



Australian Government



Coffs Harbour Bypass Project

Amendment Report

Volume 4B. Appendix E (Chapters 3-5, Appendices A-C)





Appendix E

Supplementary urban design,
landscape character and visual
impact assessment (Chapters 3-5,
Appendices A-C)



03

Landscape and visual impact assessment

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3.1 Purpose and approach

An urban design, landscape character and visual impact assessment was prepared in support of the EIS for the project (refer to Urban Design, Landscape Character and Visual Impact Assessment Report, Arup 2019). The purpose of the assessment was to address the SEARs for the project's construction and operation relevant to urban design and visual amenity.

This supplementary landscape character and visual impact assessment has been prepared to assess the impacts of the design and construction changes for the project. This supplementary assessment only includes information that has changed since the EIS and should be read in conjunction with the Urban Design, Landscape Character and Visual Impact Assessment Report (Arup 2019).

Methodology

The same landscape and visual assessment methodology used for the EIS has been used for visual and landscape assessment of the amended design. The landscape and visual sensitivity has not been reevaluated and is consistent with the EIS.

Landscape character impact assessment

The landscape character assessment for the amended design has been completed in line with the follow steps:

- The changes associated with the amended design have been reviewed against the landscape character zone boundaries
- Where changes occur within a landscape character zone, the magnitude of change and impact assessed for the EIS has been reviewed and updated to reflect the design changes
- The embedded mitigation developed as part of the urban design concepts (Chapter 2) has been updated to respond to the amended design.

Visual impact assessment

The visual impact assessment for the amended design has been completed in line with the follow steps:

- A Visual Envelope Map (VEM) for the amended design has been generated to illustrate the theoretical area from the which amended design would be visible in the landscape
- The VEM for the amended design has been compared against the VEM for the EIS as part of a quantitative analysis
- Where changes occurred to representative viewpoints, a qualitative analysis has been undertaken to determine whether further assessment was required
- Where changes were considered to be immaterial in the context of the project, such as small scale and localised earthwork changes, further analysis was not deemed necessary as it was not considered to alter the overall level of impact
- Where changes had the potential to alter the overall level impact for a representative viewpoint, further analysis has been undertaken.

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Landscape Character Impact Assessment



3.2 Landscape character zone impacts

The EIS landscape character assessment defines nine landscape character zones. The changes arising from the amended design are situated within five of these character zones, including:

- 1a. Englands Road
- 1b. Boambee Basin
- 2b. The Bowl
- 3a. Kororo Basin and Foothills
- 3b. Kororo Basin Edge.

Changes do not occur within landscape character zones 1c: Boambee and Roberts Hill Southern Foothills, 2a: Roberts Hill Northern Foothills, 2c: End Peak & Mackays Road Valley and 2d: Gatelys Road Valley and consequently further analysis has not been undertaken.

As outlined within the methodology, the design changes arising within each landscape character zone have been identified and reviewed against the EIS design. This assessment provides a summary of these changes and the associated impact arising on the landscape character zones.



1A: Englands Road

Design changes include:

The proposed design changes in this landscape character zone comprise changes to the Englands Road interchange, including:

- Realignment of the one-way local access road on the west side of the project
- Lowering the alignment of the main carriageway by about six metres
- Replacing two sets of traffic lights on Englands road with a large roundabout
- Realigning the north bound exit ramp.

Construction changes include:

- An additional ancillary site increasing the boundary extents and construction movements, including the presence of machinery and on-site construction activity.

Magnitude of change

The amended design would result in a reduction in the magnitude of change, however in the context of the overall project, the change is not considered to alter the EIS assessment.

The magnitude of change would be consistent with the EIS assessment.

Impact

The landscape character zone impact for the amended design is consistent with the landscape character zone impacts identified in the EIS.

Landscape assessment comparison table:

	Magnitude		Impact	
	Construction	Operation	Construction	Operation
EIS	Moderate	Moderate	Moderate-Low	Moderate-Low
AD*	Consistent with EIS	Consistent with EIS	Consistent with EIS	Consistent with EIS

*Amended design



1B: Boambee Basin

Design changes include:

The proposed design changes in this landscape character zone comprise changes to the vertical alignment through North Boambee Valley, including:

- Lowering the vertical alignment of the project as it crosses North Boambee Road
- Replacing Bridge 05 with a bank of culverts
- Removing earth mounds to reduce the extent of earthworks.

Construction changes include:

- An additional ancillary site increasing the boundary extents.

Magnitude of change

The amended design would result in a lower vertical alignment and a reduction in structures with the removal of Bridge 05. These changes are considered to result in a limited reduction in the magnitude of change when compared with the EIS design, however this is not considered to change the overall assessment for this landscape character zone. The magnitude of change would be consistent with the EIS design.

Impact

The landscape character zone impact for the amended design is consistent with the landscape character zone impacts identified in the EIS.

Landscape assessment comparison table:

	Magnitude		Impact	
	Construction	Operation	Construction	Operation
EIS	High	High	Moderate-High	Moderate-High
AD*	Consistent with EIS	Consistent with EIS	Consistent with EIS	Consistent with EIS

*Amended design



2B: The Bowl

Design changes include:

The proposed design changes in this landscape character zone comprise changes to the Coramba Road bus stop and changes to the proposed flood mitigation measures, including:

- The introduction of a new school bus stop on the northern side of Coramba Road and bus shelter
- The introduction of a shared user path connecting Spagnolos Road with the proposed bus stop
- An introduced cul-de-sac along Spagnolos Road
- Additional flood storage would be provide upstream and downstream of the project between Roberts Hill tunnel and Coramba Road
- Excavation of Bennetts Road detention basin would no longer be needed.

Construction changes include:

- An additional construction sediment basin located to the west of Shephards Lane and east of the alignment.

Magnitude of change

The amended design would result in the introduction of a bus stop, localised changes to Coramba Road and Spagnolos Road, reduced impacts in the Bennetts Road detention basin and the introduction of additional flood storage south of Coramba Road. These changes are not considered to alter the overall magnitude of change when compared to the EIS design. The magnitude of change would be consistent with the EIS design.

Impact

The landscape character zone impact for the amended design is consistent with the landscape character zone impacts identified in the EIS.

Landscape assessment comparison table:

	Magnitude		Impact	
	Construction	Operation	Construction	Operation
EIS	High	High	Moderate-High	Moderate-High
AD*	Consistent with EIS	Consistent with EIS	Consistent with EIS	Consistent with EIS

*Amended design



3A: Kororo Basin and Foothills

Design changes include:

The proposed design changes in this landscape character zone comprise changes to the Korora Hill interchange, including:

- A reduction of the overall scale of Korora Hill Interchange with the consolidation of infrastructure elements (including entry and exit ramps and local access roads)
- An introduced roundabout provided below the northbound entry ramp and the southbound exit ramp to provide access between Bruxner Park Road, the service Road, James Small Drive (via the service road), and the existing Pacific Highway (via slip lanes)

Construction changes include:

- The introduction of an ancillary site to the south of the Korora Hill interchange and west of the Banana Coast Caravan Park
- A reduction of the overall number of ancillary sites within this LCZ (reduced by one site).

Magnitude of change

The amended design would result in consolidation and an overall reduction in the scale of the Korora Hill interchange. These changes are considered to result in a reduction in the magnitude of change, however in the context of the overall project, the change is not considered to alter the EIS assessment.

The magnitude of change would be consistent with the EIS design.

Impact

The landscape character zone impact for the amended design is consistent with the landscape character zone impacts identified in the EIS.

Landscape assessment comparison table:

	Magnitude		Impact	
	Construction	Operation	Construction	Operation
EIS	High	High	High	High
AD*	Consistent with EIS	Consistent with EIS	Consistent with EIS	Consistent with EIS

*Amended design



3B: Kororo Basin Edge

Design changes include:

The proposed design changes in this landscape character zone comprise changes to the Kororo Public School bus interchange, the Luke Bowen footbridge and the realignment of Pine Brush and Williams creeks, including:

- Relocation and reconfiguration of the Kororo Public School bus interchange so that access is provided via the service road instead of from James Small Drive
- Relocation of the Luke Bowen footbridge so that it is closer to its current location and to the front entrance of the school
- Provision of a formal parking/drop-off facility on the western side of the project, and removal of the Solitary Rural Fire Service shed
- Changes to the proposed realignment of Pine Brush and Williams creeks west of Bridge 21.

Construction changes include:

- Introduction of ancillary site 3F south of Opal Boulevard.

Magnitude of change

The amended design would result in the reconfiguration and relocation of the Kororo Public School bus interchange and the relocation of Luke Bowen footbridge. In the context of the overall project, these changes are not considered to alter the overall magnitude of change when compared to the EIS design.

The magnitude of change would be consistent with the EIS design.

Impact

The landscape character zone impact for the amended design is consistent with the landscape character zone impacts identified in the EIS.

Landscape assessment comparison table:

	Magnitude		Impact	
	Construction	Operation	Construction	Operation
EIS	High	Moderate	Moderate-High	Moderate
AD*	Consistent with EIS	Consistent with EIS	Consistent with EIS	Consistent with EIS

*Amended design



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An aerial architectural rendering of a highway interchange and residential development. The scene is set in a hilly, green landscape with dense forests and rolling hills. A multi-lane highway with an overpass and interchange is the central focus, with several vehicles visible. To the right, a residential development is shown with numerous white, rectangular building footprints arranged in a grid-like pattern. The foreground features a mix of trees and grassy areas. The overall aesthetic is clean and modern, typical of a conceptual urban planning visualization.

Visual Impact Assessment

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3.3 Visual Impacts

The EIS visual impact assessment identified 22 representative viewpoints to comprehensively illustrate the visual amenity of the study area and represent the potential visual impact. A VEM was generated for the EIS to inform the selection of 22 representative viewpoints (refer to figure 3.1). An assessment of the 22 representative viewpoints was undertaken to comprehensively illustrate the visual amenity of the study area and represent the potential impacts.

Consistent with the EIS methodology, a VEM has been prepared for the amended design to identify where the representative viewpoints have the potential to experience a change (refer to figure 3.2). In addition to the VEM (quantitative analysis), a qualitative analysis has been undertaken to review the design and construction changes that would be visible from each viewpoint location (refer to table 3.1).

Both the VEM and the qualitative analysis identified eight representative viewpoints for further detailed analysis, including:

- 2. Coachmans Close
- 3. Kororo Nature Reserve
- 6. Charlesworth Bay Road
- 8. Sealy Lookout
- 18. Isles Drive commercial
- 20. Korora lookout
- 21. Coffs Coast Sports and Leisure.

In addition to the EIS representative viewpoints, viewpoint 23, Fern Tree Place, has been added as part of the amended design analysis to assess impacts that have the potential to arise as a result of the design changes for the Kororo Public School bus interchange and to address community concerns raised during the public display of the design changes.

Assumptions

Consistent with the approach adopted for the EIS, the VEM has been generated using observer points at 50m intervals along the amended design alignment. Due to the amended design changes, the observer points for the EIS design and the amended design would differ. In addition, it is important to note that the VEM is reliant on a digital surface model, which may have inherent inaccuracies, and the design model, which will be subject to change during detailed design.

The amended design also includes changes to the extent of the construction footprint. For the purposes of the assessment and to illustrate the worst case scenario, it is assumed that vegetation within the construction footprint would be removed. In addition to the project amendments, the changes associated with the construction footprint and the vegetation removal have the potential to contribute to changes to the extent of visibility, as illustrated in figure 3.2 on the preceding pages.

For each of the representative viewpoints, VEMs have been generated to illustrate how the visibility may change as a result of the amended design e.g. where the extent of vegetation removal has changed or new infrastructure elements have been introduced.

Table 3.1. Visual Assessment Comparison

Viewpoint:	The change associated with the amended design:	Further analysis required:
VP 1 - Aqualuna Beach resort	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 2 - Coachmans Close	Introduction of ancillary site 3F.	Further analysis undertaken.
VP 3 - Luke Bowen footbridge	Relocation of Luke Bowen footbridge.	Further analysis undertaken.
VP 4 - Hills Beach Solitary islands coastal walk	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 5 - Coffs Coast Regional Park	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 6 - Charlesworth Bay Road	Close proximity to Korora Hill interchange design change, new ancillary site 3A and Charlesworth Bay Road intersection design changes.	Further analysis undertaken.
VP 7 - Macauleys Headland walking track	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 8 - Sealy Lookout	Potential for design changes associated with additional flood mitigation provided between Roberts Hill tunnel and Coramba Road.	Further analysis undertaken.
VP 9 - Gatelys Road	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 10 - Vera Drive	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 11 - Shephards Lane	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 12- Bennetts Road	Design and construction changes are considered to be barely discernible within the context of the project.	No further analysis required.
VP 13 - Spagnolos Road	Design and construction changes are considered to be barely discernible within the context of the project.	No further analysis required.
VP 14 - Coffs Harbour CBD	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 15 - Barrie Street	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 16 - Muttonbird Island Nature Reserve	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 17 - North Boambee residential	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 18 - Isles Drive commercial	Close proximity to Englands Road interchange design change.	Further analysis undertaken.
VP 19 - Sawtell Road residential	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 20 - Korora lookout	Visual increase of the project, particularly Kororo Public School bus interchange, indicated from VEM.	Further analysis undertaken.
VP 21 - Coffs Coast Sports and Leisure	Close proximity to Englands Road interchange design and construction changes.	Further analysis undertaken.
VP 22 - Jock Avenue	Not in close proximity to design and construction changes, negligible visual increase of the project indicated from VEM.	No further analysis required.
VP 23 - Fern Tree Place	Additional viewpoint - proximity to the Kororo Public School bus interchange design change.	Analysis undertaken.

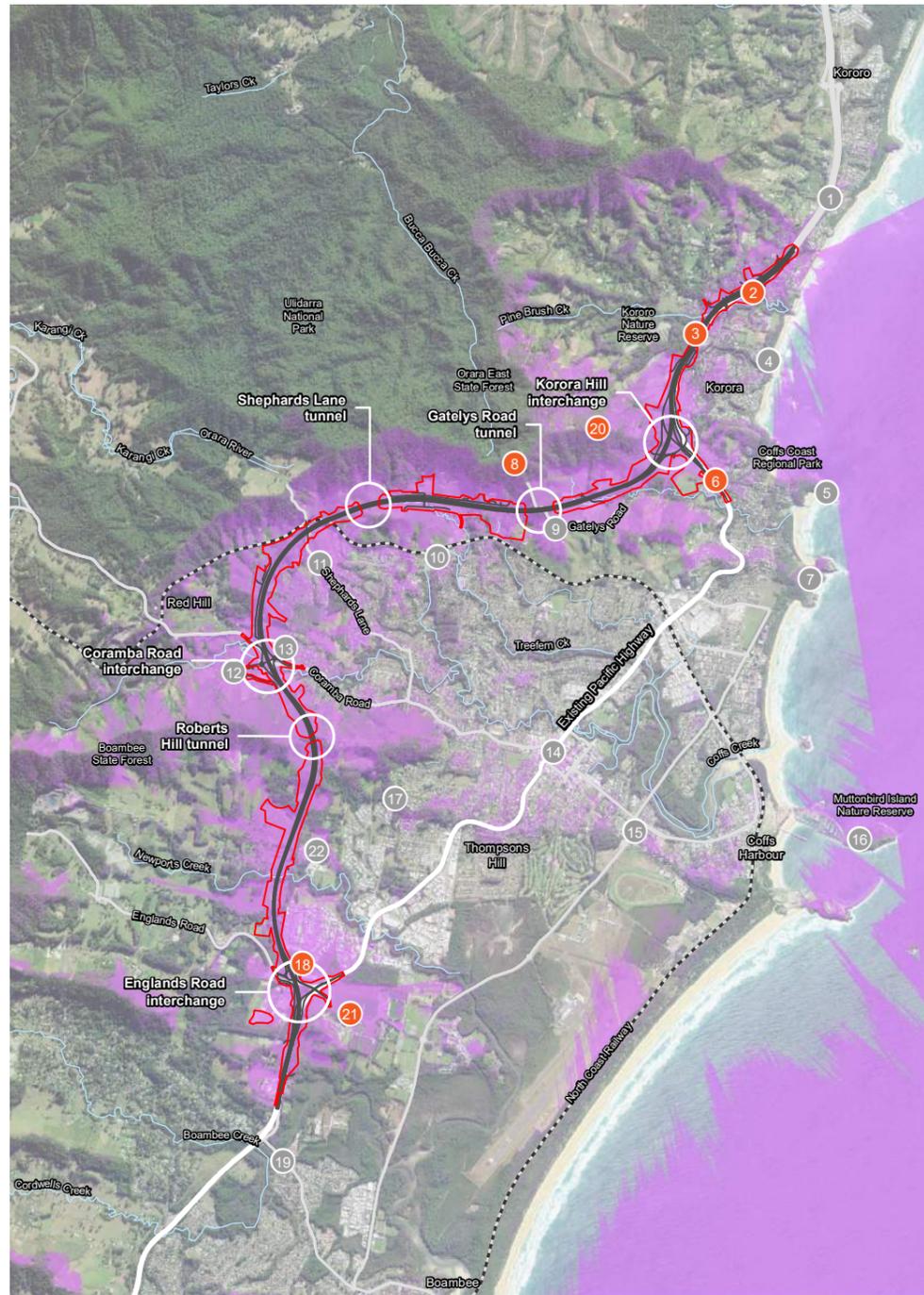


FIG 3.1 VISUAL ENVELOPE MAP: EIS DESIGN

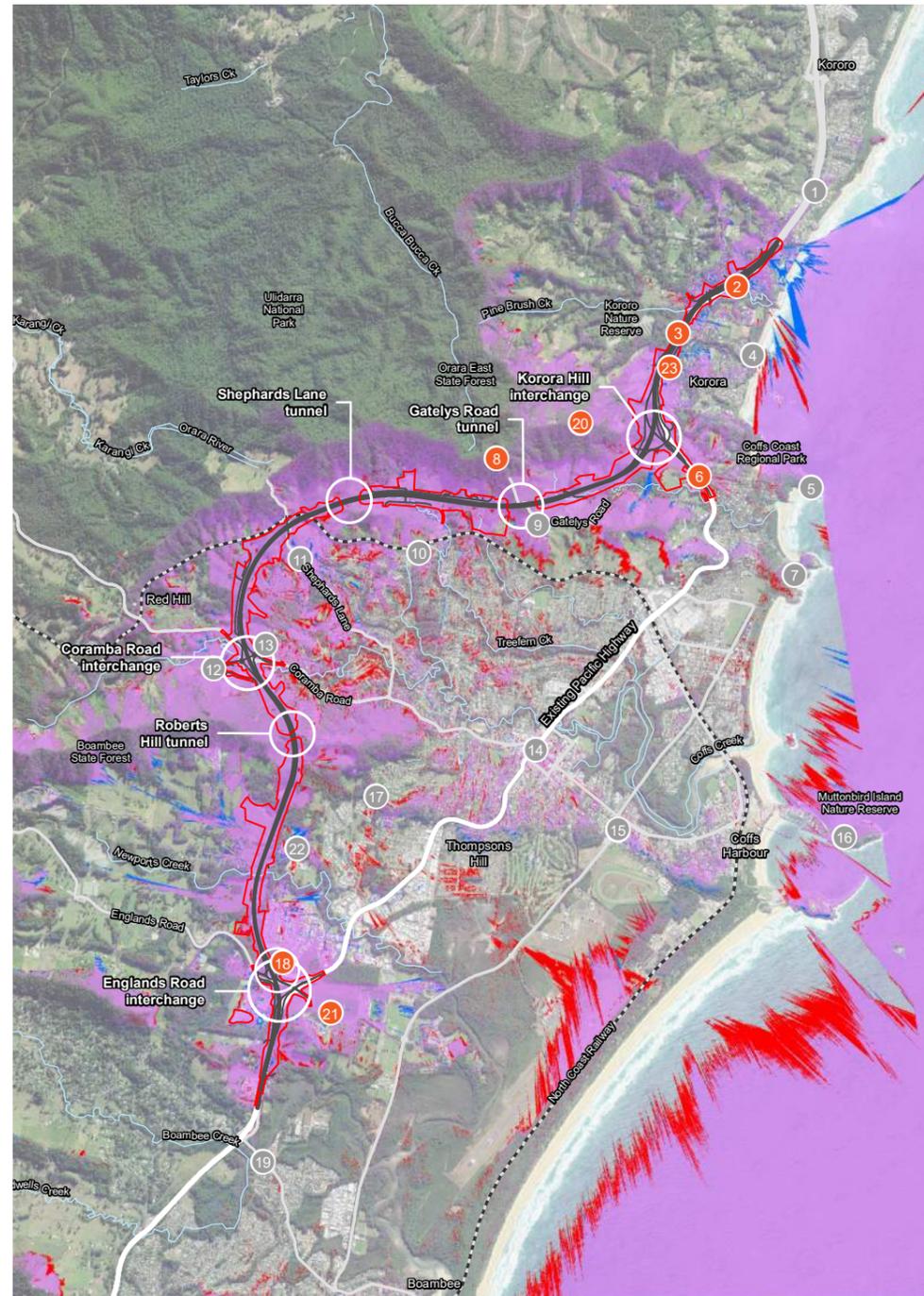


FIG 3.2 VISUAL ENVELOPE MAP: AMENDED DESIGN

LEGEND

- Visual Envelope Map
- Additional visibility due to amended design
- Less visibility due to amended design
- Viewpoints potentially affected by the proposed design and associated construction changes
- Viewpoints not anticipated to experience a change as a result of the amended design

REPRESENTATIVE VIEWPOINTS

- | | |
|--|--|
| 1 Aqualuna Beach resort | 12 Bennetts Road |
| 2 Coachmans Close | 13 Spagnolos Road |
| 3 Luke Bowen footbridge | 14 Coffs Harbour CBD |
| 4 Hills Beach Solitary islands coastal walk | 15 Barrie Street |
| 5 Coffs Coast Regional Park (Diggers Head Trail) | 16 Muttonbird Island Nature Reserve |
| 6 Residential edge (Charlesworth Bay Road) | 17 North Boambee residential |
| 7 Macauleys Headland walking track | 18 Isles Drive commercial |
| 8 Sealy Lookout | 19 Sawtell Road residential |
| 9 Gatelys Road | 20 Korora lookout |
| 10 Vera Drive | 21 Coffs Coast Sports and Leisure Park |
| 11 Shepherds Lane | 22 Jock Avenue |
| | 23 Fern Tree Place (new viewpoint) |

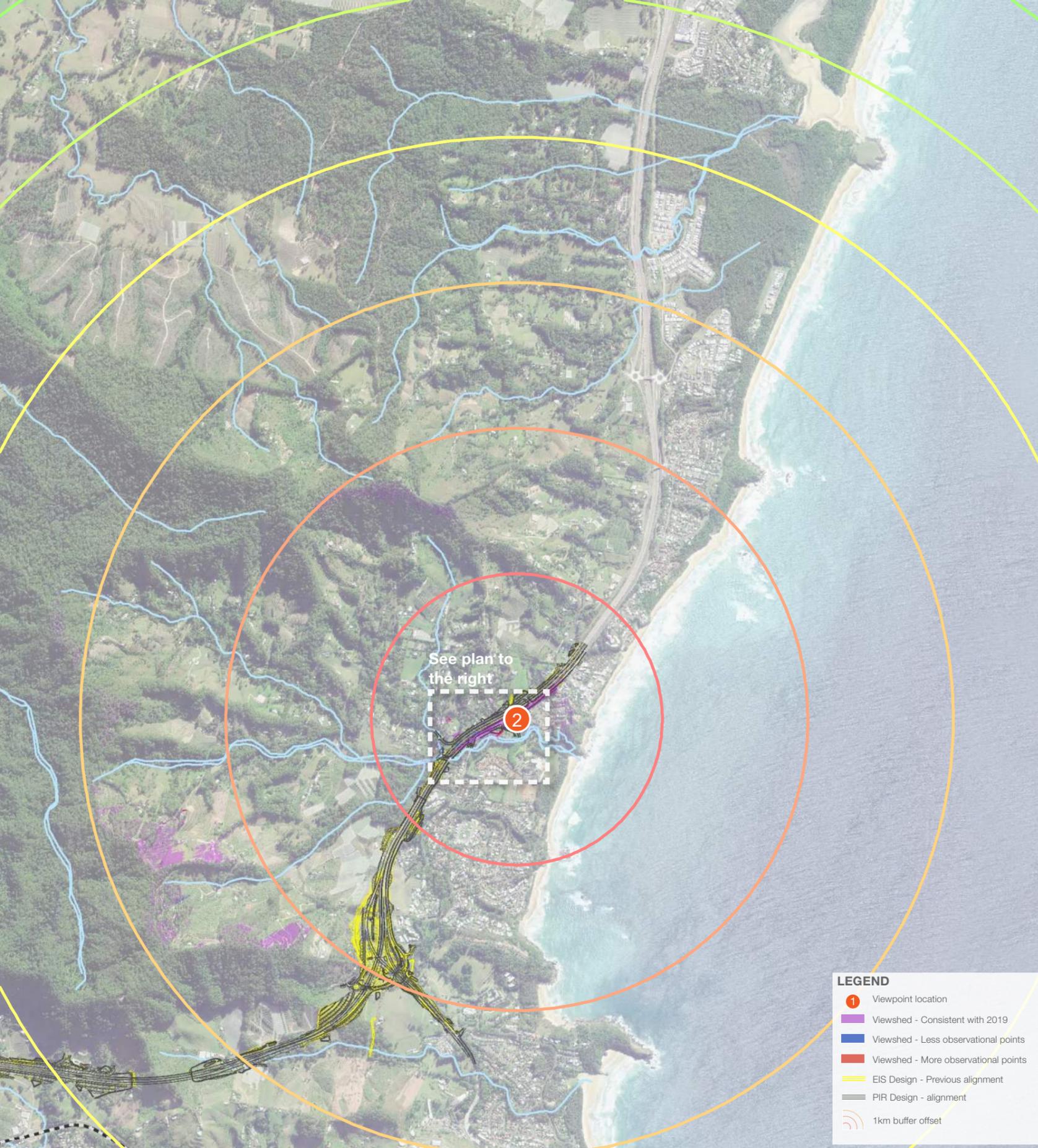


FIG 3.3 VIEWPOINT 2: VIEWSHED ANALYSIS

Viewpoint 2: Coachmans Close



Embedded design mitigation

No additional embedded design mitigation has been developed beyond the treatments contained within the EIS. For ease of reference, the EIS mitigation treatments included:

- Screen planting along the eastern edge of Coachmans Close to filter views towards passing vehicles
- Solid noise wall will assist with screening views towards passing vehicles on the Pacific Highway.

