Concept Design Description

> Provide additional native tree planting to both sides of the highway to reinstate the enclosed woodland character in this area and to visually separate the carriageways from the new intersection of Forty Bends Road and Daintree Close with the highway.

> Plant frangible species to the median to break up the expanse of hard surface and help control headlight glare.

> Provide recessive finish and colour to retaining walls.

> Plant medium height trees and shrubs in front of retaining wall.

Figure 5.4: Landscape Plan and Cross section at Station 32100.
> Provide additional native tree planting to both sides of the highway to reinstate the enclosed woodland character of this area.

> Provide breaks in new tree planting to the south to allow views over rolling pasture lands.

> Plant frangible species to the median to break up the expanse of hard surface and help control headlight glare.

> Provide recessive finish and colour to retaining walls.

> Plant medium height trees and shrubs in front of retaining wall.
Figure 5.6: Landscape Plan and Cross section at Station 33140.

Concept Design Description

> Maintain views over rolling pasture lands to the south and west.
> Provide recessive finish and colour to retaining walls.
> Plant medium height trees and shrubs in front of retaining wall.
> Screen the proposed construction compound with temporary mesh fencing.
Figure 5.7: Elevation of bridge over Whites Creek, looking south
6. LANDSCAPE CHARACTER IMPACT

6.1 LANDSCAPE CHARACTER ASSESSMENT METHODOLOGY

6.1.1 Introduction
RMS’s ‘Guidelines for Landscape Character and Visual Impact Assessment’ (RMS, 2009) provides the following definition of landscape character:

‘Landscape character is the aggregate of built, natural and cultural aspects that make up an area and provide its unique sense of place. Landscape in this context is taken to include all aspects of a tract of land - the built, planted and natural topographical and ecological features.’

Applying this definition to the specific conditions within the study area, and the features of the proposal, the landscape character assessment also considers how the area is used and how it functions as a part of the Great Western Highway.

6.1.2 Landscape Character Zones
The study area has been divided into three Landscape Character Zones (LCZ) as illustrated in Figure 6.1. The zones correspond to landscape character types in the area and allow for a more detailed discussion of the character of each zone, of the proposal within it, and of the likely impact on the landscape character to be experienced as a result of the proposal. Each zone has been defined through the development of an understanding of land use, topography, and vegetation in combination with other factors.

The three Landscape Character Zones are:

- LCZ 1. Forty Bends (East);
- LCZ 2. Whites Creek Valley;
- LCZ 3. Forty Bends (West).

Generally, the existing landscape character of this section of the Great Western Highway is rural with large expanses of rolling farmland with native vegetation in the valleys to the south and dense native vegetation associated with the southern slopes of the Hassans Walls escarpment to the north. This combines to provide an overall enclosed woodland character for motorists travelling along the highway. Whites Creek and its associated valley provide a more open experience through the centre of the study area.

6.1.3 Landscape Character Assessment
The landscape character zones facilitate detailed assessment of the character of the study area, of the proposal within it, and of the magnitude, sensitivity and impact likely on the landscape character of each zone to be experienced as a result of the proposal.

Magnitude
In landscape character assessment, magnitude refers to the type of proposal and its compatibility with the existing landscape character. All anticipated elements of the proposal, including the bridge, alignment, road infrastructure, planting, lighting, etc, are considered. The scale of the element (height, length), as well as its location or setting (within woodland, rural land, or over creek crossings), all have a bearing on the magnitude of the physical presence of the proposal.
A high magnitude results if the proposal is a major development or piece of road infrastructure and contrasts highly with the surrounding landscape, or entails heavy modification of the existing landscape, for example, the large scale removal of existing vegetation. A moderate magnitude rating would result if the proposal is moderately integrated into the landscape. A low magnitude rating would occur if the proposal is of a small scale and integrates well into the landscape.

The magnitude impact rating also considers whether the proposal has a positive or negative impact on the landscape character of the zone. For example, a proposal may be of a large scale but may provide beneficial outcomes such as increased open space, enhancement of the areas ‘sense of place’, better connectivity and a safer road environment.

**Sensitivity**

Sensitivity refers to how sensitive the character of the setting it is to the proposed change. A judgement has been made as to the quality of the landscape, its cultural and historical importance to the community, scenic quality, and overall composition of the place and its inhabitants. The following sensitivity judgements have been used as the basis for this assessment:

- Places with high social, recreational, and historical significance to local residents have higher sensitivity.
- Generally, water and natural environments are more highly valued than modified areas, though views over rolling farmland are still highly valued.
- Areas of unique scenic quality have higher sensitivity.
- A pristine environment would have greater sensitivity with less ability to absorb new elements in the landscape than modified landscapes or those areas with contrast and variety of landscape types.

**Impact**

Impact is the combination of the magnitude and sensitivity rating in accordance with the Impact Assessment Grading Matrix (refer to Figure 1.2).
Figure 6.1: The three Landscape Character Zones (LCZ’s).
6.2 LCZ 1: FORTY BENDS (EAST)

6.2.1 Existing Landscape Character

The landscape character of LCZ 1 is of a generally well vegetated rural road. Good stands of native vegetation are located on both sides of the highway, and these, along with a number of small cuttings, provide a sense of enclosure while travelling along the road. Occasional glimpses through the trees to south hint at the rolling farmland beyond.

