woodland with many large hollow-bearing trees and groundcovers with moderate to high diversity. ◗ Box Gum Grassy Woodland remnants, secondary grasslands and groundcovers that range from poor (highly modified and weedy) to very good in condition (high quality of high conservation value) within the Bombala railway corridor (*Themeda australis, Austrodanthonia sp*., *Chrysocephalum apiculatum, Wahlenbergia stricta, Swainsona sericea, Leptorhyncos squamatus, Leucochrysum albicans var.tricolor)*. ◗ Highly modified woodland and non-native pasture, with slightly greater diversity along the area directly east of the Monaro Highway but for the most part is weed affected. Additionally, there are some areas of highly modified vegetation that are largely sparse, consisting of shrubs, grasses and occasional trees.
Land Use	Public rural land and rural properties comprise the land use of these areas. Both public and private land is used for electricity lines and the major Monaro Highway. Rural land use including agricultural practices such as livestock grazing and pasture improvement. Scattered rural residences occur throughout the site. The small community of Williamsdale (petrol station and few local residents) exists approximately 700m to the north of the pipeline alignment on the Monaro Highway.
Visual Context	Views within Site 2a are experienced by: ◗ Activity focussed outdoor farm workers / farmers. ◗ Road users passing through the study area on the Monaro Highway. ◗ Road users along Angle Crossing Road passing through, approximately 300-500m to the north of the project. ◗ Views of the landscape 200m to the east and west of the Monaro Highway are recognised as important within the National Plan. ◗ One residential property approximately 300m to the south of the study area on the Monaro Highway. These residents have long viewing periods through open woodland, and whose interest is focussed upon the surrounding landscape and its amenity, and who value their landscape setting. Views are composed of landscape elements that vary from being generally degraded as a result of fire damage and modifications for agriculture, to intact and regenerating open forest habitat surrounding the Monaro Highway and Bombala Railway.

5.5 NSW

5.5.1 Site 2b Bombala Railway (western edge of the Bombala Railway corridor defines the NSW/ACT border).

Table 6 Site 2b Bombala Railway Baseline Conditions

Typical local landscape character (from publicly accessible viewpoints)

Photo 10 – View south from Williamsdale Road (700m north of pipeline/railway intersect from a publicly accessible viewpoint) along Bombala Railway indicating partly modified grassland habitat.

Photo 11 – View south west along Williamsdale Road along the pipeline alignment across a modified landscape of grazing land, highly degraded drainage and creek lines and scattered trees.

Photo 12 – View east along Williamsdale Road across a modified agricultural landscape, with scattered trees and areas of open forest within the Gibraltar Range foothills.

Photo 13 – View south east from Williamsdale Road towards the Gibraltar Range, open forest areas, and modified agricultural land. Rural residential properties are located at elevation, within the Gibraltar Range foothills with views north across the proposed pipeline route.

Landform

The rural land to the east of Monaro Highway is characterised by broad low lying plains of the Jerrabomberra and Tuggeranong Valleys and smaller flood plains associated with local creeks including Lobbs Hole Creek, Waterhole Creek, Deep Creek and Guises Creek.

Vegetation

This site is associated with highly modified vegetation that is largely sparse, with some areas of modified woodland to the foothills of the Gibraltar Range (consisting of low shrubs, grasses and occasional trees). European trees (e.g. established Poplars) are present along eroded creek and drainage lines. Significant vegetation areas include (Biosis, 2007):

- Some areas of remnant Box Gum Grassy Woodland EEC interspersed with grazing paddocks.
- Yellow Box *Eucalyptus melliodora*, Blakely's Red Gum *Eucalyptus blakelyi* woodland in association with Williamsdale Road.
- Variable combinations of *Eucalyptus nortonii, E. bridgesiana, E. melliodora, E. pauciflora, E. dives, E. rossii, E.goniocalys, E. rubida* woodland / open forest along Williamsdale Road.
- Native pasture with generally low species diversity typically associated with

	paddocks exposed to fertilization and/or higher grazing pressure.
Land Use	Public rural land and rural properties comprise the land use of these areas. Public land is used for electricity lines and rail. This section of the Bombala Railway Line (including the local Michelago Railway Reserve) is mostly closed, with the nearest local platform (Williamsdale platform) having been closed since 1975. Occasional historic tours are run on the line from Cooma to Chakola (south of this site) by Cooma Monaro Railway. Rural land use including agricultural practices such as livestock grazing and pasture improvement. Rural residential development also occurs on this land.
Visual Context	Views within Site 2b are experienced by: ◗ Rural residential properties scattered through the study area with long viewing periods. Views are generally filtered through scattered trees and/or across open grazing land, and whose interest is focussed upon the surrounding landscape and its amenity, and who value their landscape setting. ◗ Residents within the foothills of the Gibraltar Range with direct views east to the study area and the Gibraltar Range. ◗ Activity focussed outdoor farm workers / farmers. ◗ Local road users and heavy goods vehicles passing through on the unsealed Williamsdale Road, which is lined with occasional trees or groups of trees. Views are composed of a modified agricultural landscape, creek flood plains and a backdrop to the east of Gibraltar Range.

5.5.2 Site 3 Gibraltar Range

Table 7 Site 3 Gibraltar Range Baseline Conditions

Typical local landscape character (from publicly accessible viewpoints)	 Photo 14 – View south west along Williamsdale Road to the Gibraltar Range ridgeline, adjacent to residential property and highlighting significant native vegetation (open forest).  Photo 15 – View south west along Williamsdale Road within the Gibraltar Range foothills to significant riparian vegetation within a drainage line, and roadside vegetation.  Photo 16 – View north from Williamsdale Road to Gibraltar Hill lookout and open forest adjacent to residential property and highlighting significant native vegetation (open forest).
Landform	The Gibraltar Range is an abruptly rising ridge line with the peak of Gibraltar Hill lookout at an elevation of 1,100m.
Vegetation	Gibraltar Rise is associated with dense vegetation. Significant vegetation areas include (Biosis, 2007): ◗ To the west of the Gibraltar Range ridgeline, vegetation includes: Eucalyptus dives, *E. bridgesiana* and occasional *E. melliodora* Dry Sclerophyll Woodland/Forest with shrub layers including *Melichrus urceolatus, Bursaria spinosa, Acacia dealbata, Bossiaea buxifolia, Cassinia longifolia, Daviesia mimosoides, Exocarpus cupressiformis* and *Cryptandra amara* and a diverse groundcover dominated by *Joycea pallida, Vittadinia spp., Stackhousia monogyna, Solenogyne spp.*, and uncommon species including *Microseris lanceolata, Calotis scabiosifolia*. Weeds were generally sparse and concentrated along disturbance edges. ◗ Vegetation to the east of the ridgeline is generally Box Gum Grassy Woodland. ◗ Open woodlands interspersed with paddocks and dense woodland/forest in which disparate endangered ecological communities are present. ◗ Variable combinations of *Eucalyptus nortonii, E. bridgesiana, E. melliodora, E. pauciflora, E. dives, E. rossii, E.goniocalys, E. rubida* woodland / open forest on the lower Gibraltar Ranges slopes.

	◗ Variable combinations of Snow Gum *Eucalyptus pauciflora, E. bridgesiana*, *E. mannifera*, *E. dives-E. nortonii,* Candlebark *E. rubida* and *E. melliodora*-woodland (occasionally as open forest) occur as small patches around the Gibraltar 'saddle'. ◗ Yellow Box *Eucalyptus melliodora*-Blakely's Red Gum *E. blakelyi*, *E. bridgesiana* grassy woodland EEC typically occurs west of Gibraltar 'saddle' although in various forms and conditions.
Land Use	The majority of this character area is forested, with modified landscape to the foothills due to agriculture. One residence exists adjacent to the pipeline corridor with entry to the property off Williamsdale Road. Several residences occur within the foothills with views towards Gibraltar Hill and associated forest. Recreational walkers use public forest areas for nature recreation/ walking and to/from the Gibraltar Hill lookout.
Visual Context	Views within Site 3 are experienced by: ◗ Local road users and heavy goods vehicles passing through the study area on the unsealed Williamsdale Road. The road itself is generally enclosed in this location by tree canopies within adjacent forest. ◗ Recreational walkers within the Gibraltar Range that may cross over the study areas, and may experience a variety of views of the study area from its Gibraltar Hill. One residential property partially screened by open woodland vegetation (i.e. tree canopies connecting with an open understorey). Wide views of the local area are available from Gibraltar Hill. Informal walking trails within the range may cross the study area but are generally enclosed and/or filtered by forest vegetation, in varying (good to average) condition.

