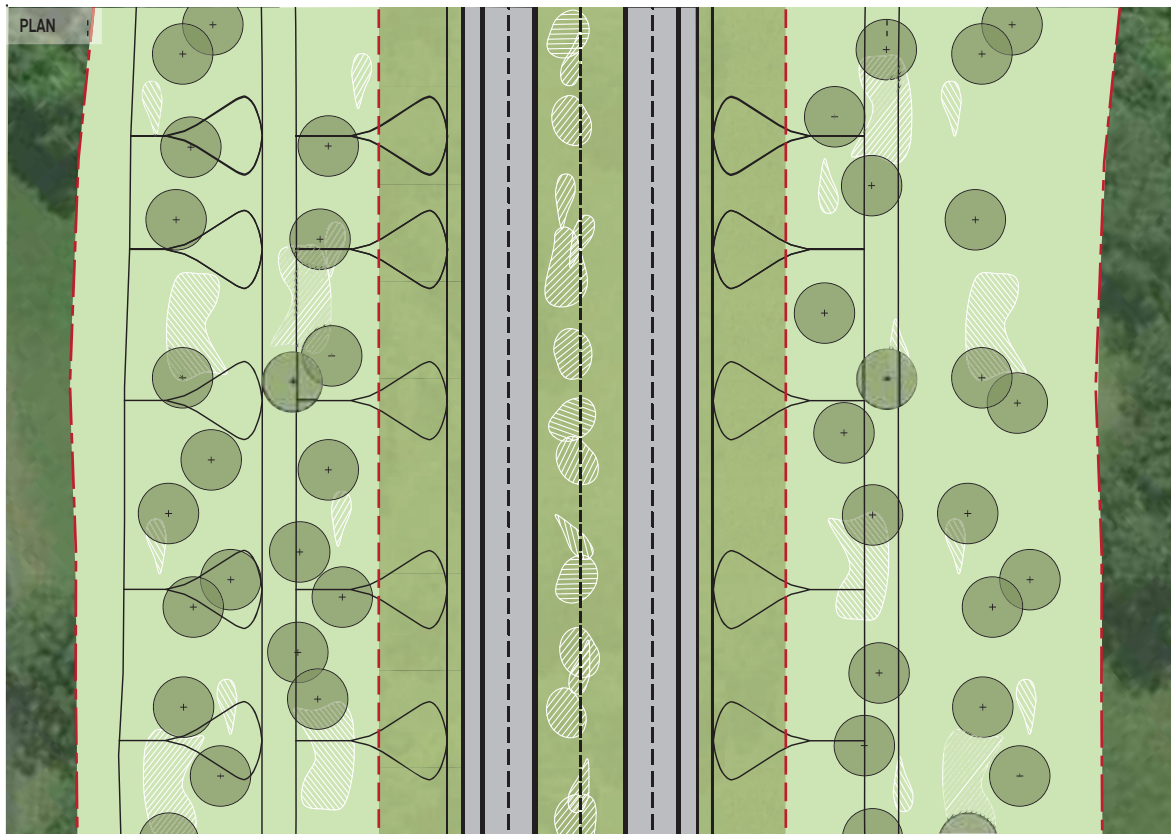
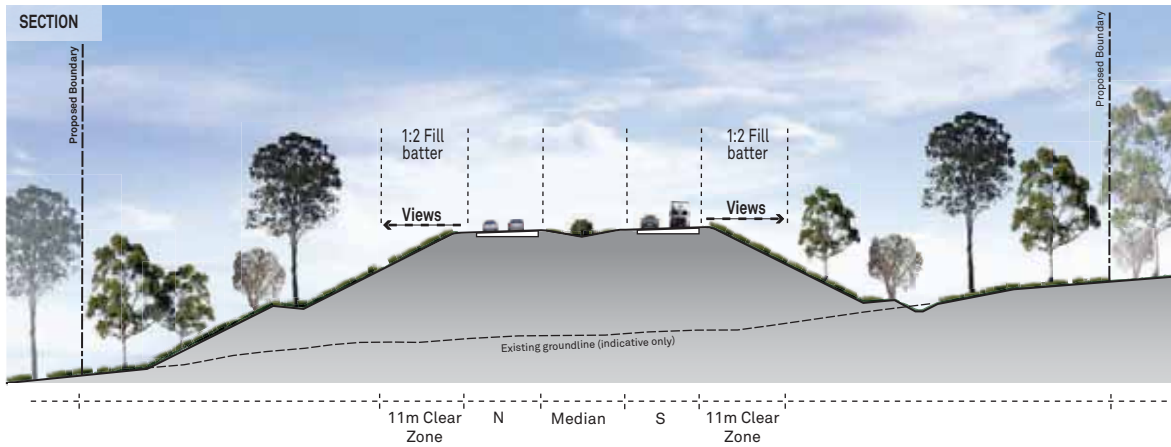


## 04 Landscape and Urban Design Strategy



Revegetate with groundcovers, grasses and occasional tree and shrub plantings. Arrangements to mimic adjacent land-use and forest coverage.

Clear zone planting. Ensure filtered views are maintained to surrounding landscape. Plant groundcovers and grasses on batters. Shrubs to be used to avoid headlight glare.

Revegetate with groundcovers, grasses and occasional tree and shrub plantings. Arrangements to mimic adjacent land-use and forest coverage.

### LA 212\_ Typical\_ High Fill above 10 m - Filtered Forest

0 10 20m  
Scale 1:1,000 @ A4

#### Legend

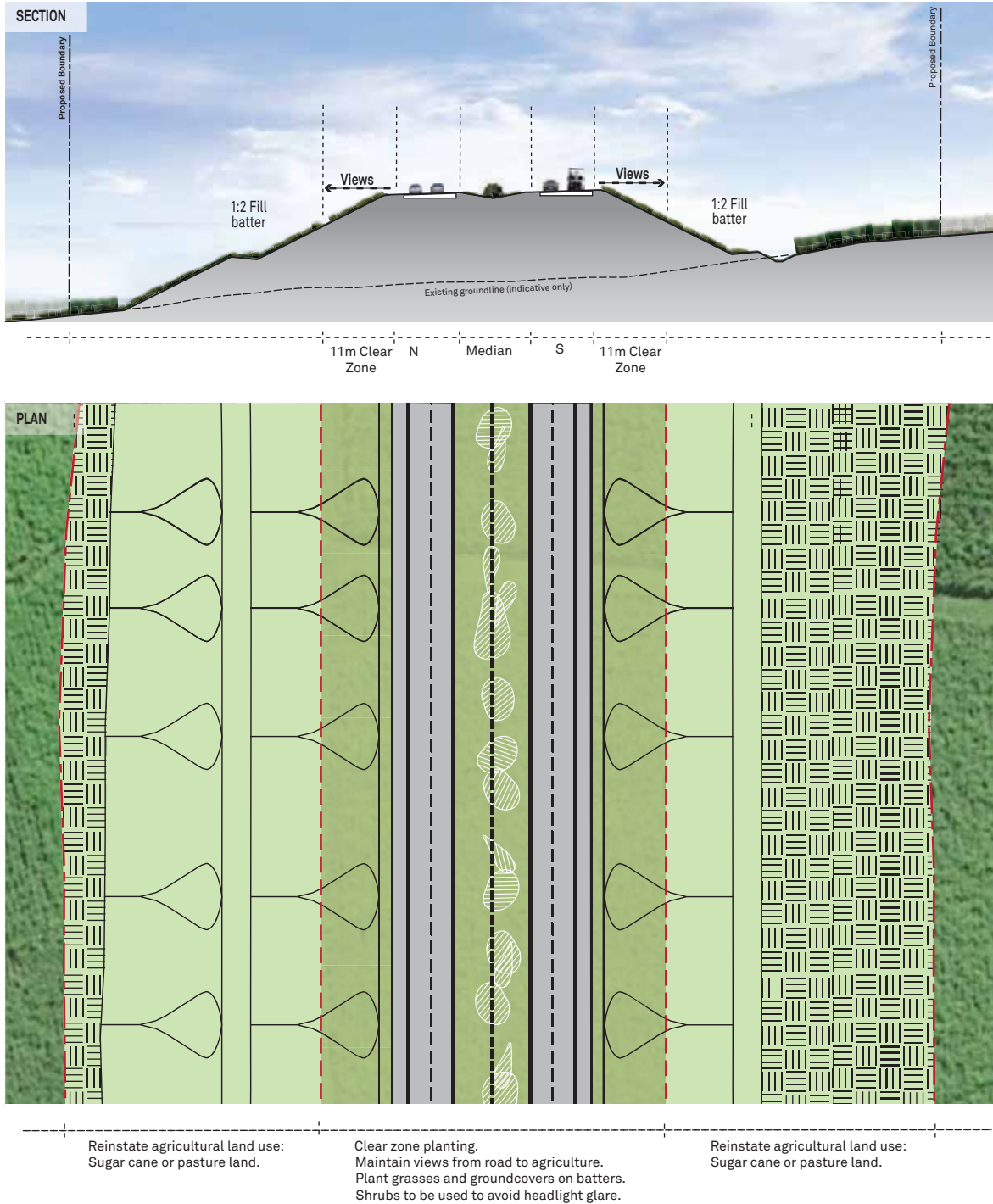
- |                     |                          |
|---------------------|--------------------------|
| Tree                | Clear Zone               |
| Shrub               | Road                     |
| Groundcover+Grasses | Existing Forest Retained |
| Site Boundary       | Fill Batters             |

#### NOTES:

- \_ Maximise the extent of 1:4 embankments where possible to minimise the use of wire rope barriers.
- \_ Where wire rope barriers are used. Clear zones are reduced to 1.5m past the barrier.