The attributes that make up the character of LCZ 1 are described below.

<table>
<thead>
<tr>
<th>Landscape Character Attribute</th>
<th>Description of Attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topography</td>
<td>Relatively flat section located on the south western side of Hassans Walls escarpment with undulating pasture lands to the south.</td>
</tr>
<tr>
<td>Hydrology</td>
<td>Well drained with shallow gullies sloping to Whites Creek.</td>
</tr>
<tr>
<td>Geology/ Soils</td>
<td>Shoalhaven Group along the road corridor with Illawarra Coal Measures further up the slope.</td>
</tr>
<tr>
<td>Vegetation</td>
<td>Good to moderate quality stands of Blaxland’s Stringybark - Mountain Gum Open Forest on both sides of the road.</td>
</tr>
<tr>
<td>Ecology</td>
<td>Good to moderate areas of dry sclerophyll forest support a moderate diversity of mammals and birds.</td>
</tr>
<tr>
<td>Settlement Patterns</td>
<td>Large lot farmland with residences to the south of the road.</td>
</tr>
<tr>
<td>Built Form</td>
<td>Three rural residences with associated out buildings located to the south along Forty Bends Road.</td>
</tr>
<tr>
<td>Spatial Quality</td>
<td>Generally enclosed by vegetation to both sides of the road with additional cuttings and an existing retaining wall to the north. Filtered mid to long distance views over the rolling rural landscape to the south.</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>None visible.</td>
</tr>
<tr>
<td>Road Environment</td>
<td>Generally flat two lane road with slight horizontal curve, becoming two lanes eastbound, one lane westbound west of Forty Bends Road, 80km/hr in both directions.</td>
</tr>
</tbody>
</table>

Plate 6.6: Character image within LCZ 1.
6.2.2 The Proposal
The proposal in LCZ 1 is summarised as:

- Removal of a substantial amount of vegetation, particularly to the southern side of the corridor.
- Eastbound carriageway located on the approximate alignment of the existing roadway, and an additional lane constructed to the south to accommodate the westbound carriageway.
- Carriageways separated by a wire rope barrier east of station 31180, then by a depressed median planted with frangible vegetation to the west.
- Substantial fill embankments on the southern side of the road corridor, and two major cut embankments to the northern side, planted with native grasses and groundcovers, and trees outside of the clear zone.
- Eastern access to Forty Bends Road terminated with the construction of a cul-de-sac with a portion of the existing road regraded to become a locked fire track.
- New left in, left out road constructed on the northern side of the road corridor at station 31340 to provide access to Hassans Walls Reserve.
- Lined catch drains constructed to the top and bottom of the cut and fill embankments on the northern side and two permanent water quality basins would be constructed to the south.

6.2.3 Landscape Character Assessment

Sensitivity
The existing road corridor is generally well vegetated with dry sclerophyll forest which has a high sensitivity, though the area outside the immediate road corridor to the south has an open rural character that reduces the sensitivity of the zone to the proposal to Moderate.

Magnitude
The proposal would double the amount of road pavement, modifying the scale of the road and the existing sense of enclosure. It would require earthworks to create the cut and fill embankments, which would encroach onto adjoining open paddocks to the south. A substantial amount of roadside vegetation to the south (up to 45 metres wide) would be removed. New tree and shrub planting would be undertaken on the embankments, visually reducing the scale of the proposal over time as they mature but would be located to allow for views over the rolling open paddocks to the south. Low planting to the median would visually reduce the amount of hard surface.

Overall, the qualitative assessment indicates that the magnitude of the proposal would be Moderate.

Landscape Character Impact
The qualitative assessment indicates that the landscape character impact of the proposal in this zone is assessed as Moderate.
6.3  LCZ 2: WHITES CREEK VALLEY

6.3.1  Existing Landscape Character

The landscape character of LCZ 2 is quite open as the road sits slightly elevated as it traverses the Whites Creek valley. There are minimal roadside tree plantings to the south providing foreground views at Whites Creek, and longer distance views over farmland to the Great Dividing Range to the western end of this zone.

The attributes that make up the character of LCZ 2 are described below.

<table>
<thead>
<tr>
<th>Landscape Character Attribute</th>
<th>Description of Attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topography</strong></td>
<td>Slightly undulating section located of south western side of Hassans Walls escarpment with undulating pasture lands to the south.</td>
</tr>
<tr>
<td><strong>Hydrology</strong></td>
<td>Well drained, road crosses over Whites Creek.</td>
</tr>
<tr>
<td><strong>Geology/ Soils</strong></td>
<td>Shoalhaven Group along the road corridor with Illawarra Coal Measures further up the slope.</td>
</tr>
<tr>
<td><strong>Vegetation</strong></td>
<td>Good quality Blaxland’s Stringybark - Mountain Gum Open Forest to the north, with moderate quality patches to the south. Area of Silvertop Ash Open Forest further up the slope.</td>
</tr>
<tr>
<td><strong>Ecology</strong></td>
<td>Good to moderate areas of dry sclerophyll forest support a moderate diversity of mammals and birds.</td>
</tr>
<tr>
<td><strong>Settlement Patterns</strong></td>
<td>Large lot farmland with residences to the south of the road.</td>
</tr>
<tr>
<td><strong>Built Form</strong></td>
<td>Rural residences situated away from the road to the south.</td>
</tr>
<tr>
<td><strong>Spatial Quality</strong></td>
<td>Generally more open as the road crosses the Whites Creek gully, with little vegetation to the south. Good mid to long distance views over the rolling rural landscape to the south.</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td>None visible.</td>
</tr>
<tr>
<td><strong>Road Environment</strong></td>
<td>Slightly undulating two lane road, divided by a jersey kerb, 80km/hr in both directions, with right turn lane into Forty Bends Road.</td>
</tr>
</tbody>
</table>