5.5.3 Site 4a Burra Rural Residential District

Table 8 Site 4a Burra Rural Residential District Baseline Conditions

Typical local landscape character (from publicly accessible viewpoints)	 Photo 17 – View north along Keewong Lane, adjacent to a residential property, with significant pine (wind break) planting and roadside trees.  Photo 18 – View south west along Williamsdale Road to a residence on the corner of Keewong Lane. Significant pine planting to the north within the proposed pipeline corridor.
	 Photo 19 – View east along Williamsdale Road across rural properties with Gibraltar Range forming a scenic backdrop.  Photo 20 – View south west from Williamsdale Road to rural properties and European planting with the Gibraltar Range forming a scenic backdrop.
Landform	The eastern extent of the pipeline route is characterised by broad, low-lying plains of the Jerrabomberra and Tuggeranong Valleys and small flood plains associated with Jerrabomberra Creek, Burra Creek and local drainage lines.
Vegetation	◗ This character area is associated with highly modified vegetation that is largely sparse, consisting of shrubs, grasses, small plantations and occasional trees, including (Biosis, 2007): ◗ Yellow Box *Eucalyptus melliodora*, Blakely's Red Gum *Eucalyptus blakelyi* woodland along parts of Williamsdale Road. ◗ Along parts of Williamsdale Road moderate to good quality grassland and woodland communities with a moderate to high diversity of native species exist, including grasses *Themeda australis, Austrodanthonia sp.*, forbs *Chrysocephalum apiculatum, Wahlenbergia stricta, Swainsona sericea, Leptorhyncos squamatus, Leucochrysum albicans var.tricolor.* ◗ Variable combinations of Snow Gum *Eucalyptus pauciflora, E. bridgesiana*, *E. mannifera*, *E. dives-E. nortonii,* Candlebark *E. rubida* and *E. melliodora*-woodland (occasionally as open forest) occur variably along the northern sections of Williamsdale Road east of the Gibraltar Range. ◗ Non-native pasture and weed affected areas within a largely agricultural landscape.

	◗ Native pasture with generally low species diversity typically associated with paddocks exposed to fertilization and/or higher grazing pressure. ◗ A small plantation of exotic Monterey Pine *Pinus radiata* on Williamsdale road (north of Keewong Lane/Williamsdale Road intersection). ◗ Windbreak planting along fence line of exotic Monterey Pine *Pinus radiata* and eucalyptus species. ◗ *Eucalypts* sp. plantings along Williamsdale Road. ◗ A mix of exotic and native planting to rural residential properties' gardens.
Land Use	The Burra rural district is associated with rural properties and agriculture.
Visual Context	Views within Site 4a are experienced by: ◗ Residents with prolonged viewing opportunities of the study area along Williamsdale Road. Views are generally filtered by garden planting, or across open agricultural landscape with windbreak planting in places along fence lines. This includes several rural residences to the west of Macdiarmid Lane set within cleared agricultural land, elevated above the study area, and with direct and clear views ranging from 50 - 200m in distance from the corridor. Some of these residences also have views north east towards Burra township and its landscape setting, and to Burra Creek which is a feature carving through the open agricultural landscape. ◗ One residential property on the corner of Keewong Lane and Williamsdale Road with filtered views north through a windbreak Pine planting north towards the study area (less than 50m away). ◗ Activity focussed outdoor farm workers / farmers. ◗ Local road users passing through the study area on Williamsdale Road, Keewong Lane, Badgery Road and Macdiarmid Road. Views are composed of a modified agricultural landscape, creek flood plains, degraded creek and drainage lines, Burra township setting and a backdrop to the west of Gibraltar Range.

5.5.4 Site 4b Burra Township & Burra Creek

Table 9 Site 4b Burra Township & Burra Creek Baseline Conditions

Typical local landscape character (from publicly accessible viewpoints)

Photo 21 – View north east from Macdiarmid Road towards Burra township, rural residences, modified agricultural landscapes and degraded creek and drainage lines and exotic tree planting.

Photo 22 – View north along Lagoon Road, within Burra township towards pipeline intersect.

Photo 23 – View west across Burra Park recreation grounds on Lagoon Road with the Gibraltar Range forming a scenic backdrop. Facilities include a children's playground, cricket / football oval, tennis courts, BBQ / picnic area, and outhouses / facility buildings.

Photo 24 –Burra Station Homestead adjacent to Burra Creek. Its setting and entrance statement is reinforced through traditional European 'avenue'/windbreak planting of established *pinus* species, garden planting and relationship with local features such as Burra Creek and associated topography.

Photo 25 – View west from Burra Creek Road, along Burra Creek indicating incised and modified riparian landscape. Googong Foreshores is approximately 200m in the distance.

Photo 26 - View south along Burra Creek Road towards Burra township and the pipeline intersect.

Landform The eastern extent of the pipeline route is characterised by broad, low-lying plains of the Jerrabomberra and Tuggeranong Valleys and small flood plains associated with Jerrabomberra Creek and Burra Creek and local drainage lines.

Vegetation

This site is associated with highly modified vegetation that is largely sparse, consisting of shrubs, grasses and occasional trees. Remnant riparian vegetation is generally associated with Burra Creek. Communities have been outlined below (Biosis, 2007)

Site 4b Pipeline

- Variable combinations of *Eucalyptus nortonii, E. bridgesiana, E. melliodora, E. pauciflora, E. dives, E. rossii, E.goniocalys, E. rubida* woodland / open forest north of the Burra/Williamsdale Road intersection.
- East of Burra Road the TSR contains moderate to good quality grassland and woodland communities with a moderate to high diversity of native species exist, including grasses *Themeda australis, Austrodanthonia sp*., forbs *Chrysocephalum apiculatum, Wahlenbergia stricta, Swainsona sericea, Leptorhyncos squamatus, Leucochrysum albicans var.tricolor.*
- Variable combinations of Snow Gum *Eucalyptus pauciflora, E. bridgesiana*, *E. mannifera*, *E. dives-E. nortonii,* Candlebark *E. rubida* and *E. melliodora*-woodland (occasionally as open forest) occur along Burra Road north of the Williamsdale/Burra Roads intersection.
- Native pasture with generally low species diversity typically associated with paddocks exposed to fertilization and/or higher grazing pressure.
- Non-native pasture and weed affected areas.
- Planted exotic trees Monterey Pine *Pinus radiata* at Burra village.
- *Eucalypts* sp. plantings near Burra.

Outlet

- Burra Creek includes dense stands of *Typha orientalis* and *Juncus* sp. rushlands, *Carex apressa* sedgelands and *Phragmites australis* reed lands.
- *Eucalyptus pauciflora- E. rubida-E. bridgesiana* grassy woodland in small patches along Williamsdale Road and more extensively along Burra Creek east from Burra Road.

Degraded riparian vegetation (Willows Salix sp. and Poplar Populus sp.) along Burra Creek between Williamsdale Road and Burra Road, and in-stream weeds including Curly Pondweed *Potamogeton crispus*.

Land Use

Site 4b Pipeline

The Burra rural district land use is primarily rural properties, the Burra village centre and access roads. Agricultural practices are common on rural properties. The Burra Station Homestead and its setting (entry statement, gardens, established trees, location on Burra Creek) is a feature within the local landscape.

Burra Park forms the heart of the township with facilities including a sporting oval (cricket and football pitch), children's play facilities, BBQ's, toilets, tennis courts, a consolidated recycling bin collection point, pavilion, established trees and parking.

The Burra Bushfire Brigade is located on Lagoon Road, adjacent to Burra Park.

Outlet

This site is also associated with Burra Creek, which flows into the Googong Foreshores. The Googong Foreshores is a popular recreation area with facilities supporting activities such as picnicking, bird watching, bushwalking, mountain bike riding, sailing, canoeing and fishing. Burra Creek is highly disturbed and eroded in parts with a mix of native and European planting.