It is anticipated that the vegetation contained within the expanded construction footprint for ancillary site 3F would be retained during construction.



Magnitude of change

The amended design would result in the following changes to this viewpoint:

- The expansion of the construction footprint and the addition of a construction ancillary site to the north west of the view
- It is anticipated that the vegetation within the ancillary site would be retained where possible, however for the purposes of the assessment, the worst case scenario of vegetation clearance has been assumed.

Impact

Day time operation

The expansion of the construction footprint as a result of the ancillary site would not alter the composition of the view or the operational impact in comparison to the EIS.

Night time operation

The changes associated with the amended design would not alter the overall level of impact identified within the EIS assessment.

Construction

The amended design would result in an incremental enlargement of the construction activity in comparison the EIS design, with construction movements in close proximity to the viewpoint. However, the amended design construction impact would be consistent with the EIS assessment.

	Magnitude of change	Operation		Construction
		Impact	Night time	Impact
EIS	High	Moderate-High	Moderate	Moderate-High
Amended design	Consistent	Consistent	Consistent	Consistent

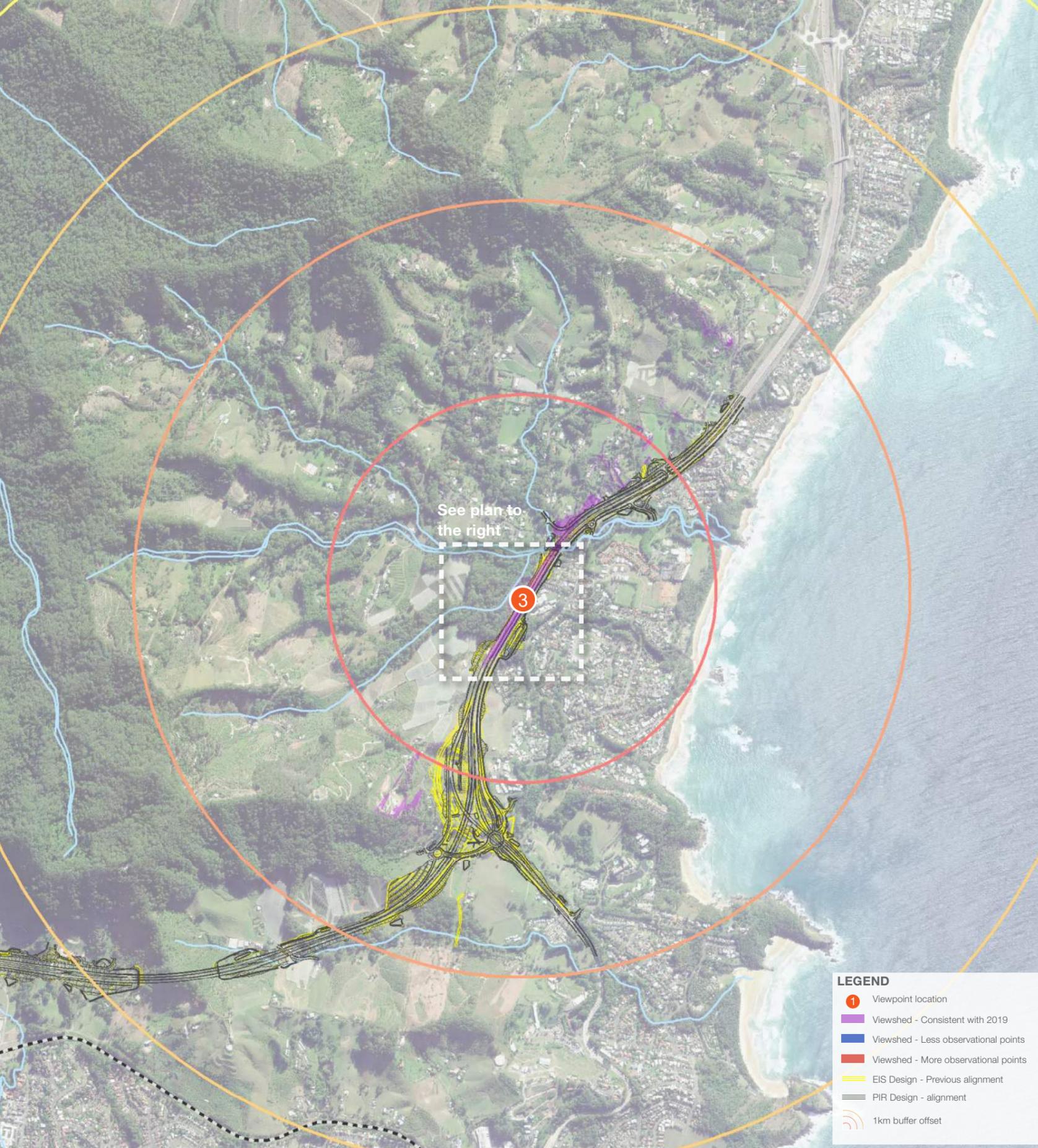


FIG 3.4 VIEWPOINT 3: VIEWSHED ANALYSIS

Viewpoint 3: Luke Bowen footbridge



Embedded design mitigation

No additional embedded design mitigation has been developed beyond the treatments contained within the EIS. For ease of reference, the EIS mitigation treatments that have been updated to reflect the amended design changes, include:

- Replacement of Luke Bowen footbridge to form a gateway and visual landmark for Coffs Harbour entry and exit journey
- Planting updated to respond to the amended design between the new service road and the Pacific Highway where space allows
- Planting to central median to assist with defining the approach to Korora Hill interchange. The planting will be a mix of low maintenance native and culturally important species.

LEGEND

	Retaining Wall
	Noise Wall
	Construction Boundary
	Viewshed
	More observational points
	Less observational points
Planting:	
	Feature Trees
	Street Trees
	Tree Grouping
	Feature Planting
	Local Road Planting Mix
	Median Planting
	Riparian Corridor
	Swale Planting
	Basin Planting Mix
	Portal Mix
Seeding:	
	Lowland Rainforest Mix
	Wet Sclerophyll Forest Mix
	Open Forest Mix
	Native Pasture Mix
	Corridor Frangible Mix



Magnitude of change

The amended design would result in the following changes to this viewpoint:

- Relocation of the proposed Luke Bowen footbridge closer to its current alignment
- The design of Luke Bowen footbridge would consist of an arched structure
- Reconfiguration of the Kororo Public School bus interchange with access provided from the service road instead of from James Small Drive.

Impact

Day time operation

The relocation of the Luke Bowen footbridge closer to the existing bridge alignment has the potential to reduce visual impacts. However in the context of the overall project, the amended design would include views towards a widened road corridor, vegetation clearance and the introduction of the lighting columns, consistent with the EIS design. The amended design is not considered to change the overall visual impacts.

Night time operation

The changes associated with the amended design would not alter the night time visual impacts identified within the EIS assessment.

Construction

The extent of the construction works at this location is anticipated to be consistent with the EIS, with no change to the assessment.

	Magnitude of change	Operation		Construction
		Impact	Night time	Impact
EIS	Low	Moderate-Low	Negligible	Moderate
Amended design	Consistent	Consistent	Consistent	Consistent

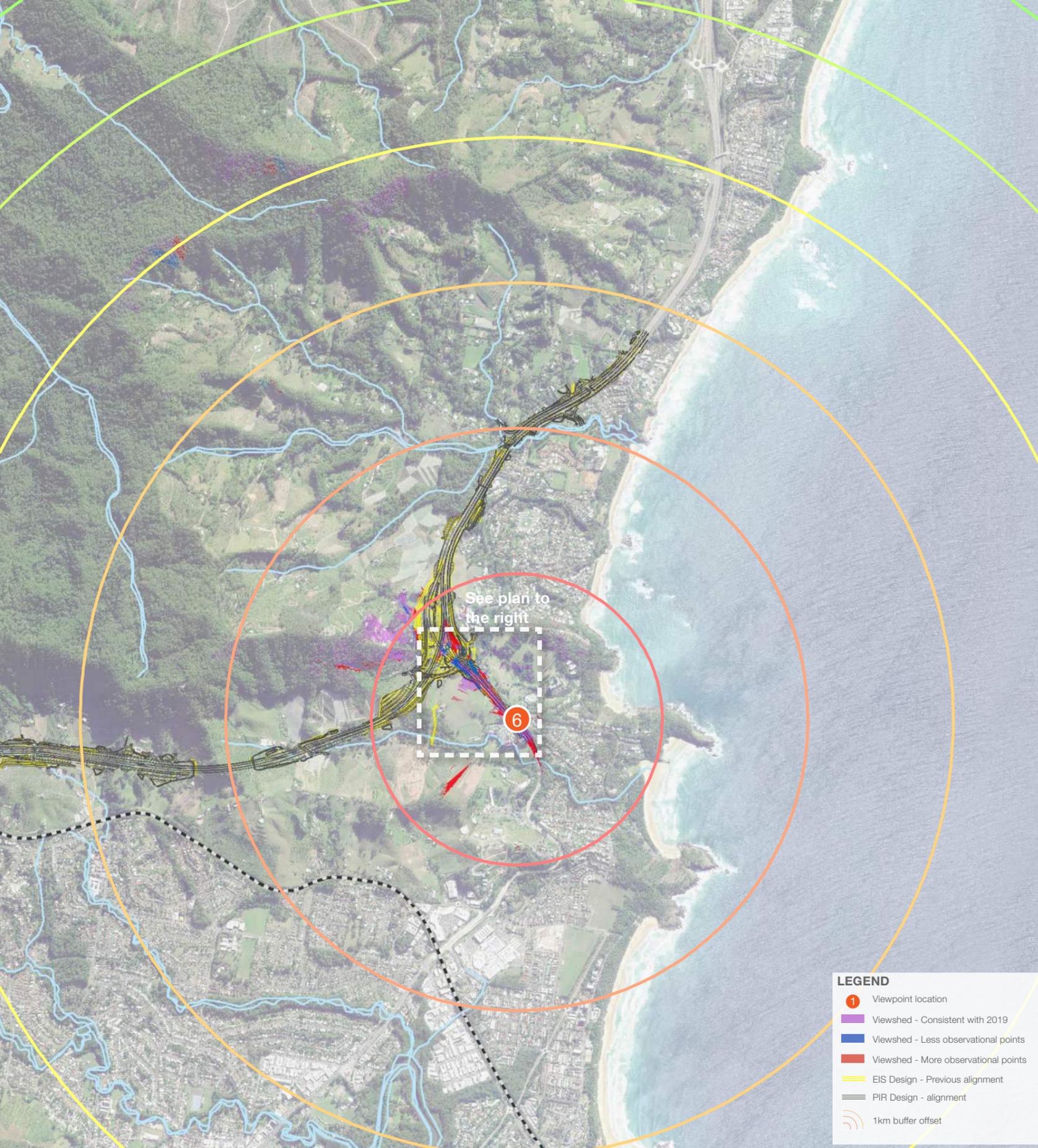


FIG 3.5 VIEWPOINT 6: VIEWSHED ANALYSIS

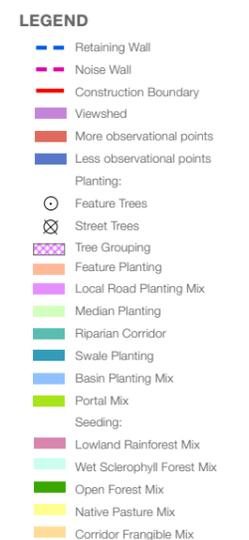
Viewpoint 6: Residential edge (Charlesworth Bay Road)



Embedded design mitigation

No additional embedded design mitigation has been developed beyond the treatments contained within the EIS. For ease of reference, the EIS mitigation treatments that have been updated to reflect the amended design changes, include:

- Feature planting to Korora Hill interchange to define the northern arrival point and gateway to Coffs Harbour
- Planting to respond to the enclosed, vegetated experience of the Pacific Highway on approach to CBD
- Planting species similar to the form and structure of the banana plantation in the surrounding areas.





Magnitude of change

The amended design would result in the following changes to this viewpoint:

- Decrease in visibility towards the project as a result of the consolidated Korora Hill interchange and associated alignment works
- The expansion of the construction footprint and the addition of a construction ancillary site to the north west of the view. The assessment was based on the assumption that all vegetation within the ancillary sites would be cleared, however TfNSW would minimise clearing where possible
- New signalised intersection at Charlesworth Bay Road.

Impact

Day time operation

The amended design would result in changes to the composition of the view in comparison to the EIS design, however, these changes would not alter the overall level of visual impact.

Night time operation

The changes associated with the amended design would not alter the overall level of impact identified within the EIS assessment.

Construction

The amended design would result in an incremental enlargement of the construction activity in comparison the EIS design, with additional construction movements in close proximity to the viewpoint. However, in the context of the whole project, this change is not considered to alter the overall impact identified within the EIS assessment.

	Magnitude of change	Operation		Construction
		Impact	Night time	Impact
EIS	High	Moderate-High	Low	Moderate-High
Amended design	Consistent	Consistent	Consistent	Consistent

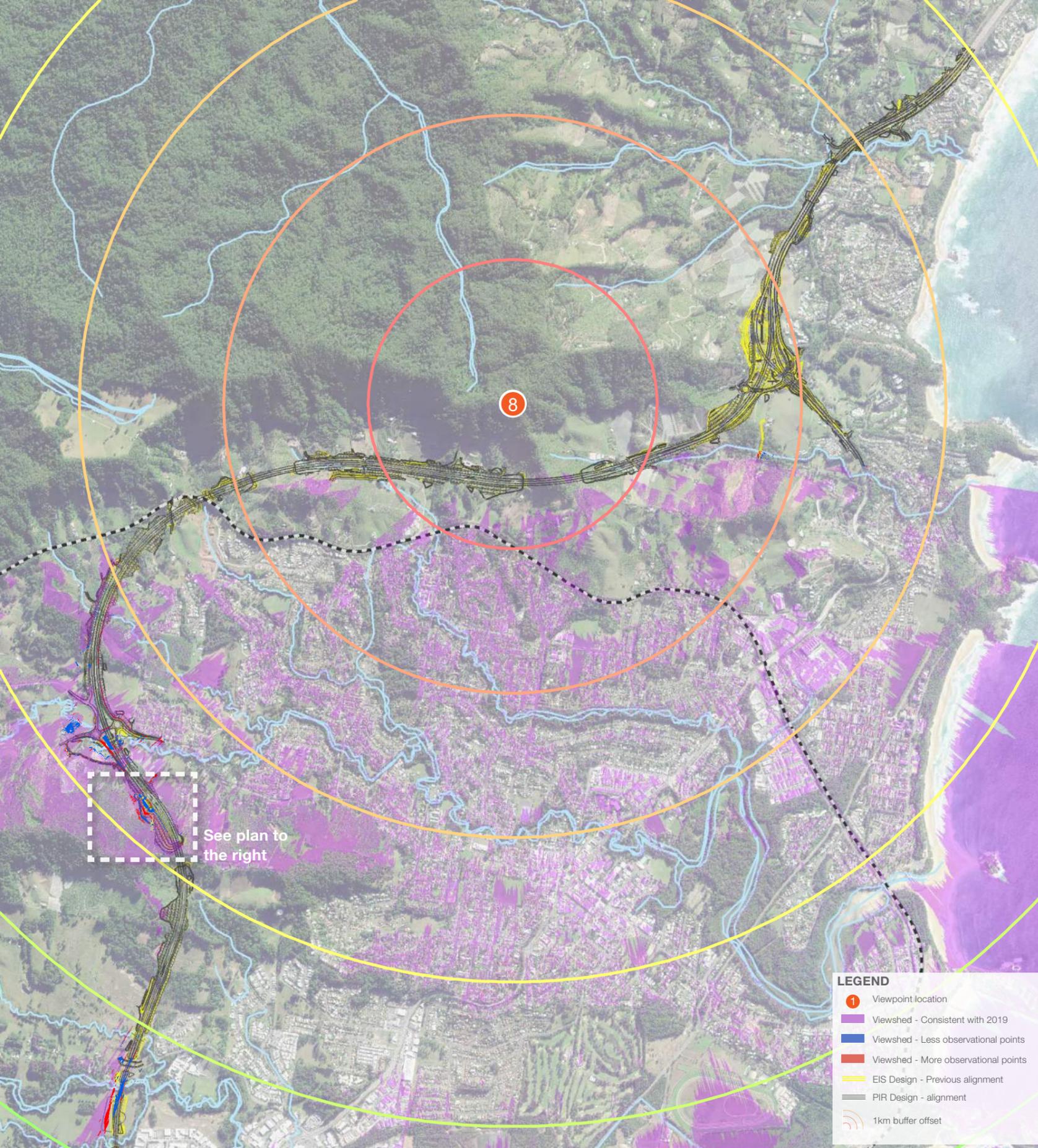
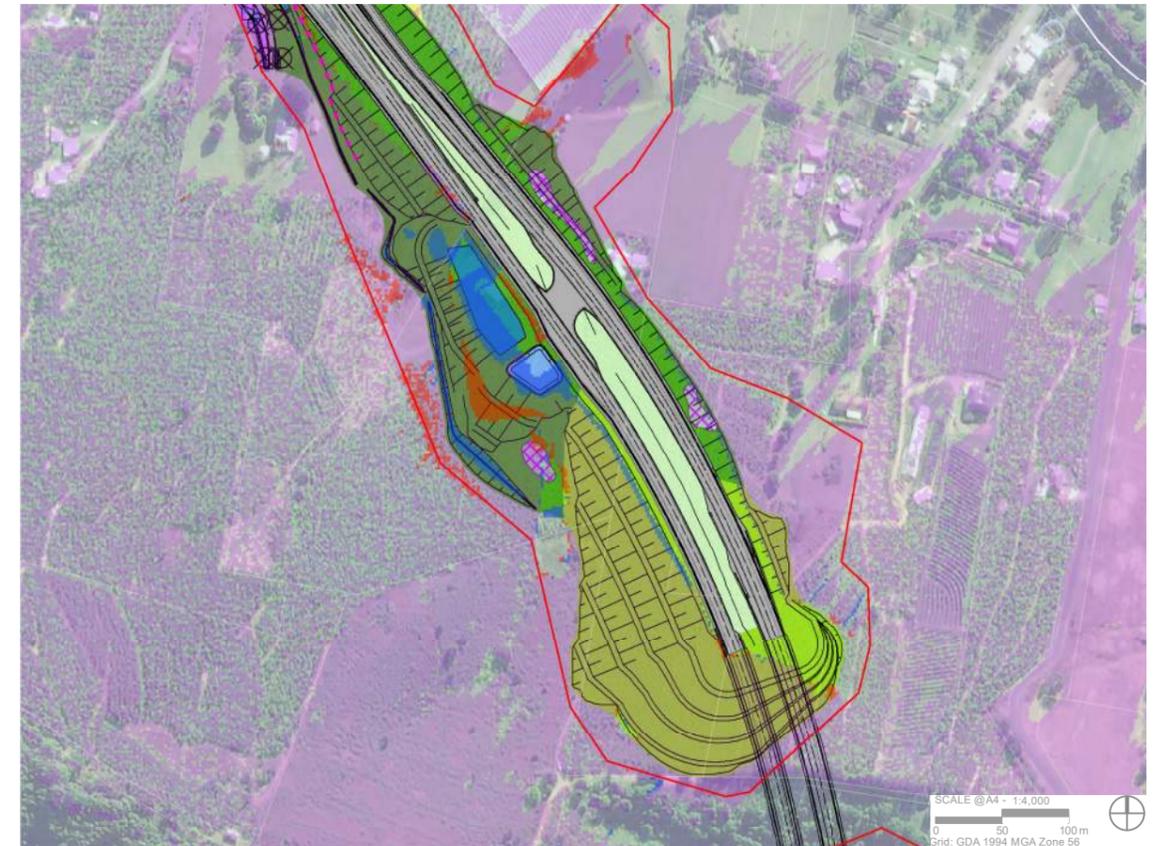


FIG 3.6 VIEWPOINT 8: VIEWSHED ANALYSIS

Viewpoint 8: Sealy Lookout



Embedded design mitigation

The landscape and urban design response includes:

- Cut slopes to be benched and planted to assist with integrating the cut rock to be changed to earthworks
- Sensitive design of the tunnel portals earthworks to relate to the natural topography where possible
- Revegetation using native species to strengthen and respond to the existing character.



Magnitude of change

The amended design would result in the following changes to this viewpoint:

- Minor increase in visibility towards the project as a result of the amended design, including changes to earthworks to provide additional flood mitigation.

The magnitude of change would be consistent with the EIS design, remaining as High for the amended design.

Impact

Day time operation

The amended design would result in changes that would be noticeable, however in the context of the project and the EIS design, the change would not alter the overall level of visual impact outlined in the EIS.

Night time operation

The changes associated with the amended design would not alter the overall level of impact identified within the EIS assessment.

Construction

The extent of the construction works at this location is anticipated to be consistent with the EIS, with no change to the assessment.

