

URBAN AND LANDSCAPE DESIGN CONCEPT - PRECINCT 2: EMIGRANT CREEK

MARTINS LANE TO BROKEN HEAD ROAD, CHAINAGE 138,000 TO 142,800

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SUMMARY OF ISSUES

As discussed in the "Visual Assessment" section of this working paper, the main urban and landscape design and visual impacts in the Emigrant Creek precinct are associated with the Ivy Lane interchange, the Emigrant Creek and local road crossings, the severing of agricultural plantations and removal of vegetation along the existing highway and the large cuttings and fill embankments required along much of the route.

From the point of view of the motorist and the driving experience along the proposed upgrade, the Emigrant Creek precinct is a visually diverse precinct that has the potential to provide a range of different visual experiences, ranging from expansive Pacific Ocean views in the southern part of the precinct to the enclosed valley surrounding the Emigrant Creek crossing, to the highly structured macadamia plantations typical of the elevated plateau. Developing the concept to build on these will provide a visually interesting and memorable journey which might also assist in keeping drivers alert. Important views have been identified in Illustration 71 and include views towards the Pacific Ocean, as well as views into the agricultural hinterland west of the proposed upgrade near the Macadamia Castle and the Ivy Lane interchange, views from the 'Yarreenbool Place' bridge, and views south from the Broken Head Road cutting.

In terms of how the proposed upgrade will be perceived by local residents and visitors to the area, views from the local road system and the visual relationship between the existing highway and the proposed upgrade are important factors and have been addressed by the urban and landscape design concept plan.

KEY AREAS FOR DETAIL DESIGN

In precinct 2, the key areas for further design investigation, resolution and development include:

> Vertically independent carriageways

Investigating the potential for independent vertical grading of the two carriageways, in order to reduce the motorway character of the proposed upgrade while also potentially reducing the amount of earthworks required. The section of the proposed upgrade south of Ivy Lane seems particularly suited for this (chainage 137,200 in precinct 1 to chainage 139,700).

> Cutting and embankment stabilisation

As about 80% of the route within this precinct features noticeable (2-5 metres tall) to very large (10-20 metres tall) cuttings and embankments, the successful stabilisation and revegetation of these will be a critical factor influencing the character of the proposed upgrade, both from the point of view of motorists and when seen from surrounding areas.

Consideration should be given to the angle of cutting and embankment slopes with regard to short and long term soil stability, the potential for plants to successfully establish and long term maintenance (issues include mulch or small rocks being washed onto the road pavement). Close liaison with geotechnical specialists is recommended in order to identify the need for and best means of soil stabilisation to ensure good long-term vegetation cover.

> Shaping of cuttings and embankments

In order to reduce the impact of sharply defined cuttings against the gently rolling character of the natural landscape, consideration should be given to the shaping cuttings in a way that reduces this contrast and allows cuttings to blend into the natural landscape.

Similarly, embankments should be 'graded out' at the bottom, to reduce the visual impact of an obvious junction between fill embankments and the natural landform.

Combined with the establishment of vegetation over time, this will assist in reducing the 'artificial' character of cuttings and embankments.

> Bridge design

As discussed in the strategic urban and landscape concept, the Emigrant Creek crossing is considered a major landmark, both along the proposed upgrade and along the diverted existing highway. Similarly, the bridges at 'Yarreenbool Place' are potentially prominent visual elements associated with the proposed upgrade. The development of bridge designs that result in an elegant, transparent and light weight appearance that is subservient to the surrounding landscape would be highly desirable from an urban design and visual point of view.

The chapter on "Urban Design Elements" in the "Urban and Landscape Concept Design" section of this working paper provides more detailed recommendations on bridge design. The application of these guidelines has the potential to greatly enhance the visual experience of the creek crossings.

> Severed plantations

As previously discussed, macadamia plantations are a defining feature of the area's visual and landscape character. The retention of stands of macadamia trees should therefore be maximised as much as possible. The issue arises where existing plantations are being severed by the

proposed upgrade, leaving isolated stands of established trees that are nevertheless not directly affected by the construction of the proposed upgrade. Retaining such stands of trees is especially important within the context of aiming to reduce the degree of visual change in parts of the landscape not directly affected by the construction of the proposed upgrade, and in order to protect the experience of the landscape for motorists along the existing highway. A prime example would be the residual plantation north of Ivy Lane, between the existing and proposed highway.

While the issue of residual lands and their future uses is addressed in a separate working paper, continuing discussions with affected and neighbouring land business owners would be important from a visual point of view, in order to maximise the degree to which the existing visual landscape character can be retained.