Visual Context

Views within site 4b are experienced by:

Site 4b Pipeline

- Residents with long viewing periods whose interest is focussed upon their surrounding landscape and its amenity. This includes several rural residences to the east of Macdiarmid Lane set within cleared agricultural land and with direct and clear views of the study area ranging from less than 30m to 200m in distance from the corridor. Overhead power lines are also present within this view. Some of these residences also have views north east towards Burra township and its landscape setting, and to Burra Creek which is a feature carving through the open agricultural landscape.
- Burra Park outdoor recreation facility users (i.e. sporting ovals, tennis courts, cricket nets, children's play equipment, BBQ and pavilion facilities) where their attention is focussed upon a particular activity (i.e. sport/play/social).
- The Burra local community that place value upon the intimate character of the township's landscape setting, cultural heritage and enjoyment of views.
- Activity focussed outdoor farm workers / farmers.
- Activity focussed fire fighters from the Burra Bushfire Brigade.
- Road users passing through the study area on Williamsdale Road, Burra Road, Macdiarmid Road, Lagoon Road and private roads through Burra township.
- Views of Burra township and the rural landscape are locally important. Landscape elements within the Burra Recreation Reserve are generally in good condition as a result of management and frequent use.

Outlet

- Views to the outlet site are limited to infrequent users that may venture upstream from the Googong Foreshores, and/or users pursuing nature recreation activities including fishing and nature recreation along Burra Creek.

6 Assessment of Impacts

6.1 General

Construction impacts are assessed route wide due to their short term duration and similarity of impacts across the site.

Impacts during operation are assessed from individual, publicly representative viewpoints.

The method of construction and range of equipment that the contractor would use has been based upon information provided in the M2G Construction Methodology Draft Report (January 2009, Version 4) prepared for the Bulk Water Alliance.

This section should be read in association with Section 7 Mitigation, below.

As detailed in Section 3.5 above, significance of impacts have been assessed using the matrix below (i.e. magnitude of landscape change / impact x visual sensitivity = significance of impact). Colour codes identify the assessment outcome (i.e. magnitude of landscape impact and sensitivity of receptor) and are represented throughout the assessment tables below.

Table 10 Significance of Impact

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

6.2 Construction Phase

Project construction will create short-term impacts primarily relating to the visual appearance of the works. These will be temporary and restricted to the construction period. General assumptions have been made in order to make a site wide assessment of the impact of the construction works. Essentially, the construction will affect the same areas as those affected by the operation phase. However, the magnitude of change is likely to be greater.

6.2.1 Route Wide Landscape Impacts During Construction

- Activities that will represent a physical change in the existing landscape during construction have 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 HLPS, LLPS, inlet and outlet structures, mini-hydro power station (underground) (Refer figure 4), mobile sub-station, underground transmission cable and electrical substation, 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, road widening).
- Major works at the HLPS site, and the intake site within the MRC including earthworks, vegetation clearance, ground modelling and building works.

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

Figure 4 Example of a mobile electrical sub-station.

6.2.2 Route Wide Visual Impacts During Construction

The construction site will 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 Monaro Highway, local roads and private roads.
- Outdoor workers (including farmers, maintenance workers, fire brigade volunteers/workers) with a moderate interest in their environment.
- Nature recreation and Burra Park activity focussed users (i.e. fishing, nature conservation, swimming, other water based activities, ball sports, bar-b-que & sports pavilion users) and tourists that value the local visual amenity.

Receptors that will experience a change in their visual environment are generally likely to view construction activities from a short distance, through scattered vegetation across gently undulating topography of flood plain areas along the project corridor. Steep topography and areas of dense bushland as proscribed by the MRC and the Gibraltar Range will restrict and screen the scope of views in some areas. Construction activities will be viewed within the context of a largely modified agricultural and/or fire affected landscape with existing transport corridors.

However, the number of residential receptors (some of which are immediately adjacent to the works site) within close proximity of the study area, and the major works planned at Angle Crossing (intake site, HLPS, LLPS) within the popular MRC recreation area suggests that they are of **high sensitivity**.

The main visual impacts likely to be experienced during construction will 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 to 40m width.
- Open cut creek crossings.
- Coffer dam and floating silt curtain at Angle Crossing
- Lighting during night time construction activities (if required) and site compounds.
- 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; and labour camps (to be confirmed).
- 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.
- Suspension of access to some public areas (e.g. car parking area at Angle Crossing, removal of car park at the HLPS site) preventing opportunities for stopping to view the MRC.

6.2.3 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 and nature recreation receptors and changes in the landscape within the MRC. However, impacts will be temporary and restricted to the construction period**.**

6.3 Operation Phase

6.3.1 Route Wide Landscape Impacts During Operation

The following landscape impacts will result scheme wide during operation:

- A new treeless linear pipeline corridor to maximum 15m wide.
- Replacement / reinstatement landscape planting during the establishment period immediately post-construction.
- Permanent loss of some landscape elements/features.
- Permanent loss of some vegetation.
- Creation of new access road, parking and associated planting at the HLPS.
- Addition of associated above ground pipeline infrastructure / structures including maintenance access, signage, air and scour valves (refer Figure 4), mini-hydro power station (underground)

above ground auxiliary components (and mobile electrical sub-station increasing the number of permanent static elements.

6.3.2 Route Wide Visual Impacts During Operation

The majority of receptors identified within the viewshed mapping will be motorists travelling along roads that cross the proposed pipeline corridor and residents that live in proximity to the project. Other receptors will include agricultural workers and passive and activity focussed recreation users.
During operation, the pipeline will generally be an underground linear feature within a largely modified rural and partly fire affected environment. Landform surrounding the scheme and the elevation of structures will be the key determinants of visibility of the project. Vegetation will have a localized influence. Views of the project will generally be limited to close receptors and those crossing the pipeline corridor on roads.

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

- The intake site, HLPS, LLPS (including associated security fencing, parking, services, access roads, landscaping), outlet site, mini-hydro power station and mobile electrical sub-station.
- The treeless pipeline corridor width itself of 15m.
- 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 (refer also to noise assessment report within the EIA, and Figure 4) at regular intervals along the pipeline.
- New and/or altered road infrastructure: retaining structures, signage, parking bays, statutory facilities, etc.
- Landscape changes outlined above will impact upon the composition of the view.

Figure 5 Example photograph of an air valve from a similar pipeline project.

6.4 ACT Local Site Assessment

6.4.1 Site 1 Angle Crossing

Table 11 Site 1 Angle Crossing Assessment

Existing View

Simulation 1 – Simulation indicating view south west of the intake structure from the north side of the MRC, adjacent to Angle Crossing.

Existing view

Simulation 2 – Simulation indicating view west from Angle Crossing Road of the HLPS.

Existing view

Simulation 3 – Simulation idicating view east from Angle Crossing within the MRC to the HLPS.

Existing view

Simulation 4 – Simulation indicating view south from Angle Crossing Road to the HLPS structure in the distance.

Project elements

LLPS Intake site, LLPS (0.5ha footprint approximately), small realignments to Angle Crossing Road associated with the maintenance access to the rear of the LLPS, ground modelling / recontouring, rehabilitation planting (riparian, marginal, screen planting), bank stabilisation works including rock batters, rip-rap drainage lines, sediment traps, de-watering zone, gravel hard standing, 100mm kerb to the upstream side of the causeway, maintenance cranes (periodically).

HLPS

The HLPS is located within this site, adjacent to the Murrumbidgee River in the vicinity of Angle Crossing. This pump station is on a hill top to the north of the Angle Crossing Road. Elements will include: security night lighting to the building; the pump station and sub-station (42m long x 11m wide x 8m height building footprint); access road to accommodate articulated trucks; realignment of Angle Crossing Road; three (3) number car parks; chain mesh security fencing around the HLPS to 1.8m height; a 25m height solid concrete microwave tower (1m diameter at the base, 300mm diameter to the top); rehabilitation planting and landscape works (grassland, woodland and screen planting); rip rap scour protection; signage; batters; guide posts to roadsides; new drainage lines to road side.

Pipeline

HLPS pipeline (underground) and associated infrastructure, scour valves, air valves.

The transmission line to the HLPS from the mini-hydro power station and mobile electrical sub-station will be underground and will run along the pipeline route.