	Magnitude of change	Operation		Construction
		Impact	Night time	Impact
EIS	<i>High</i>	<i>High</i>	<i>Moderate</i>	<i>High</i>
Amended design	Consistent	Consistent	Consistent	Consistent



Viewpoint 8: Amended design - change in visibility

LEGEND

- Reduction in visibility to the project as a result of the amended design
- Increase in visibility to the project as a result of the amended design



Viewpoint 8: Amended design - embedded mitigation

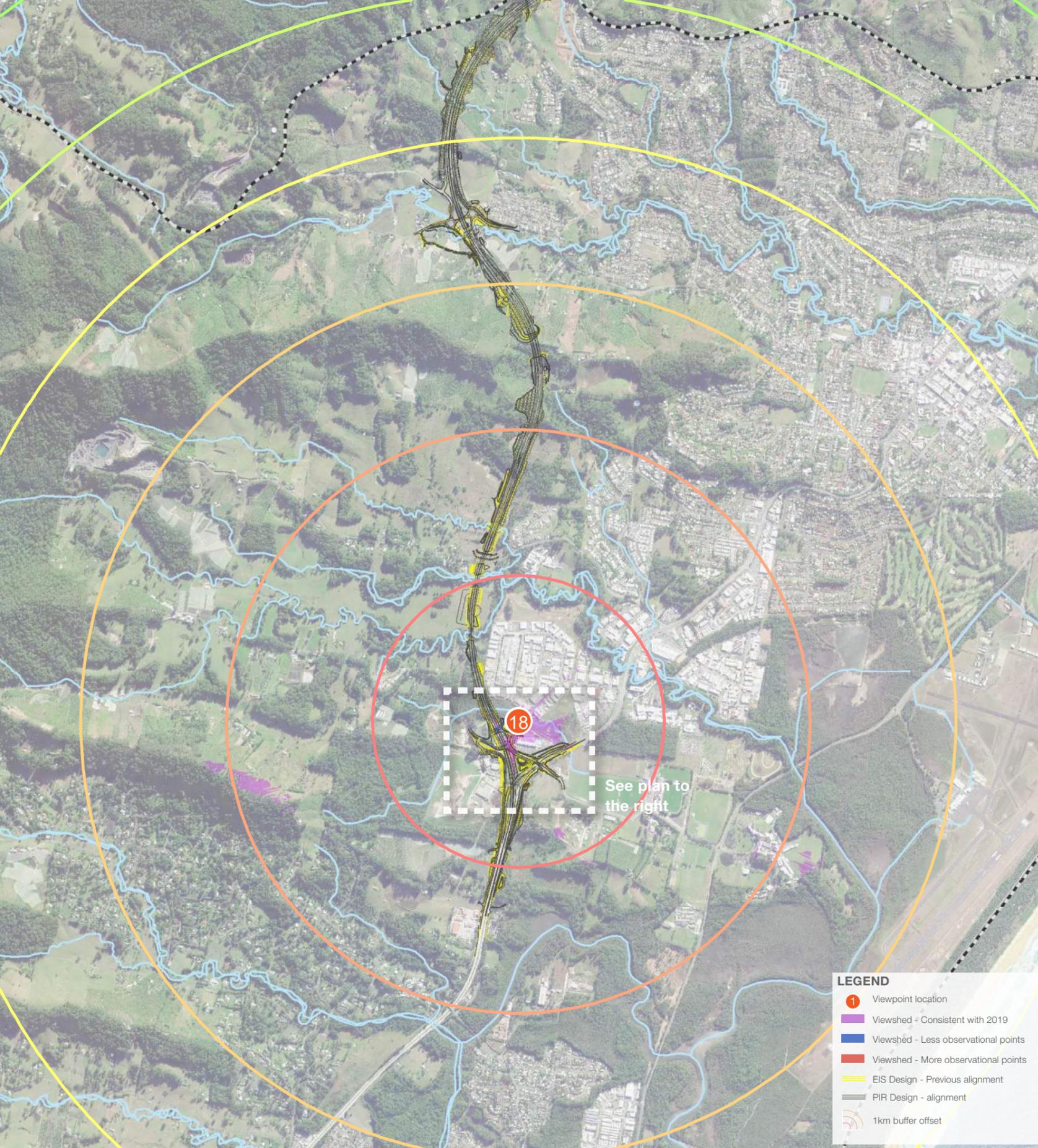
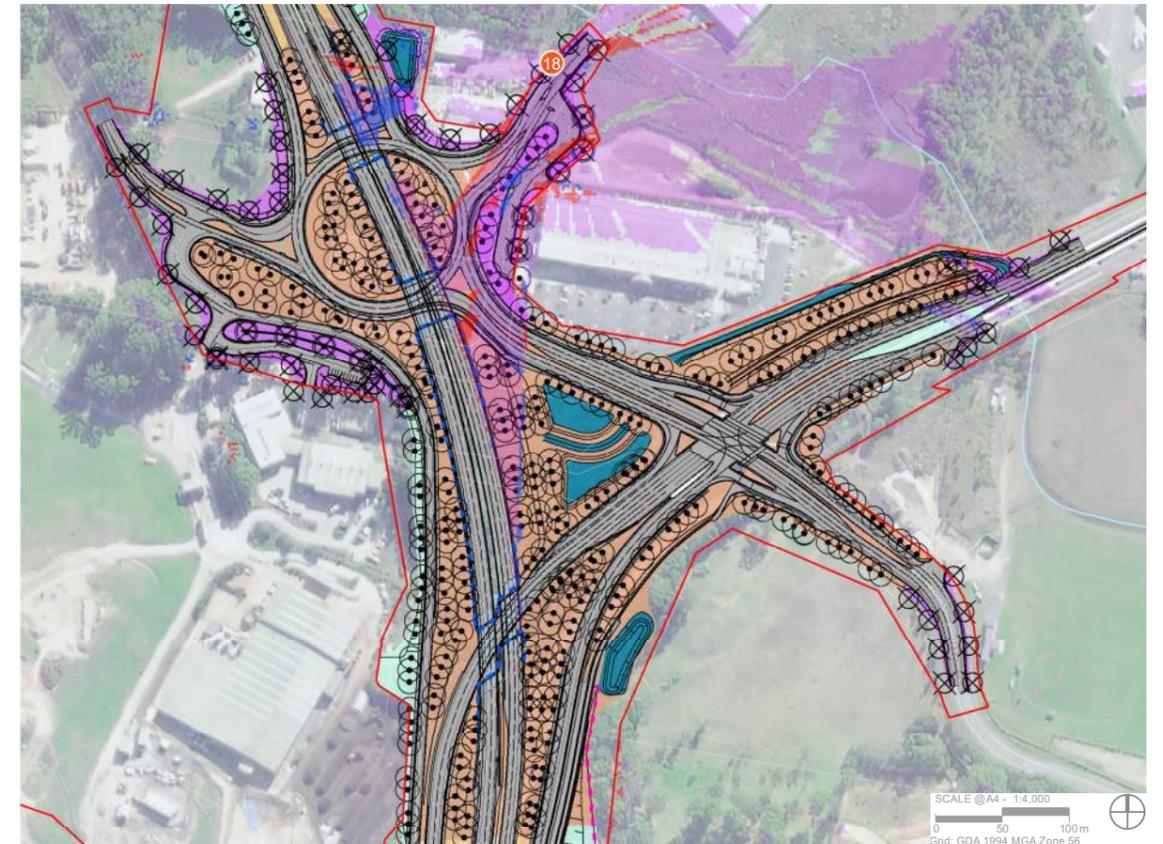


FIG 3.7 VIEWPOINT 18: VIEWSHED ANALYSIS

Viewpoint 18: Isles Drive commercial



Embedded design mitigation

No additional embedded design mitigation has been developed beyond the treatments contained within the EIS. For ease of reference, the EIS mitigation treatments that have been updated to reflect the amended design changes, include:

- Feature interchange planting of wet sclerophyll forest mix to assist with integrating the proposed embankments
- Feature trees planted along the off-ramp road to assist with obstructing direct views from the representative viewpoint towards the amended design.



Magnitude of change

The amended design would result in the following changes to this viewpoint:

- Lowering of the alignment by approximately 5.7m
- The expansion of the construction footprint and introduction of an ancillary site. It is anticipated that the vegetation within the ancillary site would be retained where possible.

Impact

Day time operation

The amended design would result in changes to the composition of the view in comparison to the EIS design, however, in the context of the overall scale of change associated with the project, the amended design would not alter the overall level of visual impact.

Night time operation

Similar to day time operational impacts, the changes associated with the amended design would not alter the overall level of impact identified within the EIS assessment.

Construction

The changes associated with the amended design would not alter the overall level of impact identified within the EIS assessment.

	Magnitude of change	Operation		Construction
		Impact	Night time	Impact
EIS	Moderate	Moderate	Negligible	Negligible
Amended design	Consistent	Consistent	Consistent	Consistent

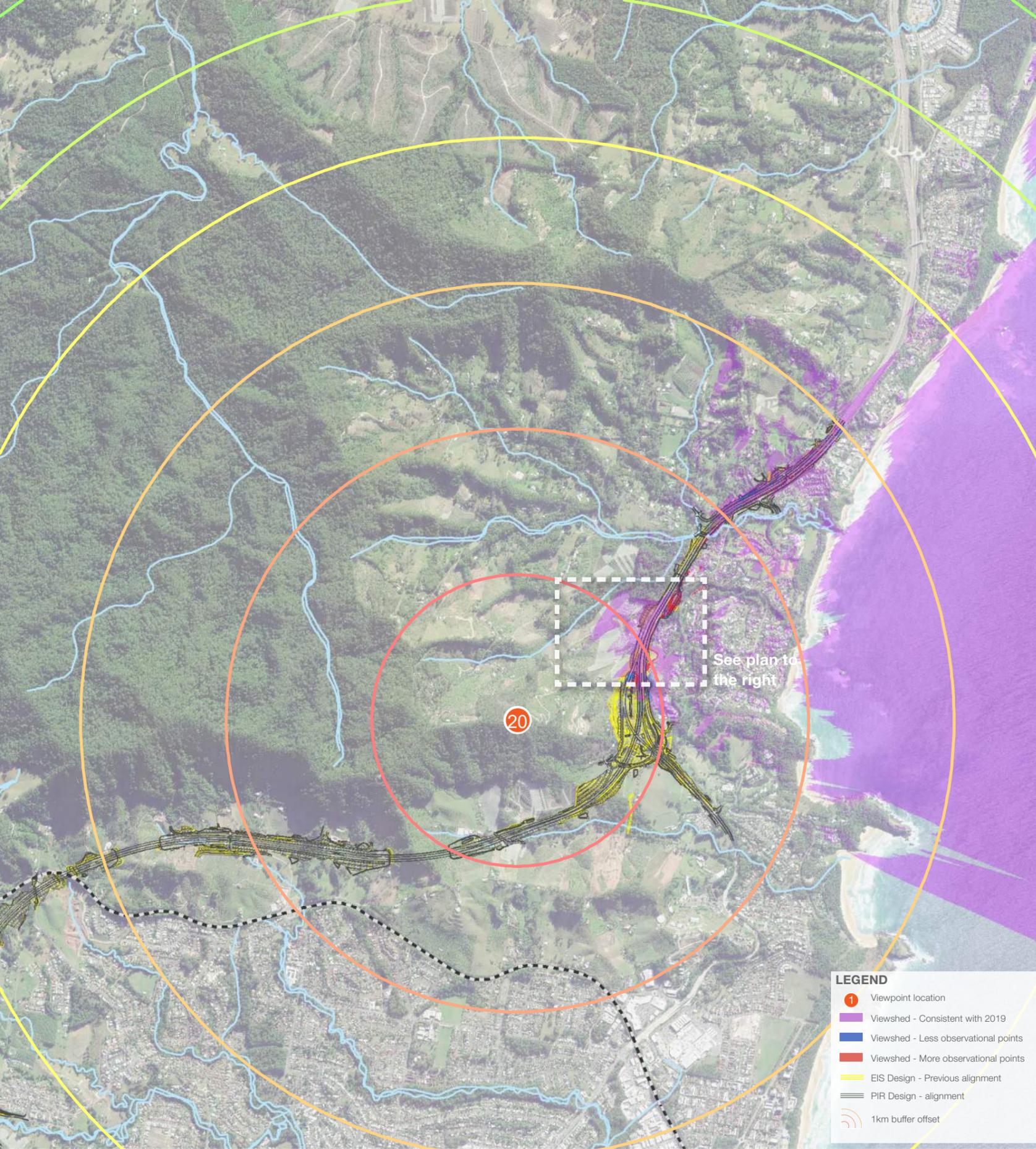
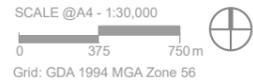


FIG 3.8 VIEWPOINT 20: VIEWSHED ANALYSIS



Viewpoint 20: Korora Lookout



Embedded design mitigation

No additional embedded design mitigation has been developed beyond the treatments contained within the EIS. For ease of reference, the EIS mitigation treatments that have been updated to reflect the amended design changes, include:

- Planting to integrate the proposed embankments, including open forest mix and feature planting to strengthen the existing landscape character
- Noise wall pattern and design to relate to the local landscape character with planting to both sides
- Open forest mix and associated planting palettes are incorporated within the Kororo Public School bus interchange design and will assist in filtering direct views towards the amended project
- Opportunities to explore framing views out from the project across the coastal landscape.

LEGEND

	Retaining Wall
	Noise Wall
	Construction Boundary
	Viewshed
	More observational points
	Less observational points
Planting:	
	Feature Trees
	Street Trees
	Tree Grouping
	Feature Planting
	Local Road Planting Mix
	Median Planting
	Riparian Corridor
	Swale Planting
	Basin Planting Mix
	Portal Mix
Seeding:	
	Lowland Rainforest Mix
	Wet Sclerophyll Forest Mix
	Open Forest Mix
	Native Pasture Mix
	Corridor Frangible Mix



Magnitude of change

The amended design would result in the following changes to this viewpoint:

- Expansion of Kororo Public school bus interchange.
- Luke Bowen footbridge arch would be visible partially filtered by existing vegetation.

Impact

Day time operation

The amended design at Kororo Public School bus interchange would result in an expansion of infrastructure width and scale at this location. Luke Bowen footbridge would be situated in close proximity to the current footbridge alignment with minimal alteration or impact during operation. In the context of the overall scale of change associated with the project, the expansion of Kororo Public School bus interchange would not alter the overall level of visual impact identified within the EIS assessment.

Night time operation

Similar to day time operational impacts, the changes associated with the amended design, including additional lighting at Kororo Public School bus interchange, would not alter the overall level of impact identified within the EIS assessment.

Construction

In the context of the overall project, the changes associated with the amended design would not alter the overall level of impact identified within the EIS assessment.

	Magnitude of change	Operation		Construction
		Impact	Night time	Impact
EIS	Moderate	High-Moderate	Low-Moderate	High-Moderate
Amended design	Consistent	Consistent	Consistent	Consistent



Viewpoint 20: Amended design - change in visibility

LEGEND

- Reduction in visibility to the project as a result of the amended design
- Increase in visibility to the project as a result of the amended design



Viewpoint 20: Amended design - embedded mitigation

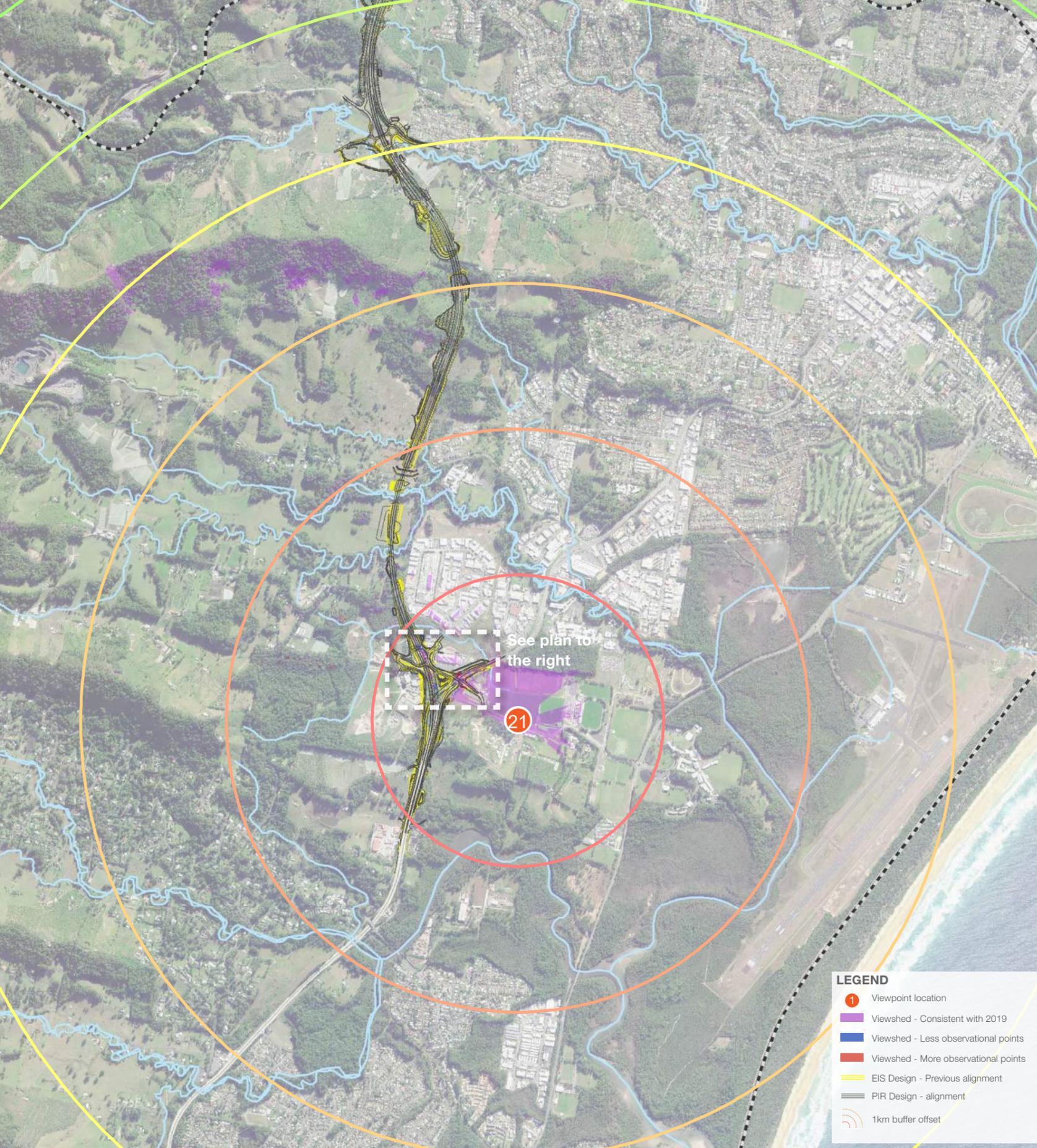
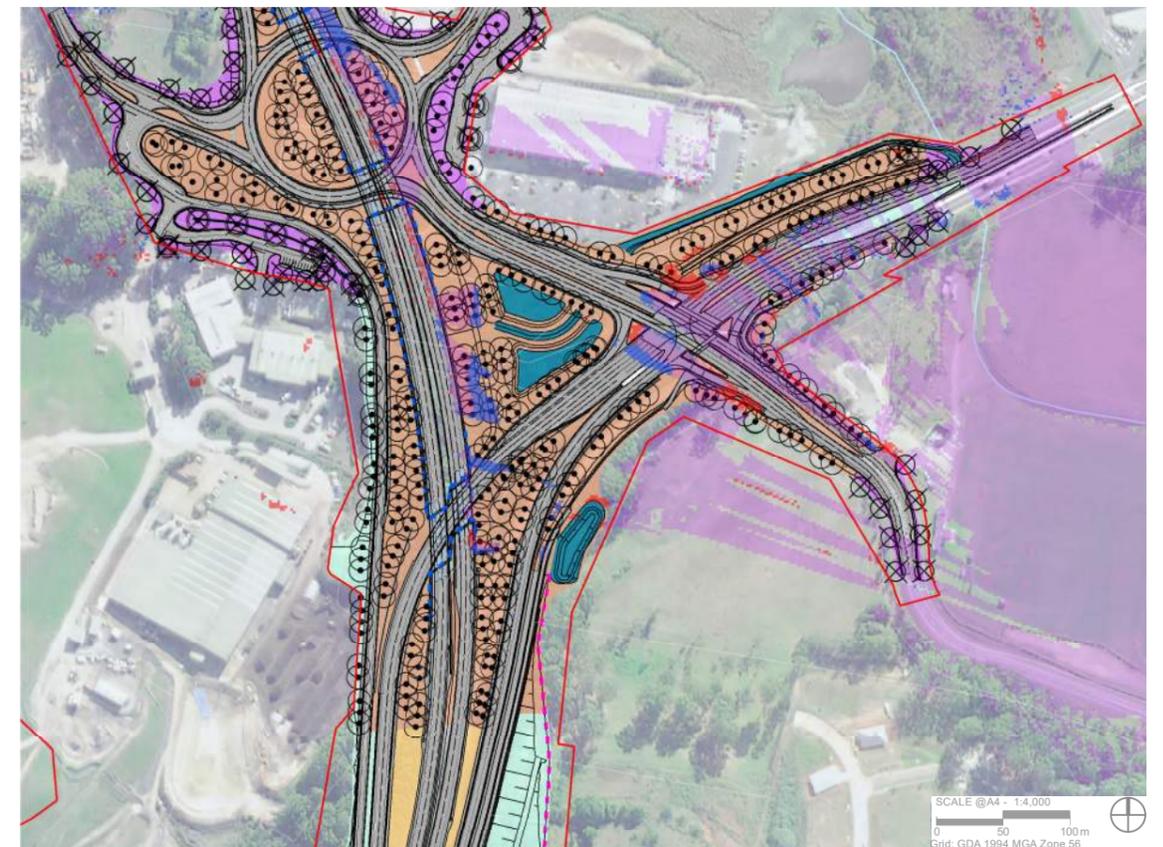


FIG 3.9 VIEWPOINT 21: VIEWSHED ANALYSIS

Viewpoint 21: Coffs Coast Sports and Leisure Park



Embedded design mitigation

No additional embedded design mitigation has been developed beyond the treatments contained within the EIS. For ease of reference, the EIS mitigation treatments that have been updated to reflect the amended design changes, include:

- Planting to integrate the proposed embankments, including wet sclerophyll mix and feature planting to strengthen the existing landscape character
- Noise wall pattern and design to relate to the local landscape character with planting to both sides.

LEGEND

- Retaining Wall
- Noise Wall
- Construction Boundary
- Viewshed
- More observational points
- Less observational points
- Planting:
 - Feature Trees
 - Street Trees
 - Tree Grouping
 - Feature Planting
 - Local Road Planting Mix
 - Median Planting
 - Riparian Corridor
 - Swale Planting
 - Basin Planting Mix
 - Portal Mix
- Seeding:
 - Lowland Rainforest Mix
 - Wet Sclerophyll Forest Mix
 - Open Forest Mix
 - Native Pasture Mix
 - Corridor Frangible Mix



Magnitude of change

The amended design would result in the following changes to this viewpoint:

- Reduced project footprint to the north of Englands Road interchange.

The representative viewpoint from Coffs Coast Sports and Leisure Park is anticipated to experience a barely noticeable reduction in visibility towards the project.

Impact

Day time operation

The amended design would result in a reduction in the visibility of the project, however the change would remain as a noticeable feature with a visual impact consistent with the EIS.

Night time operation

Similar to day time operational impacts, the changes associated with the amended design would not alter the overall level of impact identified within the EIS assessment.

Construction

The changes associated with the amended design would not alter the overall level of impact identified within the EIS assessment.

Note: Since the time of the site inspection, additional development has occurred, including the construction of the service station on the northern side of Stadium Drive. This development is not reflected in the photo montage on the preceding page.

	Magnitude of change	Operation		Construction
		Impact	Night time	Impact
EIS	Moderate	Moderate	Low-Moderate	Moderate-High
Amended design	Consistent	Consistent	Consistent	Consistent



Viewpoint 21: Amended design - change in visibility

LEGEND

- Reduction in visibility to the project as a result of the amended design
- Increase in visibility to the project as a result of the amended design



Viewpoint 21: Amended design - embedded mitigation

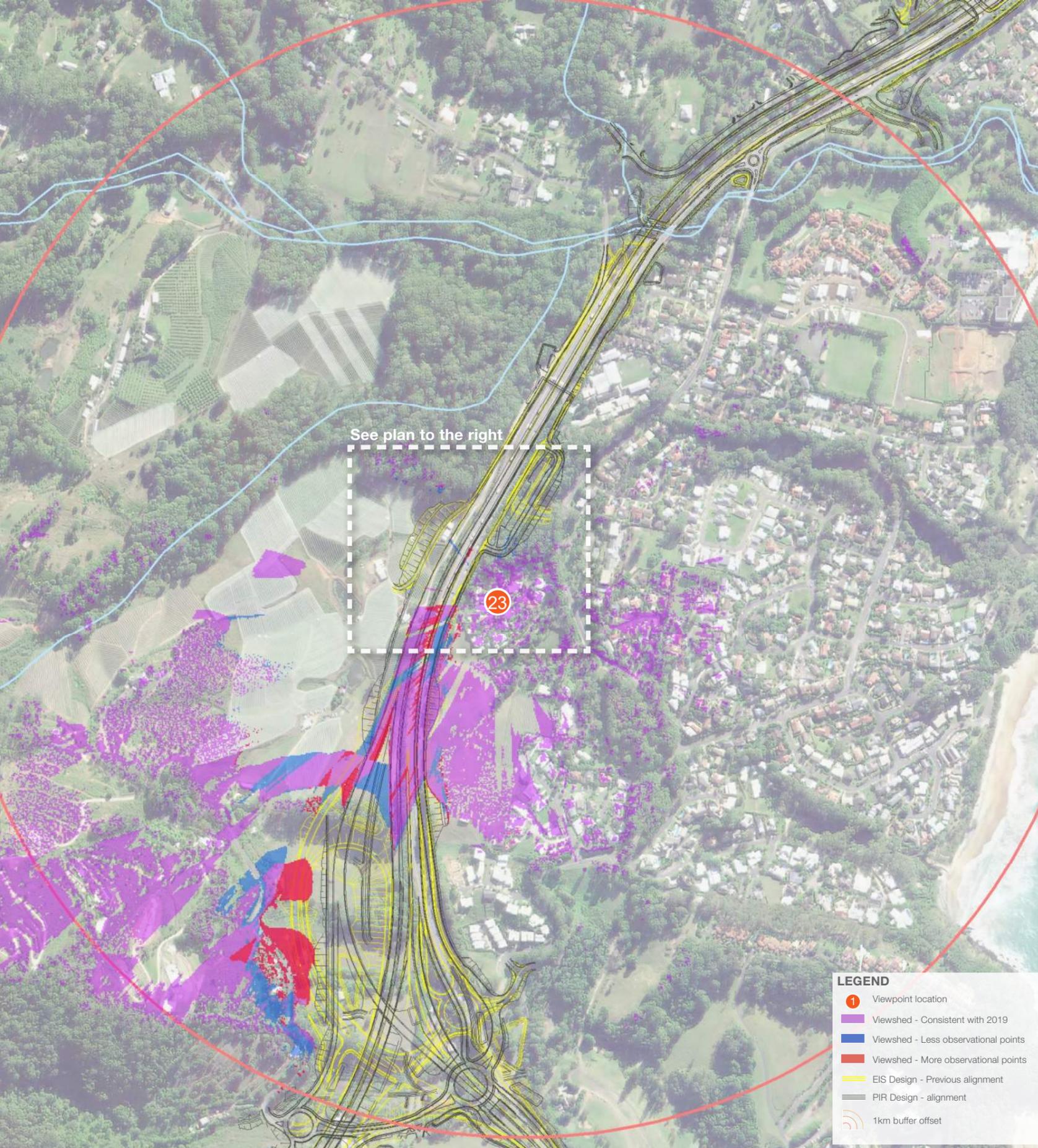
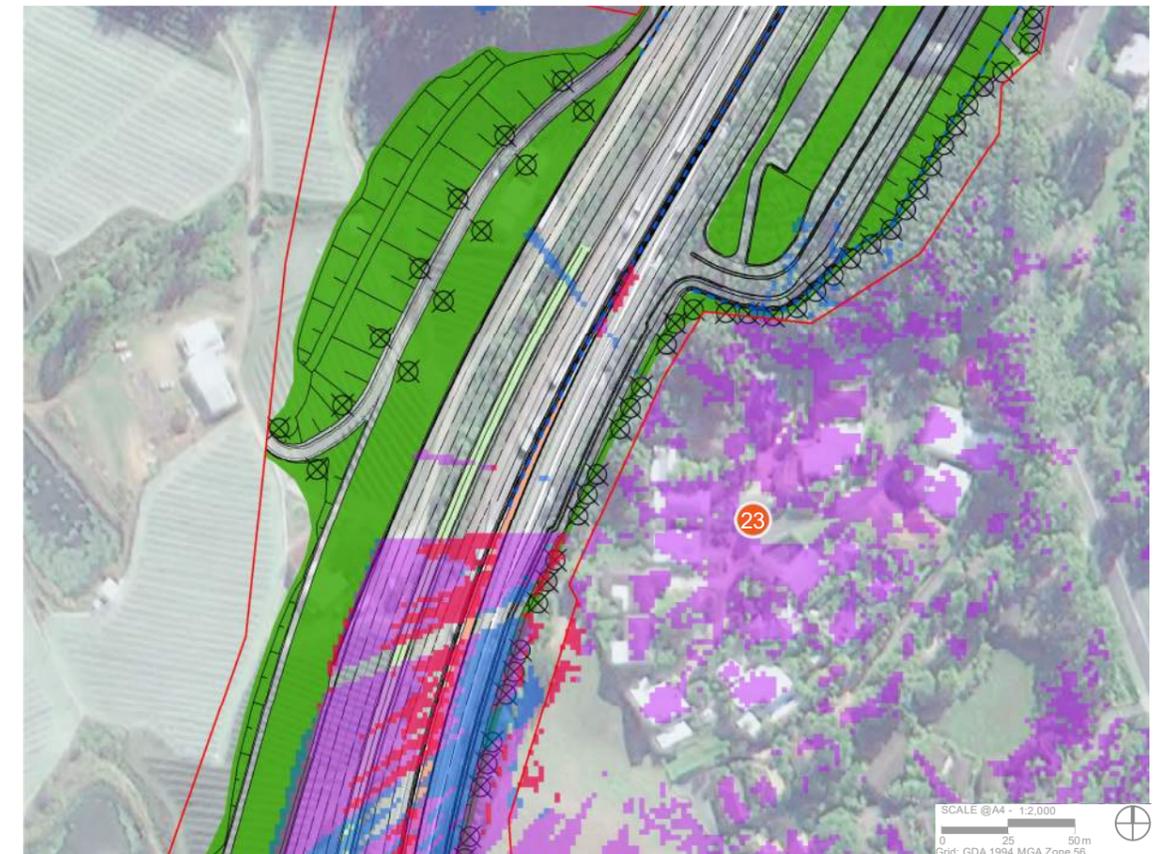


FIG 3.10 VIEWPOINT 23: VIEWSHED ANALYSIS

Viewpoint 23: Fern Tree Place



Embedded design mitigation

The landscape and urban design response includes:

- Planting to screen views towards the Kororo Public School bus interchange and retaining walls, reinstating the mature tree canopy
- Open forest planting mix incorporated within the Kororo Public School bus interchange design to assist with filtering views towards the amended design
- Sensitive design of the retaining walls, including a dark pigment and texturing that will assist with the walls receding amongst the vegetation.