URBAN AND LANDSCAPE DESIGN CONCEPT PLAN AND SPECIFIC RECOMMENDATIONS

Building on the identified key areas for detail design and the strategic principles outlined in the urban and landscape design strategic concept, Illustration 71 provides a more detailed concept plan for precinct 2. It identifies a series of precinct-specific urban and landscape design measures, which have been developed in response to the urban design objectives and principles for the proposed upgrade, and to mitigate the identified visual impacts. The plan further identifies important views to be retained and protected, in order to enhance the experience of the motorist on both the existing and the upgraded highway.

The cross sections in Illustrations 72 to 74 further demonstrate the three-dimensional urban and landscape design treatments at a number of important locations within the precinct.

Specific recommendations to mitigate the potential visual impact of the proposed upgrade and to be investigated at a detailed level in the next design stages are:

1. Use tree planting along the western side of the existing highway alignment north of Martins Lane, to redirect views of motorists travelling north on the existing highway and reduce the prominence of the proposed upgrade in the view (Chainage 137,900 - 138,100, chainage 138,600 - 138,900). Ensure to maintain good visibility of the 'Macadamia Castle' from the existing highway.
2. Use planting between the upgraded highway and local access roads to reduce the extent to which the upgraded highway would be able to be viewed, and to break up the expanse of paving visible from the existing highway alignment (chainage 138,000 - 139,100, chainage 139,750 - 140,100).
3. Use tree planting along local access roads to create the character of a country lane or avenue while allowing filtered views of the surrounding countryside (chainage 138,000 - 139,100, chainage 139,750 - 140,100).
4. Retain and protect macadamia plantations between the existing highway and the proposed Upgraded, to maintain the visual diversity along the existing highway (Chainage 137,700 - 137,950, Chainage 139,650 - 140,100 and Chainage 141,100 - 142,200).
5. Maintain the small scale of the intersection of Ivy Lane with the existing highway (Chainage 139,680).
6. Use tree and shrub planting around the Ivy Lane interchange, including between on- and off-ramps and the proposed highway alignment, to break up large areas of hard pavement and reduce its potential visual prominence from the existing highway and from Old Byron Road (chainage 139,700 - 140,200).
7. Install trees and shrubs between the existing highway and the proposed upgrade to reduce the visual prominence of the proposed upgrade around the Emigrant Creek crossing (Chainage 140,450 - 141,000, and Chainage 141100 - 141,700).
8. Following bridge construction, reinstate riparian vegetation along Emigrant Creek and complement it with additional planting to reinstate the enclosed landscape character around the creek crossing and re-establish the dense visual buffer between the proposed upgrade and adjoining properties (chainage 140,900 - 141,100).
9. Use planting to soften the appearance of the bridge piers (chainage 140,900 - 141,100).
10. Provide planting between the realigned existing highway and the access road into 'Delserene' (properties 97, 100 and 101), to reinstate dense boundary planting and visually screen the property from the proposed upgrade and associated works (Chainage 141,100 - 141,500).
11. Densely plant the noise mound at Newrybar Public School to tie in with adjoining agricultural plantations and to provide visual as well as acoustic screening (chainage 142,300 - 142,700).
12. Integrate the design and shape of the noise mound near Newrybar Public School with the cutting under the Broken Head Road overbridge (chainage 142,600 - 142,850).
13. Revegetate cuttings and embankments throughout the precinct, to soften and reduce their visual effect. A list of locally appropriate species is provided in Appendix 1.

* Notes:

1. All chainages are approximate.
2. "Planting" refers to the final outcome and not to any particular technique during construction: it includes both individual plantings and large-scale revegetation works.