Plate 6.7: Character image within LCZ 2.
6.3.2 The Proposal
The proposal in LCZ 2 is summarised as:

- New twin two lane bridges over the narrow valley of Whites Creek. The carriageways continue as two lanes in each direction with a raised median to the intersection with Daintree Close.
- Removal of the existing road to provide a shallow cut embankment linking the existing landforms.
- New tree, shrub, groundcover, and native grass planting to new embankments.
- New left in, left out road constructed on the northern side of the road corridor, east of the bridge, to provide access to an existing rural property.
- A number of water quality basins constructed to the south of the road.

6.3.3 Landscape Character Assessment

**Sensitivity**
Despite being a modified and open landscape to the south, the zone has a generally attractive rural outlook with extensive views east to Hassans Walls, and good quality dry sclerophyll forest to the north providing a **Moderate** sensitivity to the proposal in the zone.

**Magnitude**
The proposal would increase the amount of road pavement and include the construction of new twin bridges. Limited vegetation would be required to be removed. The bridge works would be a visually prominent feature in the landscape due to its location on the edge of the hillside, scale and being around five metres higher than the existing road. The bridge works would be out of scale with other road infrastructure in the area. New tree planting to the shallow embankment to the north would visually reduce the scale of the bridge over time as they mature.

Overall, the qualitative assessment indicates that the magnitude of the proposal would be **High**, due to the changes taking place.

**Landscape Character Impact**
The qualitative assessment indicates that the landscape character impact of the proposal in this zone is assessed as **High to Moderate**.

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Moderate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnitude</td>
<td>High</td>
</tr>
<tr>
<td><strong>Landscape Character Impact</strong></td>
<td><strong>High to Moderate</strong></td>
</tr>
</tbody>
</table>
### 6.4 LCZ 3: FORTY BENDS (WEST)

#### 6.4.1 Existing Landscape Character

The landscape character of LCZ 3 is similar to that of LCZ 1. It is a generally well vegetated rural road with good stands of native vegetation located on both sides of the highway. It is slightly less enclosed than LCZ 1, with good views over the rolling farmland to the Great Dividing Range to the south.

The attributes that make up the character of LCZ 3 are described below.

<table>
<thead>
<tr>
<th>Landscape Character Attribute</th>
<th>Description of Attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topography</strong></td>
<td>Slightly undulating located on south western side of Hassans Walls escarpment with undulating pasture lands to the south.</td>
</tr>
<tr>
<td><strong>Hydrology</strong></td>
<td>Well drained with shallow gullies sloping to Whites Creek.</td>
</tr>
<tr>
<td><strong>Geology/Soils</strong></td>
<td>Shoalhaven Group along the road corridor with Illawarra Coal Measures further up the slope.</td>
</tr>
<tr>
<td><strong>Vegetation</strong></td>
<td>Good to moderate quality stands of Blaxland’s Stringybark - Mountain Gum Open Forest on both sides of the road.</td>
</tr>
<tr>
<td><strong>Ecology</strong></td>
<td>Good to moderate areas of dry sclerophyll forest support a moderate diversity of mammals and birds.</td>
</tr>
<tr>
<td><strong>Settlement Patterns</strong></td>
<td>Large lot farmland with residences to the south of the road.</td>
</tr>
<tr>
<td><strong>Built Form</strong></td>
<td>Rural residences situated close to the road to the south and along Daintree Close and McKanes Falls Road.</td>
</tr>
<tr>
<td><strong>Spatial Quality</strong></td>
<td>Generally enclosed by vegetation to both sides of the road with additional cuttings and an existing retaining wall to the north. Filtered mid to long distance views over the rolling rural landscape to the south.</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td>132kV powerlines cross the road.</td>
</tr>
<tr>
<td><strong>Road Environment</strong></td>
<td>Gently winding road with two westbound and one eastbound lanes, 80km/hr in both directions, with left and right turn lanes into McKanes Falls Road.</td>
</tr>
</tbody>
</table>

![Key Plan](Image)

*Plate 6.8: Character image within LCZ 3.*
6.4.2 The Proposal

The proposal in LCZ 3 is summarised as:

- New road works comprising a two lane westbound carriageway, and a single lane eastbound carriageway separated by a median that is both raised (at intersections) and depressed and would be planted with frangible vegetation.
- New intersections at Daintree Close, that links with Forty Bends Road, and McKanes Falls Road, with a left in lane and right turn lanes from and onto the Great Western Highway.
- Three new left in, left out roads constructed on the northern side of the road corridor to provide access to existing rural properties.
- Substantial fill embankments constructed on the southern side of the road corridor, and three major cut embankments, incorporating new retaining walls, to the northern side, planted with native grasses and groundcovers, and trees outside of the clear zone.
- Wire rope barrier would be provided adjacent to the westbound carriageway where fill embankments are located.
- Lined catch drains constructed to the top and bottom of the cut and fill embankments on the northern side and a number of water quality basins would be constructed to the south.