Note:

This viewpoint has been added to the visual assessment to assess the changes arising from the amended design, specifically with a focus on the expansion of Kororo Public School bus interchange.



Baseline description

A representative view from residential properties situated on Fern Tree Place, to the east of the Pacific Highway. The street is characterised by single and double storey detached residential properties. Korora Bay Village Resort is located 160m to the east from the representative viewpoint location.

Dense, mature vegetation dominates the backdrop enclosing the properties in the area and limiting views towards the highway. To the west, the private property frames the view and is situated in an elevated position, with terrain sloping towards the east (right of the view).

Sensitivity

The sensitivity of this receptor is judged to be *High* due to the following:

- Low-density residential street currently enclosed with mature, dense vegetation that contributes to the local character of the area
- Representative view from residential properties with an interest in the surrounding environment.

Magnitude of change

The representative viewpoint from Fern Tree Place is about 75m from the amended Kororo Public School bus interchange.

Vegetation will be removed to the north of this view to facilitate the construction of the interchange. It is anticipated that the mature trees and understorey vegetation to the southern edge (immediately adjacent to the residential properties), would be retained, heavily filtering views towards the amended design from this location.

The magnitude of change for the amended design is considered to be *Negligible*, resulting in a barely noticeable change to the existing view.

Impact

Day time operation

The *High* sensitivity and *Negligible* magnitude of change is judged to result in a *Negligible* adverse impact at this location.

Night time operation

There may be a low level of night time visual impact due to increased light emittance associated with the Kororo Public School bus interchange. This will be limited through the use of aeroscreen light fittings combined with sensitive light pole placement.

Construction

During construction, the source and nature of the construction works would potentially be visible above the tree line, including siting and movement of construction machinery. The construction phase impacts would result in a Low magnitude of change and a Moderate impact.

Location of retaining wall associated with the Kororo Public School bus interchange



Viewpoint 23: Amended design



Viewpoint 23: Amended design - embedded mitigation

Summary

TABLE 3.1 LANDSCAPE CHARACTER SUMMARY ASSESSMENT - OPERATION

Landscape Character Zone	Sensitivity	Magnitude	EIS Impact	Amended Design
1A: Englands Road	Low	Moderate	Moderate-Low	Consistent with EIS impact
1B: Boambee basin	Moderate	High	Moderate-High	Consistent with EIS impact
2B: The Bowl	Moderate	High	High-Moderate	Consistent with EIS impact
3A: Korora basin and Foothills	High	High	High	Consistent with EIS impact
3B: Korora Basin Edge	Moderate	Moderate	Moderate	Consistent with EIS impact

TABLE 3.2 LANDSCAPE CHARACTER SUMMARY ASSESSMENT - CONSTRUCTION

Landscape Character Zone	Sensitivity	Magnitude	Impact	Amended Design
1A: Englands Road	Low	Moderate	Moderate-Low	Consistent with EIS impact
1B: Boambee basin	Moderate	High	Moderate-High	Consistent with EIS impact
2B: The Bowl	Moderate	High	High-Moderate	Consistent with EIS impact
3A: Korora basin and Foothills	High	High	High	Consistent with EIS impact
3B: Korora Basin Edge	Moderate	High	Moderate-High	Consistent with EIS impact

TABLE 3.3 VISUAL IMPACT SUMMARY ASSESSMENT

Representative viewpoint	Sensitivity	Magnitude Operation	Day time operational impact	Night time operational impact	Construction impact	Amended Design
VP 2 Coachmans Close	Moderate	High	Moderate-High	Moderate	Moderate-High	Consistent with EIS impact
VP 6 Residential edge (Charlesworth Bay Road)	Moderate	High	Moderate-High	Low	Moderate-High	Consistent with EIS impact
VP 8 Sealy lookout	High	High	High	Moderate	High	Consistent with EIS impact

Representative viewpoint	Sensitivity	Magnitude Operation	Day time operational impact	Night time operational impact	Construction impact	Amended Design
VP 18 Isles Drive commercial	Low	High	Moderate	Low	Moderate	Consistent with EIS impact
VP 20 Korora lookout	High	Moderate	High-Moderate	Low-Moderate	High-Moderate	Consistent with EIS impact
VP 21 Coffs Coast Sports and Leisure	Moderate	Moderate	Moderate	Negligible	Moderate-High	Consistent with EIS impact
VP 23 Fern Tree Place	High	Negligible	Negligible	Low	Negligible	New viewpoint

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An aerial rendering of a complex highway interchange. The main highway runs diagonally from the bottom left towards the top right. It features multiple lanes with traffic, including cars and trucks. The interchange includes several overpasses and ramps that curve through a landscape of dense green trees and grassy fields. To the right of the highway, there is a cluster of large, rectangular industrial buildings with flat roofs. The overall scene is a blend of infrastructure and natural environment.

04

Management of impacts

4.1 Management of construction impacts

Construction activities

The landscape and visual impacts arising from the relevant construction changes have been assessed within Chapter 3 and are considered to be consistent with the EIS design.

To mitigate adverse landscape and visual impacts, the concept design landscape and urban design treatments have been updated to reflect the amended design works.

The construction phase mitigation measures identified as part of the EIS design are applicable to the amended design and include:

- Where feasible, retain and protect existing trees. Limit clearing and earthworks to the minimum required to establish the construction sites. Investigate measures to retain as many mature trees as possible
- In consultation with land owners, where relevant, restore all areas disturbed by construction in accordance with the landscape concept plans
- Develop ancillary facilities, including the locations of visible structures and plant and perimeter fencing and treatments to minimise visual impacts for adjacent receivers where feasible and reasonable
- Ancillary sites will be rehabilitated to their pre-construction condition (where reasonable and feasible) unless agreed otherwise with the landowner
- Locate storage areas and associated works in cleared or otherwise disturbed areas away from residential areas where possible
- Consider aesthetics of site hoardings. Preference for neutral colours and designs in proximity help them blend into surrounding environment
- Ensure temporary site hoarding as well as any permanent fencing design is appropriate to the landscape character zone and fits sensitively into its surroundings
- Maintain site hoarding and perimeter site areas regularly to include the prompt removal of graffiti
- Design site lighting to avoid glare issues and light spillage into adjoining properties and be generally consistent with the requirements of Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting.

4.2 Management of operational impacts

Mitigation incorporated in to the amended design

An overarching landscape and urban design strategy was prepared as part of the EIS. This strategy has been applied consistently to the amended design with revisions to the urban design concept plans, planting design plans, and to the extent of urban design elements (including noise walls, retaining walls and bridges) to ensure the amended design is sensitively integrated and that landscape and visual impacts are reduced where possible.

Planting Design

Following comments received from CHCC, some plant mixes have been amended to remove certain species or include additional native species. Please refer to Chapter 2 for specific plant species included or removed.

Coramba Road bus stop

The existing informal bus stop at Coramba Road has been replaced with a formalised facility and includes a bus shelter and shared path connecting Spagnolos Road and Roselands Drive. Feature planting has been integrated within the Coramba Road bus stop design as part of the arrival experience.

Design of the Coramba Road bus stop will be progressed further in conjunction with the development of the Coramba Road interchange during detailed design.

Refer to Appendix A CPTED for review of changes and recommendations for detailed design.

Kororo Public School bus interchange

The landscape strategy has been updated to reflect the amended design at Kororo Public School bus interchange. Vegetation clearing during construction will be minimised and vegetation will be reinstated, where reasonable and feasible, to reduce operational impacts from vegetation clearing. Consideration will be given to providing a dark pigment to the retaining wall which will help this feature recede amongst the remaining vegetation.

At this location, the opportunity to provide planting beyond the construction footprint in agreement with property owners will also be explored further during the detailed design phase. In addition, feature tree planting has been included in response to the assessment undertaken at Fern Tree Avenue, refer to Chapter 3, viewpoint 23.

Refer to Appendix A CPTED for review of changes and recommendations for detailed design.

Englands Road interchange

The amended design includes the realignment of the one-way local access road on the west side of the project, lowering of the main carriageway alignment, realigning the north bound exit ramp and the removal of two sets of traffic lights on Englands Road and

replacing them with a roundabout. The landscape strategy has been updated to reflect this change, with additional consideration given to the bridge structures to ensure the delivery of a gateway experience that is sympathetic to the context through the use of material, colour and the design of structural forms. Framing views through the structures to the feature landscape planting has also been explored to assist in defining and celebrating the arrival and exit user experience.

Korora Hill interchange

The amended design at Korora Hill interchange includes a reduction in the overall scale of the interchange, the introduction of a roundabout below the north bound entry ramp and the south bound exit ramp and the provision for traffic lights. The landscape strategy has been updated to reflect this change with structured tree planting to enhance the gateway experience and revegetation between structures where possible. The design of structures has also been considered to ensure a respond that responds sympathetically to the landscape context through the use of materials and form.

4.3 Management measures

Consistent with the EIS design, the identification of impacts arising from the project that could eventuate during construction and operation of the project is central to the selection of appropriate environmental safeguards.

The management measures presented within the Urban Design, Landscape and Visual Impact Assessment Report (Arup 2019) to address the urban design and visual impacts are there to manage residual impacts once the embedded mitigation measures have been applied and incorporated. These measures have been reviewed in consideration of the amended design and are still considered to be suitable for the project with no further changes required beyond the application of the EIS landscape and urban design strategy and the additional management measures outlined in this chapter.

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An aerial architectural rendering of a highway interchange. The main highway has multiple lanes with various vehicles including cars, a blue truck, and a white semi-truck. A red-paved bus lane runs parallel to the highway, with several white buses. The interchange features a curved ramp with a red-paved shoulder and a pedestrian walkway. The surrounding area is lush with green trees and includes some modern, white, box-like buildings. A green rectangular overlay is positioned in the lower-left corner, containing the text '05 Conclusion' in white.

05

Conclusion

5.1 Mitigation incorporated in to the amended design

This supplementary urban design, landscape character and visual impact assessment report has been prepared to assess the impacts of the design and construction changes for the project, including:

- Englands Road interchange
- North Boambee Valley vertical alignment
- Coramba Road bus stop
- Coffs Creek flood mitigation
- Korora Hill interchange
- Kororo Public School bus interchange and Luke Bowen footbridge
- Pine Brush Creek and Williams Creek realignment
- New and revised ancillary sites.

An overarching landscape and urban design strategy was prepared as part of the EIS. This strategy has been applied consistently to the amended design with revisions to the urban design concept plans, planting design plans, and to the extent of urban design elements (including noise walls, retaining walls, interchanges and bridges) to ensure the amended design is sensitively integrated and that landscape and visual impacts are reduced where possible.

Noise attenuation

This supplementary assessment report documents the changes to the noise walls as a result of the design and construction changes, refer to Section 2.4. The noise walls have either been; amended, removed or added in response to the updated noise assessment prepared for the amended design. Consistent with the EIS, the proposed noise wall design is informed by the landscape and urban strategy and consists of three finishes, including solid pre-cast concrete, transparent panels to open up views from the road corridor, and transition panels, which address the interface between solid noise panels, transparent panels and existing noise walls. The design and finish of the noise walls will be subject to detailed design and include patterning and colour to respond to the existing landscape context. Refer to Chapter 2.4, table 2.1 for proposed noise wall finish locations.

Retaining Walls

This supplementary assessment report documents the changes to the retaining walls as a result of the design and construction changes, refer to Section 2.5. The retaining walls have either been; amended, removed or added, in response to the amended design. The structural wall type varies along the length of the project in response to the urban design strategy, however they will take the structural form of either a reinforced concrete or a bridge abutment wall. Refer to chapter 2.5, table 2.2 for retaining wall type and locations.

Bridges

This supplementary assessment report has documented the changes to the bridges as a result of the design and construction changes, refer to Section 2.6. The bridges have either been; amended, removed or added, in response to the amended design. Consistent with the EIS, the bridge have been categorised as highway overbridges (bridges over local roads, creeks and interchange ramps) or landmark bridges. Refer to Chapter 2.6, table 2.3 for the amended bridge locations and bridge types, including noise wall and fauna crossing requirements.

Planting Design

Following comments received from CHCC, some plant mixes have been amended to remove certain species or include additional native species. Please refer to 2.2 for specific plant species included or removed.

5.2 Embedded mitigation

As outlined within this supplementary assessment report, embedded landscape and urban mitigation measures associated with the amended design include;

North Boambee Valley

- Riparian corridor mix to bridges over creeks to maintain fauna connectivity through the project site
- Low grass mix planting with scattered tree groupings filter existing views out over adjacent pastoral land
- Frangible planting to wide central median. The planting will be a mix of low maintenance native and culturally important species.

Coramba Road bus stop

- Feature planting to Coramba Road bus stop to provide shade for bus stop users and integrate with the Coramba Interchange arrival experience
- Screen planting along northern extent of Coramba Road, the bus stop, and around noise walls to filter views to adjacent private properties
- Planting updated to respond to the amended design, cul-de-sac and Spagnolas Road
- Sensitive design of the noise walls, including a dark pigments and transparent overlap that will assist with the walls receding amongst the vegetation

Coffs Creek flood mitigation

- Tree planting within Open Forest mix to match existing Coffs Harbour planting palette
- Frangible planting to wide central median. The planting will be a mix of low maintenance native and culturally important species
- Tree grouping along northern edge to provide screening to neighbouring residents.

Englands Road interchange

- Undercroft of the highway bridge structures to provide a gateway experience and be sympathetic to the context through use of material, colour and design of structural forms
- Frame views through design of structures to feature landscape planting to celebrate the arrival and exit experience
- Feature interchange planting of wet sclerophyll forest mix to assist with integrating the proposed embankments
- Feature trees planted along the off-ramp road to assist with obstructing direct views from the representative viewpoint towards the amended design.

Korora Hill interchange

- Undercroft of the highway bridge structures to provide a gateway experience and be sympathetic to the context through use of material, colour and design of structural forms
- Frame views through design of structures to feature landscape planting to celebrate the arrival and exit experience
- Feature planting to Korora Hill interchange to define the northern arrival point and gateway to Coffs Harbour
- Planting to respond to the enclosed, vegetated experience of the Pacific Highway on approach to CBD
- Planting species similar to the form and structure of the banana plantation in the surrounding areas
- Planting to integrate the proposed embankments, including feature open-forest planting mix to strengthen the existing landscape character
- Noise wall pattern and design to relate to the local landscape character with planting to both sides

Kororo Public School bus interchange and Luke Bowen footbridge

- Screen planting along the eastern edge of Coachmans Close to filter views towards passing vehicles
- Solid noise wall will assist with screening views towards passing vehicles on the Pacific Highway
- Replacement of Luke Bowen footbridge to form a gateway and visual landmark for Coffs Harbour entry and exit journey
- Planting updated to respond to the amended design between the new service road and the Pacific Highway where space allows
- Planting to central median to assist with defining the approach to Korora Hill interchange. The planting will be a mix of low maintenance native and culturally important species
- Planting to screen views towards the Kororo Public School bus interchange and retaining walls, reinstating the mature tree canopy
- Open forest planting mix incorporated within the Kororo Public School bus interchange design to assist with filtering views towards the amended design
- Sensitive design of the retaining walls, including a dark pigment that will assist with the walls receding amongst the vegetation.

Pine Brush Creek and Williams Creek realignment

- Riparian corridor mix to maintain fauna connectivity at Pine Brush Creek and William Creek.

5.3 Assessment

Landscape

The design and construction changes assessed in this supplementary urban design, landscape character and visual impact assessment report are considered to result in localised increases and decrease to the magnitude of change within the landscape character zones, however within the context of the overall project, these changes are not considered to alter the landscape character impacts identified within the EIS assessment.

Visual

Consistent with the landscape assessment conclusion, the visual impacts arising from the amended design changes are considered to result in localised increases and decrease to the magnitude of change for the representative viewpoints.

The area of most prominent change includes the expansion of Korora Public School bus interchange, which would be evident from Kororo Lookout. However, in the context of the overall project, this change would not alter the visual impacts identified within the EIS assessment.

In addition, the viewpoint analysis undertaken at Fern Tree Place indicates potential views towards construction machinery would be evident during the construction phase, however views towards the bus interchange, particularly the east facing retaining wall, would be screened by existing vegetation during operation.

In summary, in the context of the overall project, the changes arising from the amended design are not considered to alter the visual impacts identified within the EIS assessment.

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ARUP

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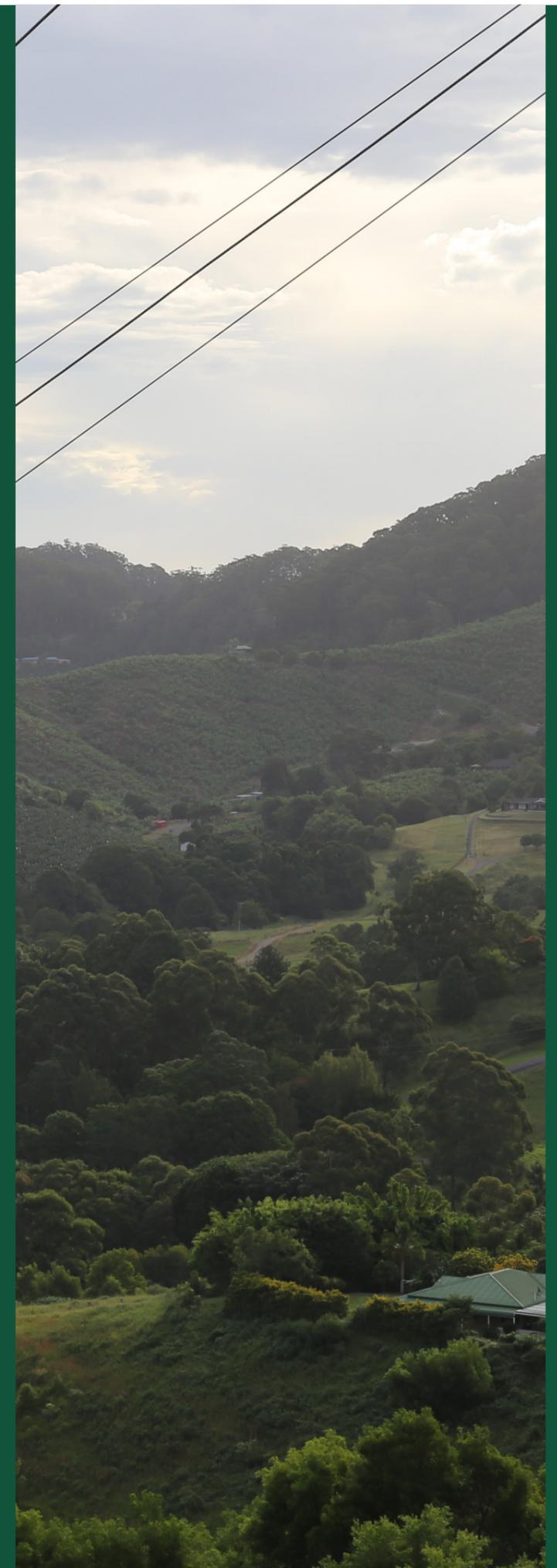
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ARUP



An aerial photograph showing a multi-lane highway interchange with several overpasses and ramps. To the right of the highway, there is a residential development with numerous white, rectangular buildings. The surrounding landscape is a mix of dense green forest and open, grassy areas. The sky is clear and blue.

Appendix A

Crime Prevention through Environmental Design

1.0 Introduction

1.1 Study purpose

This supplementary assessment has been carried out to provide a high level overview of the Crime Prevention Through Environmental Design (CPTED) guidelines.

In NSW these include:

- Safer Design programs in each NSW Police Local Area Command
- The North Coast Regional Plan 2036, in particular Goal 3 Vibrant and Engaged Communities
- “Beyond the Pavement 2014” and “Safer Designed Places 2018”, includes direction and guidance for CPTED in RMS road projects
- *Environmental Planning and Assessment Act 1979*, define two approaches to CPTED Part A - a crime risk assessment approach, or Part B - a design principle approach used to minimise crime risk.

To supplement the NSW guidelines, the following Queensland CPTED guidelines have also been used:

- Crime Prevention through Environmental Design: Guidelines for Queensland (Queensland Government, 2007). This comprises two documents: Part A: Essential features of safer places; and Part B: Implementation Guide
- The Department of Transport and Main Roads, Road Landscape Manual (DTMR, 2013).

The CPTED guidelines are applicable to the proposed design changes for the project, as listed in Chapter 1.2. These design changes have been reviewed and the design changes relevant to this supplementary assessment include:

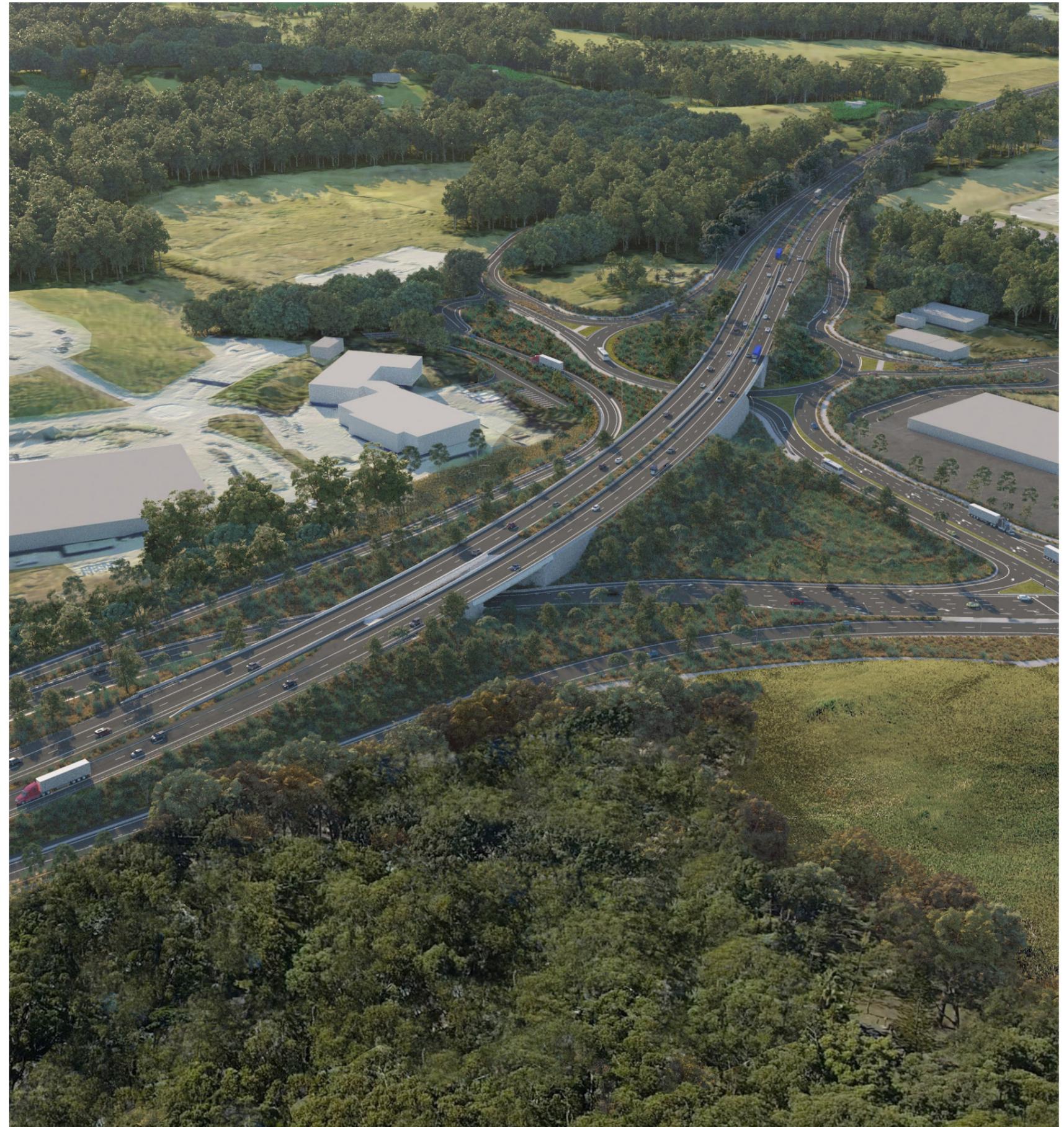
- Coramba Road bus stop
- Kororo Public School bus interchange and Luke Bowen footbridge.