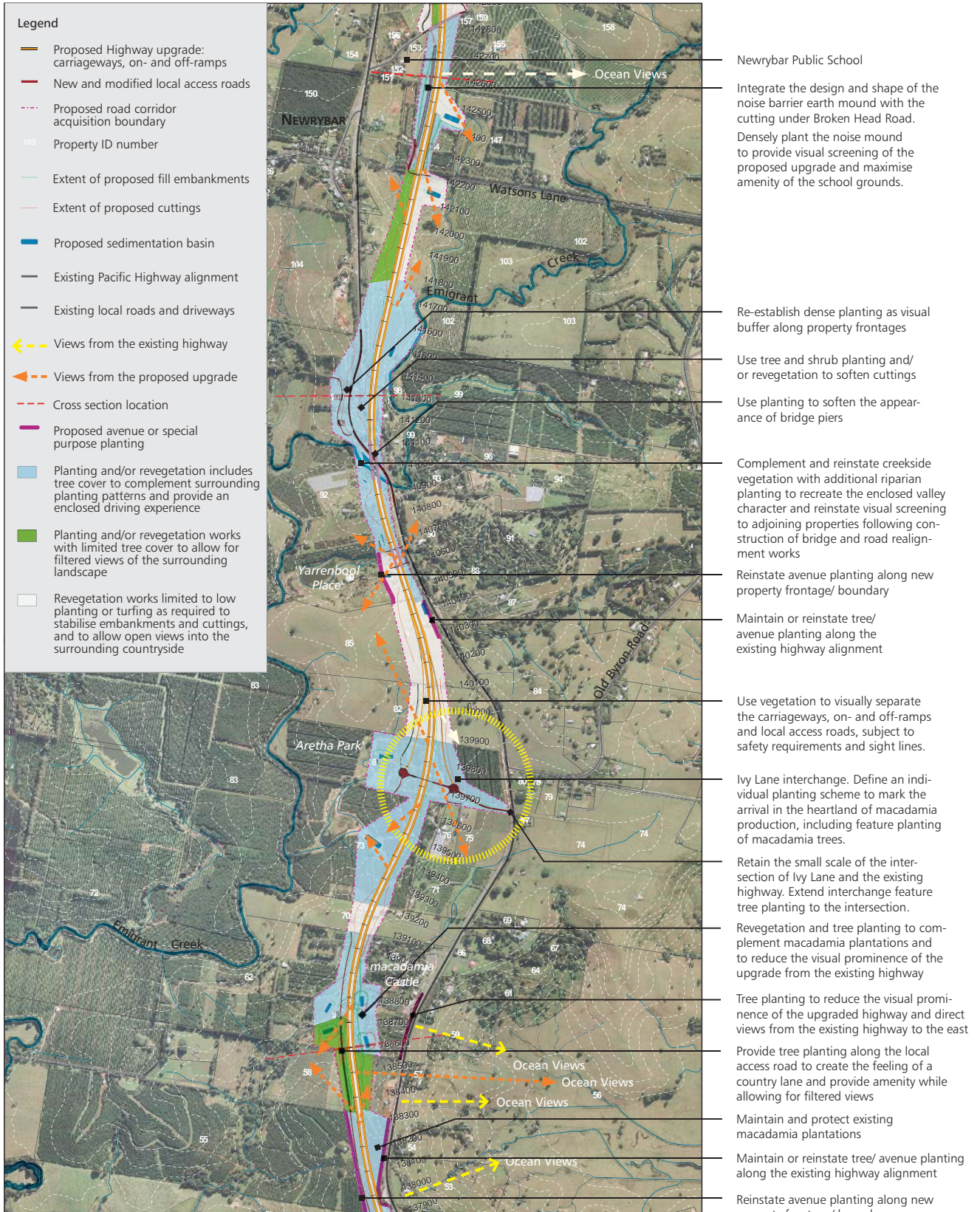


Illustration 71:
Urban and landscape design concept plan for precinct 2

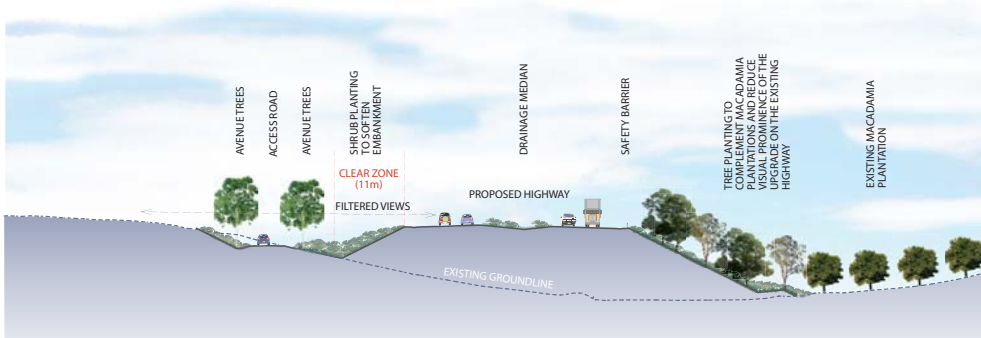


Illustration 72:
Cross section at chainage 138,600

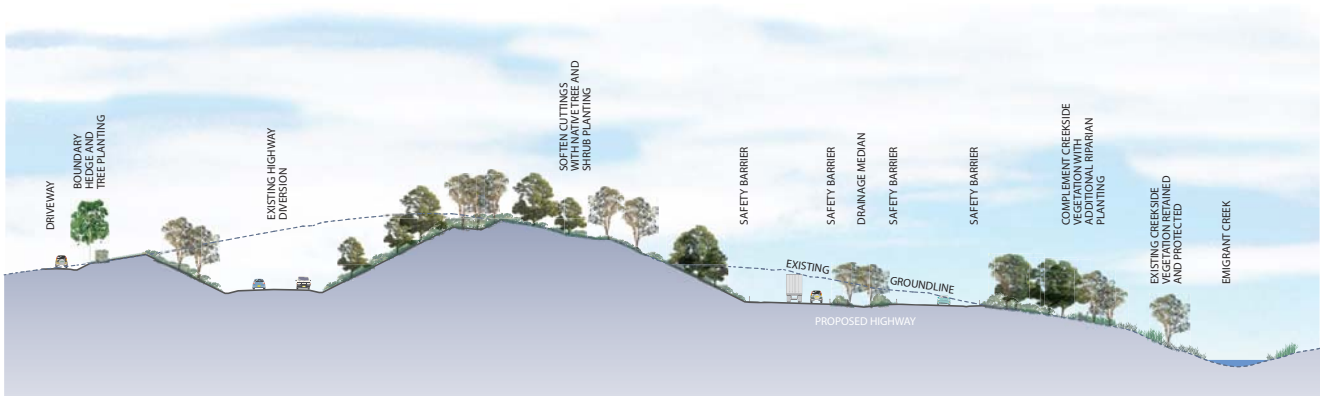


Illustration 73:
Cross section at chainage 141,300

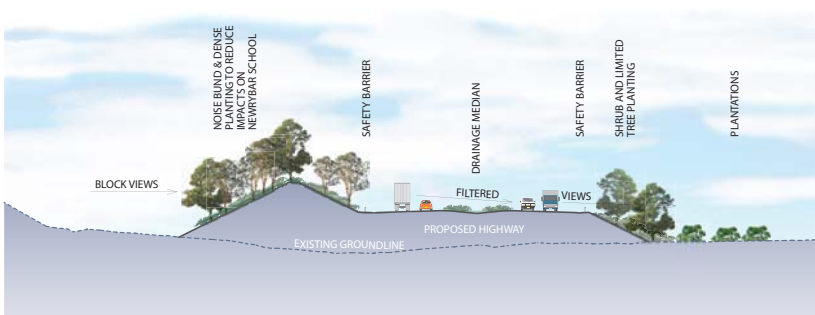


Illustration 74:
Cross section at chainage 142,600

URBAN AND LANDSCAPE DESIGN CONCEPT - PRECINCT 3: BANGALOW

BROKEN HEAD ROAD TO BYRON CREEK, CHAINAGE 142,800 TO 147,000

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SUMMARY OF ISSUES

As discussed in the "Visual Assessment" section of this working paper, the main urban and landscape design and visual impacts in the Bangalow precinct are associated with the large cutting through 'Arundel', the works around the existing Bangalow bypass including the wide areas of pavement associated with several parallel roadways, the crossing of Broken Head Road and the severing of agricultural plantations.

From the point of view of the motorist and the driving experience along the proposed upgrade, the Bangalow precinct is characterised by three major landmarks, located at the beginning and the end of the precinct (the Broken Head Road overbridge and Byron Creek crossing respectively), as well as approximately in the centre of the precinct (at Arundel). These punctuate the motorist's journey and compensate for the comparatively limited views from the proposed upgrade into the study area. The limited views are the result of much of the proposed highway being located in cuttings and of the interplay between the landform and the existing vegetation cover. Maximising the opportunities for views in areas such as at creek crossings will therefore be important (refer to Illustration 75 for other important views). The resulting contrast to visually contained sections of the route will provide an interesting driving experience and one that will make the limited areas with views all the more memorable.

In terms of how the proposed upgrade will be perceived by local residents and visitors to the area, views from the local road system and the visual relationship between the existing highway and the proposed upgrade are important factors and have been addressed by the urban and landscape design concept plan.