## 04 Landscape and Urban Design Strategy

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### LA 213\_ Typical\_ High Fill above 10 m - Agriculture/Grassland

0 10 20m  
Scale 1:1,000 @ A4

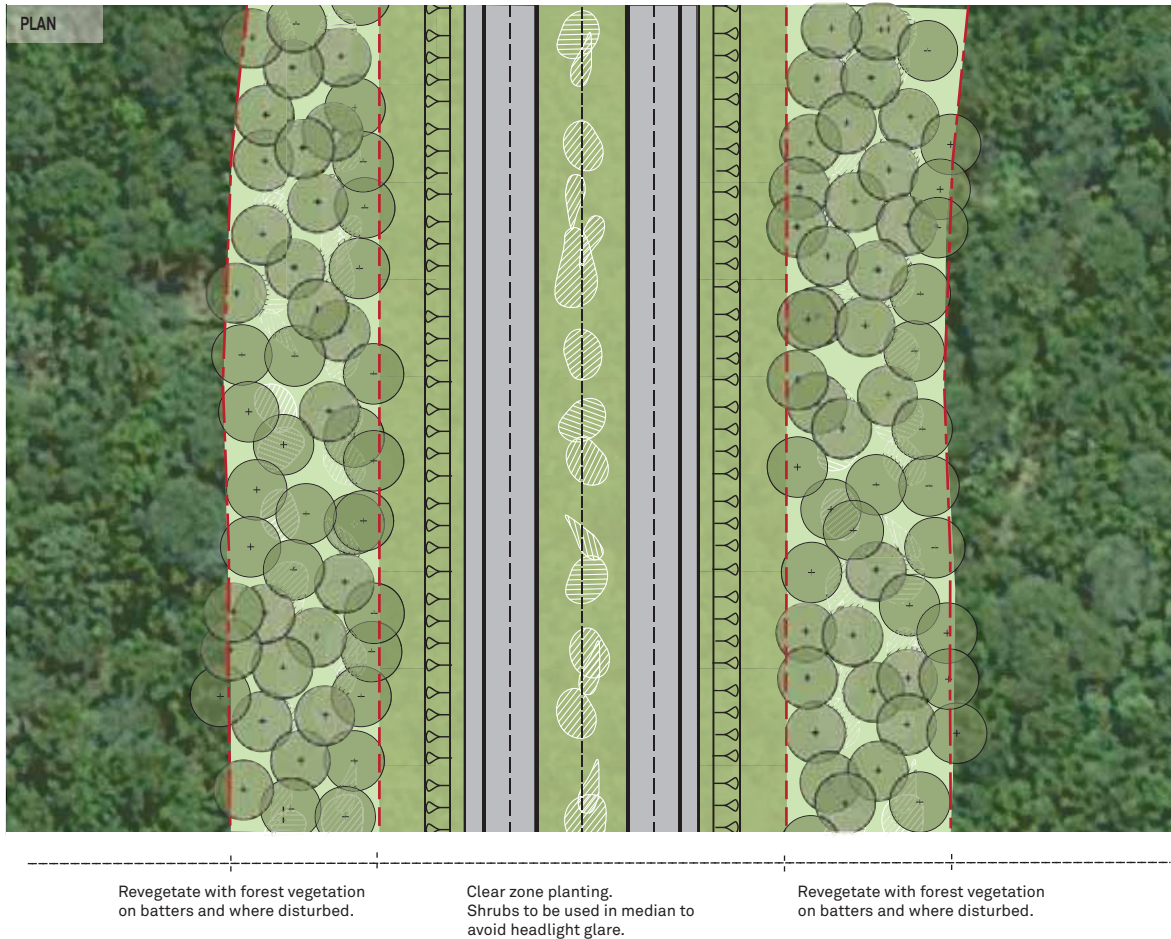
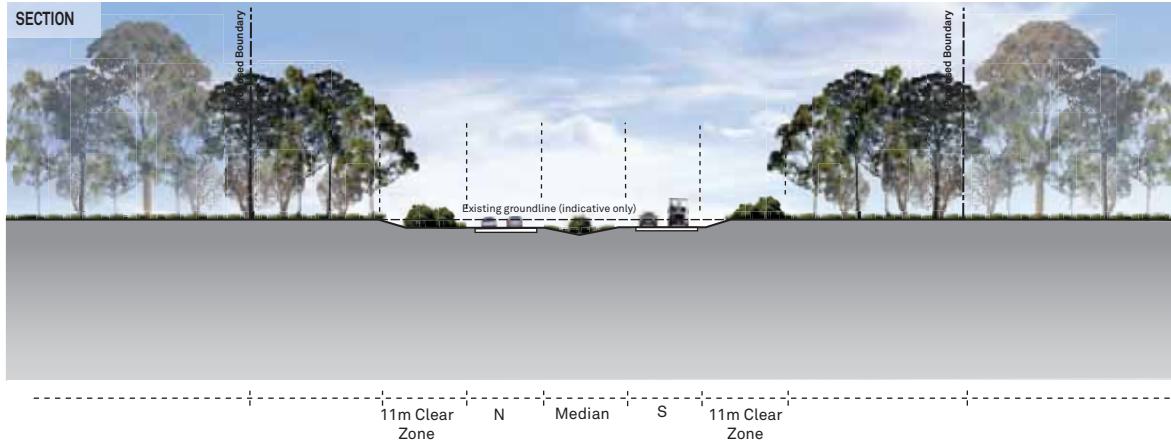
#### Legend



#### NOTES:

- \_Maximise the extent of 1:4 embankments where possible to minimise the use of wire rope barriers.
- \_Where wire rope barriers are used. Clear zones are reduced to 1.5m past the barrier.

## 04 Landscape and Urban Design Strategy



### LA 214\_ Typical \_ Shallow Cut up to 2.5 m - Dense Forest

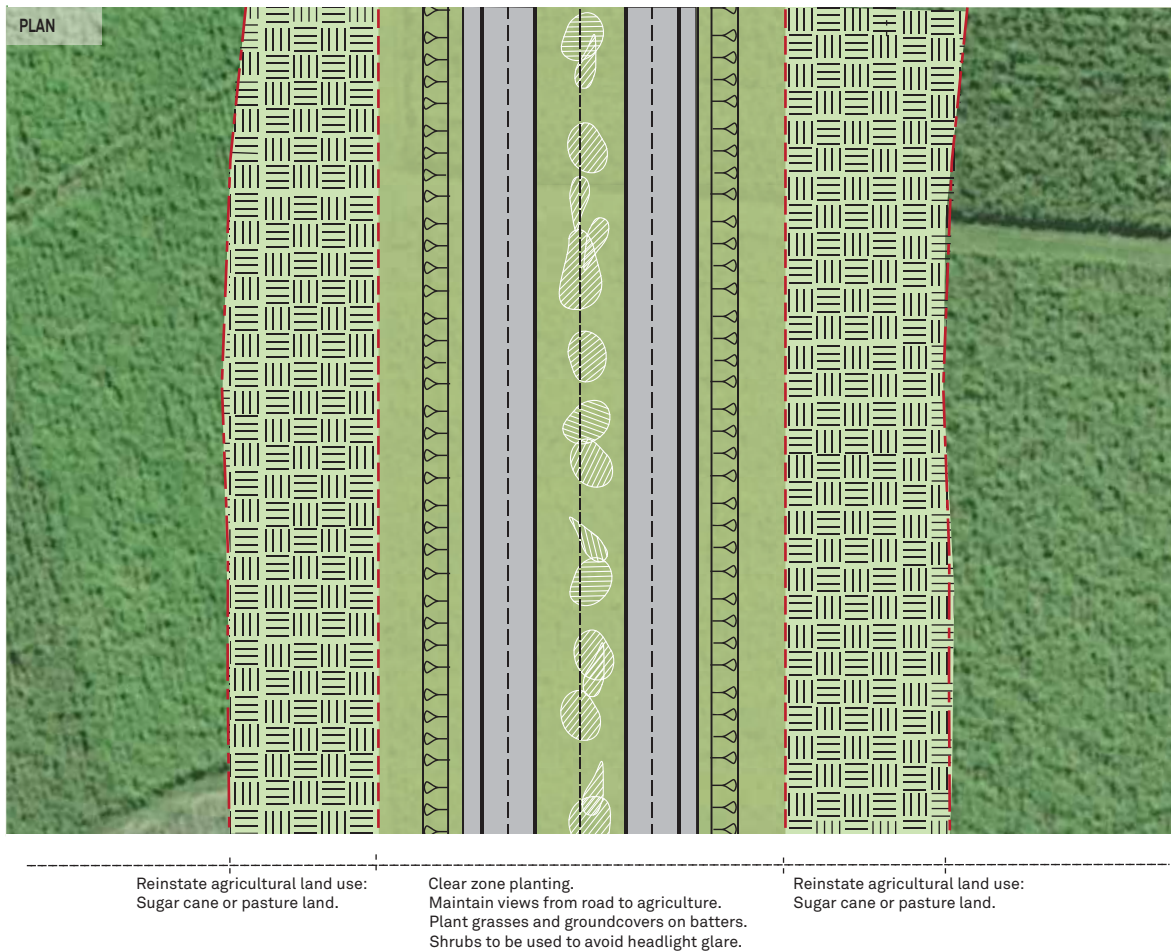
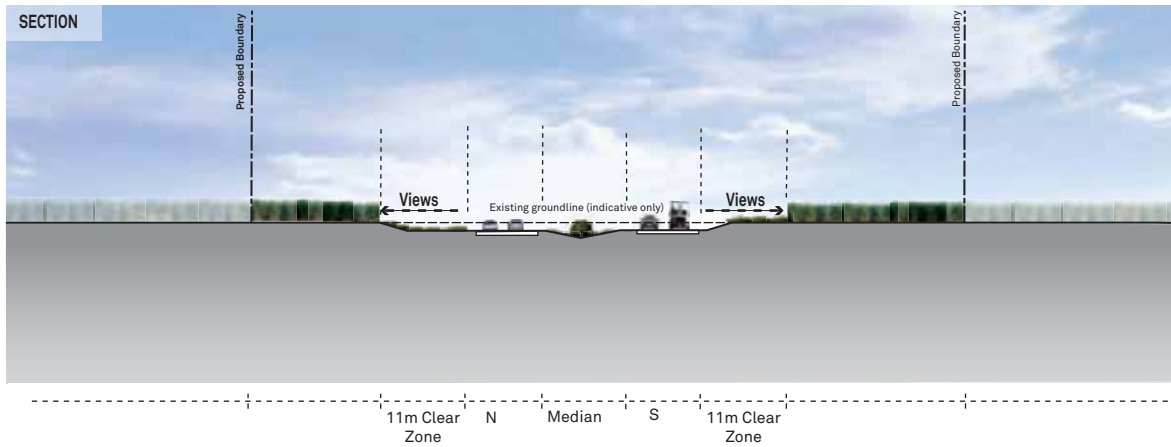
0 10 20m  
Scale 1:1,000 @ A4

#### Legend

- |   |  |
|---|--|
|  Tree                |  Clear Zone               |
|  Shrub               |  Road                     |
|  Groundcover+Grasses |  Existing Forest Retained |
|  Site Boundary       |  Cut Batters              |