6.4.3 Landscape Character Assessment

**Sensitivity**

The road corridor is generally well vegetated with dry sclerophyll forest, though the area outside the immediate road corridor to the south has a more open rural character. The rating in this zone is increased to **High to Moderate** due to the greater number of residences adjacent to the roadway who would be affected by the proposal within the zone, compared to the previous zone.

**Magnitude**

The proposal would increase the amount of road pavement, modifying the scale of the road and the existing sense of enclosure and would include the construction of three new retaining walls to the north. Moderate amounts of vegetation would be removed. New tree and shrub planting would be undertaken on the embankments, visually reducing the scale of the proposal over time as they mature and would be located to allow for views over the open paddocks to the south. Low planting to the median would visually reduce the amount of hard surface. The height and scale of the proposed retaining walls and the scale of the proposed intersections at Daintree Close and McKanes Falls Road increase the impact rating in this zone.

Overall, the qualitative assessment indicates that the magnitude of the proposal would be High to Moderate, due to the changes taking place.

**Landscape Character Impact**

The qualitative assessment indicates that the landscape character impact of the proposal in this zone is assessed as **High to Moderate**.

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>High to Moderate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnitude</td>
<td>High to Moderate</td>
</tr>
<tr>
<td>Landscape Character Impact</td>
<td><strong>High to Moderate</strong></td>
</tr>
</tbody>
</table>
6.5 SUMMARY OF LANDSCAPE CHARACTER IMPACTS

The landscape character impact assessment of the proposal described above, represents a qualitative assessment based on the three Landscape Character Zones (LCZ). The results of these assessments range from Moderate to High to Moderate and are summarised in Figure 6.2.

Overall, the proposal would have an impact on landscape character. While the proposal, for the most part, is to take place in an established road corridor, they would impact on all Landscape Character Zones to some degree, due to the removal of trees and widening of the road. Trees currently overhang the road carriageway, filtering views into and out of the road corridor. As all zones have a similar scenic quality, the greatest impacts are found in the areas where the scale of the proposal is more substantial, for example, the twin bridges over Whites Creek in LCZ 2 and the extensive retaining walls in LCZ 3.

Whilst the magnitude of some of the proposal would represent substantial adverse changes within this scenic rural setting, some enhancements have been incorporated into the proposal during the concept design process. For example, the retention of existing vegetation around Whites Creek and the revegetation of cut and fill embankments adjacent to the road will help to reinstate the existing sense of enclosure to the road journey and will help screen the road from adjoining areas.

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**Figure 6.2:** Landscape Character Impacts Summary.
7. VISUAL IMPACT

7.1 VISUAL IMPACT METHODOLOGY

7.1.1 Overview
The potential visual impact of the proposal has been assessed in relation to a number of key viewpoints. It is based on the existing pattern of land use and development adjoining the road corridor. The method of assessment involved:

> Defining the scale or size, form and type of proposal within the context of the study area;
> Establishing an estimated visual catchment, through desktop analysis and groundtruthing on site;
> Identifying key viewpoints from where the proposal would be visible; and
> Assessing the level of potential visual impact on viewers at these viewpoints from the proposal.

7.1.2 The Proposal
All elements associated with the proposal are assessed as part of this visual impact assessment. These are described in Chapter 3.

7.1.3 Visual Catchment
The extent from which the proposal would be visible from adjoining areas varies along the length of the study area. It is influenced by topography, vegetation, rural properties and associated buildings. A detailed field and desktop assessment was undertaken to determine the area from where the proposal would be visible, defined as the Visual Envelope Map (VEM), as illustrated in Figure 7.1.

Views to the proposal are generally constrained to the low ridgelines to the south, in particular, for about two kilometres along McKanes Falls Road. The Hassans Walls escarpment contains the catchment close to the existing road to the north.

The visual receivers of the proposal include residents, tourists, pedestrians and motorists.

7.1.4 Viewpoint Locations
Within the VEM, key viewpoints have been identified along the road corridor and at public domain areas, for example, Hassans Walls Lookout. This involved the analysis of views from the road to identify the extent to which houses and other buildings were visible. This provided an indication of the likely level of visibility from these buildings, as it was not feasible to inspect private residences to check potential views from these properties. Locations and directions of chosen viewpoints are representative of the range of viewpoints both within and beyond the road corridor, and are indicated in Figure 7.1.

7.1.5 Visual Impact Assessment
The magnitude of change to existing views and the sensitivity of the viewer has been assessed for each of the chosen viewpoints.

Magnitude
Magnitude of change to existing views refers to the nature and scale of the proposal, and the extent and proximity of the view to it. Magnitude represents the contrast in scale, form and type of proposal to the location and context to which it is to be placed. A high magnitude results if the proposal is of a major scale and is considered out of scale or uncharacteristic of the existing visual character, or if there is considerable...
Figure 7.1: The Visual Envelope Map (VEM)
modification to the existing landscape. A moderate magnitude would result if the proposal is prominent but not considered to be substantially uncharacteristic with the existing visual character. A low magnitude results if there is minimal alteration to the existing view and the proposal is of a scale and nature that is consistent with the existing visual character.