Landscape Impact

LLPS

Although there is strong evidence of existing human intervention and use at Angle Crossing, the proposed LLPS and intake site will constitute structural additions out of character with the MRC natural landscape that will be in clear view from the beach and north western side of the MRC. Ground modelling will tie in to, and complement existing contours. Native riparian and marginal vegetation will be reinstated but will take time to establish.

HLPS

Although there is strong evidence of existing human intervention and use surrounding the HLPS site and the wider landscape is generally degraded as a result of agriculture and fire, the HLPS (including microwave tower, road works, batters and new planting) will still form a prominent new feature within the landscape. It will constitute a discernable change to the character of the MRC due to the exposure (elevation) of the site, and design elements of the structure. Modifications to the landscape will include levelling of the hill top, new, access road layout, car parking, security fencing, new grass seeding and planting to disturbed soil areas, batters and the building itself.

Lighting is necessary for the operation and maintenance of the site, or for security purposes. However due to the nature of the site (i.e. natural environment with no existing ambient lighting) light pollution may cause a variety of impacts including an intrusion into an intrinsically dark landscape, impediment to viewing the night, sky and 'sky glow'.

Pipeline

The pipeline route itself (15m wide) will remain free of trees, with disturbed soils re-profiled to tie into existing contours and rehabilitated with native grass / low shrub seeding.

Generally, the new scheme elements outlined above will not fit with the existing landform, scale or character of the landscape. New planting will take time to establish. However, changes will be seen within the context of largely modified landscape, degraded by fire. Therefore, it is anticipated that there will be a moderate adverse landscape impact.

Visual Impact

This view will be experienced by:

LLPS

- Users of the MRC nature and recreation reserve, including the Boat Hole for walking, horse riding, bird watching, water based activities (e.g. swimming, fishing) where their attention is focussed on the immediate and surrounding landscape. These viewers go to the MRC because they value its amenity. The intake site will be seen from the northern side of the MRC, and from those engaged in water based activities. The HLPS and microwave tower will be visible from a wide catchment due to its elevation and form – both within and surrounding the MRC.

HLPS

- The HLPS and microwave tower will interrupt/be a prominent feature in views for road users travelling west and south towards the MRC, and Angle Crossing, on Angle Crossing Road. For those travelling west along Angle Crossing Road towards the MRC, this will be an eye-catching structure in the foreground, distracting the viewer from the surrounding MRC landscape.

Site 1 Pipeline

- Activity focussed outdoor workers (farmers) from the escarpments and

	hills surrounding the project. Views of the MRC are locally valued and enjoyed by receptors with views for prolonged periods at any one time. However, new elements will be seen within the context of a landscape in generally poor to average condition. This suggests that receptors are generally of **medium sensitivity**.
Assessment of Significance of Impact	**Moderately Significant Adverse Landscape & Visual Impact**

6.4.2 Site 2a Monaro Highway

Table 12 Site 2a Monaro Highway Assessment

Project elements	The treeless pipeline route to 15m wide rehabilitated with grass; air valves; scour valves; gates to fence lines; access roads A proposed location for the termination of the transmission cable (from the mini-hydro power station) is at a mobile sub-station (on the back of a trailer) that will be located about 1.5km up Angle Crossing Road from the HLPS.
Landscape Impact	The pipeline will not be a prominent new feature in this landscape, as it will be underground. However, there will be a change in the local landscape forested character (box gum woodland) through an overall local reduction in the quantity of trees, shrubs and grassland as a result of clearing a linear corridor. The pipeline corridor itself will remain free of trees and shrubs. Rehabilitation of disturbed soils will comprise grass seeding that will reflect the surrounding habitat and will take time to establish, and/or naturally regenerate. As the changes in landscape character are localised (i.e. loss of vegetation), it is anticipated that the project will result in a **small adverse landscape impact.**
Visual Impact	A change in view will be experienced by: ◗ Farm workers / farmers adjacent to the pipeline corridor will view the mobile sub-station, treeless linear pipeline corridor and removal of established trees within forest areas. ◗ Small to moderate numbers of road users on Angle Crossing Road and the Monaro Highway will have clear long views along the treeless linear pipeline corridor (new long views east and west) and rehabilitation clearance areas with grass seeding, that will take time to establish. They may also have passing views of the mobile sub-station. ◗ One residential property (on the Monaro Highway) approximately 150m south of the alignment may experience a change in view due to the loss of trees. However, views will be filtered by existing forest. Small numbers of viewers that are either at a distance from the project, have filtered views, are passing through the site or are focussed on an activity suggests receptors are generally of **low sensitivity**.
Assessment of Significance of Impact	**Not significant**

6.5 NSW Local Site Assessment

6.5.1 Site 2b Bombala Railway

Table 13 Site 2b Bombala Railway Assessment

Project elements	The treeless pipeline route to 15m wide rehabilitated with grass; air valves; scour valves; gates to fence lines; creek crossings; access roads.
Landscape Impact	The pipeline will not be a prominent new feature in this modified agricultural landscape, as it will be underground. However, the project will cause some changes in landscape character through: ◗ The loss of isolated established trees (both native and exotic) within paddocks and along creek/drainage lines, the edge of Williamsdale Road and fence line windbreak planting. ◗ Loss of trees (to 20-25m in height), shrubs and native grass habitat to the Bombala Railway corridor. ◗ Treatments at creek or drainage line crossings. The pipeline corridor crosses four creek and drainage lines in this site, all of which are highly degraded in parts. ◗ The pipeline corridor itself that will remain free of trees and shrubs. ◗ Rehabilitation of disturbed soils that will comprise grass seeding to reflect the surrounding habitat. Planting will take time to establish, and/or naturally regenerate. As the changes in landscape character are localised and isolated (i.e. loss of established trees) and within a modified landscape that is degraded in areas (i.e. creek & drainage lines, sheet erosion) it is anticipated that the project will result in a **small adverse landscape impact.**
Visual Impact	A change in view will be experienced by: ◗ A number of residents at elevation to the project will view the linear corridor within the landscape in the short term whilst disturbed soils are rehabilitated. Scours, air valves and gates within fence lines will also form a new component within their view. ◗ A number of residents within the foothills of the Gibraltar Range will have will have clear long views east along the treeless linear pipeline corridor (through a forested area and at rising elevation) and of rehabilitation of clearance areas with grass seeding that will take time to establish. ◗ Farm workers / farmers adjacent to the pipeline corridor will view the treeless linear pipeline corridor and removal of some established trees along creek/drainage lines, windbreaks and road sides. ◗ Small number of road users on Williamsdale Road will have views to the treeless linear pipeline corridor and rehabilitation of clearance areas with grass seeding that will take time to establish. The presence of a number of residents that value their landscape setting and local visual amenity suggests receptors are generally of **medium**

	sensitivity.
Assessment of Significance of Impact	**Landscape & visual impact of Minor Adverse Significance**

6.5.2 Site 3 Gibraltar Range

Table 14 Site 3 Gibraltar Range Assessment

Project elements	The treeless pipeline route to 15m wide rehabilitated with grass; air valves; scour valves; gates to fence lines; drainage line crossings; access roads.
Landscape Impact	There will be a change in the local landscape forested character of the Gibraltar Range through an overall local reduction in the quantity of trees (including established trees 20-25m in height), shrubs and grassland as a result of clearing a linear corridor. This will occur within forested areas, at the Williamsdale Road crossing, and to drainage lines within the foothills. The pipeline corridor itself (15m wide) will remain free of trees, with disturbed soils re-profiled to tie into existing contours and rehabilitated with native grass seeding that will take time to establish. Changes in landscape character will be localised. However, it is anticipated that the project will result in a **moderate adverse landscape impact** due to the opening up of the previously enclosed Gibraltar Range forest canopy and immediate natural environment within the study area.
Visual Impact	A change in view will be experienced by: ◗ Occasional nature and recreation reserve users who both value and focus their attention on the immediate and surrounding landscape amenity will pass through the study area, and will view the treeless corridor cutting through the forest from Gibraltar Hill. ◗ One residential property that will have filtered views through forest vegetation to the study area of a local reduction in the number of trees, and rehabilitation to clearance areas with grass seeding that will take time to establish. ◗ Small numbers of local road users with a passing interest in their visual environment who will view a more open forest canopy at the Williamsdale Road crossing point, and loss of trees to the foothills east of the ridgeline. Small numbers of viewers that recreate in the area occasionally, are passing through or have filtered views suggests that re generally of **low sensitivity**.
Assessment of Significance of Impact	**Landscape & visual Impact of Minor Adverse Significance**