## 04 Landscape and Urban Design Strategy










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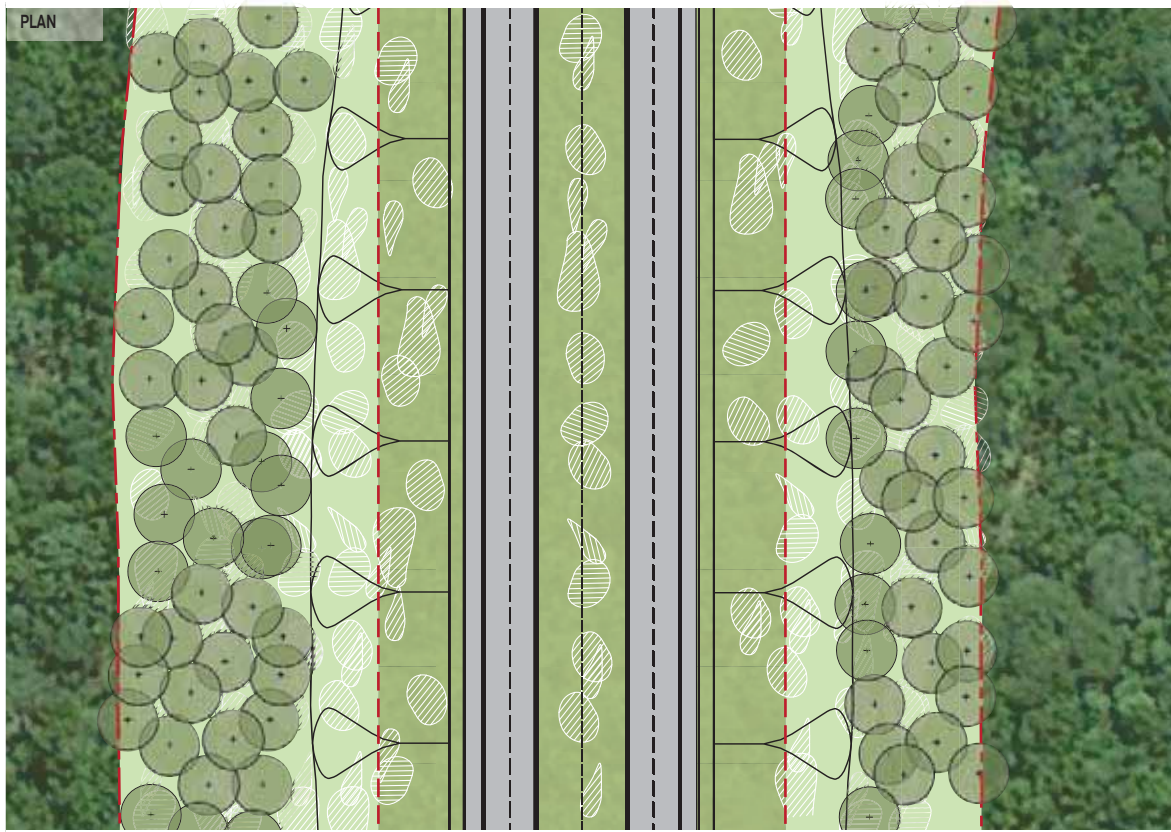
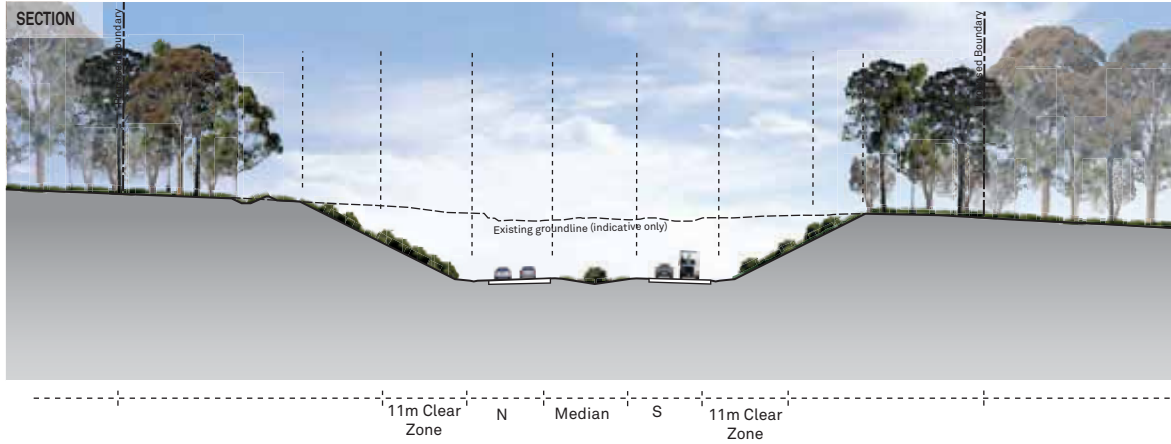
### LA 215\_ Typical\_ Shallow Cut up to 2.5 m - Agriculture

0 10 20m  
Scale 1:1,000 @ A4

#### Legend

-  Tree
-  Shrub
-  Groundcover+Grasses
-  Site Boundary
-  Clear Zone
-  Road
-  Existing Agriculture Retained
-  Reinstated Agricultural Land Use
-  Cut Batters

## 04 Landscape and Urban Design Strategy



Revegetate with forest vegetation on batters and where disturbed.

Clear zone planting includes median. Shrubs to be used in median to avoid headlight glare.

Revegetate with forest vegetation on batters and where disturbed.

### LA 216\_ Typical\_ Cut 2.5 m- 10 m- Dense Forest

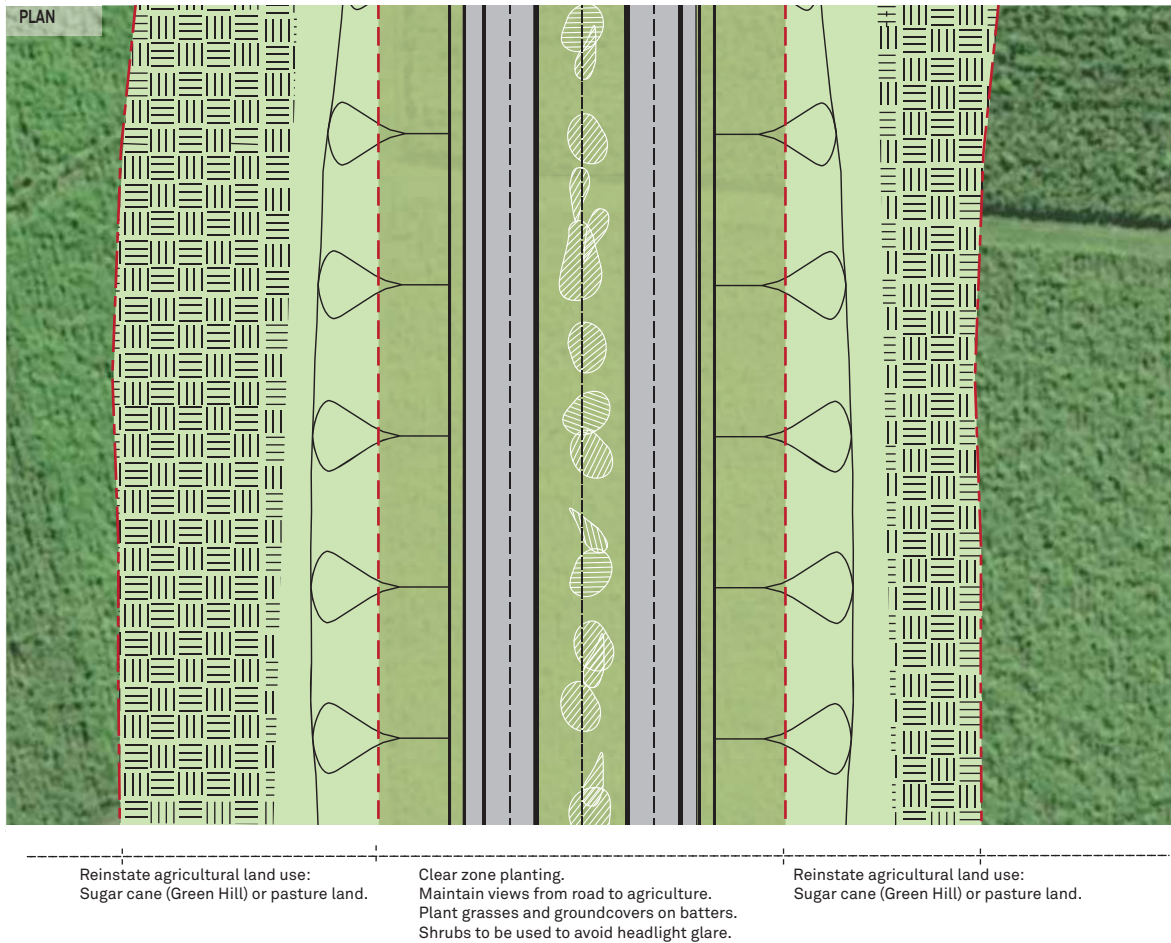
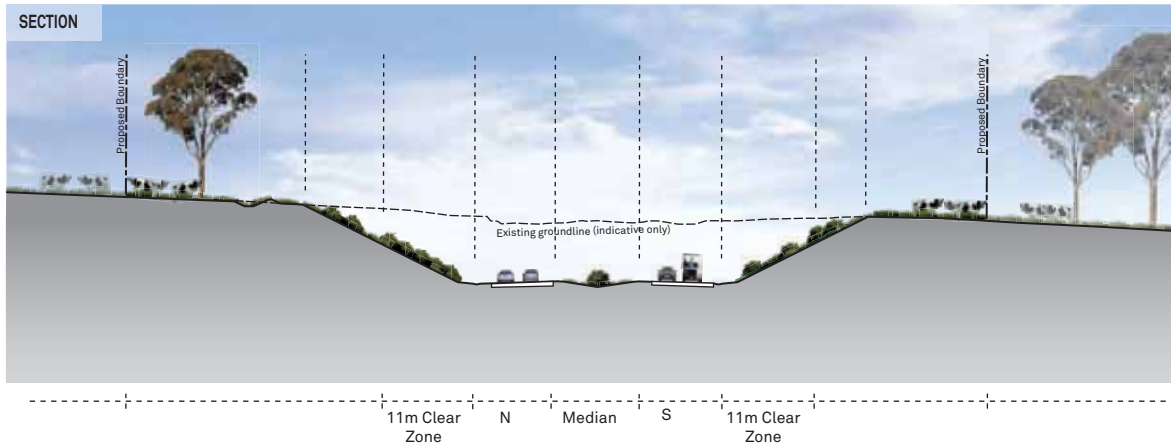
0 10 20m  
Scale 1:1,000 @ A4

#### Legend

-  Tree
-  Shrub
-  Groundcover+Grasses
-  Site Boundary
-  Clear Zone
-  Road
-  Existing Forest Retained
-  Cut Batters

