



# **New England Highway bypass of Muswellbrook**

Chapter 6.10 Landscape character and  
visual impacts

Transport for NSW | October 2021

## 6.10 Landscape character and visual impacts

### 6.10.1 Methodology

A landscape character and visual impact assessment (LCVIA) has been prepared by AECOM as part of the Urban Design, Landscape Character and Visual Impact Assessment Report (2021) (refer Appendix O). The LCVIA has been undertaken in accordance with Transport's *Environmental Impacts Assessment Practice Note – Guideline for Landscape Character and Visual Impact Assessment EIA-N04* (2020).

In accordance with this guideline and other relevant guidelines, key steps in the LCVIA include:

- Analysis of the regional and local context as well as the landscape character with the identification of specific landscape character zones (LCZs)
- Development of urban design principles that align with the overall vision for the proposal (refer section 3.2.4)
- Preparation of an illustrative urban design concept that reflects the urban design strategy (refer Appendix O)
- Evaluation of the existing landscape character within the construction footprint to inform the early stages of the urban design process, and to assess the anticipated landscape effects
- Mapping the extent of visibility of the proposal to identify sensitive receivers from publicly accessible areas, as well as a selection of representative viewpoints
- Evaluation of the existing views and visual amenity along the construction footprint to identify and assess possible impacts placed on the community
- Development of mitigation measures to reduce adverse impacts that the proposal may impose within the study area.

#### ***Landscape design for the proposal***

A key aspect of landscape design is to develop a consistent character and elements that are fully integrated with the surrounding environment and reduces the visual impact of the proposal. The landscape treatments proposed are based on an assessment of the existing landscape character and the nature of the proposal.

Collaboration between the urban design team and the proposal design team has developed a coordinated and consistent design approach for the urban design components in accordance with New England Highway Urban Design Framework (Roads and Maritime Services, October 2016). The urban design principles in Section 3.2.4 of this REF were also considered as part of development of the proposal. This approach has enabled urban design solutions to be developed into the overall design response for the proposal.

#### ***Landscape character impact assessment***

A LCZ is best described as an area, or component of a landscape area, that is relatively homogeneous in character, sharing broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement patterns and aesthetic attributes.

The landscape character assessment examines the effect of change on the landscape and the aesthetic and distinctive character of a particular LCZ. The two primary factors used to determine the extent of impact to a particular LCZ are outlined in Table 6-49.

Table 6-49: Primary factors to determine the extent of impact to a Landscape Character Zone

Factor	Description
Sensitivity	Based upon the extent to which it can accept change of a particular type and scale without adverse impacts upon its character or value
Magnitude	Depends on factors such as: <ul style="list-style-type: none"> <li>• Loss, change or addition of any feature or element</li> <li>• Duration over which the landscape effects would be felt (short, medium or long term)</li> <li>• Change to the landscape itself or one nearby that affects its character</li> <li>• Quality and extent of the concept design solution</li> </ul>

Once the sensitivity and magnitude is determined, the rating matrix outlined in Table 6-50 is used to determine an overall rating of effect.

Table 6-50: Overall significance of landscape character effects

		MAGNITUDE OF EFFECT			
		High	Moderate	Low	Negligible
SENSITIVITY	High	High	High to Moderate	Moderate	Negligible
	Moderate	High to Moderate	Moderate	Moderate to Low	Negligible
	Low	Moderate	Moderate to Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

### Visual impact assessment

The visual impact assessment analysed the effects of changes in views seen by receptors as a result of the proposal. Similar to the landscape character impact assessment, sensitivity and magnitude factors (refer to Table 6-50) are used to determine an overall rating of effect using the matrix shown in Table 6-51.