KEY AREAS FOR DETAIL DESIGN

In precinct 3, the key areas for further design investigation, resolution and development include:

> **Reduce the visual impact of parallel areas of hard pavement**

Reducing the amount of hard pavement visible from any one area or viewpoint will assist in reducing the potential visual impact resulting from the large concentration of parallel roadways around the existing Bangalow bypass and interchange. Landscape opportunities between the separate road- and carriageways (including the proposed upgrade, the existing highway, on- and off-ramps and local access roads) should be maximised, in order to visually break up the wide area of hard pavement.

Further, road design development should seek to minimise hard paved areas as much as possible, in particular where hard pavement would only be required in the case of future road widening or the potential provision of additional traffic movements at intersections in the future. In verges, consideration should also be given to the use of alternative materials and/ or textures that reduce the width of the uniform driving surface.

> **Greater horizontal separation between carriageways**

In the location of the existing Bangalow bypass, investigate the potential to increase the median width of the proposed upgrade, in order to retain and protect significant existing vegetation east of the Bangalow bypass (chainage 145,200 - 146,200). A wider median would also assist in creating better visual separation between the various roadways by providing sufficient space for planting works. Also refer to the discussion under "Reduce the visual impact of parallel areas of hard pavement"

> **Vertically independent carriageways**

Investigate the potential for independent vertical grading of the two carriageways, in order to reduce the motorway character of the proposed upgrade while also potentially reducing the amount of earthworks required. The section of the proposed upgrade between the Skinners Creek bridge and the Bangalow Road bridge seems particularly suited for this, especially in combination with greater horizontal separation of the carriageways at the Bangalow bypass (chainage 143,600 to chainage 146,600 approximately). Also refer to "Greater horizontal separation between carriageways".