**Sensitivity**

Sensitivity is the measure of the visual importance of the view and is dependent on:

- Distance between viewer and the proposal;
- The category of viewer, for example, residence, workplace, shops, open space;
- The elements of the proposal that are visible; and
- Importance of the view, for example, identified in tourist guides, do people deliberately seek the view.

Visual sensitivity includes the consideration of the perceived cultural and historical values of the visual environment and the elements within it.

Generally, viewers with the higher sensitivity are those that have long duration, repetitive views, including:

- Residents who have existing attractive views that will be affected by the proposal;
- Users of public open space where their attention is focused on the visual landscape, for example, lookout or other scenic natural areas;
- Communities that place high cultural and historical significance on the visual landscape.

Viewers with the lower sensitivity are most likely to be those with short duration views, including:

- Employees focused on their work;
- Motorists whose attention is focused on driving.

**Impact**

Impact is the combination of the magnitude and sensitivity rating in accordance with the Impact Assessment Grading Matrix (refer to Figure 1.2).

The following pages contain a table quantifying the visual impact at each viewpoint. The gradings are measured on their impact relative to each other within the scope of the proposal rather than to an absolute scale covering all potential forms of impact.

### 7.2 KEY VIEWPOINTS

A total of 12 viewpoints have been identified on the basis of the criteria outlined above. Each viewpoint is comprised of the following summary information:

- Location;
- Existing site description;
- Viewpoint selection rationale;
- Visual impact based on assessment of magnitude of change and sensitivity;
- Mitigation measures that have been incorporated into the landscape and engineering designs.

The viewpoints are as indicated in Figure 7.1 and are listed from east to west.
Viewpoint 1
Edge of Hassans Walls Lookout, looking west.

Site description
The edge of the rock escarpment, south of the Hassans Walls Lookout is a popular public lookout that provides spectacular 270° panoramic views over the dramatic natural and rural landscape of the area. The extent of the site is only a small section of the panorama. The edge of the vegetation that delineates the road corridor is clearly seen from this location.

Viewpoint selection
This viewpoint is from the perspective of a lookout user and provides an overview of the entire proposal. It is located approximately 615 metres from the eastern extent of the proposal.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
</table>
| 1 | High to Moderate | Considerable sensitivity to a small number of tourists and local residents using this lookout, despite its distance from the proposal. | High to Moderate | > Minimise the number of trees to be removed.  
> Revegetate cut/ fill batters with local species of trees, shrubs and groundcovers. |

Long distance view
The extent of the proposal being undertaken would be evident by the removal of existing vegetation, opening up the road corridor and increasing the amount of road pavement visible. The bridge works would also be visible due to its height above the existing road, its width and the white colour of the concrete.

Plate 7.1: Viewpoint 1

Key Plan
**Viewpoint 2**
Great Western Highway, station 30770, looking west.

**Site description**
Within the road corridor, the landscape is slightly undulating, sitting on the southern edge slopes of the Hassans Walls escarpment, and is surrounded by Blaxland’s Stringybark - Mountain Gum Open Forest on both sides, providing an attractive rural road character, with dappled light and shade and filtered views to the rural landscape to the south. An existing gabion retaining wall is located to the northern side of the road. There are no existing residences in close proximity to this area.

**Viewpoint selection**
This viewpoint is from the road users perspective travelling west. It addresses the removal of existing vegetation.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Foreground to mid</td>
<td>Moderate</td>
<td>Moderate to Low</td>
<td>&gt; Minimise the number of trees to be removed.</td>
</tr>
<tr>
<td></td>
<td>distance view</td>
<td></td>
<td></td>
<td>&gt; Revegetate cut/ fill batters with local species of trees, shrubs and groundcovers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moderate</td>
<td>&gt; Provide openings in the plantings to take advantage of the significant long distance views to the south.</td>
</tr>
</tbody>
</table>

Plate 7.2: Viewpoint 2

Key Plan
Viewpoint 3
Great Western Highway at eastern intersection of Forty Bends Road, looking east.

Site description
Within the road corridor, the landscape is slightly undulating, sitting on the southern edge slopes of the Hassans Walls escarpment, and is surrounded by Blaxland’s Stringybark - Mountain Gum Open Forest on both sides, providing an attractive rural road character, with dappled light and shade and filtered views to the rural landscape to the south. An existing gabion retaining wall is located to the northern side of the road. There are no existing residences in close proximity to this area.

Viewpoint selection
This viewpoint is from the road users perspective travelling east. It addresses the tie in with the existing road.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Foreground view</td>
<td><strong>Moderate</strong></td>
<td><strong>Moderate to Low</strong></td>
<td>Moderate</td>
</tr>
</tbody>
</table>
|           |           | The amount of road pavement would increase in this natural/ rural setting and would require the removal of existing vegetation to the south, with an extensive fill batter which would be revegetated. | A high number of motorists would be affected by the changed view, however their sensitivity is considered moderate to low due primarily to their speed of travel through this area. | > Minimise the number of trees to be removed.  
> Revegetate cut/ fill batters with local species of trees, shrubs and groundcovers.  
> Provide openings in the plantings to take advantage of the significant long distance views to the south east. |
**Viewpoint 4**  
Great Western Highway, station 31630, looking west.