Table 6-51: Primary factors to determine the extent of impact to visual receptors

Factor	Description
Sensitivity	Depends on factors such as: <ul style="list-style-type: none"> <li>• Location and context of the receptor location</li> <li>• Expectations and activity of the receptor</li> <li>• Type and number of receptors</li> <li>• Quality of the existing view</li> <li>• Temporal duration of the view</li> </ul>

Factor	Description
Magnitude	<p>Depends on factors such as:</p> <ul style="list-style-type: none"> <li>• Extent of visibility of the change as per the visual envelope</li> <li>• Scale, size and character of the proposal</li> <li>• Degree of obstruction of existing features and contrast with the existing view</li> <li>• Quality of the design outcome</li> <li>• Angle of the existing view</li> <li>• Distance of view from the proposal</li> </ul>

The visual impact assessment focuses on landscape outcomes around 12 to 18 months after road opening, which is considered a conservative assessment.

### 6.10.2 Existing environment

#### *Landscape context*

Muswellbrook township is located to the west of the proposed road corridor. The town centre features commercial activities, retail and local services, while the rest of the township is mostly characterised by low density residential with rural lifestyle blocks in its periphery providing the transition to rural areas.

Key elements of the landscape surrounding Muswellbrook include the agricultural Hunter River floodplain, large patches of regrowth and remnant forest communities, coal mining activities and open pastureland primarily subject to grazing.

The proposed road corridor would travel along flat to undulating stretches of landscape with open views over the Muswellbrook mining area, rolling plains and forested hills in the distance. The proposed road corridor would also cross the Main North railway line, Muscle Creek and Sandy Creek.

#### *Landscape character zones*

Ten LCZs have been identified within and surrounding the construction footprint, as outlined in Table 6-52 and shown on Figure 6-30.

Table 6-52: Landscape character zones

LCZ	Description
LCZ 1 Industrial	<ul style="list-style-type: none"> <li>• Land use – SP2 Infrastructure and E3 Environmental Management</li> <li>• Topography and drainage – steep, man-made cuttings with artificial fill and ponding water</li> <li>• Vegetation – limited to edges of zones</li> <li>• Built form – limited to temporary amenity blocks, sheds and entry facilities</li> <li>• Spatial form – typically visually contained (some distant views available)</li> </ul>
LCZ 2 Agricultural floodplain	<ul style="list-style-type: none"> <li>• Land use – predominantly RU1 Primary Production</li> <li>• Topography and drainage – flat with riparian corridors</li> <li>• Vegetation – Swamp Oak Forest community aligning the Hunter River and agricultural crops and pasture within the floodplain</li> <li>• Built form – occasional farmhouses, sheds and outbuildings</li> <li>• Spatial form – wide open expanses with extensive views</li> </ul>