All other areas of change would be consistent with the CPTED guidance and principles outlined within the EIS.

1.2 Assumptions

The assumptions for this supplementary assessment are consistent with the assumptions identified in the EIS, and include:

- An in-depth crime analysis will be undertaken for the Coffs Harbour area in collaboration with the local authorities and the NSW Police
- A full CPTED audit will be developed as part of the detailed next phase of the project, which includes an implementation framework that responds to the crime analysis, outlining specific measures to be delivered for the alignment where there is an identified risk
- The recommendations in this report convey a ‘common sense’ approach to implementation of the CPTED guidelines, developing CPTED responses for ‘typical’ alignment scenarios that will be applicable along the length of the project.



2.0 Design Changes

2.1 Coramba Road bus stop

The design changes include:

- An existing informal school bus stop located on the corner of Coramba Road and Spagnolos Road would be replaced as part of the project. A new school bus stop would be provided on the north side of Coramba Road about 50 metres east of Spagnolos Road. The new bus stop would include capacity for four 12.5 metre long buses
- A bus shelter
- A raised concrete median to separate the facility and its users from Coramba Road traffic
- A footpath which connects Spagnolos Road with the new bus stop on Coramba Road
- A shared user path connecting Coramba road roundabout and Roselands Drive.
- Two noise walls (with overlap), the first located between the Coramba road roundabout and the bus stop, terminating at the junction between share user path and footpath. The second located between residential properties and footpath, from the bus stop to Spagnolas Road.
- A cul-de-sac would be provided at the Coramba Road end of Spagnolos Road to provide an informal area for pick-up and drop-off at Coramba Road.

2.2 Kororo Public School bus interchange and Luke Bowen footbridge

The Kororo Public School bus interchange design has been changed to provide access from the service road (instead of James Small Drive) to remove the need for additional bus traffic on James Small Drive, and the Luke Bowen footbridge has been relocated so that it is closer to the front entrance of the school and the bus interchange.

Design changes to the Kororo Public School bus interchange and Luke Bowen footbridge include:

- The existing bus interchange located near Kororo Nature Reserve would be relocated to just south of Kororo Public School with access provided via the service road
- The bus interchange would have capacity for eight 12.5 metre long buses with bus shelters provided adjacent to the bus bays
- The bus interchange would include capacity for 30 staff car park spaces
- Pick up/drop off bays would be provided within the bus interchange, accessed via the service road. The 'kiss-and-drop' facility would be separated from the bus bays via a barrier

- Luke Bowen footbridge would be replaced with a new pedestrian bridge over the project just south of the existing bridge. The new bridge would retain the name Luke Bowen footbridge. This bridge would provide a pedestrian and cyclist connection between Old Coast Road and the proposed service road next to Kororo Public School
- Additional off-street short and long term car park spaces would be provided on Old Coast Road near the existing Solitary Rural Fire Services shed
- The existing Solitary Rural Fire Services shed would need to be relocated to accommodate the additional car park spaces and the new pedestrian bridge.



FIG 1.1 CORAMBA ROAD INTERCHANGE



FIG 1.2 KORORO PUBLIC SCHOOL BUS INTERCHANGE AND LUKE BOWEN FOOTBRIDGE

3.0 Assessment

A high level CPTED review was completed for the design changes at Kororo Public School bus interchange and Coramba Road bus stop, and an overview of the findings is provided below.

Kororo Public School bus interchange and Luke Bowen footbridge

The proposed bus interchange design allows for buses to set down users at the back of the interchange, adjacent to the retaining wall on the eastern side. The interchange also incorporates a kiss and drop zone, as well as about 30 car parking spaces in front of the bus lanes. Users have four routes (as shown in Figure 1.3) in which to enter and exit the interchange:

- Users can enter and exit the interchange via stairs adjacent to the bus set down lane, to the neighbourhood roads via James Small Drive (route one)
- Users can exit and enter the interchange at grade via the footpath for access to the front entrance of Kororo Public School (route two)
- Users wishing to travel to the western side of the highway can access Luke Bowen footbridge at grade, while users wishing to access the bus interchange or front entrance of Kororo Public School from the western side of the highway are able to do so via Luke Bowen footbridge (route three).

The bus interchange also includes a kiss and drop zone, which would be separated from the bus bays via a barrier. Users from there have one route in which to exit the kiss and drop zone:

- Users arriving or departing via the kiss and drop zone or parking are able to access school grounds via a set of stairs and underpass below the entrance to the bus interchange, leading to a path below grade towards the school (route 4). This path assumes users of the kiss and drop zone and parking are only accessing the school, and only via route 4, to avoid pedestrian conflicts with vehicles.

The bus interchange also includes a general use car park (located on the western side of Luke Bowen footbridge) adjacent to the north bound carriageway of the Pacific Highway, and at the same level as the highway.

- Parents requiring parking for pick up and drop off of students can use this car park and walk over the Luke Bowen footbridge via route 3
- Users of the car park also have a wider connection to the existing neighbourhood to the north via route 5.

From a high-level review, the proposed design encounters some issues, such as surveillance, vulnerability and visibility in the provision of a secure space for users, especially for vulnerable users such as children, and should be considered for further assessment and potential treatment. Issues identified from the review include:

- Surveillance and vulnerability because of limited visibility for people using the stairs to James Small Drive (route one) and people using the stairs/underpass from the car park/kiss and drop (route four)
- Visibility of users on the stairs from the interchange and surrounding houses could be obscured depending on vegetation or building infrastructure, so sight lines and visibility should continue to be considered in further design
- Maintenance and materials: Tunnels and stairs within public transport facilities are often subject to graffiti and other anti-social behaviour.

Notwithstanding these issues, the specification of low plantings/landscaping within the interchange would help to maintain the visual/natural surveillance of the area. The fencing clearly demarcates where vehicles and pedestrians should be, reducing the vulnerability of pedestrians crossing a bus or car lane and being injured.

Using CPTED principles, the following may require additional consideration during detailed design:

- Opportunities to improve surveillance for vulnerable users
- Operational management and materials.

Additional treatments such as lighting, CCTV, emergency help points, wayfinding and throw screens for Luke Bowen footbridge ramps should be considered during detailed design, to increase safety and security of the interchange.

TfNSW will continue to consult with Kororo Public School about the design of the bus interchange during detailed design.

Coramba Road bus stop

The proposed design for the Coramba Road bus stop includes an indented bus bay adjacent to Coramba Road with provision for four buses to set down at a time. There are three routes users can take to get to and from the bus stop. These are shown in Figure 1.4 and include:

- Users can exit and enter the bus stop via a footpath between the bus stop and Spagnolas Road (route one)
- Users can exit and enter the bus stop via the shared user path to the east towards Roselands Drive, where on-street pick up and drop off for school children can be achieved (route two)
- Users can exit and enter the interchange via the shared user path to the west towards the eastern roundabout of the Coramba Road interchange (towards Bennetts Road) (route three).

The high-level review of the proposed design identifies some issues, such as access points, sight-lines, and surveillance in the provision of a secure space for users, especially for vulnerable users such as children. These should be considered for further assessment and potential treatment during detailed design. Issues identified from the review include:

- While access points and sight-lines provide clear access and visibility

of users from Coramba Road, there should still be consideration given to the access towards Spagnolas Road

- Potential surveillance concerns with any space between the bus stop, noise wall and rear boundary that is shared with adjacent private properties.

Using CPTED principles, this high-level review has outlined the following considerations for the design.

- Opportunities to improve surveillance for vulnerable users
- Operational management and materials.

The design considerations to be investigated during detailed design could include:

- Additional assessment to incorporate adequate lighting and electronic security to increase the safety and security of the space
- Consider the ability to access any space between the bus stop, noise wall and rear boundary that is shared with adjacent private properties
- Access to any areas between the boundary noise wall of the adjacent private properties and bus stop is restricted to the public, reducing the likelihood for anti-social behaviour
- Maintenance and the materials used to reduce anti-social behaviour and ensure spaces are easily maintained is important to ensure community ownership and pride in the space.

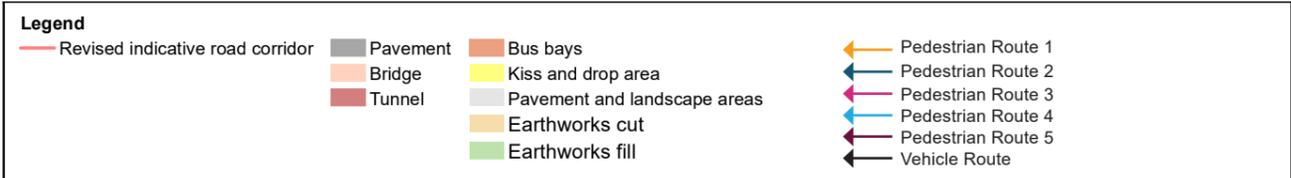
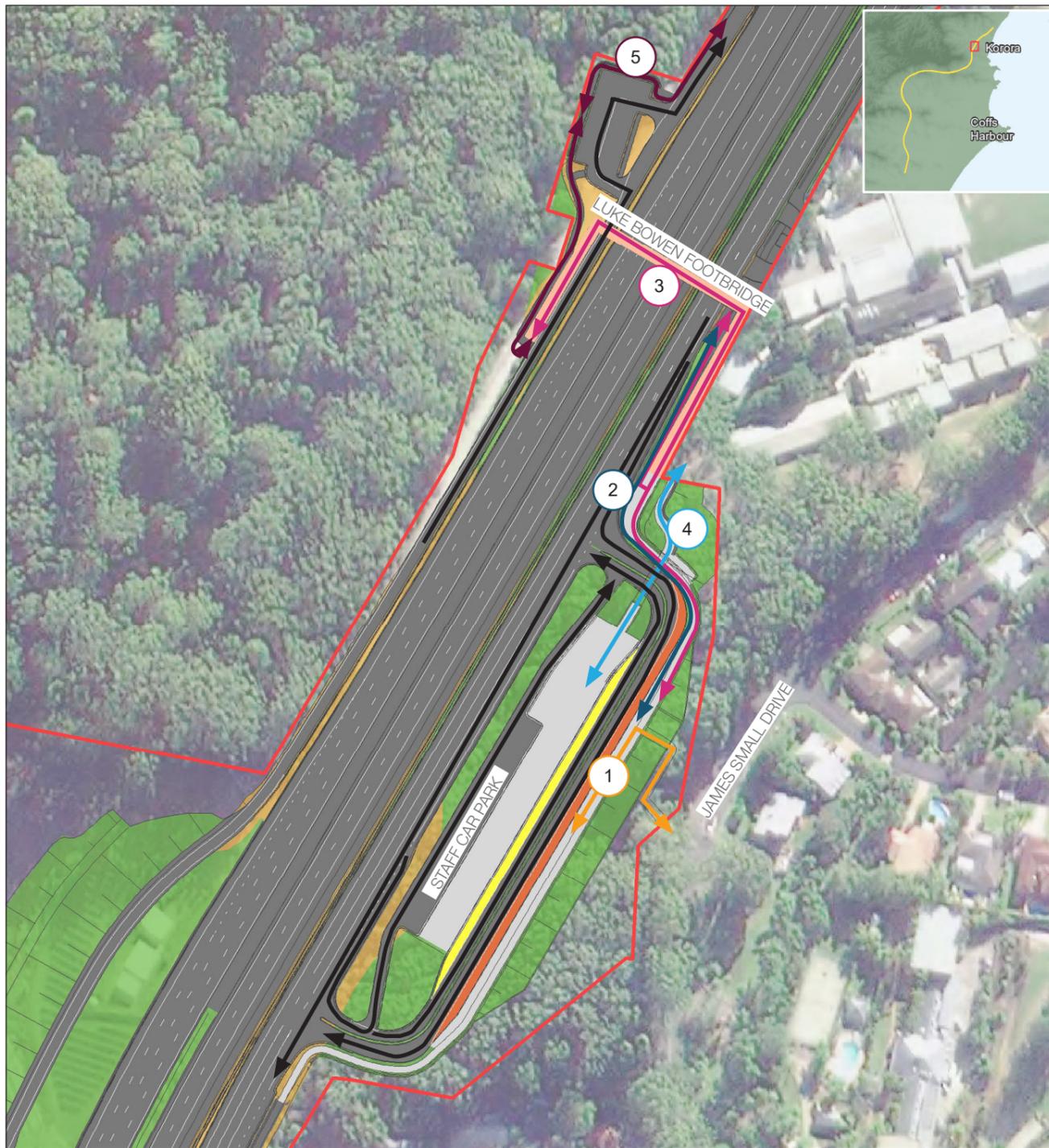


FIG 1.3 KORORO PUBLIC SCHOOL BUS INTERCHANGE AND LUKE BOWEN FOOTBRIDGE CIRCULATION ANALYSIS NOT TO SCALE



FIG 1.4 CORAMBA BUS STOP CIRCULATION ANALYSIS NOT TO SCALE

4.0 Next Steps

The next steps reported in the Urban Design, Landscape Character and Visual Impact Assessment Report (Arup 2019) are still relevant to the amended design and include:

Crime assessment

A concise analysis of the crime risks, involving local authorities and the NSW police, should be undertaken for the areas along the length of the project. This will inform a detailed CPTED audit, assessing the likely risk of crime, and develop targeted measures around any potential crime hot spots.

Detailed CPTED Audit

Using the concise crime assessment as a framework, a detailed CPTED report should be developed for the project. This would identify key areas with an increased risk for crime and detail CPTED counter measures to reduce this risk. This study will also form part of the framework for the detailed CPTED audit.

Lighting design

The detailed design phase of the project should identify a full lighting design for the corridor in accordance with relevant legislation and Australian Standards. The lighting design is to work in collaboration with the detailed CPTED audit, responding to recommendations made in the audit.

Integrating CPTED design principles in detailed design

The detailed design phase of the project should incorporate CPTED design principles as part of the development process, ensuring the principles are integrated into the design effectively.

Measures for further consideration in detailed design

The following measures should be considered for further assessment and potential treatment as part of the detailed design stage:

- Surveillance (visual/natural) and vulnerability
- Sightlines, visibility and access points
- Maintenance and materials.

Appendix B

Overshadowing Analysis



Overshadowing analysis

The amended design changes, including updates to noise walls (following the updated noise and vibration assessment), retaining walls and bridges, have been reflected in the model and incorporated in to the overshadowing analysis. Refer to Figure B.1 'amended design overshadowing key plan' for the location of these changes with supporting analysis on the following pages.

Methodology

The methodology for the assessment of the amended design has been carried out in accordance with the methodology used for the EIS (refer to Urban Design, Landscape Character and Visual Impact Assessment Report, Arup 2019).

Updates to the methodology, to capture impacts associated with to the amended design, included:

- Updating the 3D model with the proposed design changes, including changes to the alignment, noise walls, retaining walls, earthworks and bridges
- Analysing overshadowing impacts associated with the changes.

Limitations

Whilst every effort has been used to create an accurate model, the limited resolution of the contour data and the approximation of dwelling height and form means that the overshadowing output should only be used as a guide.

The output is conservative as it does not take into account existing vegetation, minor built form or proposed landscape treatments, due to the potential for these items to alter over time. Overshadowing that arises from existing vegetation is considered to be variable, influenced by season and also the changing maturity of vegetation over the life of the particular species.

Where transparent noise walls would assist with reducing the extent of overshadowing, this has been referenced in the analysis.

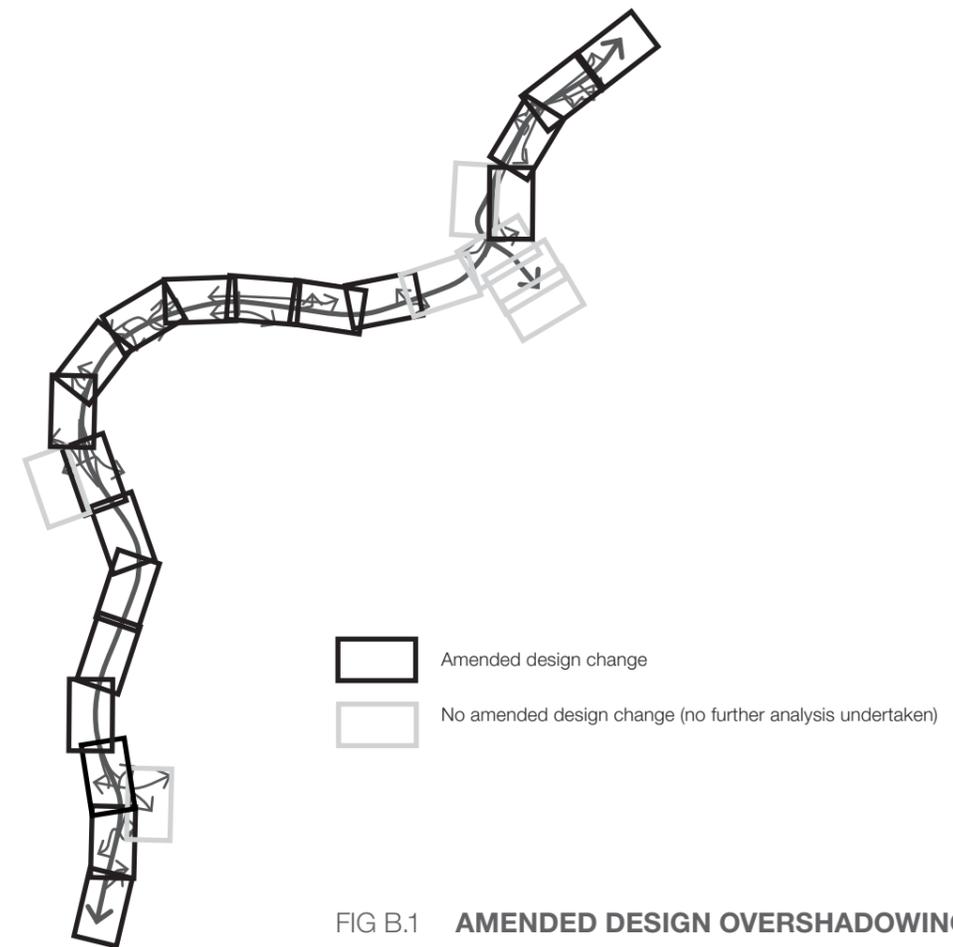


FIG B.1 AMENDED DESIGN OVERSHADOWING KEY PLAN

Design changes

Noise walls:

- Solid noise NCA03-SB-01 has reduced in height from 5m to 4.5m.

Potential impacts

The design change would result in a slight reduction in the extent of shadow as a result in the height reduction. Consistent with the EIS, the shadow would be situated within the construction footprint.

Assessment consistent with the EIS assessment.



FIG B.2 21ST JUNE 7AM

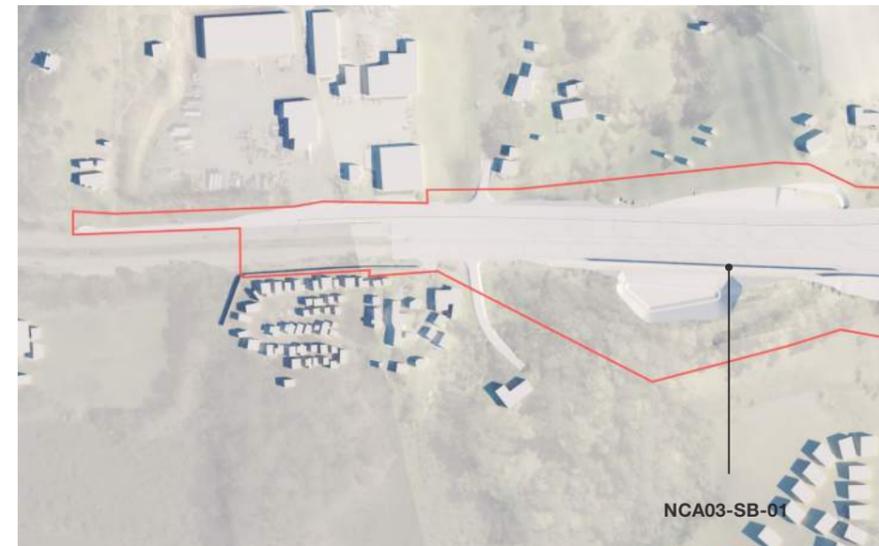


FIG B.3 21ST JUNE 9AM

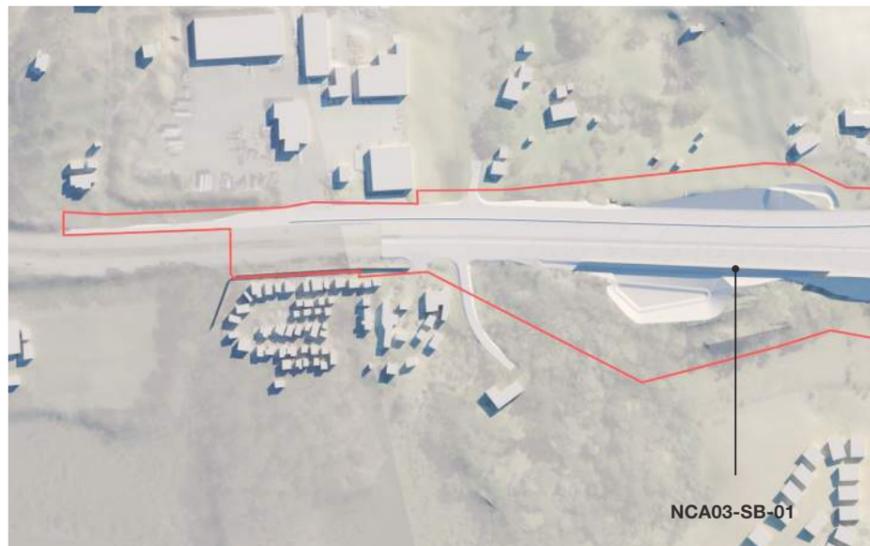
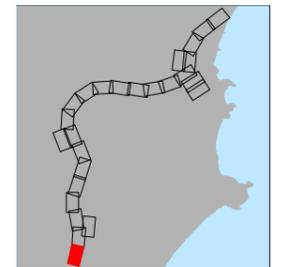


FIG B.4 21ST JUNE 1PM



FIG B.5 21ST JUNE 3PM



Design changes

Noise wall

- Solid noise NCA03-SB-01 has reduced in height from 5m to 4.5m

Retaining Wall

- Retaining walls RW501, RW502 and RW204 have been introduced

Potential impacts

The design change and introduction of additional retaining walls primarily arise as a result of the reconfiguration of Englands Road interchange. As illustrated in the adjacent figures, the extent of overshadowing associated with the retaining walls is anticipated to remain within the construction footprint.

The reduction in the height of noise wall NCA03-SB-01 would reduce the extent of overshadowing beyond the construction footprint in comparison to the EIS design. However, consistent with the EIS, the existing vegetation is anticipated to be retained at this location, which would generate comparable shadows to the noise wall.

Slight reduction in overshadowing beyond the construction footprint in comparison to the EIS assessment.