6.5.3 Site 4a Burra Rural District

Table 15 Site 4a Burra Rural District Assessment

Project elements	The treeless pipeline route to 15m wide rehabilitated with grass; air valves; scour valves; gates to fence lines; drainage line crossings; access roads.
Landscape Impact	The project will cause some small changes in landscape character that will not be out of context with the surrounding modified and open (generally clear of vegetation) agricultural environment through:

	◗ The loss of few isolated trees (both native and exotic) within paddocks and along the edge of Williamsdale Road, Macdiarmid Road and isolated trees from windbreak planting. ◗ The loss of some established exotic pine plantation trees to the edge of Williamsdale Road, opposite Keewong Lane, will create a more open environment, but will be within the context of an already modified landscape. The pipeline corridor itself will remain free of trees and shrubs. Rehabilitation of disturbed soils will comprise grass seeding that will reflect the surrounding habitat and will take time to establish, and/or naturally regenerate. As the changes in landscape character are localised, isolated and not out of context with the existing modified, open, agricultural landscape that is degraded in areas, it is anticipated that the project will result in a **negligible landscape impact.**
Visual Impact	A change in view will be experienced by: ◗ A number of residents slightly elevated above the study area will view the linear corridor within the landscape, the absence of some trees grass seeding rehabilitation to disturbed soils. Scours, air valves and gates within fence lines will also form a new component within their view. ◗ One resident directly adjacent to (approximately less than 50m) the corridor on the corner of Williamsdale Road and Keewong Lane with prolonged viewing opportunities filtered through pine planting to their garden. Scours and air valves will also form a new component within their view. ◗ Farm workers / farmers adjacent to the pipeline corridor will view the treeless linear pipeline corridor and removal of some established trees along creek/drainage lines, windbreaks and road sides and grass rehabilitation. ◗ Small number of road users on Williamsdale Road will have views to the treeless linear pipeline corridor and rehabilitation of clearance areas with grass seeding that will take time to establish. The presence of a number of residents that value their landscape setting and local visual amenity, and are at times in close proximity to the study area with clear views across an agricultural landscape suggests receptors are generally of **high sensitivity.**
Assessment of Significance of Impact	**Landscape & visual impact of Minor Adverse Significance**

6.5.4 Site 4b Burra Township & Burra Creek

Table 16 Site 4b Burra Township & Burra Creek

Existing View

Simulation 5 – Simulation of view east along Burra Creek to the discharge structure.

Project elements	Discharge site (0.5ha footprint approx.), pipeline (underground), scour valves, air valves, unsealed access road, fence to the top of the LLPS, ground modelling/recontouring to Burra Creek discharge site and crossing, rehabilitation planting, increased environmental flows and changes in water level, underground mini-hydro power station covered with a concrete slab (not shown in Simulation 5 above) with above ground auxiliary elements
Landscape Impact	**Pipeline** The pipeline alignment occurs along the north western edge of the Burra township, and passes close to residential properties and their gardens. Localised changes to the landscape as a result of the project will include creek crossing earthworks, tree and riparian planting removal and rehabilitation planting (woodland, screen planting, grassland and marginal planting). The loss and change in these elements will adversely affect the traditional and intimate rural setting of the township. Additionally, the project will result in a change to the landscape setting to the Burra Station Homestead. Some removal of garden, entry statement, riparian, isolated trees (both native and exotic) within paddocks and traditional European windbreak planting will be required. Earthworks will cause localised changes, particularly at Burra Creek. There is some opportunity to reinstate planting appropriate to this site.

Outlet

Generally, the outlet site will constitute new components out of character with the local Burra Creek riparian zone character. However, the nature of its location within the side of the bank, and use of natural materials inspired by the surrounding environment, will assist in integration. Earthworks (recontouring) to fit the structure and the addition of an access track (unsealed) to the site will cause localised change. New planting (woodland, screen planting, grassland and marginal planting) will take time to establish but in the longer term will assist in screening and integration of structural elements.

Increased environmental flow regimes (intermittent) will change volumes of water flowing towards Googong Foreshores and promote the occurrence/change in natural riparian habitat structure, allow for pools of water from time to time, and therefore change the landscape character of the creek environment itself. Downstream of the outlet, this may generate a beneficial effect for the local landscape character through promotion of a healthy living creek environment and improvement in recreation value and landscape amenity.

The mini-hydro power station will be underground is anticipated to be located within the 40m construction zone with a fooprint of approximately 30mx25m, near the outlet structure. A transmission line from the mini-hydro power station to the mobile electrical sub-station will be underground and within the pipeline route.

The changes in landscape character are localised, and will be out of context with the intimate nature of the township and Burra Creek natural environment to some degree. However, changes will be viewed within the context with the existing modified agricultural landscape, and degraded Burra Creek environment.

Therefore, it is anticipated that the project will result in a small adverse landscape impact within the Burra Township and at Burra Creek.

Visual Impact

Changes in view will be experienced by:

Pipeline

- Small numbers of residents between Macdiarmid Road and Burra township within an agricultural landscape setting. These receptors have prolonged viewing opportunities and are approximately 100 to 500m in distance from the study area. Generally views are open, on rising topography, and across the agricultural landscapes towards Burra township and Burra Creek. Scours and air valves will also a new component within their view. Rehabilitation planting will also be visible to Burra Creek and the pipeline corridor.
- One resident directly adjacent to (approximately less than 30m) the study area to the east of Macdiarmid Road, with open and prolonged viewing opportunities. Scours and air valves will also form a new component within their view. Rehabilitation planting will also be visible to Burra Creek and the pipeline corridor.
- Residents of Burra Station Homestead approximately 50m from the study area.
- Small numbers of local road users passing through, or on their way to/from Burra township on Lagoon, Burra, and Roads.
- Small numbers of activity focused outdoor workers (farmers, maintenance workers).
- Small numbers of activity focussed users of the recreational facilities

	within Burra Park and the Bushfire Brigade. **Outlet** ◗ Recreational users of Burra Creek and Googong foreshores who may be attracted to the amenity of increased environmental flows. ◗ The mini-hydro power station above ground elements The location, number, and prolonged viewing opportunity of receptors suggest they are of **high sensitivity**.
Assessment of Significance of Impact	**Moderately Significant Adverse Landscape & Visual Impact**

7 Mitigation Measures

7.1 General

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

Specific measures for key areas (i.e. HLPS and outlet site) would be further considered within concept design, the construction Construction Management Plan (CMP) developed prior to commencement on site.

7.2 Construction Phase

The CMP would aim to achieve construction of the scheme 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.

For the purposes of this assessment, as a minimum within the CMP it would be assumed that mitigation would include:

- 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 that which are necessary for 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.
- Identification of potential impacts to the MRC, including riparian and aquatic habitat systems during and post construction, and techniques for the preservation and protection of existing ecological and landscape values.
- Appropriate soil erosion prevention techniques would be employed.
- Alleviate soil compaction caused by construction activities, through ripping and cultivation.
- Dust control, as outlined within the CMP.
- ‘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.
- Seek to achieve a cut and fill balance of material on site, with reuse of excess material on site as part of landscape mitigation proposals, where appropriate.

- Vegetation rehabilitation, replacement planting and encouragement of natural regeneration to the pipeline corridor extents (i.e. to the furtherest extent of the 15m tree clearance zone) and at key locations *outside* the pipeline corridor (to be negotiated with land owners). This will optimise visual protection of receptors from above ground structures (i.e. screening and integration). New planting will consider appropriateness to local character and to enhance local biodiversity and habitat value.
- A weed management plan will need to be formulated in order to allow successful establishment of indigenous/native planting.

7.3 Operation Phase

Mitigation of landscape and visual impacts as a result of the project would strive to achieve a balance between all design disciplines to achieve an optimal outcome. The mitigation strategy for the LVIA will primarily focus on screening the project elements from view and designing the pipeline components in a way that minimises detrimental effects on visual amenity and landscape character. Measures have been outlined below.