LCZ	Description
LCZ 3 Open rural landscape	<ul style="list-style-type: none"> <li>• Land use – RU1 Primary Production and E3 Environmental Management</li> <li>• Topography and drainage – undulating foothills and hills</li> <li>• Vegetation – cleared understorey with scattered Ironbark-Spotted Gum-Grey Box trees</li> <li>• Built form – occasional rural dwellings with associated sheds and farming infrastructure, accessed by long gravel driveways and stock fences</li> <li>• Spatial form – partially enclosed to expansive and open</li> </ul>
LCZ 4 Recreational open space	<ul style="list-style-type: none"> <li>• Land use – RE1 Public Recreation and RE2 Private Recreation</li> <li>• Topography and drainage – typically flat to gently undulating, some parks and reserves associated with drainage lines</li> <li>• Vegetation – managed/mown turf with taller vegetation/trees at edges</li> <li>• Built form – limited to amenity blocks and changing sheds</li> <li>• Spatial form – open</li> </ul>
LCZ 5 Riparian corridor	<ul style="list-style-type: none"> <li>• Land use – W1 Natural Waterways and RE1 Public Recreation</li> <li>• Topography and drainage – incised drainage channel / river / creeks</li> <li>• Vegetation – heavily vegetated, including an EEC (River Red Gum / River Oak grassy riparian woodland of the Hunter Valley) and weeds</li> <li>• Built form – none</li> <li>• Spatial form – river corridor enclosed but visible from surrounding landscape</li> </ul>
LCZ 6 General residential	<ul style="list-style-type: none"> <li>• Land use – R1 General Residential</li> <li>• Topography and drainage – gently to steeply undulating</li> <li>• Vegetation – native remnant paddock vegetation with exotic landscaped gardens surrounding houses</li> <li>• Built form – single and some double storey housing (typically brick)</li> <li>• Spatial form – streets laid out to follow contours of the landscape. View corridors along streets and across sparsely vegetated paddocks</li> </ul>
LCZ 7 New residential suburbs	<ul style="list-style-type: none"> <li>• Land use – R1 General Residential</li> <li>• Topography and drainage – steep to gently undulating</li> <li>• Vegetation – predominantly turf surrounding houses</li> <li>• Built form – typically single storey housing with setbacks from the street</li> <li>• Spatial form – streets laid out to follow contours of the landscape. View corridors along streets</li> </ul>
LCZ 8 Rural residential	<ul style="list-style-type: none"> <li>• Land use – R5 - Large Lot Residential</li> <li>• Topography and drainage – gently undulating to steeper land</li> <li>• Vegetation – mix of remnant native trees, gardens and open, manicured lawns</li> <li>• Built form – detached dwellings and large sheds</li> <li>• Spatial form – mostly enclosed with some elevated areas having a sense of openness with views to distant forested ranges</li> </ul>
LCZ 9 Commercial	<ul style="list-style-type: none"> <li>• Land use – B2 Local Centre and B5 Business Development</li> <li>• Topography and drainage – flat with one drainage corridor (Muscle Creek)</li> <li>• Vegetation – mix of introduced and native tree plantings and some decorative shrub beds</li> <li>• Built form – multi storey commercial/retail</li> <li>• Spatial form – linear patterns and moderately enclosed</li> </ul>

LCZ	Description
LCZ 10 Transport corridor	<ul style="list-style-type: none"><li>• Land use – SP2 Infrastructure</li><li>• Topography and drainage – flat to undulating</li><li>• Vegetation – limited to turf and some trees</li><li>• Built form – gantries, signage, bridges, bunding, guard rails and safety fencing</li><li>• Spatial form – open</li></ul>