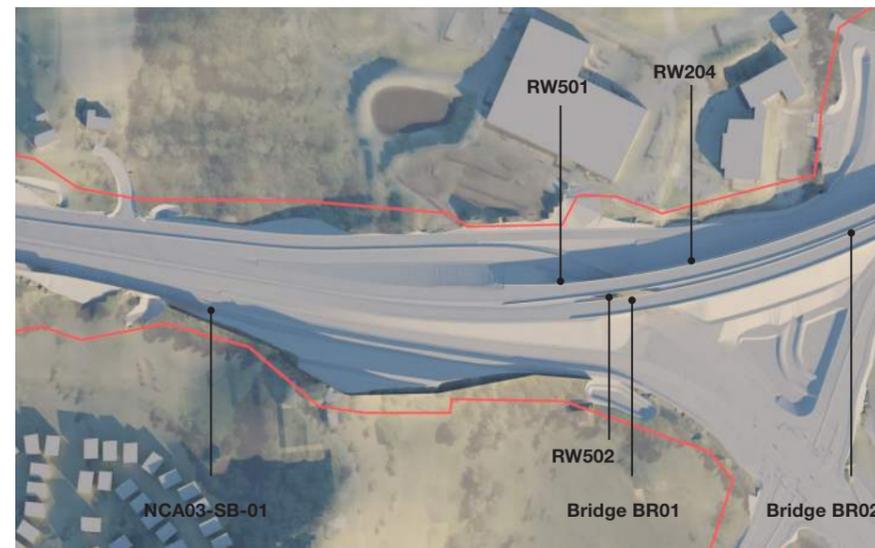


FIG B.6 21ST JUNE 7AM

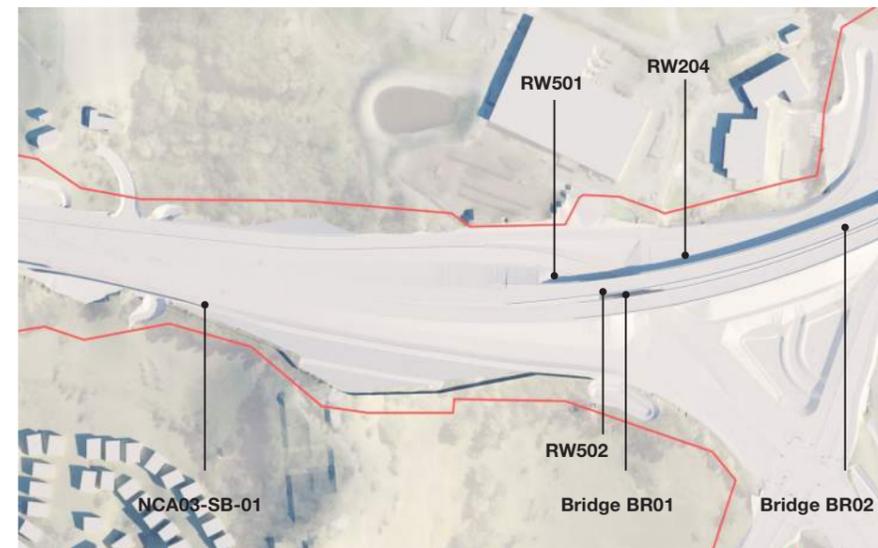


FIG B.7 21ST JUNE 9AM

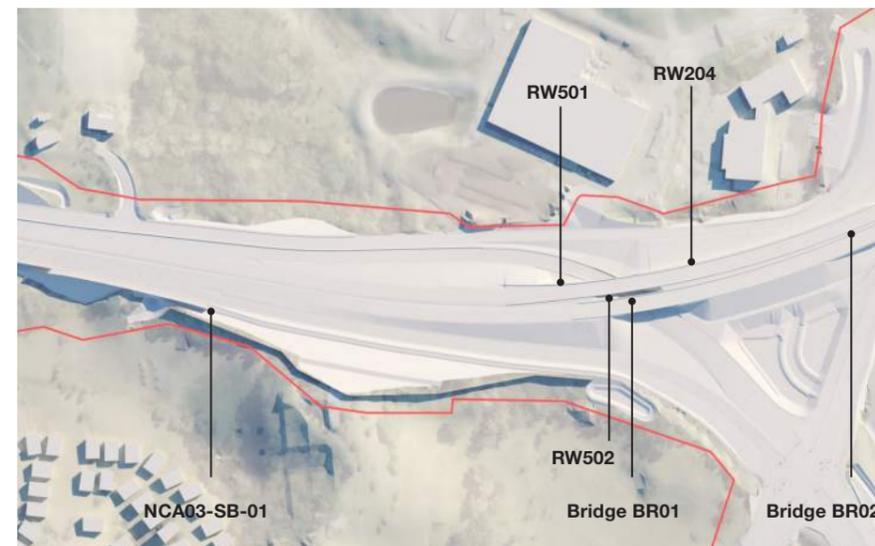
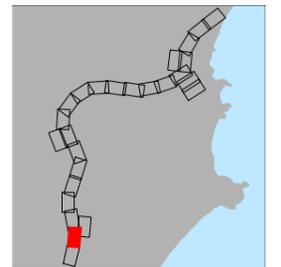


FIG B.8 21ST JUNE 1PM



FIG B.9 21ST JUNE 3PM



Design changes

Bridge

- BR02 - Bridge over local road - Amended design. BR25 - Bridge over local road - Introduced

Retaining Wall

- RW501, RW502, RW503, RW504, RW505 and RW506 (Bridge portal RWs) all introduced.

Water basin

- Additional operational water quality basin

Alignment

- Alignment updates associated with the reconfiguration of Englands Road interchange

Potential impacts

Changes to the horizontal alignment results in the alignment moving slightly west, resulting in overshadowing beyond the construction footprint adjacent to the additional operational water quality basin. Existing vegetation is situated at this location.

The overshadowing anticipated to extend to the commercial car park would be removed as a result of the amended design.

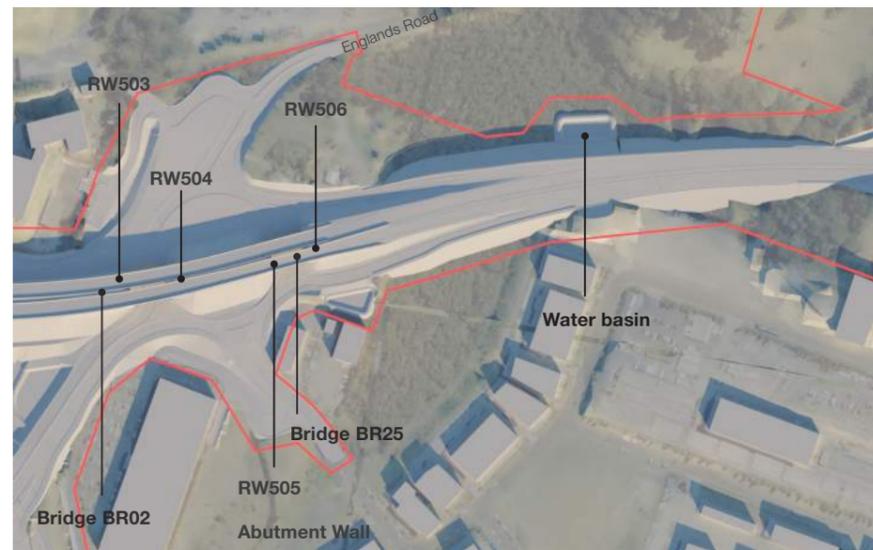


FIG B.14 21ST JUNE 7AM

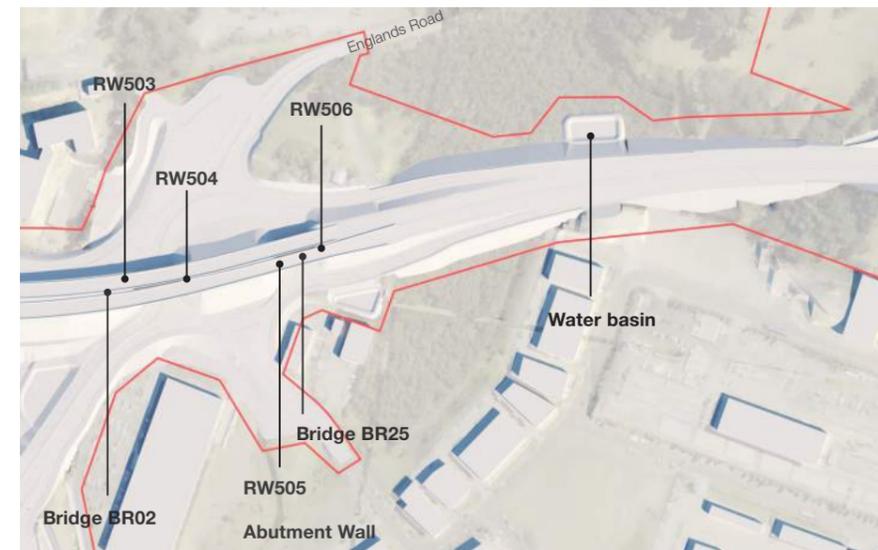


FIG B.15 21ST JUNE 9AM

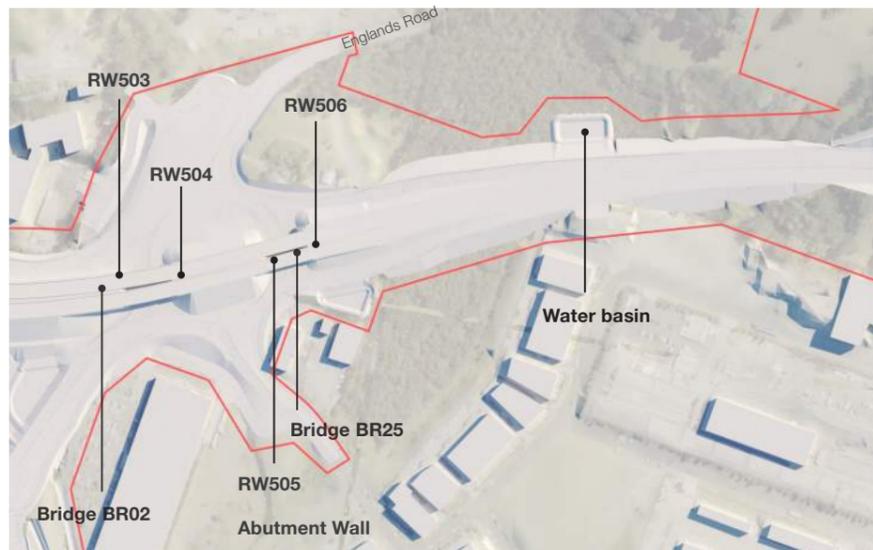


FIG B.16 21ST JUNE 1PM

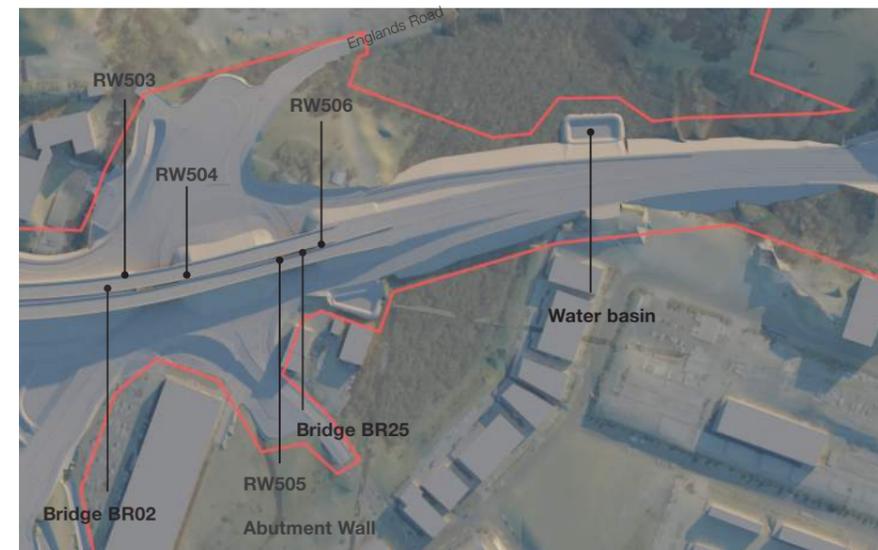
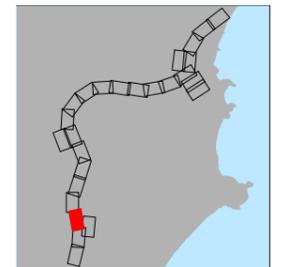


FIG B.17 21ST JUNE 3PM



Design changes

Noise wall

- Solid noise NCA06-SB-01 has reduced in length from 1558m to 1460m by 142m. The height remains consistent at 5m.

Alignment

- Alignment lowered over North Boambee Road and removal of earth mounds

Potential impacts

The alignment changes, including the lowering of the alignment and the removal of earth mounds, reduces the extent of earthworks and subsequently the extent of overshadowing beyond the construction footprint.

The changes to the alignment would position the noise wall closer to the alignment in comparison to the EIS assessment, reducing the extent of overshadowing.

Slight reduction in overshadowing beyond the construction footprint in comparison to the EIS assessment.

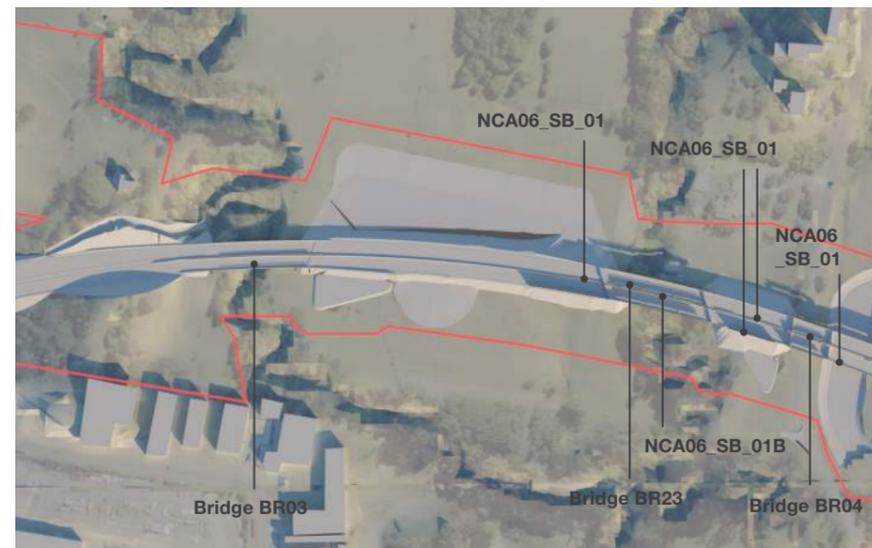


FIG B.18 21ST JUNE 7AM

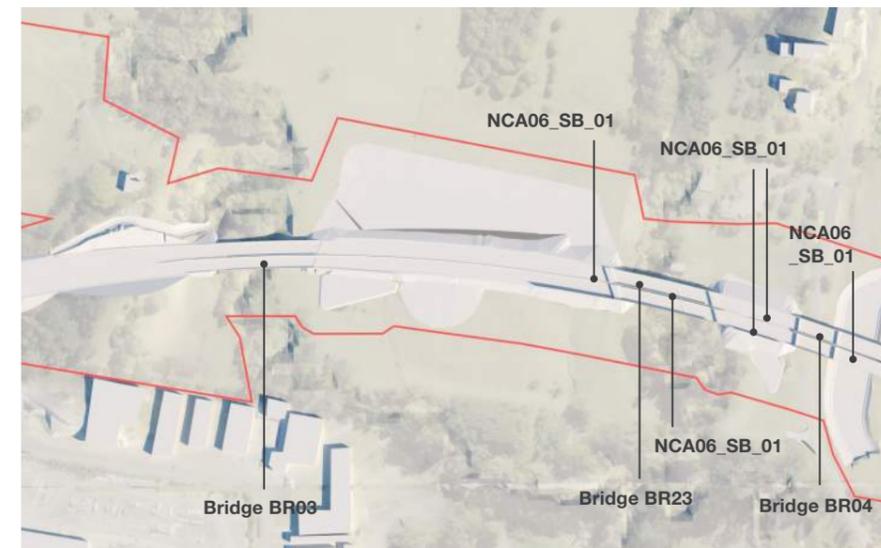


FIG B.19 21ST JUNE 9AM

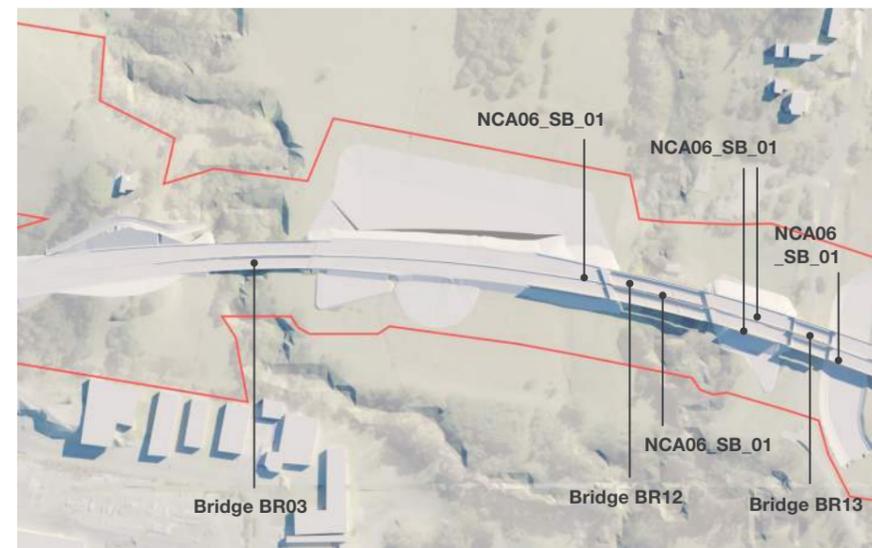


FIG B.20 21ST JUNE 1PM

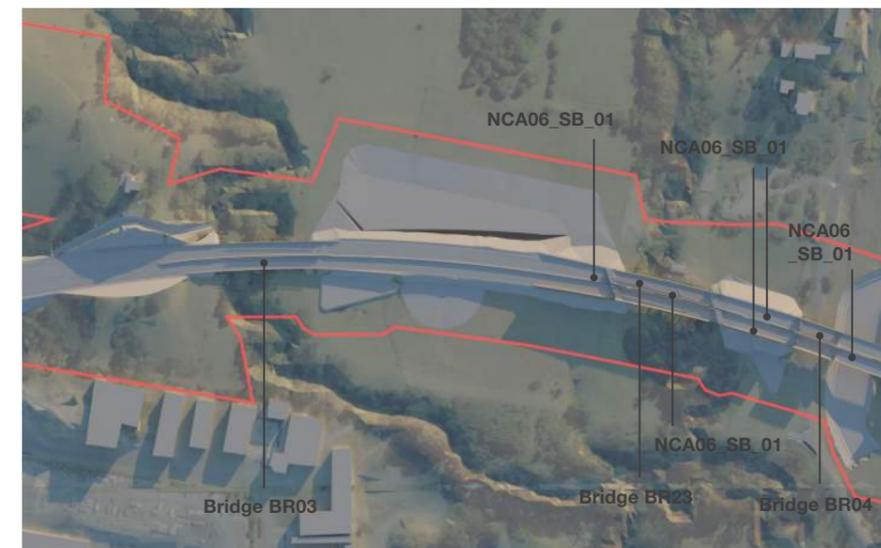
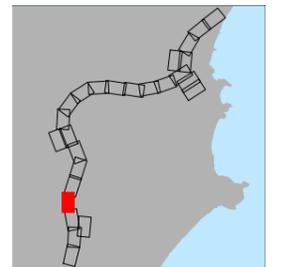


FIG B.21 21ST JUNE 3PM



Design changes

Noise walls

- Solid noise NCA06-SB-01 has reduced in length from 1558m to 1460m by 142m. The height remains consistent at 5m.

Bridges

- Bridge 05 has been removed and replaced with culverts

Alignment

- Alignment lowered over North Boambee Road and removal of earth mounds

Potential impacts

The alignment changes, including the lowering of the alignment and the removal of earth mounds, reduces the extent of earthworks and subsequently the extent of overshadowing beyond the construction footprint.

Slight reduction in overshadowing beyond the construction footprint in comparison to the EIS assessment.



FIG B.22 21ST JUNE 7AM

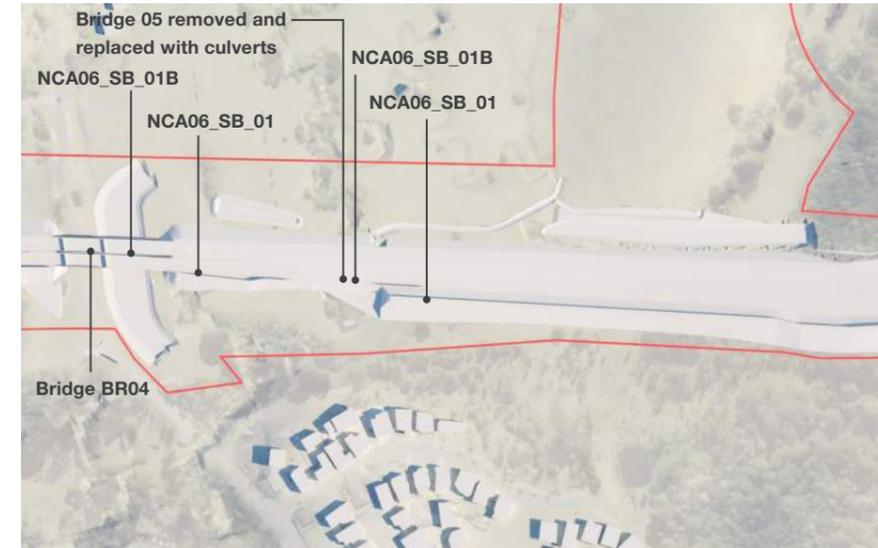


FIG B.23 21ST JUNE 9AM

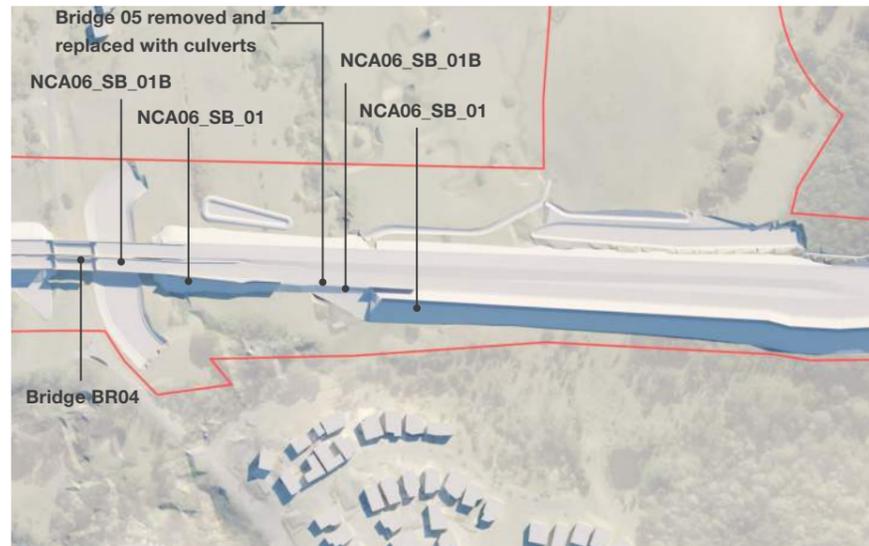
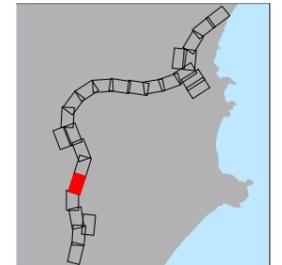


FIG B.24 21ST JUNE 1PM



FIG B.25 21ST JUNE 3PM



Design elements

Earthworks

- Solid noise NCA06-SB-01 has reduced in length from 1558m to 1460m by 142m. The height remains consistent at 5m.

Potential impacts

Consistent with the EIS design, overshadowing is anticipated to be limited on the construction footprint. The reduction in noise wall length is not considered to reduce overshadowing beyond the construction footprint.

Assessment consistent with the EIS assessment.