**Site description**  
Within the road corridor, the landscape slopes to the gentle gully of Whites Creek. Good quality Blaxland’s Stringybark - Mountain Gum Open Forest is located to the south and Silvertop Ash Open Forest to the north on the slopes of the Hassans Walls escarpment, providing an attractive rural road character, with dappled light and shade and filtered views to the rural landscape to the south. A concrete barrier divides the carriageways.

**Viewpoint selection**  
This viewpoint is from the road user’s perspective travelling west. It addresses the new twin bridge crossing over Whites Creek.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
</table>
| 4         | High      | Moderate to Low | High to Moderate | > Minimise the number of trees to be removed.  
> Revegetate cut/ fill batters with local species of trees, shrubs and groundcovers.  
> Provide openings in the plantings to take advantage of the mid to long distance views to the south. |
| Foreground view |          |             |        |                     |
**Viewpoint 5**  
Forty Bends Road, west of Whites Creek, looking north.

**Site description**  
Gently sloping pasture land and rural fencing with scattered tree planting adjacent to Forty Bends Road. Forty Bends Road is an attractive, tree lined, winding rural road with open and forested views.

**Viewpoint selection**  
This viewpoint is from the road users or pedestrian perspective. It addresses the new twin bridge crossing over Whites Creek.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Plant local forest trees to screen bridge piers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Plant surrounds of water quality basin to provide a natural aesthetic.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Screen the construction compound with local tree species.</td>
</tr>
</tbody>
</table>

The elevated proposed bridge and embankment would be highly visible from this area. A new permanent water quality basin is proposed adjacent to the road. A construction compound and/or stockpiles are proposed in this location during the construction period.

A low number of motorists and pedestrians using Forty Bends Road would be affected by the changed view, however the slow speed of travel would increase the period of exposure to this view.

*Plate 7.5: Viewpoint 5*
**Viewpoint 6**
Great Western Highway at intersection of Forty Bends Road, looking east.

**Site description**
Within the road corridor, the landscape slopes down to Whites Creek, and is surrounded by Blaxland’s Stringybark - Mountain Gum Open Forest on the slopes to the north and mixed native vegetation community to the south. An existing exposed cutting is located to the northern side of the road. There are attractive mid distance views to Hassans Walls.

**Viewpoint selection**
This viewpoint is from the road user’s perspective travelling east. It addresses the approach to the bridge over Whites Creek and the treatment of the Forty Bends Road intersection.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Foreground and mid distance view</td>
<td>Moderate</td>
<td>Moderate to Low</td>
<td>Moderate</td>
<td>&gt; Minimise the number of trees to be removed.</td>
</tr>
<tr>
<td></td>
<td>The amount of road pavement would double in this natural/rural setting. The road corridor would be widened and the addition of the upgraded road linking Forty Bends Road and Daintree Close, reduces the existing sense of enclosure.</td>
<td>A high number of motorists would be affected by the changed view, however their sensitivity is considered moderate to low due primarily to their speed of travel through this area.</td>
<td>&gt; Revegetate cut/ fill batters with local species of trees, shrubs and groundcovers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Plant frangible species to the median to break up the expanse of hard surface.</td>
<td></td>
</tr>
</tbody>
</table>
**Viewpoint 7**
Forty Bends Road at western intersection with the Great Western Highway, looking west.

**Site description**
Within the road corridor at the intersection of Forty Bends Road, the landscape rises out of the Whites Creek gully, and is surrounded by Blaxland’s Stringybark - Mountain Gum Open Forest on both sides of the road, providing an attractive rural road character. An existing exposed cutting is located to the northern side of the road.

**Viewpoint selection**
This viewpoint is from the road users perspective travelling west. It addresses the proposed retaining wall and new Forty Bends Road intersection.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Foreground view</td>
<td>High</td>
<td>Moderate to Low</td>
<td>High to Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A high number of motorists would be affected by the changed view, however their sensitivity is considered moderate to low due primarily to their speed of travel through this area.</td>
<td>&gt; Minimise the number of trees to be removed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; Revegetate cut/ fill batters with local species of trees, shrubs and groundcovers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; Provide recessive finish and colour to retaining walls and plant medium height trees and shrubs in front of retaining wall.</td>
</tr>
</tbody>
</table>

*Plate 7.7: Viewpoint 7*
**Viewpoint 8**
Southern end of Daintree Close, looking east.

**Site description**
The landscape is predominately undulating cleared rural land with scattered native and exotic plantings, with a forested background, and is located south of the road corridor. The location is surrounded by a number of residences and associated farm buildings along Daintree Close and south along a private road. A 132kV transmission line traverses the site in a north west to south east direction.

**Viewpoint selection**
This viewpoint is from the perspective of a small group of residences on Daintree Close. It addresses the mid to long distance views over the eastern extent of the proposal.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Mid to long distance view</td>
<td>High to Moderate</td>
<td>High to Moderate</td>
<td>A small number of existing residents would have a high to moderate sensitivity to the changes to this attractive rural view with Hassans Walls in the background.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; Minimise the number of trees to be removed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; Revegetate cut/ fill batters with local species of trees, shrubs and groundcovers.</td>
</tr>
</tbody>
</table>

Plate 7.8: Viewpoint 8

Key Plan
Viewpoint 9
McKanes Falls Road at intersection with the Great Western Highway, looking west.