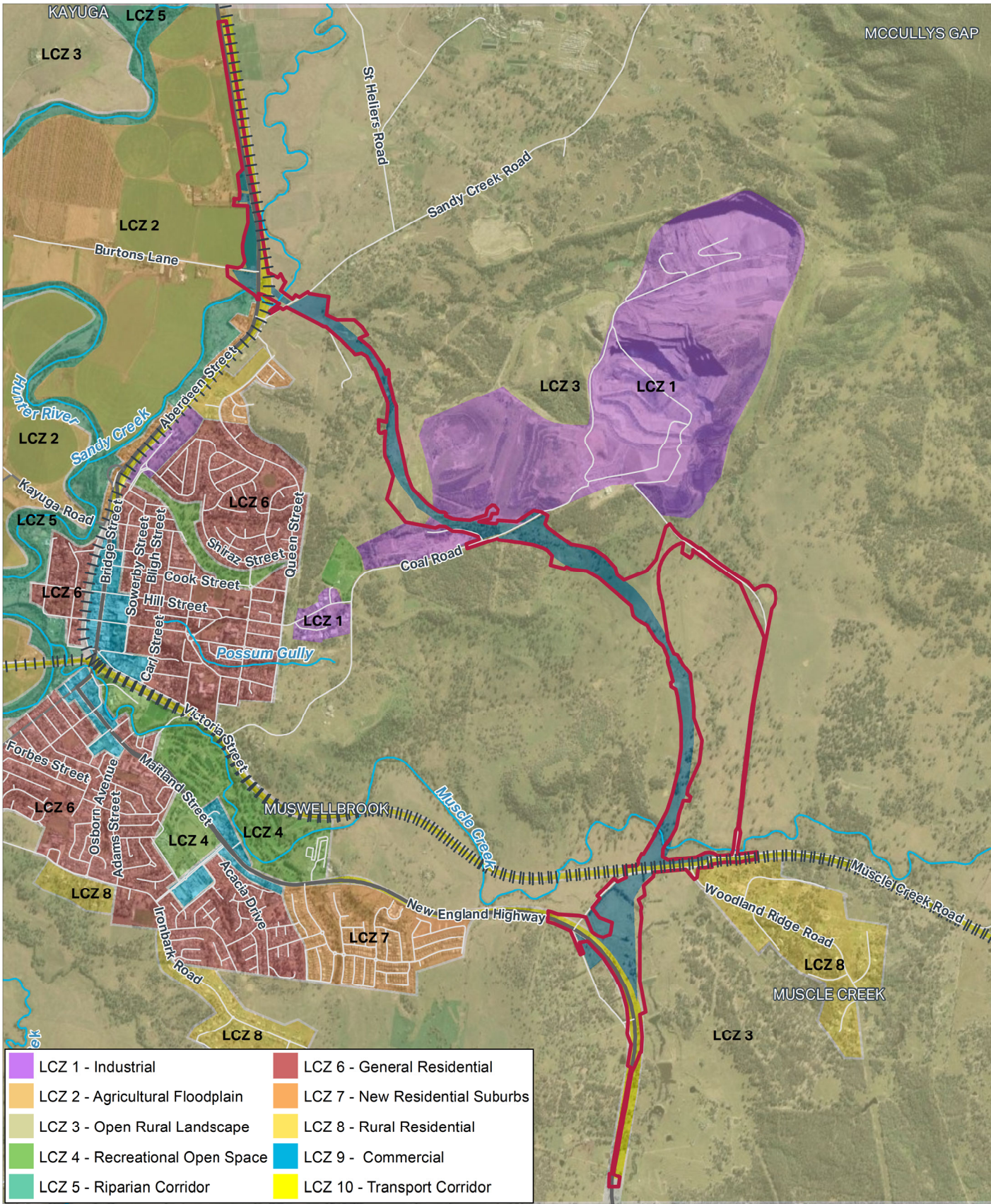


FIGURE 6-30: LANDSCAPE CHARACTER ZONE MAP



- Legend**
- Construction footprint
  - Railway
  - Proposed road corridor
  - ~ Watercourse
  - State Road
  - Regional Road
  - Local Road

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### Visual receptors

Ten representative viewpoints have been used to assess potential impacts from the proposal on existing views seen by receptors, as outlined in Table 6-53 and shown on Figure 6-31.

Table 6-53: Viewpoints for visual receptors

Viewpoints	Description
Viewpoint 1: New England Highway South (heading north)	Motorists approaching Muswellbrook from the south
Viewpoint 2: Milpera Drive North	Residents on Milpera Drive looking east
Viewpoint 3: New England Highway South (heading south)	Motorists leaving Muswellbrook heading south
Viewpoint 4: Muscle Creek Road	Residents and motorists on Muscle Creek Road looking west
Viewpoint 5: Private Road, Muswellbrook Coal Mine Access	Motorists travelling north on the private access road to Muswellbrook Coal Mine looking west
Viewpoint 6: Public recreation area	Receptors in an area zoned for public recreation
Viewpoint 7: Queen Street	Residents in a new housing estate looking north
Viewpoint 8: Sandy Creek Road	Residents and motorists on Sandy Creek Road near the rail corridor looking north
Viewpoint 9: Sandy Creek Road East	Church members and motorists on Sandy Creek Road looking west
Viewpoint 10: New England Highway North	Church members and motorists on the New England Highway looking south