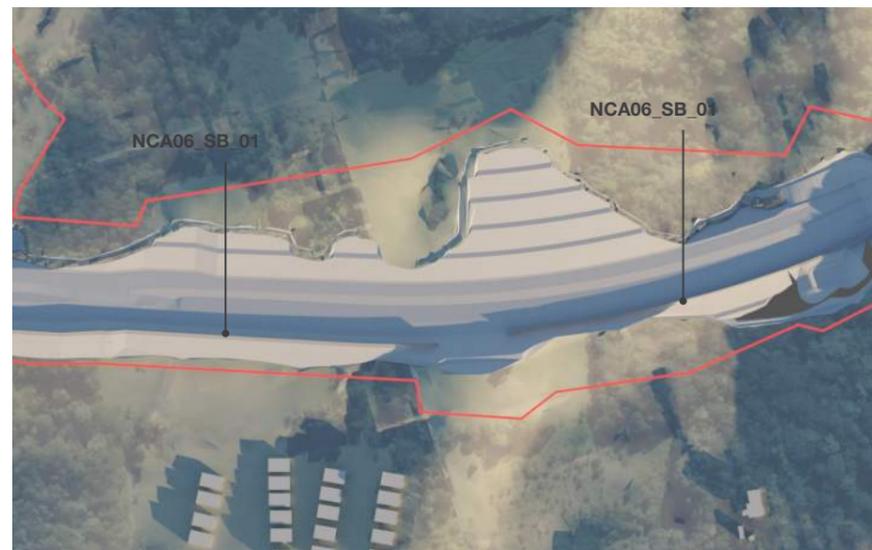


FIG B.26 21ST JUNE 7AM

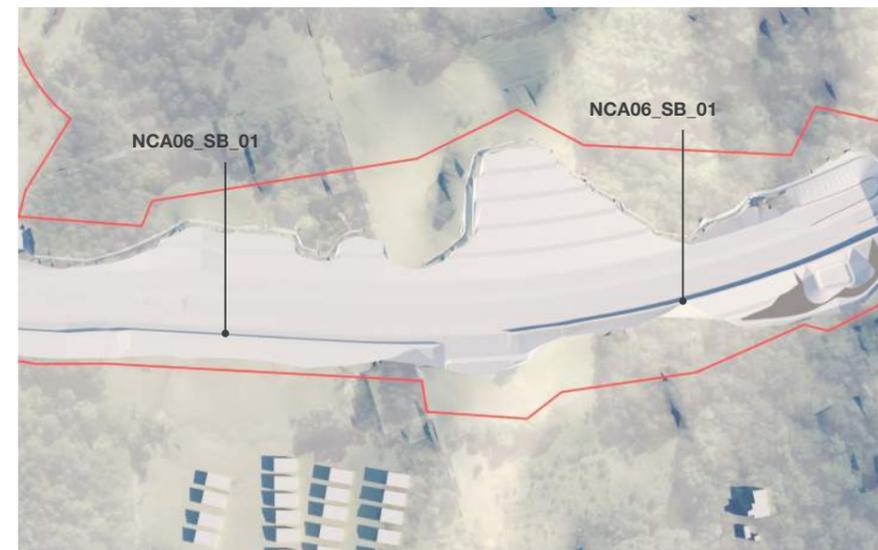


FIG B.27 21ST JUNE 9AM

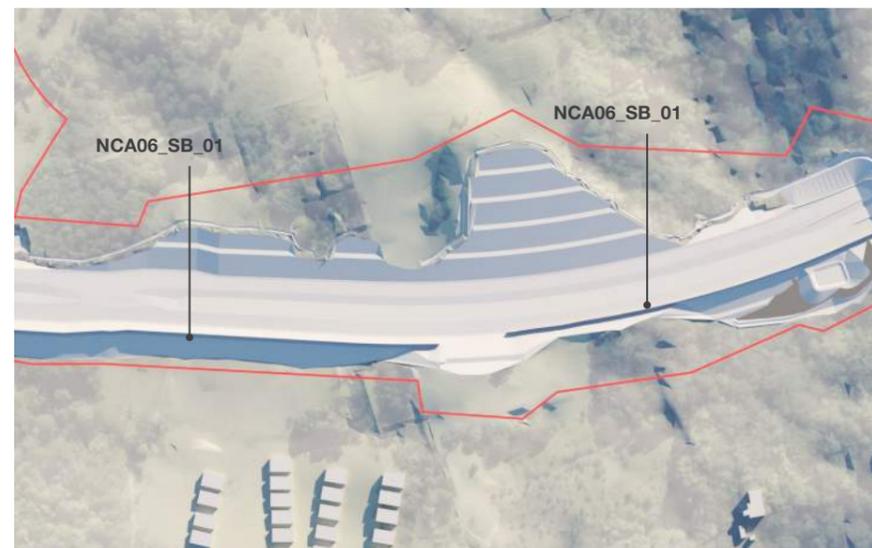
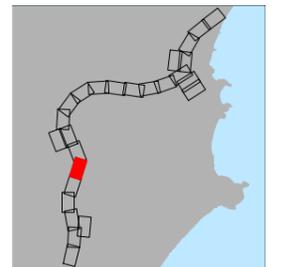
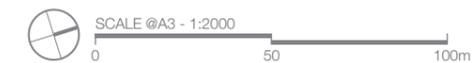


FIG B.28 21ST JUNE 1PM



FIG B.29 21ST JUNE 3PM



Design elements

Drainage

- Coffs creek flood mitigation in this area, including additional cutting

Potential impacts

The additional earthworks to accommodate the Coffs creek flood mitigation area are not anticipated to result in overshadowing beyond what has been analysed as part of the EIS.

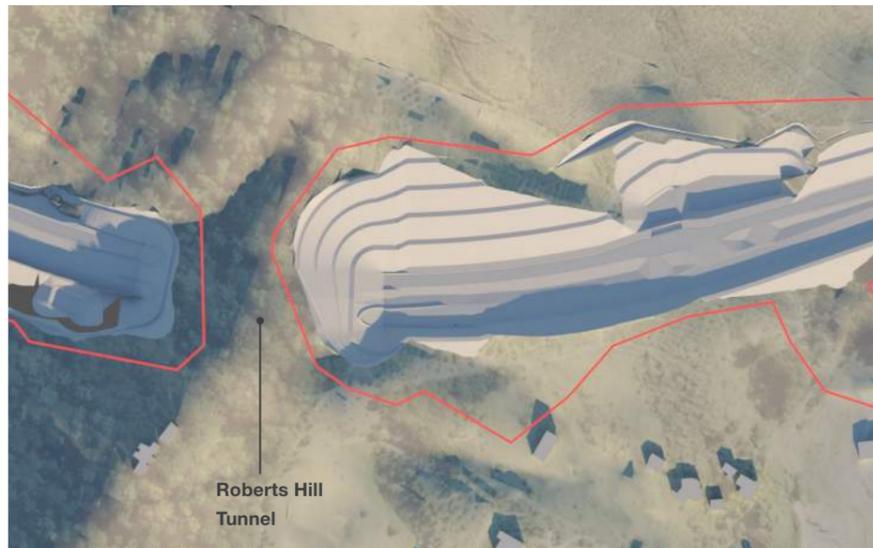


FIG B.32 21ST JUNE 7AM

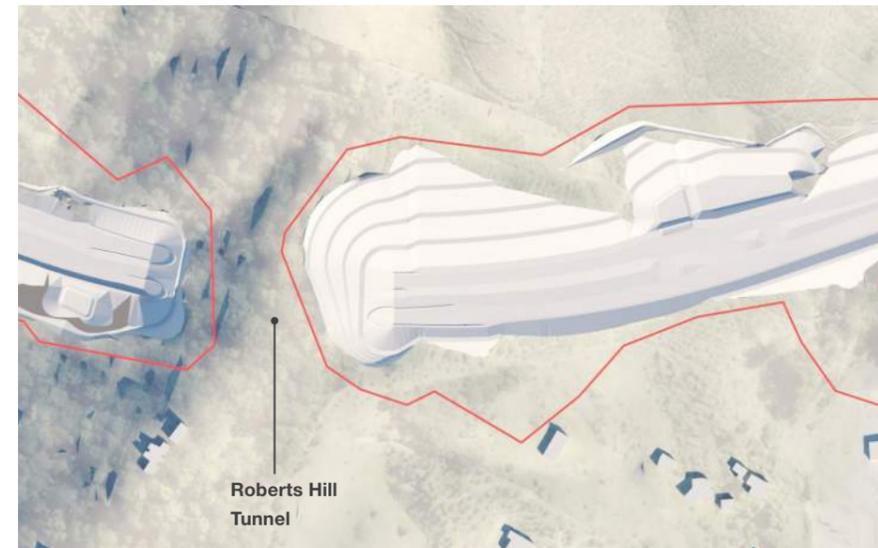


FIG B.33 21ST JUNE 9AM

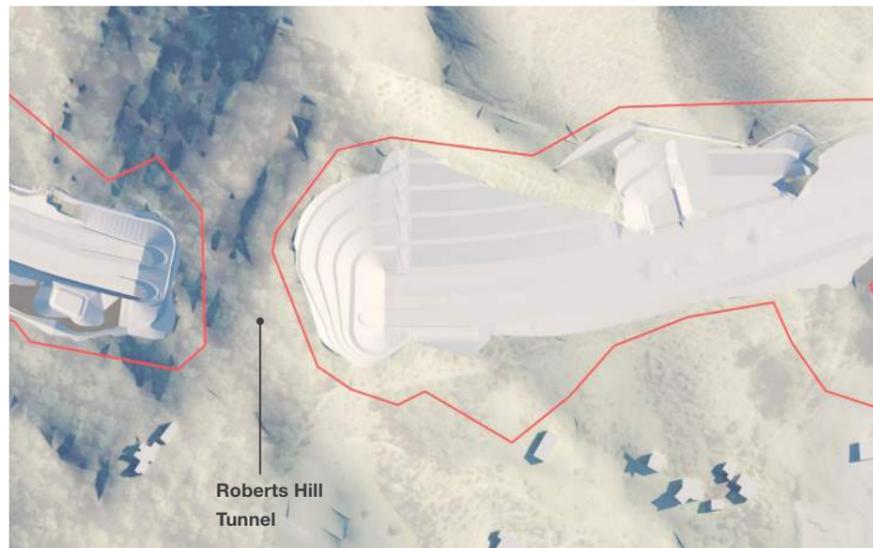
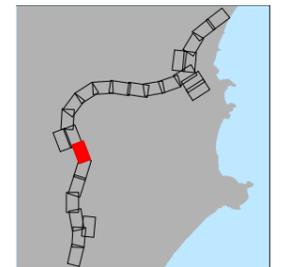


FIG B.34 21ST JUNE 1PM



FIG B.35 21ST JUNE 3PM



Design elements

Noise walls

- Solid noise NCA013-SB-01 has increased in height from 3.5m to 4m and increased in length from 1015m to 1800m by 15m.

Retaining Wall

- RW200 - Bridge portal (new)
- RW100 - (reduction in 0.5 length and 0.5 height in height)
- RW101 (reduction in 0.2m in length and 0.2m in height)
- RW102 (reduction in 0.7 length and 0.1m in height)

Potential impacts

Consistent with the EIS, overshadowing to the ground plane to the rear of properties situated on Tiffany Close would remain.

The retaining wall changes arising from the amended design are not considered to result in overshadowing beyond the construction footprint.

Similarly, the noise wall change (including the extension of the noise wall and the introduction of a staggered alignment to allow pedestrian access), is not considered to result in changes to the EIS overshadowing assessment.

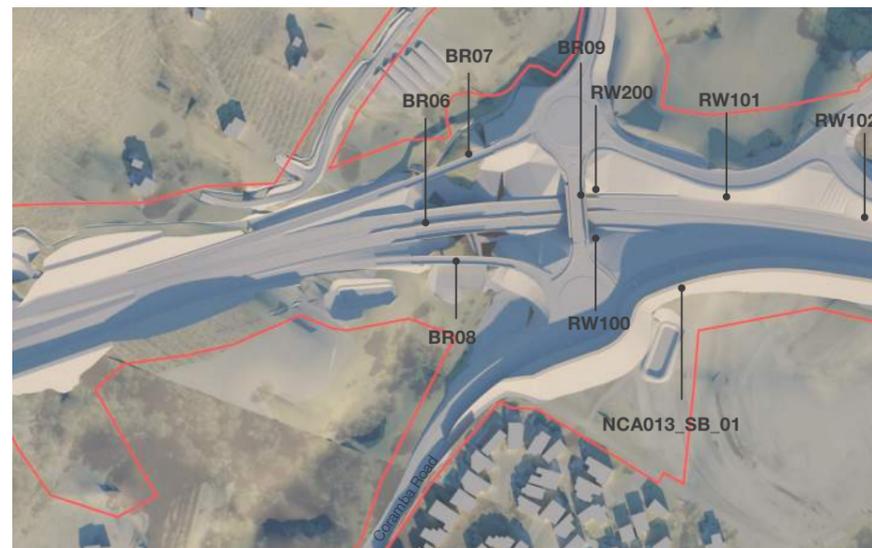


FIG B.36 21ST JUNE 7AM

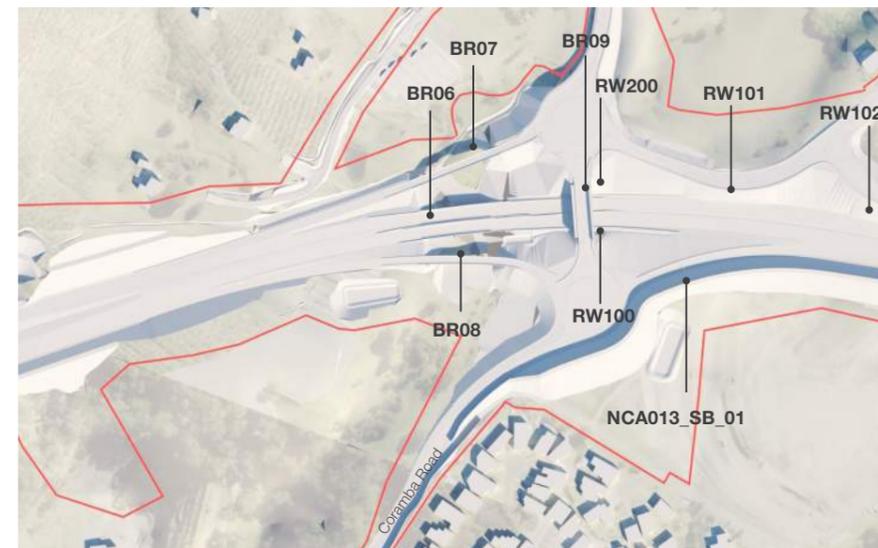


FIG B.37 21ST JUNE 9AM

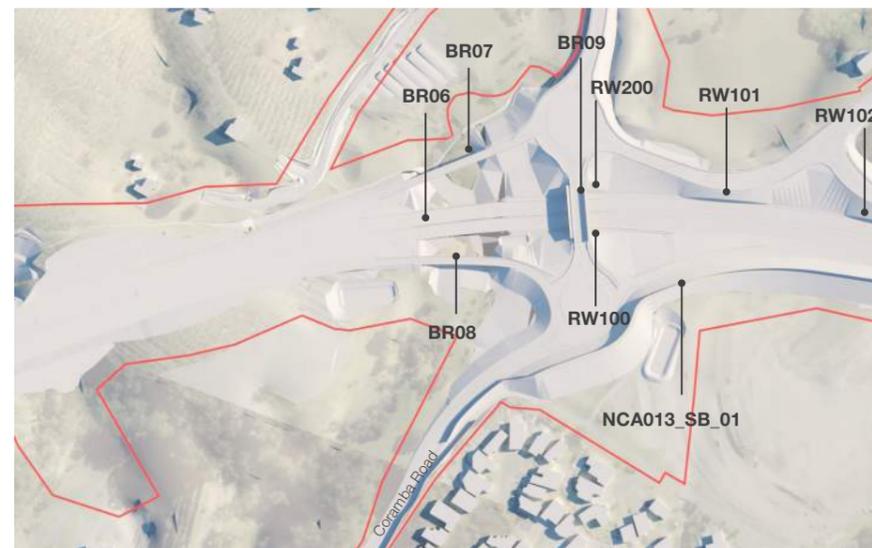
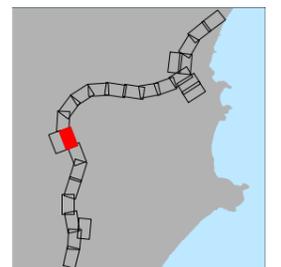


FIG B.38 21ST JUNE 1PM



FIG B.39 21ST JUNE 3PM



Design elements

Noise wall

- Solid noise NCA14-SB-01 has increased in height from 4.5m high to 5m and decreased in length by 86m.

Retaining wall

- RW102 - Amended - 0.7m decrease in length, 0.1m decrease in height.

Earthworks

- Earthwork batters extending east along the highway.

Potential impacts

By 3pm, the changes to the height of the noise wall will result in a small increase to the extent of overshadowing to the east of the alignment, including overshadowing to the Spagnolos Road detention basin.



FIG B.48 21ST JUNE 7AM

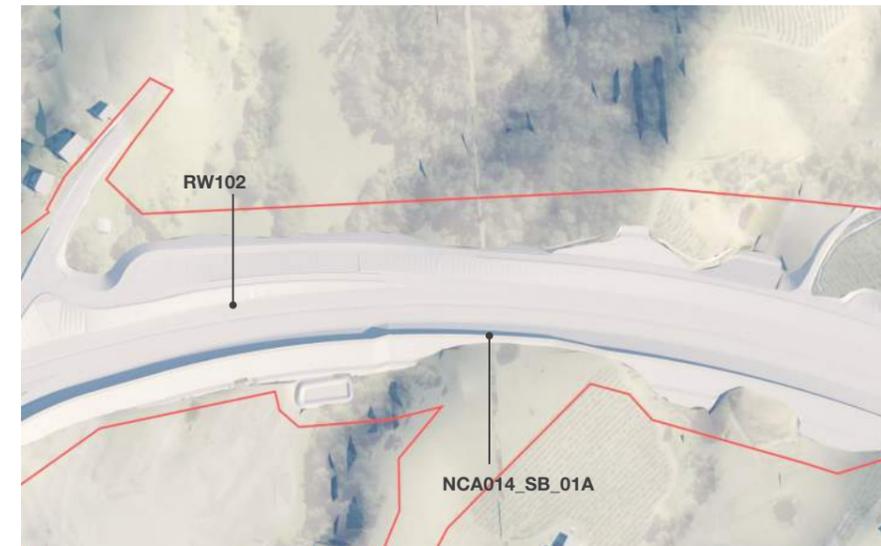


FIG B.49 21ST JUNE 9AM

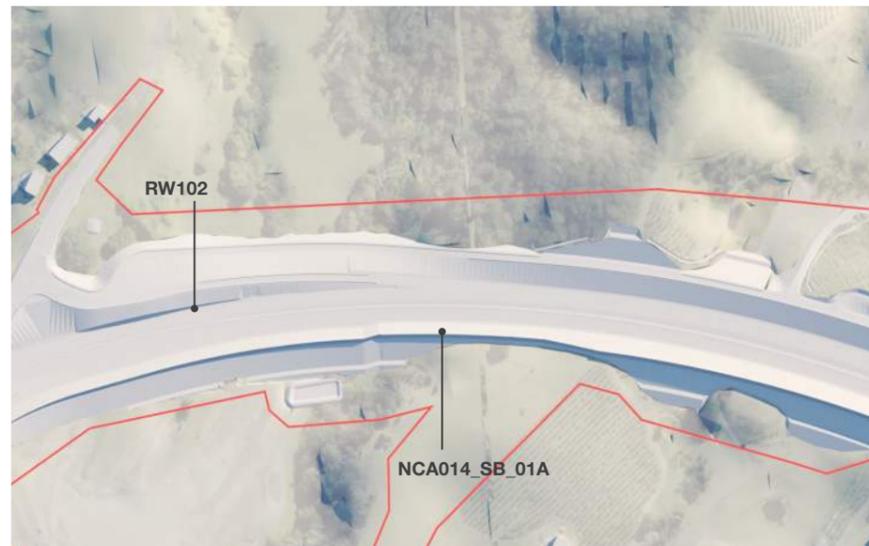


FIG B.50 21ST JUNE 1PM

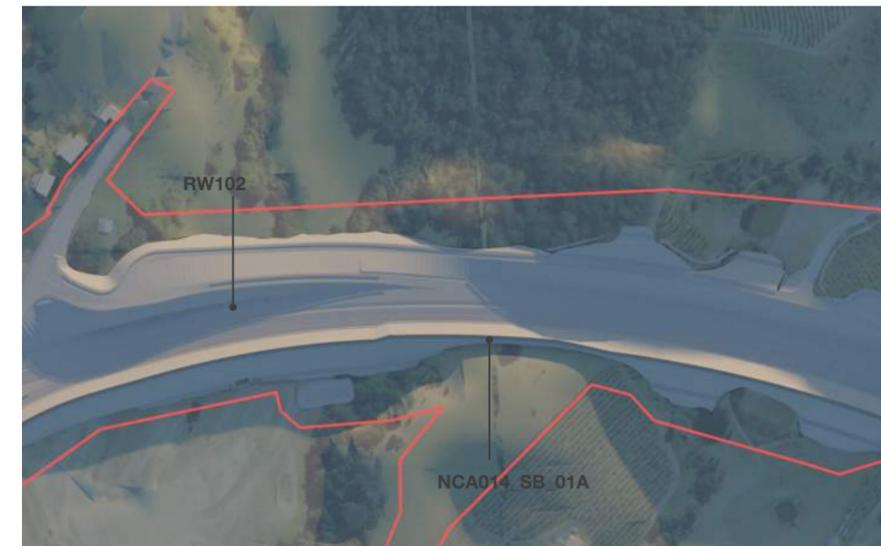
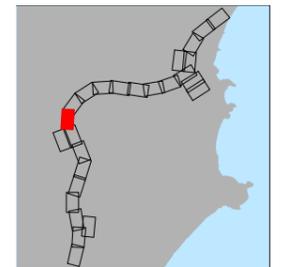


FIG B.51 21ST JUNE 3PM

SCALE @A3 - 1:2000
0 50 100m



Design elements

Noise wall

- Solid noise NCA014-SB-01 has increased in height from 4.5m high to 5m and decreased in length by 86m.

Earthworks

- Consistent with the EIS design, deep earthwork slopes along the highway.

Potential impacts

The changes to the height of the noise wall will result in a small increase to the extent of overshadowing, however this change is not anticipated to result in shadows extending beyond the construction footprint. The existing surrounding topography casts the project corridor in to shadow in the afternoon.



FIG B.52 21ST JUNE 7AM

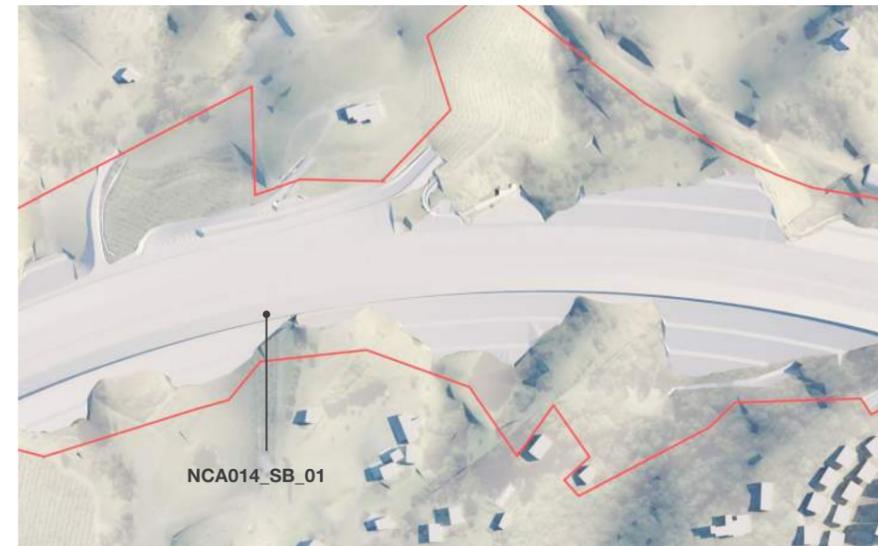


FIG B.53 21ST JUNE 9AM

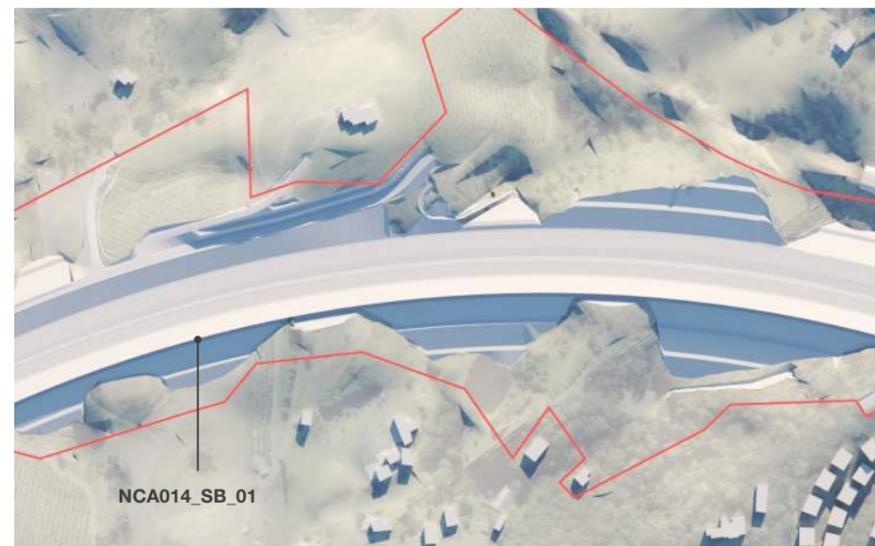
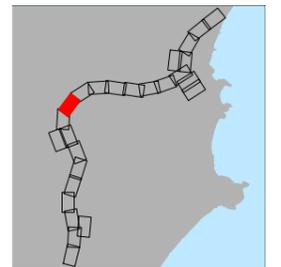


FIG B.54 21ST JUNE 1PM



FIG B.55 21ST JUNE 3PM



Design elements

Noise walls

- Solid noise NCA014-SB-01 has increased in height from 4.5m high to 5m and decreased in length by 86m.

Retaining wall

- RW107 and 108 (new retaining walls)

Potential impacts

The change to the height of the noise wall will result in a small increase to the extent of overshadowing to the south. The shadows are anticipated to extend beyond the construction footprint to adjacent residential properties within Sunset Ridge residential lots and agricultural land to the east.

Consistent with the EIS assessment, by 3pm the existing surrounding topography cast the project corridor in to shadow.