## 04 Landscape and Urban Design Strategy

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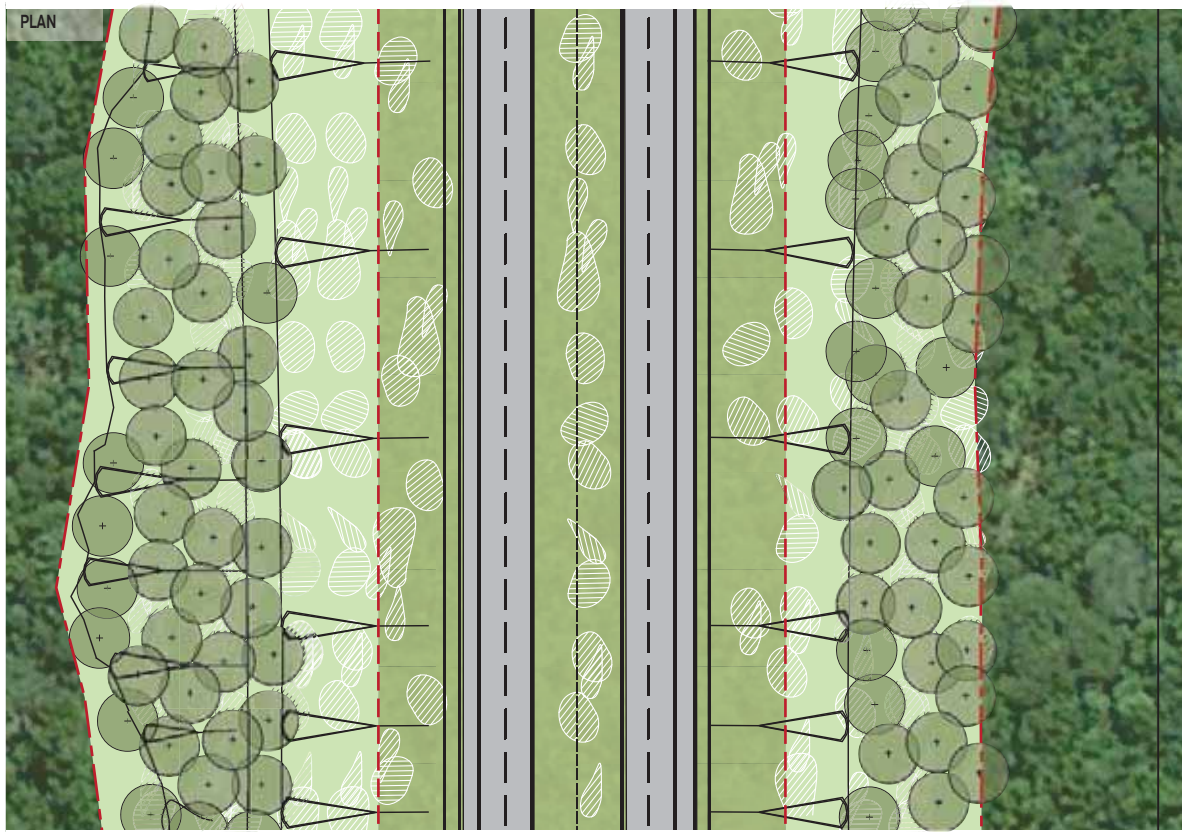
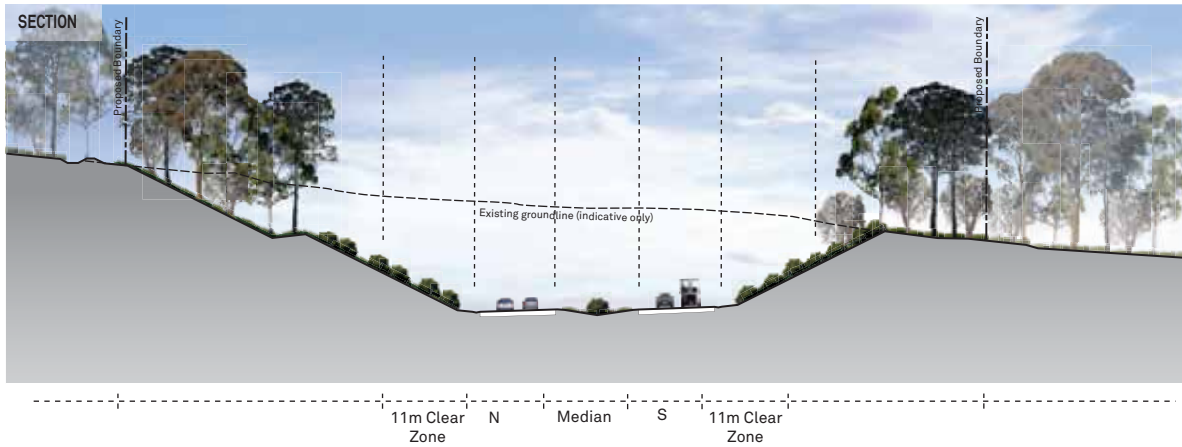
### LA 217\_ Typical\_ Cut 2.5 m- 10 m- Agriculture

0 10 20m  
Scale 1:1,000 @ A4

#### Legend

- Tree
- Shrub
- Groundcover+Grasses
- Site Boundary
- Clear Zone
- Road
- Existing Agriculture Retained
- Reinstated Agricultural Land Use
- Cut Batters

## 04 Landscape and Urban Design Strategy



Revegetate with forest vegetation on batters and where disturbed

Clear zone planting includes median  
Shrubs to be used in median to avoid headlight glare

Revegetate with forest vegetation on batters and where disturbed

### LA 218\_ Typical \_ Deep Cut in Earth or Soft Rock- Dense Forest

0 10 20m

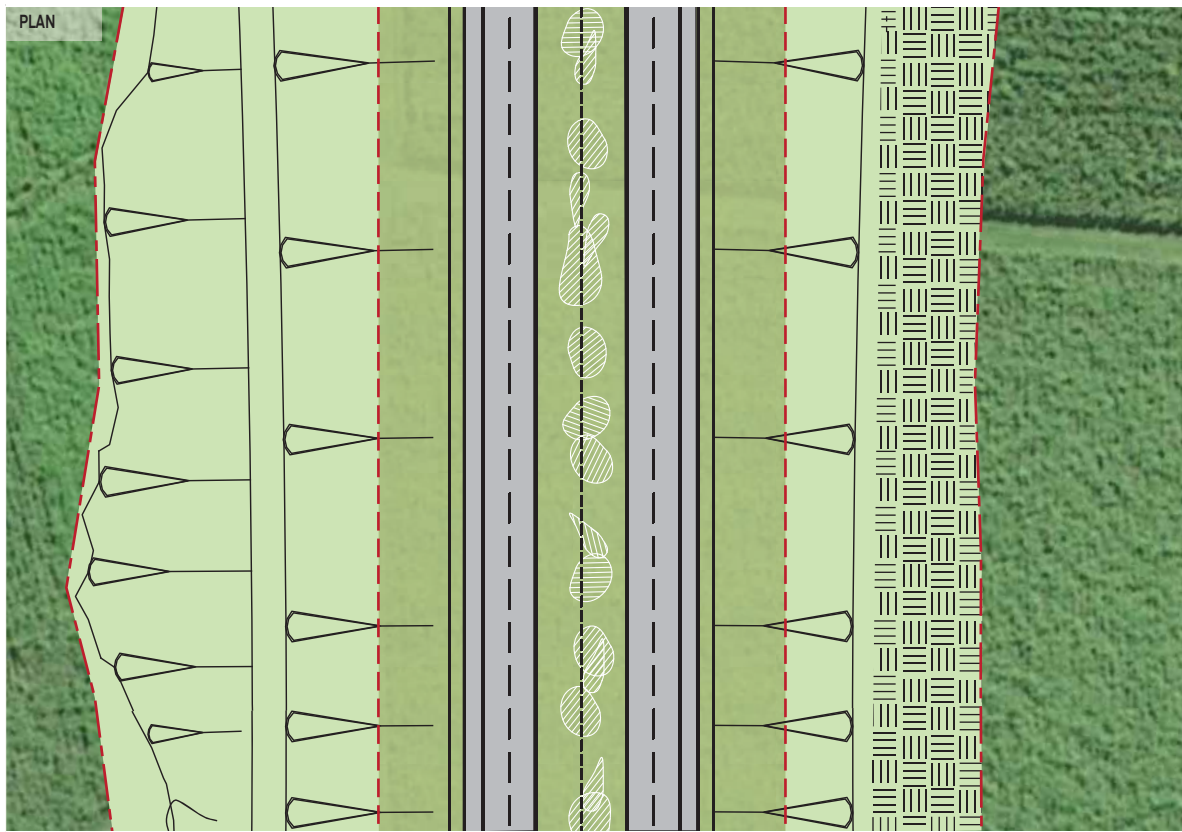
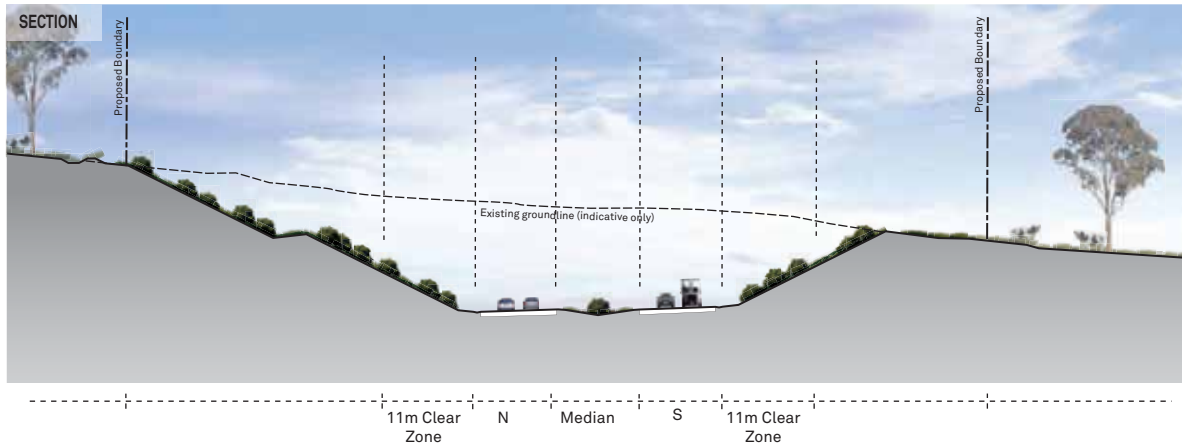
Scale 1:1,000 @ A4

#### Legend

- |   |  |
|---|--|
|  Tree                |  Clear Zone               |
|  Shrub               |  Road                     |
|  Groundcover+Grasses |  Existing Forest Retained |
|  Site Boundary       |  Cut Batters              |

## 04 Landscape and Urban Design Strategy

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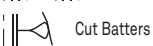
Clear zone planting  
 Maintain views from road to agriculture.  
 Plant grasses+groundcovers on batters.  
 Shrubs to be used to avoid headlight glare.