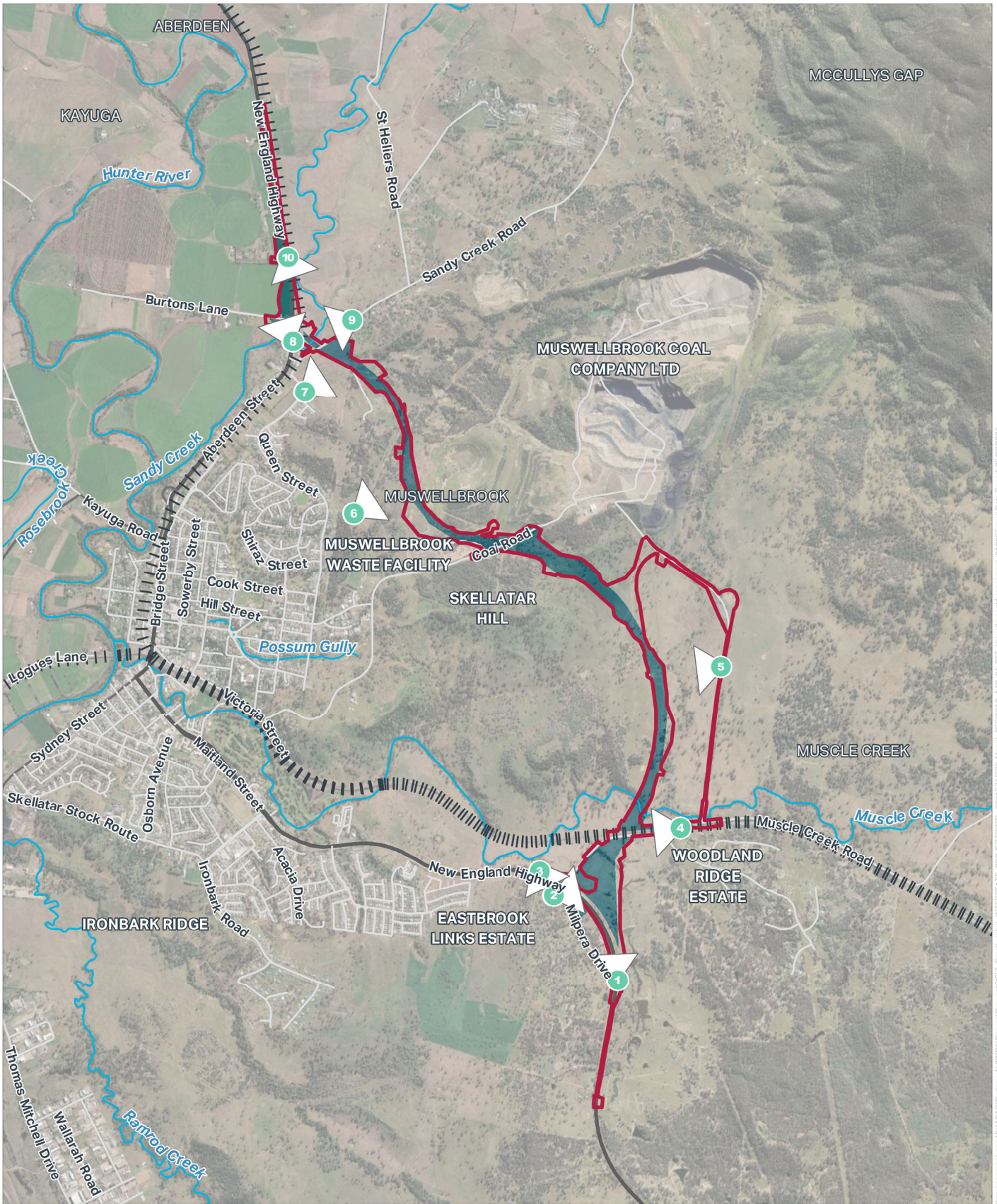
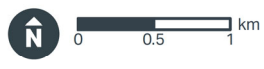


FIGURE 6-31: VISUAL RECEPTOR LOCATION MAP



- Legend**
- Construction footprint
  - Railway
  - Proposed road corridor
  - Watercourse
  - State Road
  - Regional Road
  - Local Road
  - 1 View point location

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### 6.10.3 Potential impacts

#### Construction

##### Landscape character

The construction of the proposal would not impact on identified LCZs.