7.3.1 General (Site Wide)

- Consideration of the appearance of new permanent features such as signage, fencing and gates.
- Appropriate revegetation of the study area as soon as possible after construction. Subject to weather conditions, it would be reasonable to assume that grasses and shrubs would establish within 12 to 24 months, with middle storey species and trees taking up to 5 years. Techniques would include collection and use of seed of local provenance, direct seeding, overlaying of removed vegetation, topsoil respreading and planting with tube stock. 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 to screen the residence within Site 2a (on the Monaro highway) from the pipeline route.
- Works that may damage areas of significant *off site* vegetation (including the root zone) are to be avoided.
- Above ground structures (eg. air and scour valves) would be designed and located to be as visually unobtrusive as can be technically achieved. Where possible, provision of high quality engineering / architecture would reinforce landscape character and distinctiveness, and minimise visual intrusion.
- Consider the impact to the landscape and visual setting to important cultural sites (Burra Station Homestead) and residences (garden setting, wider views of landscape).

Minimise the visual impacts of replacement / reinstated / repaired road surfacing and infrastructure. Replace / reinstate with robust materials to a consistent theme.

7.3.2 LLPS

There are opportunities for mitigation measures to the LLPS, as outlined below. However, these sites cannot be completely mitigated for because of their nature and location within the landscape. Desired results (rehabilitation planting, marginal and riparian planting) would take time to establish.

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 such as pruning and removal of dead wood; re-use of organic material); mulching; reinstatement and site preparation; provision of instream habitat; and; treatment of weed control areas.

There may be opportunities to incorporate the need identified by Parks, Conservation and Lands (PCL) to restore *Eucalyptus viminalis* that has a fibrous root system that would assist with bank stabilisation and habitat provision (aquatic and riparian). There are also a range of indigenous planting (Tee Tree, Acacia, and *Eucalyptus rubida* & *pauciflora*) that may be re-introduced to improve local habitat value.

Structures & Road Works

- The LLPS fence should be low profile.
- Rip rap drains should aim to re-use local rock exposed during excavation works.
- Siting of the access road is to be within the existing topography to minimise its visibility within the landscape.

7.3.3 HLPS

There are opportunities for mitigation measures to the HLPS, as outlined below. However, this site cannot be completely mitigated for because of its nature and location within the landscape. Desired results (new planting, rehabilitation & screen planting) would take time to establish.

Landscape Plans

Provision of a landscape design 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 such as pruning and removal of dead wood; re-use of organic material); mulching; reinstatement and site preparation, and; treatment of weed control areas.

Screen planting would assist in minimising the building's exposure (approximately 8m in height above the highest existing point) and lower components of the microwave tower, and assist in amelioration of scarring and soil disturbance. Planting locations are recommended to the north, western, eastern and road frontage (southern) areas of the proposed HLPS site.

Consideration of offset planting outside the pipeline corridor on lower slopes and within the MRC should be considered. This would reinforce screening of the structure, promote and link habitat, prevent erosion through soil stabilisation on steep slopes and encourage water quality enhancement of run-off from the site to the MRC. This includes gully areas into which the rip rap dissipater drains. Additionally, screen planting would assist in screening popular recreation areas (the Boat Hole and Angle Crossing beach) from intrusive views of the pump station, batters, rip rap drainage works and microwave tower.

There are opportunities for provision of visitor interpretation and signage. This may include information on their location, regional water sources, the purpose of structures, local water resource and cultural history.

High quality fencing will be required for the site, as well as the incorporation of security measures (casual surveillance) to the building to discourage anti-social behaviour (e.g. vandalism). It is recommended that fencing follow natural contour lines where possible.

Rip rap lined drains and significant earth works (including batters) should utilise natural, local materials, and where possible complement the local contours.

Lighting

A number of opportunities exist to mitigate light pollution, including:

- Appropriate lighting design to minimise light spill.
- Use of specifically designed lighting equipment that minimises the upward spread of light or glare towards receptors.
- The use of vegetation screening to assist in providing a perception of light while also contributing to a visual and landscape response.
- If lighting vertical structures (e.g. information signs) direct light downwards.
- Specify appropriate luminaries in sensitive locations to reduce spill light, sky glow and glare.
- Sensitive placement and specification of lighting to minimise any potential increase in light pollution within the natural environment.

7.3.4 Outlet Site

The discharge site would require specific treatments including:

- Appropriate indigenous riparian and marginal planting palette, weed removal and control with consideration of downstream increased environmental flows.
- Earthworks to consider bank stabilisation, erosion, water quality and tie in to existing contours.
- Integration of structural components through screen planting, use of natural materials sourced from the local area (rocks, etc).
- Access and integration of the road into the local landscape through sensitive earthworks to reduce visibility.
- Safety through material selection.

8 Residual Impacts

8.1 Construction

It is not anticipated that there will 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).

8.2 Operation

8.2.1 General

Some impacts resulting from the project are unavoidable and cannot be mitigated for during operation. The project will alter the surrounding landscape and the visual experience of receptors. However, these changes will be seen within the context of the existing local environment. Foremost amongst residual impacts is the addition of pipeline infrastructure (intake point, HLPS, LLPS, air valves, scour valves and discharge site) permanent removal of trees along 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 the Section 8 above will be implemented. Route wide impacts are outlined below, with significance of residual impacts outlined within Table 18.

Initially, the new pipeline elements, access road and landscaping at key sites (HLPS, LLPS intake site and discharge site) 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 views of an integrated pipeline route, suggests they would be of **low sensitivity**. Therefore, the assessment of significance of *residual* impacts will be considered as **Not Significant**.

8.2.2 Site 1 Angle Crossing

Site 1 (HLPS, LLPS and intake site) will continue to have a **moderate adverse residual landscape impact** due to its visual prominence (elevation), proximity to the MRC and location within a natural setting. Mitigation measures will not fully integrate the proposals over time (i.e. the building will continue to be a prominent feature).

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)

will view new elements integrating with the natural environment over time as a result of screen planting, suggesting they are of **low sensitivity**.

This would result in a landscape and visual *residual* impact of **Minor Adverse Significance**.

8.2.3 Site 4b Burra Township & Burra Creek

Site 4b will be considered to have a **negligible residual landscape impact (**assuming mitigation measures are undertaken) and therefore will successfully integrate the proposals over time into the surrounding culturally valued setting. This also assumes an appropriate maintenance regime over time (riparian areas, weed control, access road maintenance).

Key receptors (i.e. recreation facility users, residents) and the presence of a number of close residents that value their landscape setting and local visual amenity, will view rehabilitated / established vegetation, with screening of project elements in sensitive areas, suggesting they will generally be of **medium sensitivity.**

Therefore, landscape and visual *residual* impacts would be **Not Significant**.

9 Conclusions & Summary of Impacts

The construction effects of the project on landscape and visual amenity will primarily be related to site clearance and general construction activities that would occur during the limited duration of the construction activities. These will 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 of **Minor Adverse Significance**.

Site 1 Angle Crossing and the HLPS is the exception, and is considered to have a **Moderately Significant Adverse Landscape & Visual Impact**.

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

In view of the separation distance and the dimensions of structures there is unlikely to be any cumulative visible impact.

A summary of the significance of impacts is provided in Table 18.

Table 17 Summary of Significance of Impacts

Site	Impact Description	Mitigation	Significance of Impact	Residual Impact
Site 1 Angle Crossing	Introduction of built elements (HLPS, air valves, scour valves, security fencing, night lighting, signage, intake, LLPS) and associated infrastructure into the landscape. Electrical cable route. Clearing of vegetation to MRC including established trees. Major earth works (HLPS) on an exposed and elevated site, including access road. Major earth works to MRC intake site. Movement of workers. Rehabilitation planting. Immediately adjacent to recreation receptors.	Site selection to minimise visual intrusion. Avoid significant vegetation removal. Screen planting. Built form to sit within existing topography. Built elements designed (and built) to reduce visibility within landscape.	Moderately Significant Adverse	Minor adverse significance
Site 2a Monaro Highway	Treeless pipeline corridor with grass seeding rehabilitation, air and scour valves. Air and scour valves above ground. Numerous creek and drainage line crossings. Movement of maintenance workers. Grass seeding rehabilitation. Minor earth works.	Natural regeneration and/or rehabilitation of grass and vegetation to pipeline corridor margin. Minimise area of vegetation clearance.	Not Significant	Not Significant
Site 2b Bombala Railway	Treeless pipeline corridor with grass seeding rehabilitation, air and scour valves. Movement of maintenance workers. Residential receptors experience permanent change in view of treeless pipeline corridor within an enclosed forest environment of the Gibraltar Range.	Natural regeneration and/or rehabilitation of grass within corridor, and vegetation and trees adjacent to corridor to form a screen to properties. Minimise area of vegetation clearance.	Minor Adverse Significance	Not Significant