Reinstate agricultural  
 land use:  
 Sugar cane or pasture  
 land

### LA 219\_ Typical \_ Deep Cut in Earth or Soft Rock- Agriculture/ Grassland

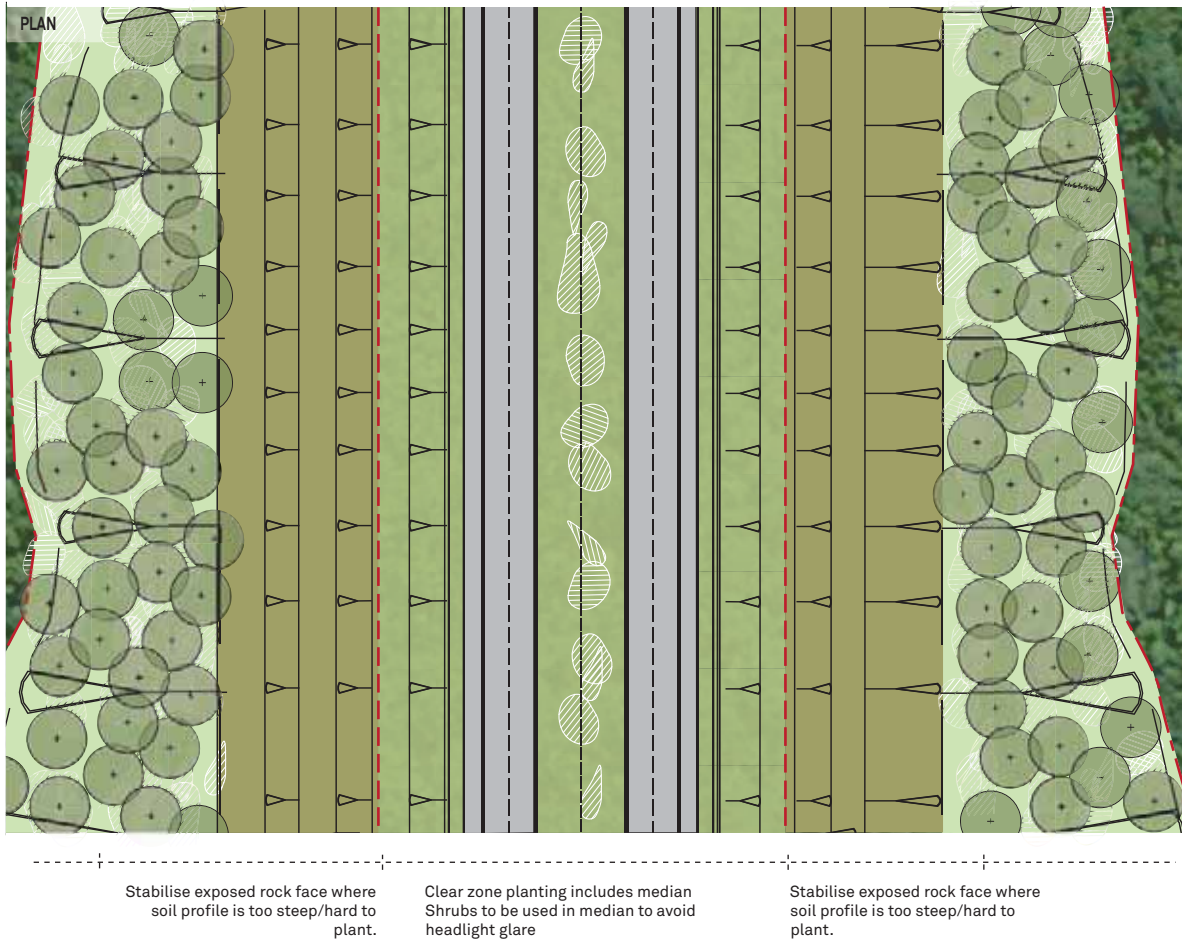
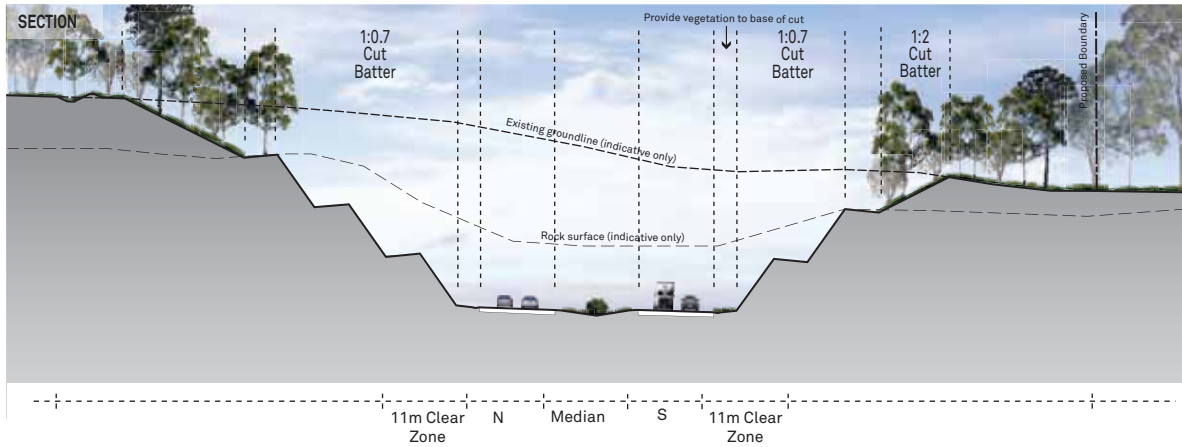
0 10 20m  
 Scale 1:1,000 @ A4

#### Legend

-  Tree
-  Shrub
-  Groundcover+Grasses
-  Site Boundary
-  Clear Zone
-  Road
-  Existing Agriculture Retained
-  Reinstated Agricultural Land Use
-  Cut Batters



## 04 Landscape and Urban Design Strategy



### LA 220\_ Typical\_ Deep Cut in Hard Rock- Dense Forest\_ Option 1

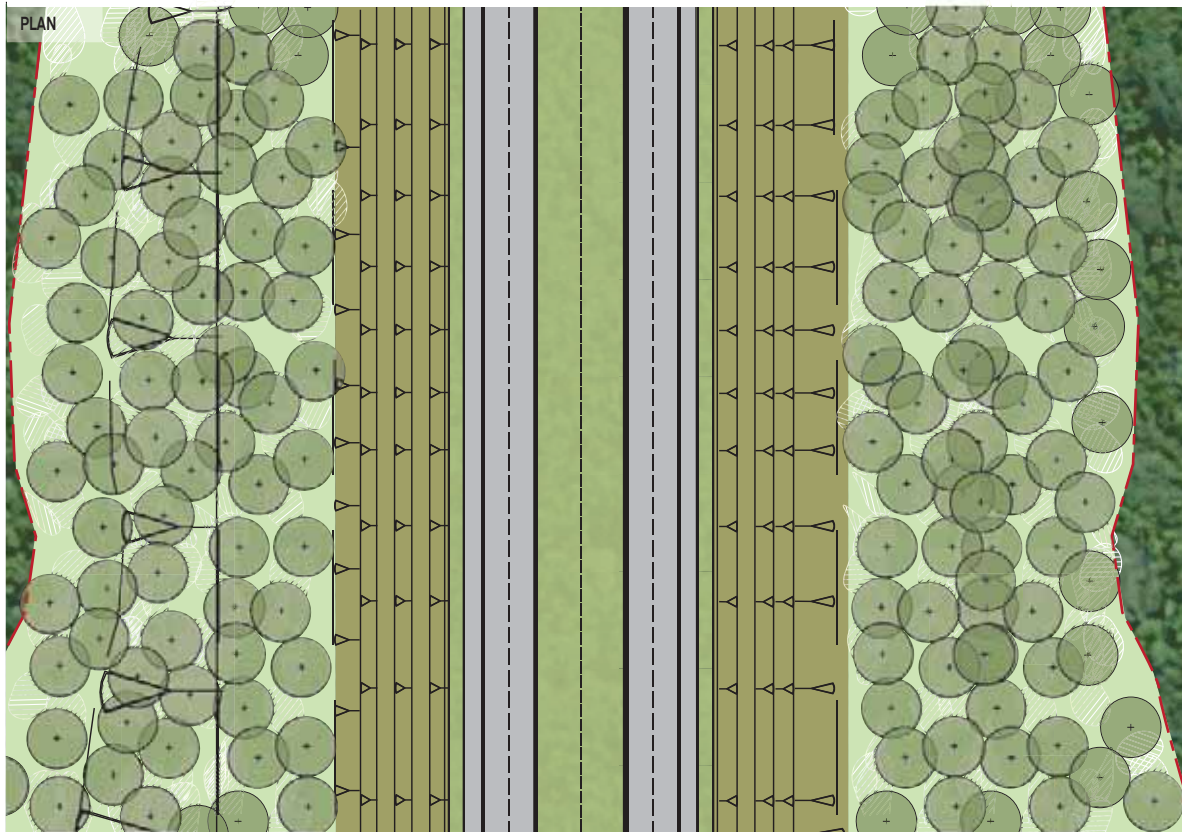
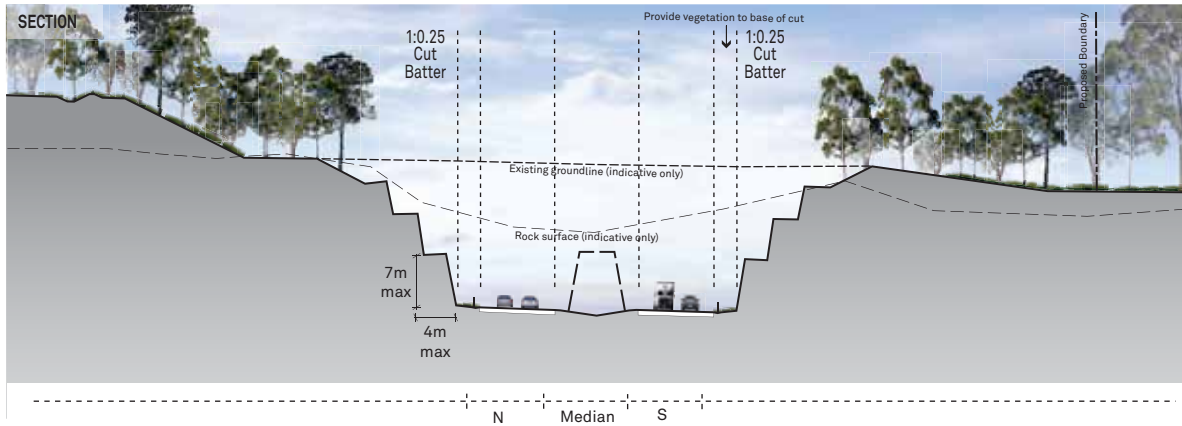
0 10 20m  
Scale 1:1,000 @ A4

#### Legend

- Tree
- Shrub
- Groundcover+Grasses
- Site Boundary
- Clear Zone
- Exposed Hard Rock
- Road
- Existing Agriculture Retained
- Reinstated Agricultural Land Use
- Cut Batters

## 04 Landscape and Urban Design Strategy

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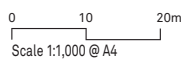


Stand rock cutting slopes at 1(V):0.25(H) and expose rock surface. Lay back upper slope to 1:4 and revegetate with forest vegetation. Barriers required at base cut.