##### Visual

During construction, receivers expected to experience visual impacts include residents along the New England Highway, Muscle Creek Road, Sandy Creek Road, Koolbury Flats Row and Burtons Lane. The introduction of construction sites would reduce the privacy of some properties and construction of the bridges would be visible from a number of receivers, given their height. The positioning of plant and equipment within the view of surrounding properties and existing road users would result in temporary visual impacts. The proposal would require earthworks which would expose subsoil and the removal of vegetation within the construction footprint including some planted and remnant native trees. Some of this vegetation contributes to the amenity and character of the area. This would lead to temporary visual impacts during construction until the works are complete and disturbed areas rehabilitated.

#### Operation

##### Landscape character

As shown in Table 6-54:, operation of the proposal would give rise to negligible or low landscape character impacts at six LCZs. Two LCZs would be subject to a moderate landscape character impacts and the remaining two LCZs would be subject to high to moderate landscape character impacts which are considered to comprise considerable impacts on the landscape character given the high landscape value of the agricultural landscape.

Table 6-54: Summary of landscape character impacts

LCZ	Sensitivity	Magnitude	Landscape character impact
LCZ 1 Industrial	Low	Low	Low
LCZ 2 Agricultural floodplain	High	Moderate	High to Moderate
LCZ 3 Open rural landscape	Moderate	High	High to Moderate
LCZ 4 Recreational open space	High	Negligible	Negligible
LCZ 5 Riparian corridor	Moderate	Negligible	Negligible
LCZ 6 General residential	Moderate	Negligible	Negligible
LCZ 7 New residential suburbs	Moderate	Negligible	Negligible
LCZ 8 Rural residential	Moderate	Negligible	Negligible
LCZ 9 Commercial	High	Low	Moderate

LCZ	Sensitivity	Magnitude	Landscape character impact
LCZ 10 Transport corridor	High	Low	Moderate

Visual

As shown in Table 6-55, two visual receptor locations would be subject to low visual impact and four would be subject to moderate and moderate to low visual impact. The remaining four visual receptor locations would be subject to visual impact ratings of high and high to moderate which are considered to comprise considerable impact on the views from those locations.

Indicative photomontages of the viewpoints with visual impact ratings of high to moderate, high or moderate are shown below in Plate 21 to Plate 32.

Table 6-55: Summary of visual impacts

Visual receptor location	Sensitivity	Magnitude	Visual impact
V1 New England Highway South (heading north)	Low	Moderate	Moderate to Low
V2 Milpera Drive North	Moderate	Moderate	Moderate
V3 New England Highway South (heading south)	Low	Moderate	Moderate to Low
V4 Muscle Creek Road	High	High	High
V5 Private Road, Muswellbrook Coal Mine Access	Low	Low	Low
V6 Public recreation area	Low	Low	Low
V7 Queen Street	Moderate	High	High to Moderate
V8 Sandy Creek Road	Moderate	High	High to Moderate
V9 Sandy Creek Road East	Low	High	Moderate
V10 New England Highway North	Moderate	High	High to Moderate

At Muscle Creek Road, two existing residences would receive clear views to the proposal, including views to large batters where the bypass road connects to the southern connection, a bridge spanning the Main North railway line and the removal of existing trees. These receptors would experience a high visual impact from the proposal. At the northern connection, existing residences on the New England Highway would have views to the proposed bridge over Sandy Creek, the Main North railway line and Sandy Creek Road. The proposal would however be viewed by a low number of receptors in this location and as a consequence the visual impact is considered moderate. Away from these areas, the magnitude of operational visual impact on the local community would be moderate given the geographical area of impact, the open, flat to undulating landscape and low number of visual receptors. The socio-economic impact attributed to visual impacts for the majority of the proposal is rated as moderate.