> **Cutting design and stabilisation**

The cutting through 'Arundel' (property 197 and 198) is probably the most significant cutting along the proposed upgrade. This applies to both the physical magnitude of the cutting and its exposure to viewers. As discussed earlier, the cutting is potentially widely visible from surrounding areas, including from parts of Bangalow. It therefore takes on a landmark role along the proposed upgrade and the design outcomes for the cutting are likely to influence the perception of the visual quality of the proposed upgrade as a whole.

From a visual point of view and in order to reduce the potential visual impacts of the cutting, the main aim of cutting design is the reduction of the contrast between the cutting and the rolling character of the natural landscape. Consideration should therefore be given to the way the cutting is transitioned into the shape of the natural landscape, the steepness of cutting slopes, the design of benches and the potential of the cutting faces to successfully support revegetation measures in the long term.

The potential for successful and ongoing vegetation establishment should be treated as integral to the design of cuttings, because of the potential of vegetation to significantly reduce the engineered nature of the cutting, as well as of the portion of the cutting face exposed to viewers from any one angle. Close liaison with geotechnical specialists is recommended in order to identify the need for and best means of soil amelioration and stabilisation to ensure good long-term vegetation cover. In combination with the gentle curve of the cutting, dense vegetation at the more exposed northern end in particular would assist in reducing the visual impact of the cutting.

> Bridge design

As discussed in the strategic urban and landscape concept, the Byron Creek crossing is an important junction point considered a major landmark along the proposed upgrade. Both the Byron Creek bridge and the Bangalow Road bridge are elevated high above the natural floodplain, making them prominent elements in the naturally flat landscape.

The development of bridge designs that result in an elegant, transparent and light weight appearance that is subservient to the surrounding landscape would be highly desirable from an urban design and visual point of view.

The chapter on "Urban Design Elements" in the "Urban and Landscape Concept Design" section of this working paper provides more detailed recommendations on bridge design. The application of these guidelines has the potential to greatly enhance the visual experience of this important junction, in particular when seen from Bangalow Road, the Bangalow bypass and the railway line.

> Overbridge design Broken Head Road overbridge

Both overbridges in the precinct will be visually important elements, bridging a deep cutting at Broken Head Road and being located at the southern end of the major 'landmark' cutting at 'Arundel'. Both bridges would be highly visible from the proposed upgrade, giving great importance to the design of the overall structures and of specific details when seen from the side and below. Broken Head Road is also an important local road and the experience of the bridge by motorists on the road will be need to be carefully considered. In particular, the elevation of the ridge supporting Broken Head Road gives rise to scenic views into the surrounding countryside. The design and detail design of the bridge structure should support and complement these views. For a more detailed discussion on overbridge design, refer to the section on "Urban Design Elements".

> Severed plantations

As previously discussed, macadamia plantations are a defining feature of the area's visual and landscape character. The retention of stands of macadamia trees should therefore be maximised as much as possible. The issue arises where existing plantations are being severed by the proposed upgrade, such as north of Broken Head Road. Retaining severed plantations is important in order to reduce the degree of visual change in parts of the landscape not directly affected by the construction of the proposed upgrade, and to protect the experience of the landscape for motorists along the existing highway.

> Noise wall design

At the time of writing this working paper, detailed information on the likely length, height and location of the noise barrier in relation to the proposed upgrade near 'Clover Hill' was not known. However, as a noise barrier in a predominantly rural environment and one as scenic as the elevated plateau is likely to be perceived as highly unusual, the design of the noise barrier should aim to reduce the visibility of the structure as much as possible. This could be achieved through a landscaped earth mound or a hard engineering structure such as a noise wall, provided it is accompanied by dense planting. A more detailed discussion is provided in the section on 'Urban Design Elements'.

> Shaping of embankments

The proposed upgrade involves large fill embankments in the Byron Creek floodplain which would contrast strongly with the naturally flat landscape of the floodplain. In order to reduce this contrast, embankments should be shaped to 'grade out' at the bottom, making the junction between fill embankments and the valley floor less sharply defined. This should be combined with the planting of vegetation at the bottom of embankments, the establishment of which over time, this will assist in reducing the 'artificial' effect of embankments.

URBAN AND LANDSCAPE DESIGN CONCEPT PLAN AND SPECIFIC RECOMMENDATIONS

Building on the identified key areas for detail design and the strategic principles outlined in the urban and landscape design strategic concept, Illustration 91 provides a more detailed concept plan for precinct 3. It identifies a series of precinct-specific urban and landscape design measures, which have been developed in response to the urban design objectives and principles for the proposed upgrade, and to mitigate the identified visual impacts. The plan further identifies important views to be retained and protected, in order to

enhance the experience of the motorist on both the existing and the upgraded highway.