Site	Impact Description	Mitigation	Significance of Impact	Residual Impact
Site 3 Gibraltar Range	Clearing of vegetation constitutes a change to woodland character. Treeless pipeline corridor within enclosed forest environment changes local landscape character. Air and scour valves. Movement of maintenance workers. Some earth works.	Natural regeneration and / or rehabilitation of grass and vegetation to pipeline corridor margin. Minimise area of vegetation clearance.	Minor Adverse Significance	Not Significant
Site 4a Burra Rural District	Grass seeding rehabilitation, air and scour valves. Plantation planting removal. Movement of maintenance workers. Residential receptors experience permanent change in view with one very close residential receptor.	Natural regeneration and / or rehabilitation of grass within corridor, and vegetation and trees adjacent to corridor to form a screen to properties.	Minor Adverse Significance	Not Significant
Site 4b Burra Township	Clearing of vegetation within a local culturally valued and intimate setting. Air and scour valves. Movement of workers. Creek crossing. Permanent change in view to very close (one) residential and recreation receptors. Grass rehabilitation. Earth works to Burra Creek.	Avoid & retain significant vegetation including rehabilitation & sensitive recontouring of riparian areas. Protect culturally significant landscape setting. Screen views of pipeline elements from recreation receptors.	Minor Adverse Significance	Not Significant
Site 4b Burra Creek	Introduction of built element (discharge site, air and scour valves, fencing) into the landscape. Some clearing of riparian vegetation. Earth works to riparian zone and new access road. Movement of maintenance workers. Changes to downstream river landscape due to increased	Site selection to minimise visual intrusion. Avoid significant vegetation removal. Rehabilitate riparian zone, including weed control and recontouring sensitively. Set access road into landscape contours to reduce visibility. Protect nationally significant landscape in the broader context (Googong Foreshores).	Moderately Significant Adverse	Not Significant

Site	Impact Description	Mitigation	Significance of Impact	Residual Impact
	environmental flows.			

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watersecurity
MAJOR PROJECTS

Landscape and Visual Impact Assessment Addendum

Murrumbidgee to Googong Water Transfer

December 2009

ACTEW
CORPORATION

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1 Introduction

1.1 Background

ACTEW Corporation Limited (ACTEW) proposes to transfer water from the Murrumbidgee River through an underground pipeline to Burra Creek in NSW which flows into Googong Reservoir. This proposed project is known as the Murrumbidgee to Googong Water Transfer.

In order to obtain community feedback and satisfy statutory approval requirements a series of community meetings and a period of public exhibition of the Environmental Assessment (NSW) and Draft Environmental Impact Statement (ACT) (referred to as the EA/Draft EIS) were undertaken. In response to community feedback received before and during the public exhibition period ACTEW has modified the location at which the pipeline would discharge into Burra Creek.

This report addresses the impacts associated with the proposed upstream outlet location into Burra Creek.

1.2 Upstream outlet overview

The project involves construction and operation of infrastructure required to transfer approximately 100 ML/day of water a distance of approximately 12 km from the Murrumbidgee River to Burra Creek which flows into Googong Reservoir. The infrastructure required to transfer the water includes an intake/low lift pump station; a high lift pump station; an underground pipeline; an outlet structure and a power supply.

The original outlet location outlined in the EA/Draft EIS proposed that the pipeline would discharge just downstream of an existing flow measuring station near Burra Road, approximately 10 km south of Googong Reservoir. The original outlet structure was located east of Burra Road within land known as the Googong Foreshores, which is Commonwealth owned land within NSW.

The modified outlet location is 3.2 km upstream from that previously proposed in the EA/Draft EIS. The new outlet location is located in the vicinity of the low level crossing on Williamsdale Road near the junction of Burra and Williamsdale Roads.

The transferred water would discharge through a concrete structure located on the banks of Burra Creek. The outlet structure has been modified to suit this alternative Burra Creek location where the channel is only approximately 1 m deep. It would be a concrete topped structure stretching approximately 12 m along the creek bank with a 250 mm grated opening.

A mini-hydro power generation facility would be located close to the Burra Creek discharge location, but above flood level. The mini-hydro power generation facility would largely be housed underground and would recover almost 20% of the total electricity used for the pumping of the water.

The upstream outlet proposed by the community submissions would reduce a number of adverse environmental and social impacts of the original project including:

- Project footprint reduced as follows:
  - Pipe length reduced by one km;
  - One less pipeline creek crossing;
  - Five landholders no longer affected by easement requirements;
  - An estimated 10 landholders no longer indirectly impacted by construction works;
  - An estimated five air valves, four scour valves and associated potential impacts reduced;
  - Four less road crossings;
  - Less disruption to flora and fauna (habitats within this area are mostly highly disturbed but includes a small area of box-gum grassy woodland close to the original proposed outlet site);

– Outlet location not on Commonwealth land;

– Greenhouse gas emissions would be reduced by at least 3% during construction.

Additional targeted consultations are also underway with major stakeholders and those landholders located near the new outlet location or abutting the additional length of creek that would be affected by increased flows.

1.3 Purpose and scope of the report

The purpose of this study is to discuss:

- The existing condition of Burra Creek at the upstream outlet point;
- Potential impacts associated with the mini hydro power facility;
- Potential impacts associated with the outlet; and
- Mitigation recommendations.

1.4 Structure of the report

This report will address:

- The impact of the upstream structure;
- The impact of the mini hydro plant; and
- The impact of a design change to the High Lift Pump Station.

This report should be read in conjunction with the Murrumbidgee to Googong Water Transfer Project Landscape and Visual Impact Assessment.

2 Outlet and Mini- Hydro Location

The Landscape and Visual Impact Assessment report for the Murrumbidgee to Googong Water Transfer Project considered the local site impacts of the construction and operation of the Project from various locations along the proposed alignment.

A change in alignment and outlet location following the finalisation of this report results in the assessment of Site 4b (Burra Township & Burra Creek) no longer applying. This location will no longer be directly impacted upon by the Project as the pipeline outlet will be located further upstream.

A new viewing location – designated in this addendum as Site 4c – has been considered for the purposes of this addendum and assesses the impacts in the area of the Corner of Burra Road and Williamsdale Road and the section of Burra creek near the new outlet location. This location is shown on the map in Figure 1.

Figure 1 – Site 4c Location Map

2.1 Existing Environment

The landscape character of the general area in which this change occurs is described in detail in the Landscape and Visual Impact Assessment report in section 5.5.3 – Site 4a Burra Rural Residential District. This report should be read in conjunction with this addendum.

The following is a series of brief excerpts from section 5.5.3 of the report, describing the landscape character of the general area in which this design change is proposed:

2.1.1 Landform

The eastern extent of the pipeline route is characterised by broad, low-lying plains of the Jerrabomberra and Tuggeranong Valleys and small flood plains associated with Jerrabomberra Creek, Burra Creek and local drainage lines.

2.1.2 Vegetation

This character area is associated with highly modified vegetation that is largely sparse, consisting of shrubs, grasses, small plantations and occasional trees.

2.1.3 Land Use

The Burra rural district is associated with rural properties and agriculture.

2.1.4 Visual Context

Views within Site 4a are experienced by:

- Residents with prolonged viewing opportunities of the study area along Williamsdale Road. Views are generally filtered by garden planting, or across open agricultural landscape with windbreak planting in places along fence lines.
- Activity focussed outdoor farm workers / farmers.
- Local road users passing through the study area on Williamsdale Road, Keewong Lane, Badgery Road and MacDiarmid Road.

Views are composed of a modified agricultural landscape, creek flood plains, degraded creek and drainage lines, Burra township setting and a backdrop to the west of Gibraltar Range.

2.2 Assessment of Impacts

The assessment of impacts in this addendum is conducted in line with the methodology used in the Landscape and Visual Impact Assessment report. This methodology, described in Section 3.3 of the report, assesses the significance (severity) of an impact by considering both Landscape impacts and Visual impacts. The significance of the impact is calculated as a sum of the impact upon the landscape and the sensitivity of the receptor. Section 3.3 of the Landscape and Visual report should be read in conjunction with this Assessment of Impacts.