Site description
Within the road corridor at the intersection of McKanes Falls Road, the landscape rises to the ridgeline on which McKanes Falls Road is located, and is surrounded by a generally poor quality modified vegetation community on both sides of the road. A low existing exposed cutting is located to the northern side of the road.

Viewpoint selection
This viewpoint is from the road users perspective turning left out of McKanes Falls Road. It addresses the proposed retaining wall and new McKanes Falls Road intersection.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>High</td>
<td>Moderate to Low</td>
<td>High to Moderate</td>
<td></td>
</tr>
<tr>
<td>Foreground view</td>
<td>The amount of road pavement would increase in this natural/ rural setting and would require the removal of vegetation to the north. A cut embankment and retaining wall would be constructed to the north which encroaches onto an existing property. New intersection and turning facility would be provided.</td>
<td>A high number of motorists would be affected by the changed view but their sensitivity is considered moderate to low.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Plate 7.9: Viewpoint 9

Key Plan
Viewpoint 10
McKanes Falls Road, 100 metres south of the intersection with the Great Western Highway, looking north east.

Site description
This viewpoint is located on McKanes Falls Road which is aligned on a ridgeline which falls to the south, away from the edge slopes of the Hassans Walls escarpment. The land is predominately cleared with scattered native and exotic plantings along the Great Western Highway, and is located south of the road corridor. The location is adjacent to a residence and associated farm buildings.

Viewpoint selection
This viewpoint is from the perspective of a small number of residences at the northern end of McKanes Falls Road. It addresses the mid distance views over the road corridor and proposed construction stockpile.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
</table>
| 10        | High to Moderate | High to Moderate | High to Moderate | > Minimise the number of trees to be removed.  
> Revegetate cut/ fill batters with local species of trees, shrubs and groundcovers. |

Plate 7.10: Viewpoint 10

Key Plan
**Viewpoint 11**
Great Western Highway, west of the proposal tie in, looking east.

**Site description**
Within the road corridor, the road sits on a flat bench on the south western slopes of the Hassans Walls escarpment. It is edged by a modified vegetation community on both sides. An existing access road to properties is located to the northern side of the road.

**Viewpoint selection**
This viewpoint is from the road users perspective travelling west. It addresses the proposed retaining wall and tie in with the existing road.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Foreground view</td>
<td><strong>Moderate</strong></td>
<td><strong>Moderate to Low</strong></td>
<td><strong>Moderate</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The amount of road pavement would increase in this natural/ rural setting and would require the removal of existing vegetation to the north and reshaping of the cut batters, slightly widening the road corridor. The retaining wall may be visible to the north.</td>
<td>A high number of motorists would be affected by the changed view, however their sensitivity is considered moderate to low due primarily to their speed of travel through this area.</td>
<td>&gt; Minimise the number of trees to be removed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; Revegetate cut/ fill batters with local species of trees, shrubs and groundcovers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; Plant surrounds of water quality basin to provide a natural aesthetic.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; Screen the construction compound with local tree species.</td>
</tr>
</tbody>
</table>

*Plate 7.11: Viewpoint 11*
**Viewpoint 12**
McKanes Falls Road, looking east.

**Site description**
The landscape is predominately undulating cleared rural land with scattered native plantings along the drainage gullies, and is located south of the road corridor. The location is surrounded by a number of residences and associated farm buildings along McKanes Falls Road. A 132kV transmission line traverses the site in a north west to south east direction.

**Viewpoint selection**
This viewpoint is from the perspective of a small group of residences along McKanes Falls Road. It addresses the long distance views over the middle to eastern extent of the proposal.

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Magnitude</th>
<th>Sensitivity</th>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Long distance view</td>
<td><strong>Moderate to Low</strong></td>
<td><strong>Moderate</strong></td>
<td>&gt; Minimise the number of trees to be removed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; Revegetate cut/ fill batters with local species of trees, shrubs and groundcovers.</td>
</tr>
</tbody>
</table>

The extent of the proposal would be noticed by the removal of existing trees, in particular those to the eastern extent of the site. It is expected that part of the Whites Creek bridge may be visible from this viewpoint in the middle distance although revegetation of the adjoining areas would restrict this view overtime.

A low number of existing residents with long duration views would be affected by the changed view, but their distance from the proposal reduces the rating.

Plate 7.12: Viewpoint 12
7.3 SUMMARY

A total of 12 viewpoints form the basis of the visual impact assessment. The viewpoints are focused across the range of anticipated magnitudes and sensitivities including residents, tourists and motorists, providing a more even ratings outcome.

Out of the 12 selected viewpoints, visual impact ratings were determined as follows:

> Six viewpoints have High to Moderate visual impact;
> Six viewpoints have Moderate visual impact.

Ratings of High to Moderate impact occur where sensitivity to change is the highest, such as Hassans Walls Lookout and groups of residences adjacent to the road, along Daintree Close and the northern section of McKanes Falls Road, or where a greater magnitude of the proposal is viewed, for example, the retaining walls on the northern side of the Highway and the bridge over Whites Creek. The remaining Moderate impacts result from a variety of conditions including a greater distance from the proposal and the category of viewer being a road user.