Clear zone. Shrubs to be used to avoid headlight glare or investigate option of cut rock retained in median.

Stand rock cutting slopes at 1(V):0.25(H) and expose rock surface. Lay back upper slope to 1:4 and revegetate with forest vegetation. Barriers required at base cut.

### LA 221\_ Typical \_ Deep Cut in Hard Rock- Dense Forest\_ Option 2



#### Legend



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## **04 Landscape and Urban Design Strategy**

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### **4.6\_ Road infrastructure**

#### **4.6.1\_ introduction**

A detailed list of landscape and urban design recommendations are provided to ensure optimum landscape and urban design outcomes are achieved for the project.

#### **4.6.2\_ Bridges**

Bridges are a major component of the proposed work to be undertaken for the project. A total of 116 bridges are proposed, excluding culverts. They include low level creek crossings, local road underpasses and overpasses, and major elevated river crossings.

A key urban design objective for the Pacific Highway is the integrated design of road infrastructure elements as a series of related elements that presents a consistent design language while responding to different settings and functions. The major river crossings of the Clarence and Richmond Rivers require significant site specific bridge designs to be developed and refined in future detailed design phases of the upgrade.

#### **Key principles**

The key design principles for bridge design across the project include:

##### **Consistency**

\_The design and arrangements of all elements should be considered as part of a family of elements that relate to each other and other sections of the highway upgrade to provide consistency with variety

##### **Simplicity and refinement**

\_The design, form, materials and arrangement of all elements must be simple and refined and carefully integrated with adjoining elements

##### **Context**

\_The design of all elements must be relevant to the existing context and road function  
\_Specific landscape treatment should reference all recommendations from the heritage report

##### **Unobtrusive appearance**

\_The bridges must be visually unobtrusive allowing the landscape and environmental attributes of the area to be fully appreciated by road users. Bridges must present smooth, clean lines

##### **Integrated design**

\_The design, form, materials and finishes of the bridges on the upgrade must be consistent and integrated with each other to ensure visual continuity

##### **Transparency**

\_The bridge superstructure must be as transparent as possible to optimise views through the bridge to the landscape beyond. This includes minimising the depth of structure and refining the bridge abutments. The bridge should wherever possible “float” above the landscape rather than be grounded in a large vertical abutment

## 04 Landscape and Urban Design Strategy

In addition to the key principles outlined above the following general principles should be considered in developing detailed design for bridges across the project.

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### Bridge and pier form

- \_ Minimise the number of bridge piers by maximising span lengths
- \_ Minimise the thickness of bridge superstructures and bridge decks
- \_ Bridge design, including the parapets and other critical elements, must address the slenderness ratio of the structures
- \_ Pile caps must be concealed below finished surface levels
- \_ Reverse tapers are recommended on short elevation of piers
- \_ All bridge elements, including piers, sill beams, abutments and leading edges, must be fully integrated

### Abutments

- \_ Spill through abutments, aligned with adjacent batters, should be provided in preference to walled abutments
- \_ Where retaining wall abutment structures are utilised, they should return back to the bridge alignment to form buttresses
- \_ Abutments must be designed for ease of maintenance
- \_ Spill through abutments should adopt a maximum slope of 1:2 where achievable and be lined with an appropriate hard surfacing material that is consistent with the bridge setting
- \_ Shotcrete should not be used

### Soffits

- \_ Where soffits are visible, careful consideration should be employed to produce clean, uncluttered soffits with neat connections and simple layout of girders

### Safety screens

- \_ Safety screens must be integrated with overall bridge design
- \_ Post spacings should provide a pleasing and ordered visual relationship with other bridge details
- \_ Screens and posts must not be attached to or obscure the outer face of bridge parapets
- \_ Terminate screens by tapering down towards bridge parapets and should match the extent of bridge parapets
- \_ Tops of safety screens should be parallel to bridge alignment without stepping



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#### 1\_ Bridges

Taper employed on short elevation of pier  
*RMS image.*

#### 2\_ Bridges

The bridge superstructure should dominate over the bridge piers.  
*RMS image.*

## 04 Landscape and Urban Design Strategy

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### Bridge barriers

- \_Parapet, bridge barriers/rails and throw screens should be designed as integrated elements
- \_Designs should maximise visual transparency to the landscape beyond
- \_Bridge barriers are to continue past the abutments in order to anchor the bridge to the surrounding landscape
- \_Wherever possible there should be simple resolutions maintaining a constant height between bridge barriers and adjacent road barriers
- \_At creek and river crossings, two-rail bridge barriers or other similar bridge barriers that maximises views out should be provided.

### Ecology

- \_Bridge designs must provide clearance between ground level and bridge soffit and the toe of the bridge abutment and edge of the water course to provide fauna connectivity consistent with the EPA's fauna crossing design principles. Ensure that clearances in emu habitat areas are sufficient to encourage access for these animals.
- \_Bridge designs should allow penetration of sufficient light and moisture to encourage growth of vegetation under the structures.
- \_Where possible design bridges with a natural substrate at the abutment such as dirt or vegetation. Scattered rocks can be included.



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### 1\_ Bridges

Spill through abutment aligned with the adjacent batters.

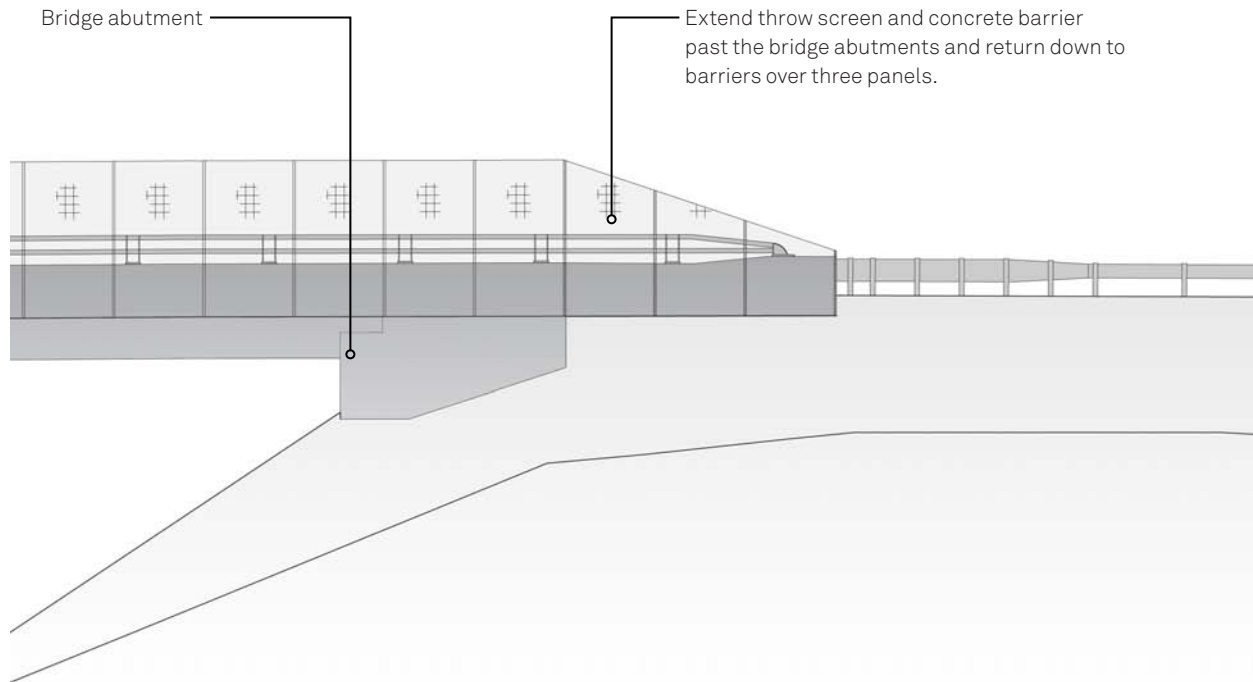
*RMS image.*

### 2\_ Bridges

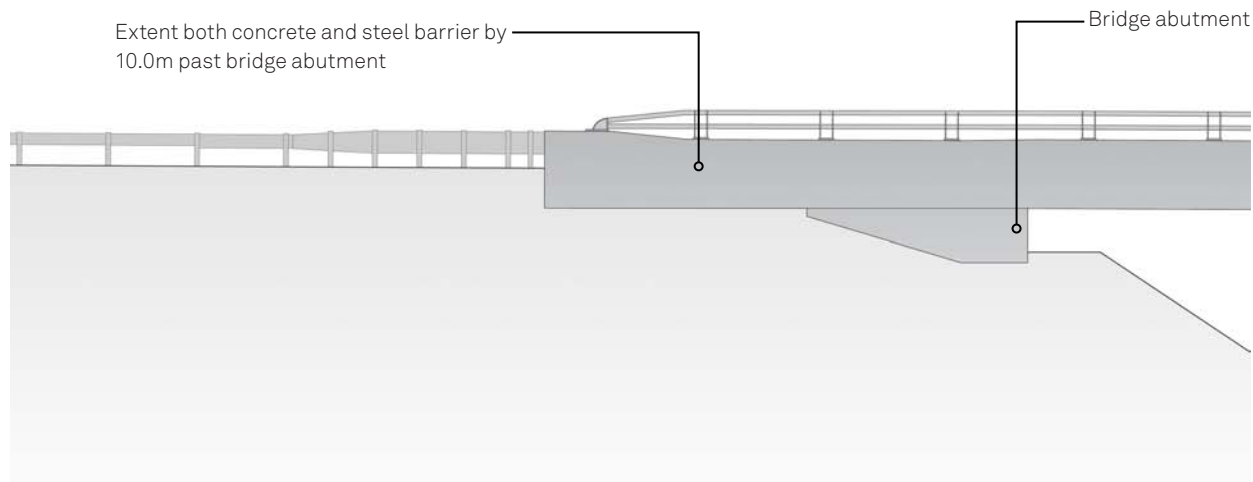
**Banora Point Upgrade central valley viaduct:** Integrated design solution for the viaduct structure, edge barrier, noise wall and reinforced earth retaining walls.

*HASSELL image.*

## 04 Landscape and Urban Design Strategy



Bridge elevation\_ Typical highway over bridge  
Not to scale



Bridge elevation\_ Typical highway bridge  
Not to scale

## 04 Landscape and Urban Design Strategy

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### 4.6.3\_ Acoustic barriers

At this stage, noise modelling has indicated that no noise walls are anticipated and the visual assessment has been based on this assumption. If noise become part of the project as part of future detail design work further visual assessment will be required to address the visual implications of the change. If noise walls become part of the project in the future their location and design will need to be in accordance with the Noise Wall Design Guideline (RMS, 2007). The selection and type of noise barrier to be used, including noise mound and headlight screens, would need to be based on the following order of precedence:

- \_Landsaped mound or 'false' cutting;
- \_Noise wall and low wall/screen combination to reduce perceived height of noise barriers and integrate them with adjoining cuttings, etc, and
- \_Noise walls or headlight screens.