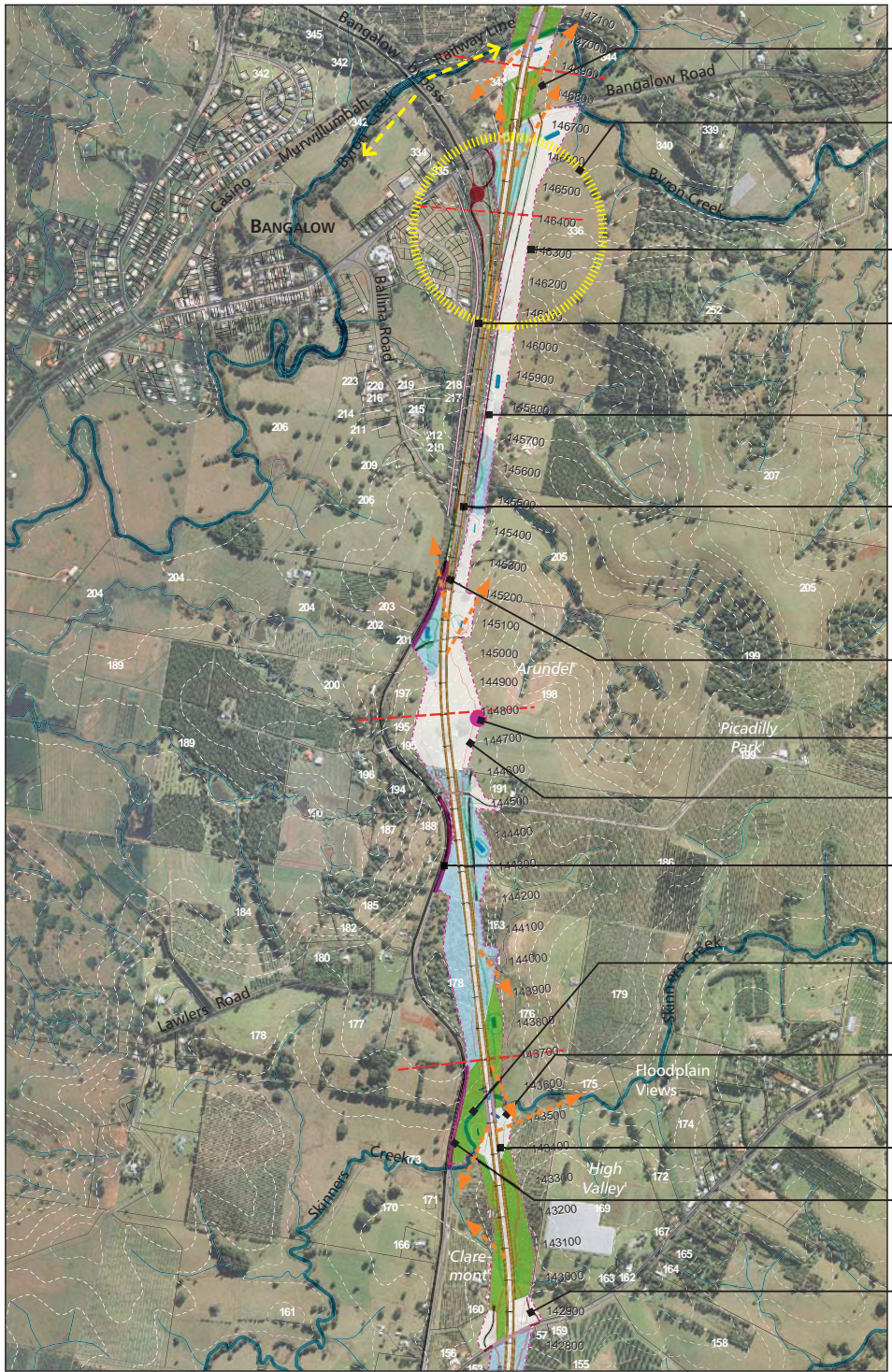
The cross sections in Illustrations 76 to 78 further demonstrate the three-dimensional urban and landscape design treatments at a number of important locations within the precinct.

Specific recommendations to mitigate the potential visual impact of the proposed upgrade and to be investigated at a detailed level in the next design stages are:

1. Complement cutting revegetation with tree planting around the Broken Head crossing to visually reduce the vertical scale of the cutting and the potential visual effect associated with the new bridge and its abutments (Chainage 142,700 - 143,300).
2. Retain and protect macadamia plantations between the existing highway and the proposed upgrade, to maintain the visual diversity along the existing highway (Chainage 142,800 - 143,400).
3. Provide landscape planting on the eastern side of the existing highway to reduce visibility of the Skinners Creek bridge and associated large fill embankments and direct views of drivers on the existing highway towards open areas in the west (chainage 143,150 - 143,550).
4. Provide planting of riparian species in the Skinners Creek floodplain to mark the creek crossing and to reduce the visual prominence of cuttings, embankments and bridge piers (Chainage 143,300 - 143,650).
5. Use tree planting along the existing highway alignment to reduce the visual prominence of the upgrade (Chainage 144,200 - 144,600 and Chainage 145,000 - 145,300).
6. Where subsoil conditions require relatively flat angles of repose to cuttings (such as at 'Arundel'), round off the tops and sides of cuttings and tie them back into the natural landforms to reduce the effect of engineered slopes against the skyline, as well as to reduce the contrast with the gently rolling natural hills of the area (Chainage 144,500 - 145,000).
7. Replace the large mature fig tree on the hilltop at 'Arundel' with a new mature landmark tree above the eastern edge of the proposed cutting (chainage 144,800).
8. As much as possible, provide dense shrub planting in the existing median of the Bangalow bypass, to provide visual separation between the existing highway/ future local road and the proposed upgrade, and to reduce the amount of pavement visible from any one roadway (Chainage 145,300 - 146,450).
9. On the eastern side of the proposed upgrade, re-establish the dense vegetation buffer between the proposed upgrade road corridor reservation and adjoining property frontages (chainage 145,200 - 146,700).
10. Use tree and shrub planting between the upgraded highway and the local access road, to reduce the amount of pavement visible from both the local access road and the upgraded highway, and to create the character of a country lane or avenue along the local access road (chainage 145,500 - 146,700).
11. Provide dense planting to both sides of the proposed noise barrier to reduce the visual impact of the noise barrier on the rural countryside, to reinstate the densely vegetated highway road corridor and to provide increased visual amenity to both adjoining residents and motorists (chainage 145,500 - 146,600).
12. Use tree and shrub planting plant between the upgraded highway, including on- and off-ramps, and the Bangalow bypass/ local link road to reduce the amount of road infrastructure visible from any one road and from surrounding areas (Chainage 146,100 - 146,720).
13. Remove obsolete pavements around the Bangalow interchange and revegetate the areas (chainage 146,100 - 146,700).
14. Complement existing riparian and floodplain vegetation to soften the appearance of fill batters and bridge abutments in the Byron Creek floodplain by planting at the bottom of fill embankments (Chainage 146,500 - 146,950).
15. Reinststate and complement existing riparian/ creekside vegetation with additional planting to reduce the visual impact of bridge piers in the Byron Creek floodplain (chainage 146,650 - 147,100).
16. Revegetate cuttings and embankments throughout the precinct, to soften and reduce their visual effect. A list of locally appropriate species is provided in Appendix 1.

* **Notes:**

1. All chainages are approximate.
2. "Planting" refers to the final outcome and not to any particular technique during construction: it includes both individual plantings and large-scale revegetation works.



- Plant floodplain vegetation at the bottom of fill embankments to reduce the visual impact on the floodplain
- Bangalow interchange. Build on the existing Bangalow bypass planting scheme to define an individual planting character marking the arrival the Bangalow township, including Bangalow Palms.
- Reinstate the dense buffer of vegetation along the frontage with adjoining properties to the east.
- Provide dense planting to both sides of the proposed noise barrier, to visually screen the barrier, and improve the visual amenity of both residents and motorists.
- Provide tree planting along the proposed local access road to create the feeling of a country lane and provide amenity.
- Maximise planting between individual road-and carriageways of the existing Bangalow bypass and the Bangalow interchange, to maximise their visual separation and reduce the visual prominence of large paving areas. In particular, maximise planting in the existing Bangalow bypass median strip.
- Provide tree and shrub planting along the existing highway to provide visual separation from the proposed upgrade.
- Reinstate the major landmark tree on the hilltop above the 'Arundel' cutting
- Round of benches and tops of cuttings to integrate the cutting with the shape of the natural landscape.
- Provide tree and shrub planting along the existing highway to provide visual separation from the proposed upgrade.
- Retain and protect existing trees and complement them with additional planting to provide a dense stand of bushland screening the proposed upgrade
- Reinstate and complement existing riparian vegetation to mark the creek crossing and soften the visual effect of the bridge piers
- Maximise floodplain views from the Skimmers Creek bridge
- Plant to the east of the existing highway to reduce the potential visual prominence of the Skimmers Creek bridge and associated fill embankments
- Use tree and shrub planting to reduce the perceived vertical scale of the Broken Head Road cutting and to mitigate the potential visual impacts of the bridge and bridge abutments

Illustration 75: Urban and landscape design concept plan for precinct 3

Legend		
Proposed Highway upgrade: carriageways, on- and off-ramps	Proposed sedimentation basin	Planting and/or revegetation includes tree cover to complement surrounding planting patterns and provide an enclosed driving experience
New and modified local access roads	Existing Pacific Highway alignment	Planting and/or revegetation works with limited tree cover to allow for filtered views of the surrounding landscape
Proposed road corridor acquisition boundary	Existing local roads and driveways	Revegetation works limited to low planting or turfing as required to stabilise embankments and cuttings, and to allow open views into the surrounding countryside
Property ID number	Views from the existing highway	
Extent of proposed fill embankments	Views from the proposed upgrade	
Extent of proposed cuttings	Cross section location	
	Proposed avenue or special purpose planting	