Landscape and urban design mitigation strategies have been developed from the outcomes of the landscape character and visual assessments, as a way of mitigating the potential impacts, and have been incorporated into the overall Concept Design. These are discussed in the following chapter.
8. MITIGATION STRATEGY

The integration of the engineering and performance objectives with urban and landscape design objectives for
the Forty Bends proposal aims to produce a design outcome that has high visual quality and is integrated into
the existing environment. In order to achieve this, a range of mitigation measures, developed in accordance
with the urban design and landscape objectives and principles outlined in Chapter 4, have been incorporated
into the proposal. These measures combine to develop a solution that protects and enhances the existing
visual character of this section of the Great Western Highway and would be the basis for further investigation
during the design development process.

Retention of roadside trees
The coordination of the road design with landscape considerations can maximise the retention of existing trees
that may be supplemented by new planting as part of the landscape works that will form part of the proposal.
A major benefit of retaining existing roadside trees is that they contribute immediately to the visual quality of
the upgraded road. In addition, the existing roadside vegetation provides visual screening of views to the road
from adjoining residences and farmland in many situations.

The retention of roadside vegetation can be achieved by varying the horizontal and vertical alignment of the
carriageways. If necessary, safety barriers should be used where trees are located within clear zones in order to
retain the maximum number of trees.

Landscape treatment in road corridor
Design of the landscape works to be carried out as part of the proposal would need to achieve two major
objectives. Firstly it mitigates the potential visual impact on people living, working and participating in recreation
activities in areas adjoining the road corridor. Secondly it should enhance the visual experience for road users.
In most situations the second objective would involve revegetation, to screen potential views of the road and
traffic travelling along it.

Revegetation, based on existing vegetation communities (including grasses, groundcovers, shrubs, riparian
species, and trees depending on sight line requirements), in medians and roadside areas would help to reduce
perceived corridor width.

Earthworks Design
The proposal would involve extensive earthworks including cuttings, fill embankments, and retaining walls to
achieve the necessary horizontal and vertical alignments. The potential visual impact of these earthworks can
be minimised by careful design that integrates them with the adjoining landforms.

Existing embankments should be retained where possible. For example, the embankments to the existing
roadway in the vicinity of the new bridge over Whites Creek could be retained to protect existing vegetation
and to maintain fauna corridors and visual amenity. The road pavement would also be removed and
revegetated.

Retaining walls would be required in combination with the earthworks. Visually recessive materials, textures
and colours and where space permits, screen planting would reduce their visual dominance and blend with the
unique landscape of this area.
Modification of access and intersections

Modifications to the intersections and access arrangements along the road corridor would require a number of trees to be removed for the construction of additional deceleration and acceleration lanes and embankments. Planting to verges, medians and traffic islands would help soften and break up large areas of pavement and reduce perceived intersection width and screen visually unattractive infrastructure. Any ameliorative measures would need to consider sight distance restrictions.

Bridges and Culverts

The new bridge over Whites Creek, as well as culverts and other drainage lines would create a series of new elements within the road corridor. The design of these structures and associated earthworks should be designed to minimise impacts on the creek bed, banks and vegetation.

Minimise the depth of the structure to reduce the visual impact of the bridge from surrounding areas. The number of bridge piers should be minimised to keep views through and across the bridge as open as possible. The tapering of the piers would give them a finer appearance.

Culverts should be designed to be visually recessive. This can be achieved by using dark coloured concrete on the wing walls and head wall and splaying the wing walls back further and stacking boulders in front of them to further integrate the structures with the surrounding bush environment. Using dark coloured rock for the scour protection and placing it in a naturalistic way, would help to disguise or replace the concrete pad at the culvert entrances.
9. CONCLUSION

The study area for the Forty Bends proposal adjoins a predominately rural landscape with rolling pasture lands and stands of vegetation to the south and well vegetated woodland to the north. The character of the road itself is relatively constant as a generally slightly winding and undulating two to three lane road.

The proposal aims to improve road safety and efficiency and, in doing this, would introduce a number of elements into the environment, as described in Section 3 of this Report, including:

- Widened pavement surface and depressed median;
- New twin span bridge crossing over Whites Creek on a new alignment;
- Construction of new water quality basins and drainage works;
- Construction of new cut and fill batters.

These proposal elements affect the existing character but are consistent with other projects, either completed or under construction along the Great Western Highway. The urban design principles developed take into account urban design and visual character not only for the study area itself, but also reflect its relationship with surrounding areas. The integration of proposal elements and urban design and landscaping treatments within the study area helps achieve the desired future character. The urban design and landscape treatments:

- Include targeted revegetation measures to maintain and enhance the vegetated character of the corridor;
- Provide opportunities to view the wider landscape from selected locations;
- Would incorporate materials and finishes for new road elements that align with those elements already used along the Great Western Highway;
- Would seek to limit the visual dominance of road elements relative to the wider vegetated corridor through a consistent and limited colour palette.
REFERENCES

RMS (Formerly RTA) references and guidelines

Mount Victoria to Lithgow project reports
Mount Victoria to Lithgow Alliance, 2012. Great Western Highway Upgrade, Mount Victoria to Lithgow, *Biodiversity Survey Results*.
Mount Victoria to Lithgow Alliance, 2011. *Aboriginal Archaeological Survey and Assessment. Preferred Route Corridor, Great Western Highway Upgrade, Mount Victoria to Lithgow*.
Mount Victoria to Lithgow Alliance, 2012. *Non-Aboriginal Heritage. Preferred Route Corridor, Great Western Highway Upgrade, Mount Victoria to Lithgow*. 