Table 1 Site 4c Corner of Burra Road and Williamsdale Road & Burra Creek

Photo 1

Photo 2

Existing Views in the vicinity of the change in alignment. The location and direction of these views is shown in Figure 1.

Simulation 6 & 7 – Indicative simulations of discharge structure and mini hydro plant. Note: These simulations are representative of the project elements only and not produced from the same locations as Photo 1 and Photo 2, above. The location and direction of these views is shown in Figure 1. Simulations supplied by ACTEW.

Project elements	Discharge site (0.5ha footprint approx.), pipeline (underground), air valve, access road (existing) , ground modelling/re-contouring to Burra Creek discharge site and crossing, rehabilitation planting, increased environmental flows and changes in water level, substantially underground mini-hydro power station with above ground auxiliary elements
Landscape Impact	**Pipeline** Whilst the previously assessed pipeline route crossed Williamsdale Road before heading along MacDiarmid Road, the revised pipeline route follows the alignment of Williamsdale Road, staying between the road and Burra Creek in the lead up to the mini hydro power facility and outlet structure. In this realigned section, the pipeline crosses a residential driveway and runs in close proximity to three residences. Localised changes to the landscape as a result of the project will include earthworks, tree and riparian planting removal and rehabilitation planting (woodland, screen planting, grassland and marginal planting). The loss and change in these elements will adversely affect the traditional and intimate rural

	setting of the locality. It is expected that vegetation will be removed and rehabilitated along both Williamsdale Road and Burra Creek in this location. **Outlet** Designed at lower level than original to minimise impact. Generally, the outlet site will constitute new components out of character with the local Burra Creek riparian zone character. However, the nature of its location within the side of the bank and the use of natural materials inspired by the surrounding environment will assist in achieving integration into the surrounding landscape. Earthworks (re-contouring) to accommodate the structure will cause localised change. New planting (woodland, screen planting, grassland and marginal planting) will take time to establish but in the longer term will assist in screening and integration of structural elements. Existing vegetation on the south side of Burra Creek may help to screen views from the residence on the same property. Increased flow regimes (intermittent) will change volumes of water flowing towards Googong Foreshores and promote the occurrence/change in natural riparian habitat structure, allow for pools of water from time to time, and therefore change the landscape character of the creek environment itself. Downstream of the outlet, this may generate a beneficial effect for the local landscape character through promotion of a healthy living creek environment and improvement in recreation value and landscape amenity. Impacts associated with increased creek flows have been assessed downstream of the original discharge location in the Landscape and Visual Impact Assessment. This addendum assesses only those impacts that may occur between the new discharge location and that assessed in the report. ACTEW has stated it is willing to work with local community groups to progressively re-establish riparian vegetation along the creek. **Mini Hydro Power Facility** The mini-hydro power station, located adjacent to an existing earth embankment and substantially underground, is anticipated to be located within the 40m construction zone with a footprint of approximately 30mx25m, near the outlet structure. An underground cable along the pipeline route (co-located within the pipe trench) will transmit the generated power back to the Murrumbidgee River pump stations. Earthworks will be required during the construction phase of the power station, however the design will incorporate earth batters around the structure following completion. Whilst this structure will be out of character with the local landscape, it is expected that impacts will be lessened somewhat over time as mitigation planting matures. The changes in landscape character are localised and would be viewed within the context of the existing modified agricultural landscape, and degraded Burra Creek environment. Therefore, it is anticipated that the project will result in a **moderate adverse landscape** at the eastern end of Williamsdale Road and at Burra Creek.
Visual Impact	Changes in view will be experienced by: ◗ The residents of one property on MacDiarmid Road, one property on Williamsdale Road and two properties on Burra Road within an agricultural landscape setting would potentially have views towards the Project site. These receptors may have prolonged viewing opportunities and are approximately 80 to 300m in distance from the study area. Generally views are across the

	agricultural landscapes towards Burra Creek with some deciduous vegetation which may provide screening in the warmer months. One air valve, as indicated in Figure 1, may also form a new component within the view. Rehabilitation planting will also be visible to Burra Creek and the pipeline corridor. ◗ One residence directly adjacent to (approximately 80m) the study area to the south of Burra Creek, with open and prolonged viewing opportunities with the residence oriented towards the creek and works area. The mini hydro plant and inlet structure form a new component within the view from this location. Existing vegetation along Burra Creek will screen views from this residence in the warmer months, however much of this vegetation is deciduous and will not provide as greater screening benefit during the colder months. ◗ Small numbers of local road users passing through, or on their way to/from Burra township on Burra, Williamsdale and MacDiarmid Roads. ◗ Small numbers of activity focused outdoor workers (farmers, maintenance workers). The location, number, and prolonged viewing opportunity of receptors suggest they are of **high sensitivity**.
Assessment of Significance of Impact	**Highly Significant Adverse Landscape & Visual Impact**

2.3 Mitigation Measures

Mitigation measures that have been proposed as part of the outlet site design in the original Landscape and Visual Impact Assessment still apply to the new outlet location. The following mitigation measures for the outlet site are an excerpt from section 6.5 of the Landscape and Visual Impact Assessment Report:

- Appropriate indigenous riparian and marginal planting palette, weed removal and control with consideration of downstream increased environmental flows.
- Earthworks to consider bank stabilisation, erosion, water quality and tie in to existing contours.
- Integration of structural components through screen planting, use of natural materials sourced from the local area (rocks, etc).
- Access and integration of the road into the local landscape through sensitive earthworks to reduce visibility.
- Safety through material selection.

The Mini-Hydro Power Facility location had not been defined in the original report and as such, mitigation measures had not been proposed.

There are opportunities for mitigation measures to the power plant, as outlined below. However, this site cannot be completely mitigated for because of its nature and location within the landscape. Desired results (new planting, rehabilitation & screen planting) would take time to establish.

- Earthworks mounding as high as possible around structure walls to assist in screening.
- Screening vegetation to be planted on batters and around the site.
- Vegetation planted on batters to be tied in with surrounding vegetation in order to ‘blend’ the structure into the landscape as best as possible.
- Colour and materials of structure to be sensitive to the surrounding environment and any built elements.

- Parking area to be surfaced with crushed rock / gravel similar to existing surface of Williamsdale road to reduce visual impact.

2.4 Residual Impacts

As with the assessment of landscape and visual impacts, the location defined as Site 4c has been considered in terms of residual impacts:

2.4.1 Site 4c Corner of Burra Road and Williamsdale Road & Burra Creek

Site 4c will be considered to have a **small residual landscape impact** (assuming mitigation measures are undertaken) and therefore will successfully integrate the proposals over time into the surrounding culturally valued setting. This also assumes an appropriate maintenance regime over time (riparian areas, weed control, access road maintenance). This change in impact would result from appropriate screening of the structures, as explained in Section 3.3.1 of the Landscape and Visual Impact Assessment.

Key receptors (i.e. recreation facility users, residents) and the presence of a number of close residents that value their landscape setting and local visual amenity, will view rehabilitated / established vegetation, with screening of project elements in sensitive areas, suggesting they will generally be of **medium sensitivity**. This change in sensitivity would result from residential receptors views of the proposed structures being appropriately screened, as explained in Section 3.3.2 of the Landscape and Visual Impact Assessment.

Therefore, landscape and visual *residual* impacts would be of **Minor Significance**.

3 High Lift Pump Station

Changes to the configuration of the High Lift Pump Station since the publication of the Landscape and Visual Impact Assessment have resulted in the height of the proposed structure being reduced from approximately two storeys to approximately one storey.

The impacts assessed in section 6.4.1 (Site 1 Angle Crossing) of the report may be reduced as a result of this change. The pump station building will have a lower profile and the zone of visual influence may be reduced, however the microwave tower, as described in the report, will remain at the originally assessed height.

Photomontage simulations 2, 3 and 4, as included in the report, have not been modified, as impacts are only expected to be lessened by this design change. The significance of landscape and visual impacts, however, are still expected to remain the same, as the building and associated infrastructure will still be out of context with the surrounding environment to a similar degree. Similarly, the significance of residual impacts at the High Lift Pump Station site, as assessed in the report, remains unchanged.