Additional recommendations for the use of noise walls, if they are required, include the following.

- \_Noise walls should be transparent wherever possible to allow views to landscape and landmarks beyond
- \_Noise walls should be simple, plain structures without patterns or images. They should utilise durable materials that are easily maintained, be aesthetically pleasing, be dark in colour, and recessive in the landscape in general
- \_Noise walls including noise mounds and headlight screens must respond appropriately to the landscape in which they are located
- \_Screen planting should be considered as a technique to blend the noise walls with the surrounding landscape and minimise its visual impact where possible
- \_Noise walls should be avoided on bridges. If required, they should be integral to the bridge design and transparent to maximise outward views and minimise visual impact
- \_Noise walls should not be stepped on sloping lands. They should have a continuous flowing top of wall line that follows the vertical alignment of the highway
- \_Noise walls should not start or terminate abruptly with vertical faces. They should emerge from the ground gradually with smooth flowing lines and a vertical emphasis
- \_The appearance of both side of the noise wall must be equivalent in design quality and must satisfy the expectations of both residents adjoining the project and the road users
- \_Noise walls must respond to the locality in which they are situated, integrated with each other and with other structures including retaining walls, bridges, and landscape works. In feature areas they must be sculptural, dynamic and interesting. Where they are located close to property boundaries and near neighbourhoods they must be recessive and simple
- \_Noise walls on top of retaining walls must consolidate into one wall
- \_On bridges noise walls must be integrated with the design of the bridge as a whole, be constructed from a transparent and shatter proof material and be provided with markings and /or symbols to reduce the likelihood of bird strike and extend a minimum of 25 m from the bridge abutments into the bridge approaches



## 04 Landscape and Urban Design Strategy

### 4.6.4 Retaining walls

Detailed urban design recommendations for the project include the following.

- \_Retaining walls should be plain, monochromatic, recessive and constructed in one material type, without patterns or images on their surface
- \_Batter/retaining wall combinations should be used where possible
- \_Retaining walls should be screened by planting
- \_Gabion walls may be used where appropriate to context and setting

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#### 1\_ Retaining walls

Gabion walls may be used in where appropriate to context and setting  
*HASSELL image.*

#### 2\_ Noise Attenuation

Visually transparent noise wall  
*HASSELL image.*

## 04 Landscape and Urban Design Strategy

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### 4.6.5\_ Cutting and embankments

Cutting and embankments occur along the entire project route. Where they occur the following design strategies are to be adopted:

- \_All earth cuttings and embankments should have soft, feathered transitions. Tops, bottoms and ends of cuttings should be rounded off
- \_At locations where rock is competent, cuttings shall be steepened to 1(V) in 0.25(H). The top batter shall still be laid back to 1:4 and rounded off
- \_At locations where rock is competent investigate the opportunity to retain rock in the median
- \_Shotcrete should be avoided. Shotcrete should only be used in cuttings as a plug for weak seams. The overall form of the shotcrete covered cutting should be natural and unobtrusive. Reference to RMS Shotcrete Design Guidelines, 2005
- \_Fill batters in agricultural landscapes are to be gradient 1:4, where possible

### 4.6.6\_ Road barriers

- \_Use white up-stands for four wire rope barriers. Always try to minimise the number of barriers that are required along a single stretch of new road so that a forest of barriers does not become the most dominant element in the landscape. Especially minimise the use of wire rope fencing in open agricultural areas where all new carriageways, service and access roads are usually visible. Investigate alternative solutions such as 1:4 batters and wider medians wherever possible
- \_In forest areas consider using wire rope barriers to reduce the width of the clear zone and allow tree planting closer to travel lanes where applicable
- \_Avoid using median barriers. If necessary use a single centrally located barrier
- \_Wherever possible there should be simple resolutions maintaining a constant height between road barriers and adjacent bridge or other barriers



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#### 1\_ Cutting and embankments

Cuttings are to be rounded to appear natural in the landscape  
*HASSELL image*

#### 2\_ Cutting and embankments

At locations of hard rock, expose surface and steepen to reduce impacts on adjacent environments  
*Google image*

#### 3\_ Barriers

Minimise the extent of wire rope barrier use  
*HASSELL image*

## 04 Landscape and Urban Design Strategy

### 4.6.7 Signage

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- \_Signage should be kept to a minimum wherever possible whilst still taking traffic and road safety considerations into account
- \_Signposting, including directional signposting must be integrated with the urban and landscape design. Signposting, variable message signs and variable speed limit signs must be designed and located so that they:
  - \_Are not visually intrusive in the natural and coastal environment
  - \_Do not affect the short distance or panoramic views of the landscape , the visual relationship of communities to the project or the quality of community environments
  - \_Are compatible with, and integrated with the design of other structures such as bridges
- \_Signage should be kept below the skyline with a backdrop of landform or vegetation
- \_Signage should be avoided in highly scenic areas and where possible, should be located so that important views are not blocked. Further consideration of impacts should be carried out for all large scale signs, advertising signs, variable message signs and camera support structure areas
- \_With the exception of road name markers, signage should be kept off all over bridges
- \_With the exception of name plates and navigation markers, signage should be kept off all bridges across the rivers and creeks
- \_Signage structure and composition should be of a high quality design and finish
- \_Any safety devices, platforms, lighting or logos should be considered and assessed as part of the signage proposal
- \_Consideration should be given to place marking and prominence of signs denoting tourist routes and nearby towns that are by-passed by the project. A comprehensive strategy looking at the signage requirements of each town on the project route should be prepared



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#### 1\_ Signage

Signage on bridges is to be limited to name plate signage  
*HASSELL image*

#### 2\_ Signage

Road signage shall be below the skyline, with a backdrop of landform or vegetation  
*HASSELL image*

## 04 Landscape and Urban Design Strategy

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### 4.6.8\_ Fences

Fencing generally:

- \_Avoid excessive use of peripheral fencing for the project
- \_Where possible install all fencing types behind plantings to obscure views of it. Where the fencing is likely to be visually obtrusive consider using a dark or black colour to diminish its visibility
- \_Consider and address ecological requirements in detail design of all fences
- \_Avoid doubling up of fencing types along any road boundary. Ensure proposed fencing alignments always consider and address all fauna or any other fencing requirements and design the fence accordingly
- \_Provide all fencing types in accordance with RMS typical details and requirements
- \_Views of fencing on the skyline should be minimised

Fauna fencing:

- \_Fauna fencing must be provided, as a minimum, where there is an identified fauna movement corridor or where there is a medium to high risk of road kill in accordance with the RMS and environmental technical criteria
- \_Fauna fences must be installed as close as possible to the road, taking into account the visual and urban design principles, in order to:
  - \_Avoid drains, operational basins, rough topography and the like which could be potential fauna access points. Crossing drains must be avoided wherever possible
  - \_Provide maintenance access
  - \_Provide greater revegetated habitat for fauna
  - \_Allow fauna access to available fauna watering points, including constructed wetlands
  - \_Avoid large trees which could fall across and damage fences and thereby provide an avenue for fauna to cross the fences
- \_Where the fauna fences are installed on fill, the fences must be set down below the top of the fill batters so that they are less visible from vehicles but are easy to maintain. Tops of fauna fences may be set at just below safety barrier levels on fill batters so that they are unobtrusive. Fauna fences must be located in less visible locations wherever possible
- \_Fauna fences may be installed on the highest fill bench and lowest cut batter bench to locate the fences closer to the road. Fencing on cut batter benches must blend into the surroundings and high quality landscaping must be provided to screen the fences. Design of landscaping in the vicinity of fauna fences must avoid vegetation with the potential to grow to a size that overhangs the fencing, and prevents fauna from entering the road way
- \_Fauna fences must be installed on the outside of all spill containment / water quality treatment basins to prevent fauna from accessing polluted water sources



#### 1\_ Fencing

Floppy top fencing that is both visually recessive (dark colour) and hidden from view (screened by vegetation from the road)

HASSELL image

## 04 Landscape and Urban Design Strategy

### 4.6.9 Landscape and planting

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The landscape and planting design should provide a strong emphasis on creating a well-vegetated corridor with lush and distinctive intersections, interchanges and rest areas. Where planting is used the planting mix must contain tube stock for indigenous ground cover species and larger stock for feature plantings.

The planting strategy should provide the following:

- \_An attractive approach and departure from developed areas
- \_A planting palette based on key local vegetation patterns to ensure the visual and ecological integrity of the journey. It should reinforce enclosure when passing through forest and woodland areas, provide long distance views for road users when they are available, and retain existing district views for residents
- \_Minimised visibility of the project from townships, farms and homesteads
- \_A varied sequence of views along the journey to reduce the linear effect of the highway, provide visual interest and enjoyment and reduce potential for driver fatigue
- \_Distinctive a locally characteristic semi-mature tree plantings should be used to emphasise junctions to local towns and rest areas, or to provide character along the route and to rest areas
- \_Mitigate the visual impact of fauna fencing and overhead power lines where they occur
- \_Revegetate cuttings and embankments to maintain the character of undulating green hills against the horizon line
- \_A planting palette including local endemic species particularly through forest areas
- \_A range of frangible grass, ground cover or low shrub planting in medians
- \_Non-frangible planted and seeded areas that conform to clear zone requirements and roadside furniture requirements
- \_Safe sight distances and signage which is not obscured by planting and revegetation areas
- \_Setbacks for structures, roadside furniture and pathways that enable clear access for maintenance and visual inspections when the landscape matures

Prepare detailed landscape design documentation for all project batters and median planting areas in accordance with the Landscape Guideline (RTA, 2008) the requirements of the biodiversity report and this concept design to ensure the most robust, successful and effective planting design can be achieved.



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#### \_ Planting

The planting design shall emulate the existing plant communities along the length of the project.

1\_ Eucalypt woodland in the Pillar Valley  
*HASSELL image*

2\_ Littoral rainforest and mangrove communities on the banks of the Clarence River  
*HASSELL image*

## 04 Landscape and Urban Design Strategy

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Re-vegetation strategy:

- \_In disturbed areas within the project construction zone re-vegetation treatment should augment the existing endemic vegetation communities
- \_New planting and seeding must integrate with existing vegetation to reinforce local and remnant vegetation patterns and to maintain or enhance existing landscape character. Use the local seed bank and soils where possible
- \_Retention of existing vegetation (including root and above ground plant mass) must be maximised
- \_In areas where the possibility of weed invasion is high, re-vegetation of disturbed areas should include planting, seeding, and the establishment of a clean weed free layer of topsoil as the foundation for re-vegetation work. Topsoil or other growing medium used in landscape works must also be free of weeds or other unintended or undesirable species.