Illustration 76:
Cross section at chainage 143,700

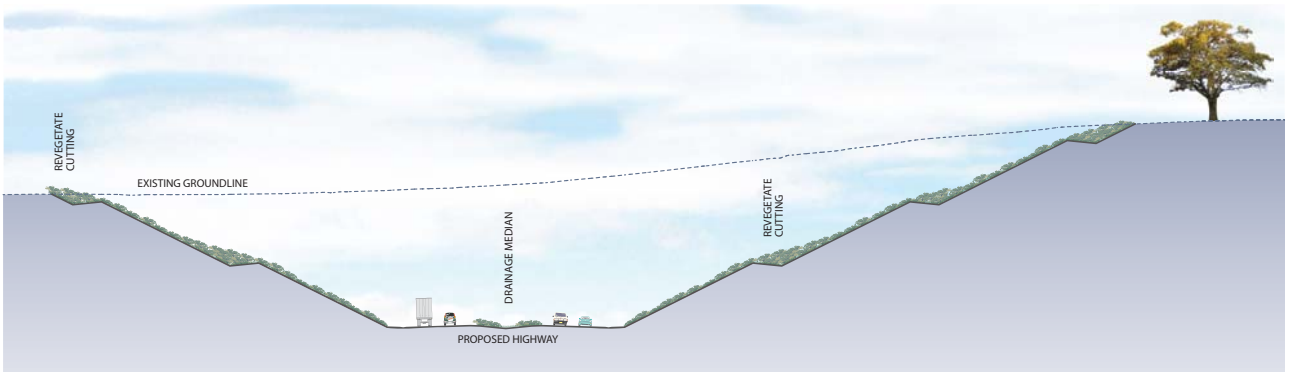


Illustration 77:
Cross section at chainage 144,800

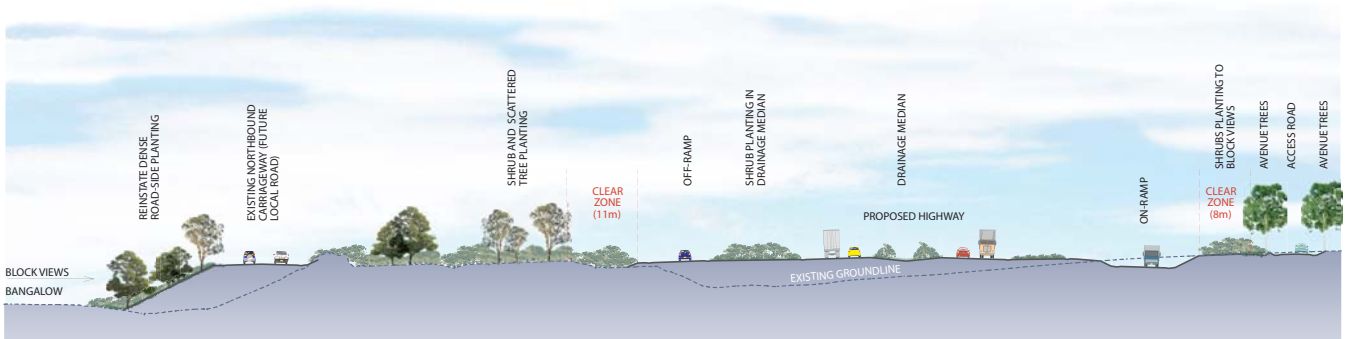


Illustration 78:
Cross section at chainage 146,400

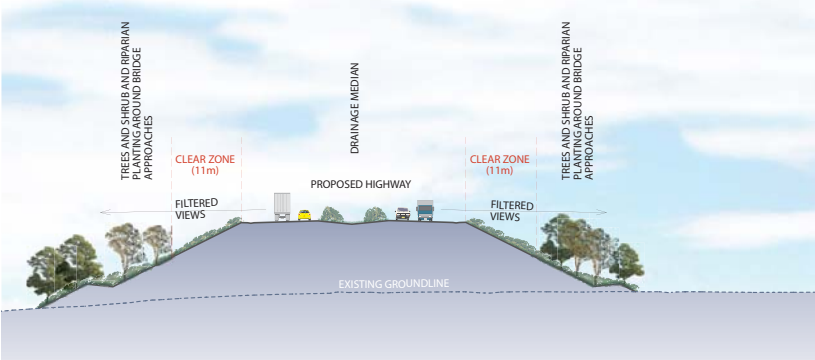


Illustration 79:
Cross section at chainage 146,870

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