Specific mitigation measures have been proposed in Section 6.10.4 to address these impacts.



Plate 21: Viewpoint 3 – existing view from the eastern verge of the New England Highway, looking south



Plate 22: Viewpoint 3 – proposed changes to the view seen in plate 21



Plate 23: Viewpoint 4 – existing view from Muscle Creek Road at the rail overpass, looking west



Plate 24: Viewpoint 4 – proposed changes to the view seen in plate 23





Plate 25: Viewpoint 7 – existing view from the northern end of Queen Street, looking north



Plate 26: Viewpoint 7 – proposed changes to the view seen in plate 25



Plate 27: Viewpoint 8 – existing view from the intersection of the rail corridor and Sandy Creek Road, looking north



Plate 28: Viewpoint 8 – proposed changes to the view seen in plate 27





Plate 29: Viewpoint 9 – existing view from Sandy Creek Road, looking west



Plate 30: Viewpoint 9 – proposed changes to the view seen in plate 29



Plate 31: Viewpoint 10 – existing view from the New England Highway, looking south



Plate 32: Viewpoint 10 – proposed changes to the view seen in plate 31

Removal of heavy vehicles from the streetscape would afford an opportunity for Muswellbrook Shire Council to pursue initiatives for a revitalised town centre and presents opportunities to improve the public domain along the main road.

The landscape treatment south from the northern connection along the New England Highway will include rows of ornamental trees to assist in screening the changes within the view and increase visual amenity. Ornamental trees provide a 'gateway' landscape treatment to the township of Muswellbrook.

The landscape treatment to the central connection (at Coal Road) would be more visually recessive, with scattered tree and shrub planting to match the length of the bypass and suggest a more local entry point to the township, rather than the 'gateway' statement at the northern and southern connections.

#### 6.10.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Landscape and visual	<p>Visual impact mitigation at Muscle Creek Road will include:</p> <ul style="list-style-type: none"> <li>• Tree planting along the proposed relocated driveway on Muscle Creek Road which will assist in reducing the visual impact of the proposal on receptors by partially screening the view to the bypass from these locations. Semi mature trees and shrubs will provide immediate screening post construction</li> <li>• Scattered tree or shrub planting to the batters of the proposed bypass road, particularly between Muscle Creek Road and Muscle Creek, which will visually 'break up' the flat expanse of the batter planted with pasture grasses</li> </ul>	Construction contractor	Detailed design	Additional safeguard
Landscape and visual	<p>The landscape treatment south from the northern connection along the New England Highway will include rows of ornamental trees to assist in screening the changes within the view and increase visual amenity. Ornamental trees provide a 'gateway' landscape treatment to the township of Muswellbrook</p> <p>The landscape treatment to the central connection (at Coal Road) will be more visually recessive, with scattered tree and shrub planting to match the length of the bypass and suggest a more local entry point to the township, rather than the 'gateway' statement at the northern and southern connections</p>	Construction contractor	Detailed design	Additional safeguard

Impact	Environmental safeguards	Responsibility	Timing	Reference
Landscape and visual	All plant material will be locally sourced (seed collection preferred), with any seed collection to commence within three months of construction contract award, where possible	Construction contractor	Detailed design	Additional safeguard
Landscape and visual	<p>An Urban Design Plan will be prepared as part of the CEMP. The Plan will include:</p> <ul style="list-style-type: none"> <li>• Location and identification of vegetation in the proposed road corridor to be retained and proposed landscaped areas</li> <li>• Details of the staging of built elements including bridges and concrete barriers</li> <li>• Details of the staging of landscape works</li> <li>• Maintenance measures for landscaped or rehabilitated areas, including timing of maintenance works</li> <li>• A landscape monitoring program including an inspection program and frequency of inspection</li> </ul>	Construction contractor	Detailed design and Pre-construction	Additional safeguard

Other safeguards and management measures that would address visual impacts are identified in sections 6.5, 6.9 and 6.12 of this REF.