Local access roads:

- \_Where local access roads are located within close proximity to the proposed upgrade, provide screen planting on batters to detail design.

Creek crossings and riparian zones

- \_Where bridges and road structures cross creeks and interrupt riparian zones, re-vegetation strategies should endeavour to reconnect the riparian patterns. Endemic species should be utilised to re-vegetate the affected areas and reconnect local habitat
- \_Topsoil or other growing medium used in landscape works must be generally free of weeds or other unintended or undesirable species
- \_Maximise riparian vegetation under creek crossings to encourage fauna connectivity along creek lines

### 4.6.10\_ Topsoil Management

Topsoil management is an important aspect in the success of landscape treatments, as most of the project runs through areas of pasture and other exotic grasses. Separation of the upper layers of topsoil that contain grass and weed propagules from clean lower layers of soil should be undertaken to ensure only weed free soils are used in top-soiling works. Topsoil management treatments for the project should include:

- \_Site topsoil containing any grass or weed growth should not be used in final landscape layers and should be buried in accordance with Specification R178 (RTA)
- \_Clean site topsoil won from stripping operations should be stockpiled according to soil type for re-use in final landscape treatments
- \_All sub grades of areas to receive landscape treatments should be tested along with site topsoil to be used in finished works
- \_Prior to placement of site topsoil in areas to be landscaped, any weed growth should be eradicated prior to receiving topsoil
- \_If additional earth mounding (beyond that shown in the current design) is required, each mound needs a specific site/grading design to ensure the mounding profile blends suitably into the existing landscape setting. Mounding should be compacted in 1.5 m layers with 1:3 maximum batter slopes. Permanent mounds should be treated with ameliorants and overlaid with topsoil to minimum 150 mm to ensure suitable planting conditions are achieved. Plant material should include trees, shrub and grass species that match the surrounding habitat.

## 04 Landscape and Urban Design Strategy

### 4.6.11\_ Clear zones

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Clear zones must be kept free of all infrangible objects. If it is not possible to avoid infrangible objects in the clear zone then a safety barrier must be employed to protect road users. Clear zones should be planted with endemic frangible vegetation, low shrubs and native grasses. Frangible clear zone planting can be useful for bush land areas to help restore landscape and habitat and to encourage native fauna corridors where width is adequate.

### 4.6.12\_ Water quality control ponds

A natural, fitting appearance should be achieved for all permanent water quality control ponds (WQCP) proposed as part of the project. Detail designs should be prepared for each WQCP maximising the effective water quality control area, and sculpting each pond to fit into the existing landform. The area around the WQCP should be re-vegetated with native seed. Ponds, swales and wetlands should be planted to maximise effective water quality treatment.

WQCP's provide the opportunity to cleanse contaminated first flush run off from road carriageways. Cleaned water should be directed back into the surrounding existing landscape where possible. All design should be completed in accordance with RMS Landscape Water Sensitive Urban Design Guidelines.

### 4.6.13\_ Fauna crossings (land bridges)

An integrated approach to fauna crossings should be pursued that addresses the particular vegetation communities located within the immediate project area. Detailed design should address connections, crossing types, habitat requirements, fencing and refuge locations.

The following is recommended for fauna crossings for the project:

- \_ Horticultural conditions and planting to create a self-sustaining landscape need to be achieved in accordance with the project fauna crossing design principles
- \_ Sufficient width should be provided to achieve an effective crossing which provides hiding spaces and escape routes so that animals can avoid predators
- \_ Floppy top fencing should be located 1-2m back from bridge edges
- \_ Significant width should be provided to maximise habitat options
- \_ Maximise/consolidate the available landscape areas on bridges - avoid creating narrow strips of landscape
- \_ Additional features such as leaf litter, rocks, boulders, and artificial habitat suitable to the target and other species should be considered in accordance with project fauna crossing design principles for all fauna crossing locations



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#### 1\_ Water quality control ponds\_

Rocks, planting and landform combine to create a natural looking detention pond with diverse ground conditions to aid in habitat recovery.

*RMS image*

#### 2\_ Fauna crossings

Gabion walls and Bebo arches backfilled with fill material at the Yelgin to Chinderah Bypass support excellent tree growth and maximise habitat potential.

*HASSELL image*

## 04 Landscape and Urban Design Strategy

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### 4.6.14\_ Construction ancillary sites

Up to 90 construction ancillary sites may be required for the construction phase of the project. These are shown indicatively on the concept design (landscape Strategy Plans) in accordance with the current proposal. There are also substantial areas within the project construction boundary which are outside the proposed extent of earthworks shown on the concept design which may also be required for construction activities. Some of these potential construction areas are located in forest. It is understood that remnant forest would not be cleared unless they are absolutely necessary for project activities and that many patches of forest vegetation located in these ancillary sites will not be disturbed. The following typical landscape treatments are recommended for ancillary sites in the forest.

- \_Provide screen planting to construction compounds to minimise visual impact and disturbance to local people during the construction phase
- \_Allow to reinstate disturbed forest in heavily forested areas to ensure existing ecological corridors are maintained in accordance with specific ecological instructions
- \_Consider the importance of the visual landscape at each compound location and allow to restore important forest vegetation to prominent ridge lines or other landscape elements as appropriate
- \_Negotiate with private land owners, as applicable, to determine future treatments for other non- forested compound areas
- \_Re-grade disturbed post construction areas to achieve a sustainable and functional landform. Stabilise all surfaces in accordance with good engineering and environmental practise

Similarly, compound and construction areas beyond the extent of proposed earthworks are located in agricultural areas. Throughout the project sugar cane plantations, pasture land and other agricultural pursuits would be disconnected and disturbed by the project, particularly where it follows a new alignment. Future landscape treatment of these areas is difficult to predict because their long term use cannot be accurately determined. Ideally, remnant agricultural land not required for the project is best returned to it's original use. Other solutions may be also determined subject to negotiation with land owners. Some basic recommendations for these areas would include the following.

- \_Provide screen planting to construction compounds to minimise visual impact and disturbance to local people during the construction phase
- \_Reinstate "fingers" of riparian vegetation in the open landscape
- \_Consider the importance of the visual landscape at each compound location and allow to restore important forest vegetation to prominent ridge lines or other landscape elements as appropriate
- \_Re-grade disturbed post construction areas to achieve a sustainable and functional landform. Stabilise all surfaces in accordance with good engineering and environmental practise

Broad scale landscape strategy for construction ancillary sites is shown indicatively on the 1:20,000 scale landscape strategy plans. Detailed resolution at 1:5000 scale is not provided as the necessary detailed design information is not yet available.



## 04 Landscape and Urban Design Strategy

### 4.6.15 Rest areas

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In accordance with the RMS Landscape Guidelines, rest areas should be simple, attractive and encourage motorists to stop and rest. Design elements should include the following:

- \_Generous shade tree planting designed for good passive surveillance
- \_Tree and ground cover species selection should be appropriate for their setting
- \_Vegetated mounding should be employed to separate car and large truck parking areas
- \_Children's play facilities should be provided. These should be shaded and thoughtfully integrated into the overall design
- \_Picnic facilities, toilets and way finding and information signage should be provided
- \_Open grassed areas should be provided centrally for informal play
- \_Detailed design should incorporate local context, landscape patterns and address the landscape and visual impacts on any adjacent residents or dwellings
- \_Mounding to separate car and truck stop areas should be considered
- \_Incorporate interpretation signage that explains the cultural heritage significance and or history of the surrounding area



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#### 1\_ Rest Areas

Provision of shaded play spaces  
*HASSELL image*

#### 2\_ Rest Areas

Centrally located facilities and provide open space  
*RMS image*

#### 3\_ Rest Areas

Wayfinding and information signage  
*RMS image*

#### 4\_ Rest Areas

Vegetation mounding to provide separation of rest area uses.  
*HASSELL image*

## 04 Landscape and Urban Design Strategy

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### 4.6.16\_ Place marking and cultural planting

An important cultural and visual element of the journey is the connection to the historical development of local communities and townships along the way. Distinctive cultural tree planting can become distinctive place markers in the landscape which reference historical development and local stories. It is important to consider the location of these landmarks in the detail design phase to ensure that key view corridors to these landmarks from the highway and surrounding areas are not obscured by the project.

New place making is also addressed in the concept design, particularly at Maclean and Harwood where significant street planting is proposed to highlight the route through, or entry point to, these major urban areas. This needs to be considered in detail at the next design phase of the project.



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#### 1\_ Place markers

Farmhouse planting, Pillar Valley  
*HASSELL image*

#### 2\_ Place markers

Norfolk Island Pine plantings, Harwood  
*HASSELL image*

#### 3\_ Place markers

Norfolk Island Pine plantings,  
Broadwater  
*HASSELL image*

#### 4\_ Place markers

Palms, hibiscus and Bougainvillea,  
Clarence River floodplain  
*HASSELL image*

## **04\_\_\_\_\_Landscape and Urban Design Strategy**

### **4.6.17\_ Conclusion**

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These landscape and urban design recommendations and the range of RMS guideline documents referenced throughout this report need to form the basis of all future detail design activities associated with the project. Importantly they also need to be applied consistently over the full length of the project.

Through careful design of all road elements from bridges to embankments, noise mitigation measures and road furniture, a unified design theme can be created to link these elements together to achieve an elegant, simple and durable design solution to the project which minimises visual impacts, retains and highlights the existing landscape character and provides an inspiring and memorable journey for roads travellers.

## **04\_\_\_\_\_Landscape and Urban Design Strategy**

### **352 4.7\_ Concept design illustrated**

A series of perspective views to illustrate the proposed landscape and urban design treatments and the project alignment and configuration have been prepared. These address some of the major interchanges and bridge crossings as well as some typical conditions of the project in the coastal landscape. The selected views are on the following pages and are as follows.

\_Aerial view at Tyndale looking east

\_Ground view at Gulmarrad looking north west

\_Aerial view at Maclean looking north

\_Aerial view at Harwood looking north-west

\_Aerial view at Harwood looking south

\_Ground view of the bridge crossing the Clarence River at Harwood, looking south west

\_Ground view of the bridge crossing the Clarence River at Harwood, looking south east

\_Aerial view at Broadwater looking north

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Aerial view of the interchange at Tyndale looking east towards Bondi Hill



HASSELL



Typical ground view from Gulmarrad housing estate near Green Hill, looking west north west.





HASSELL



Aerial view of the interchange at Maclean looking north



HASSELL



Aerial view over the Clarence River looking north west towards Harwood.





Aerial view from north of Harwood looking south.



HASSELL

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Ground view of the bridge crossing the Clarence River at Harwood, looking south west  
Box girder bridge design





HASSELL



Ground view of the bridge crossing the Clarence River at Harwood, looking south east .  
Box girder bridge design





Aerial view from near Broadwater looking north.



HASSELL

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