FIG B.58 21ST JUNE 7AM

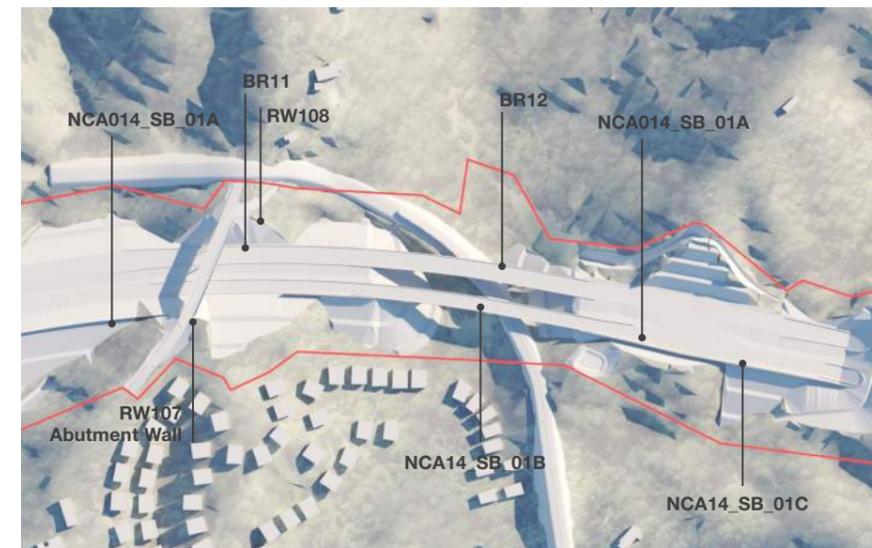


FIG B.59 21ST JUNE 9AM

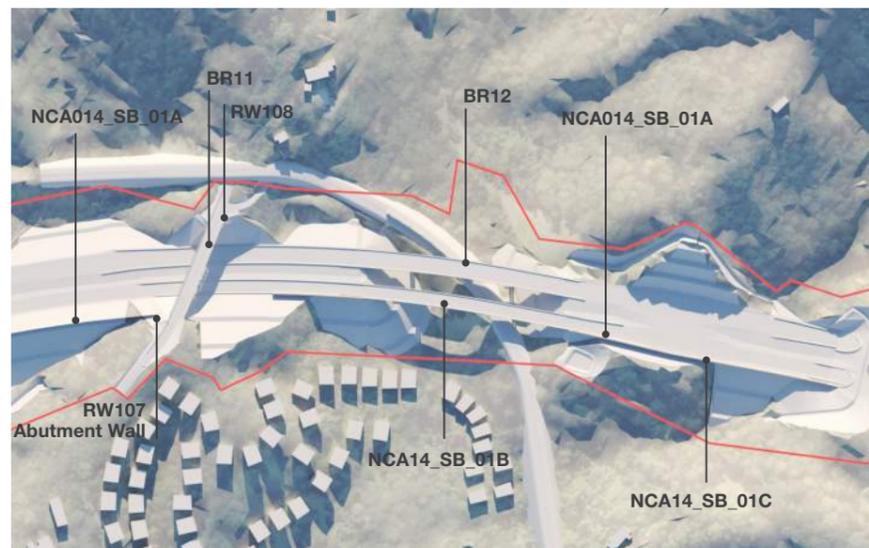
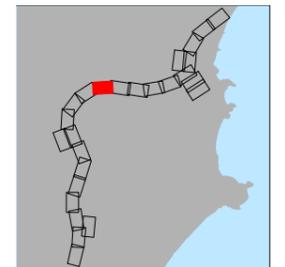


FIG B.60 21ST JUNE 1PM



FIG B.61 21ST JUNE 3PM



Design elements

Noise wall

- Solid noise NCA14-SB-01 has increased in height from 4.5m high to 5m and decreased in length by 86m.

Earthworks

- Deep earthwork slopes along the highway.

Potential impacts

Consistent with the EIS design, overshadowing due to structural elements and earthworks is anticipated to primarily be within the construction footprint.

Assessment consistent with the EIS assessment.



FIG B.62 21ST JUNE 7AM

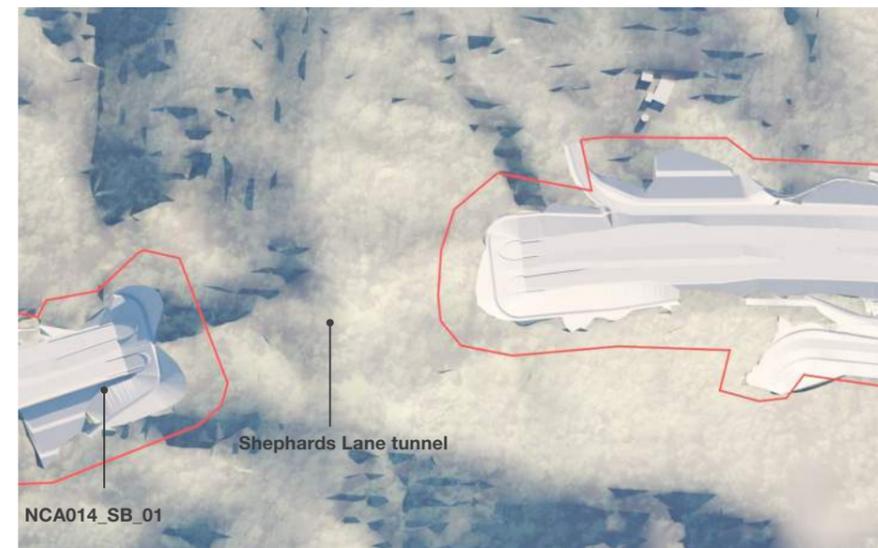


FIG B.63 21ST JUNE 9AM

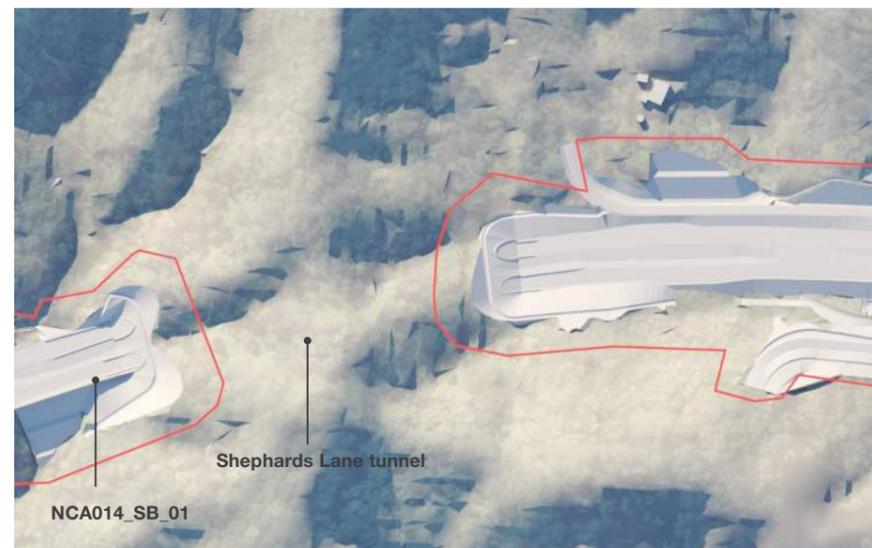
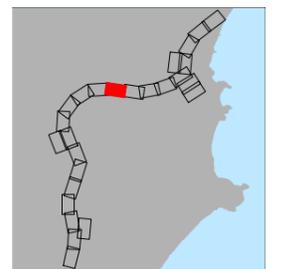


FIG B.64 21ST JUNE 1PM



FIG B.65 21ST JUNE 3PM



Design elements

Noise wall

- Transparent noise wall NCA18-SB-01 has increased in height from 4.5m high to 5m and decreased in length by 90m.

Potential impacts

The change to the height of the noise wall will result in a small increase to the extent of overshadowing to the south.

Consistent with the EIS assessment, by 3pm the existing surrounding topography cast the project corridor in to shadow.

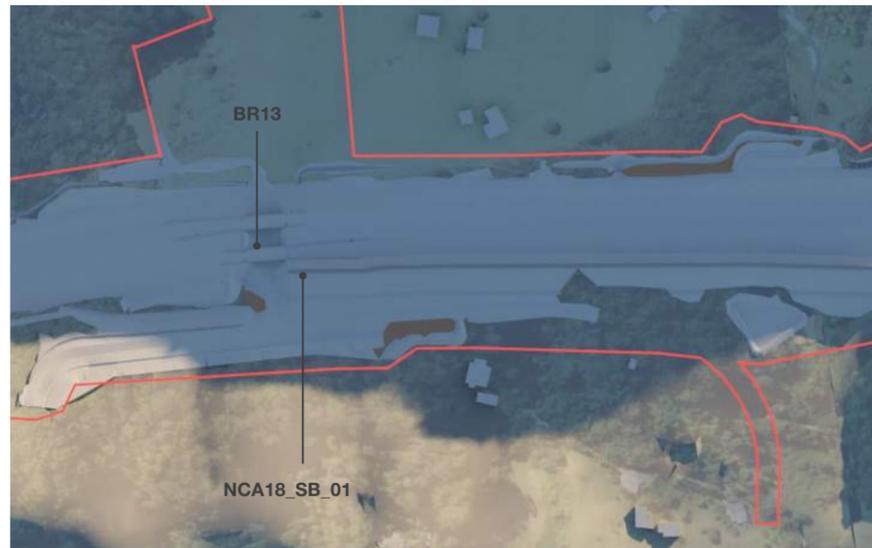


FIG B.70 21ST JUNE 7AM

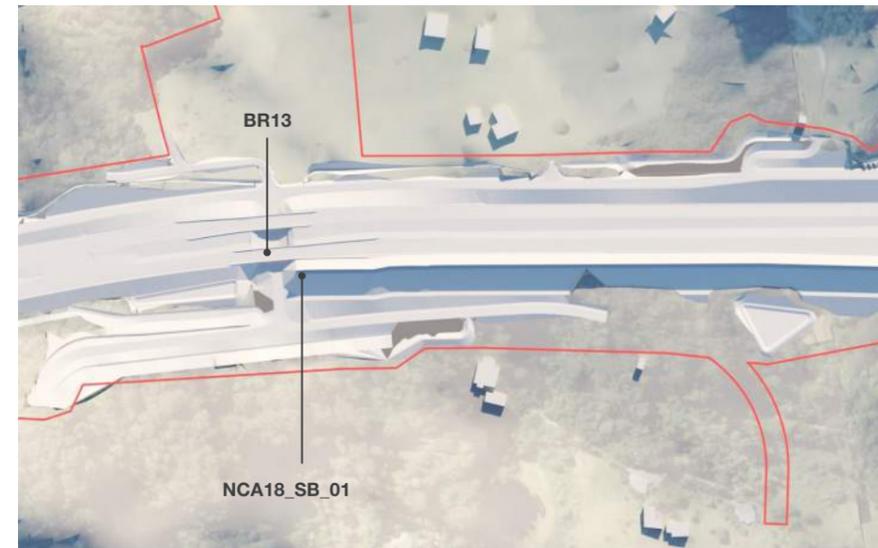


FIG B.71 21ST JUNE 9AM

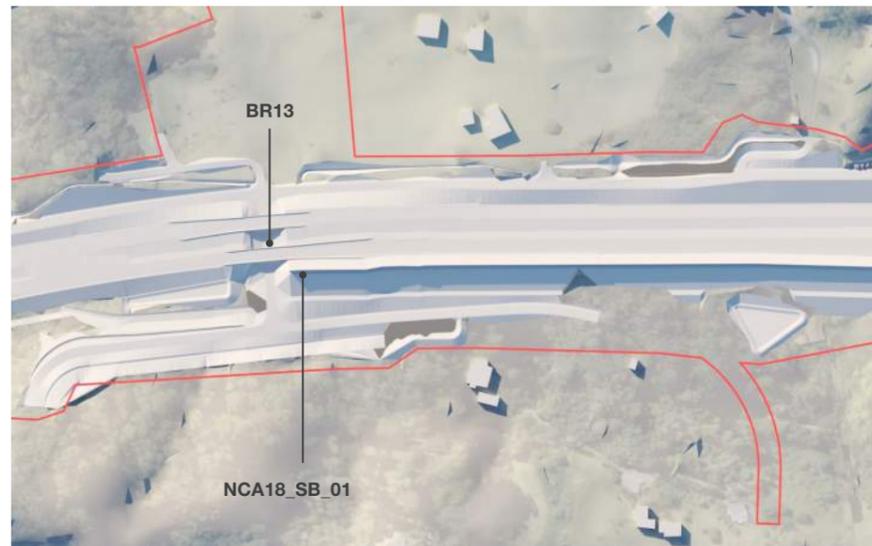
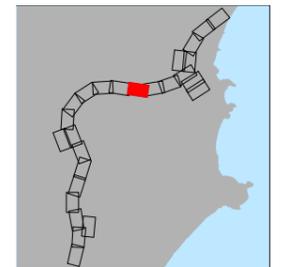


FIG B.72 21ST JUNE 1PM



FIG B.73 21ST JUNE 3PM



Design elements

Noise walls

- Transparent noise wall NCA18-SB-01 has increased in height from 4.5m high to 5m and decreased in length by 90m.

Retaining wall

- Introduction of RW114.

Earthworks

- Deep cuttings and high earthworks along the highway.

Potential impacts

The change to the height of the noise wall will result in a small increase to the extent of overshadowing to the south, however this increase will be within the construction footprint.

Consistent with the EIS design, the combination of earthworks and noise walls would result in overshadowing within the construction footprint. By 3pm, the existing surrounding topography casts the project corridor in to shadow.

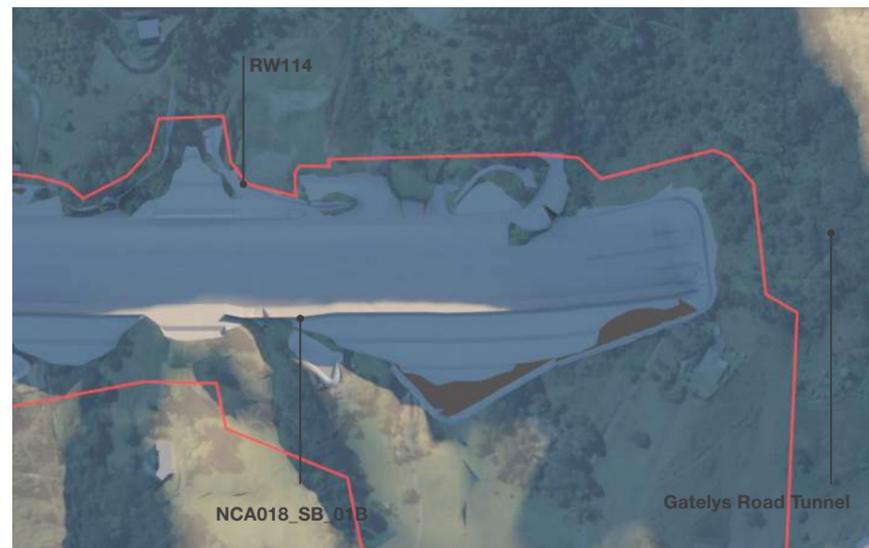


FIG B.74 21ST JUNE 7AM

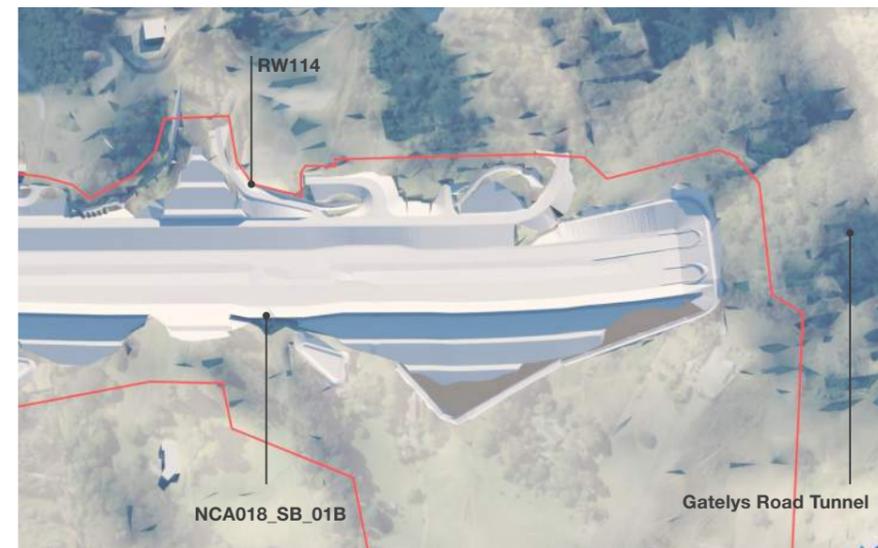


FIG B.75 21ST JUNE 9AM

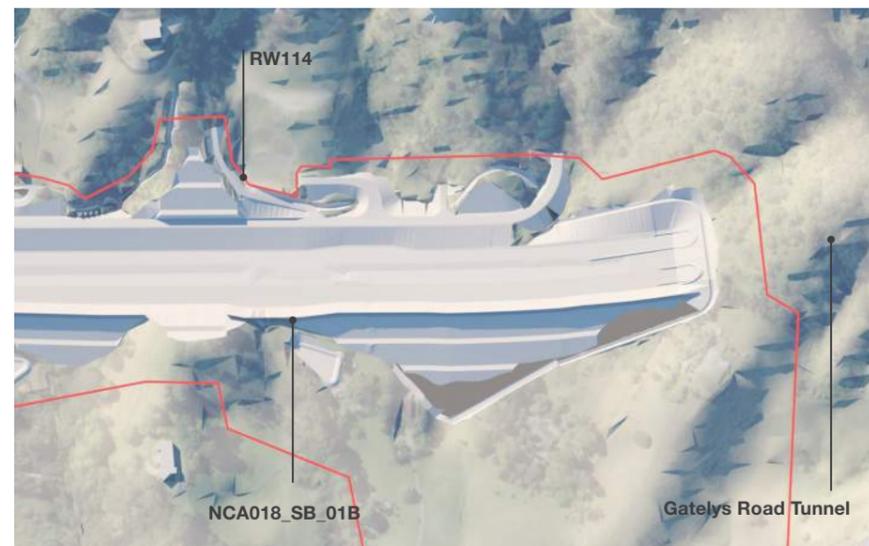
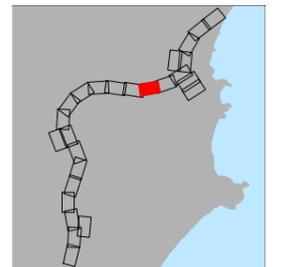


FIG B.76 21ST JUNE 1PM



FIG B.77 21ST JUNE 3PM



Design elements

Bridges (BR17 and BR19)

- Twin bridges BR17 (over local road) and bridge BR19 (ramp bridge over local road) will be situated in different locations compared to the EIS design.

Retaining Wall

- Introduction of new retaining walls, including RW402, 508, 507, 404, 401, 511, 512, 510, 509, 403

Alignment

- Realignment and consolidation of the interchange

Potential impacts

Overshadowing arising from the introduction of additional retaining walls are not anticipated to extend beyond the construction footprint. The additional works to the east of the alignment (as the project ties in with the Pacific Highway), results in overshadowing that slightly extends beyond the construction footprint. The slight overshadowing would extend to an area of existing vegetation.

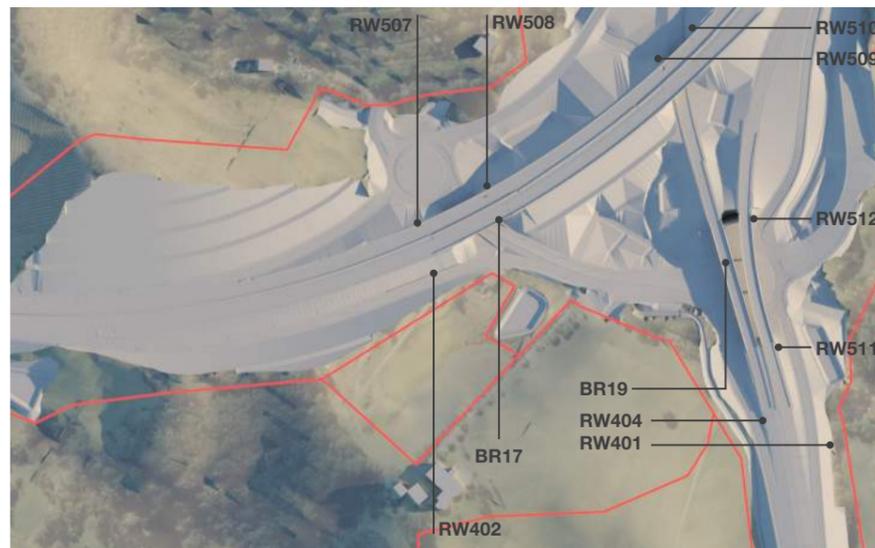


FIG B.86 21ST JUNE 7AM

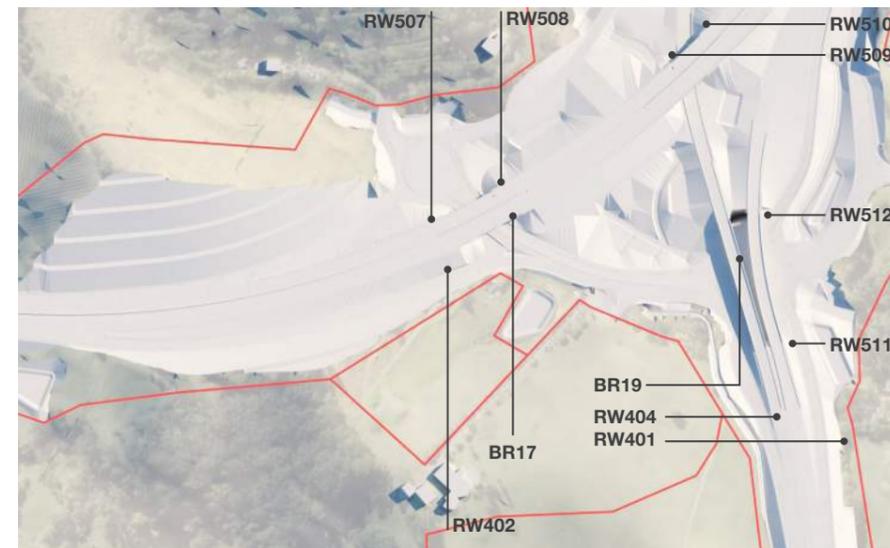


FIG B.87 21ST JUNE 9AM

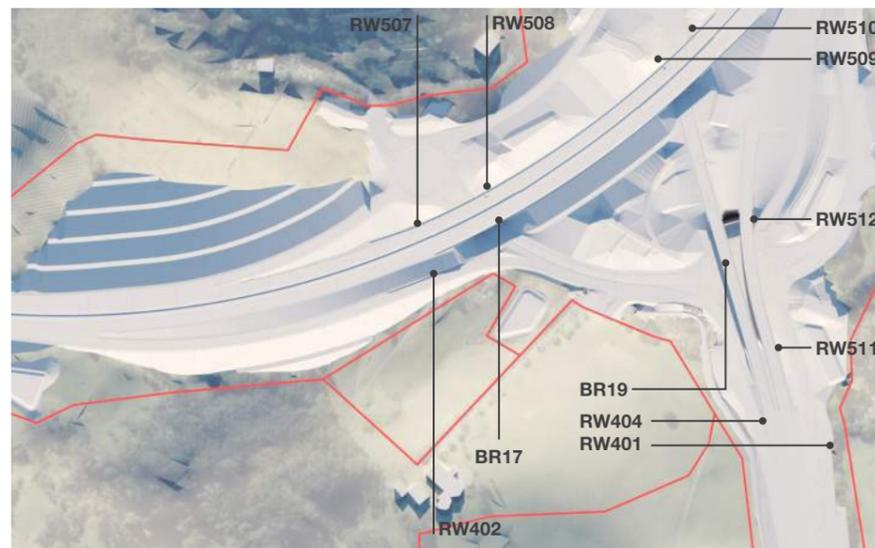


FIG B.88 21ST JUNE 1PM

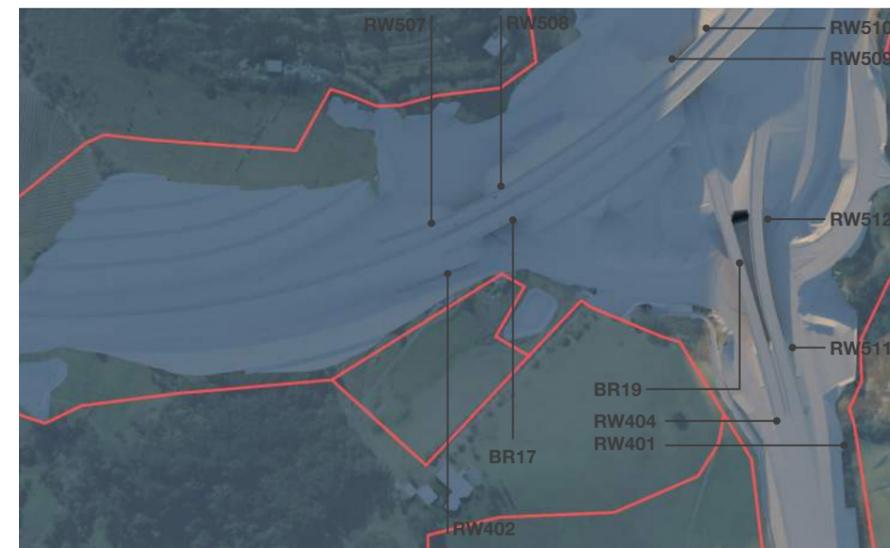
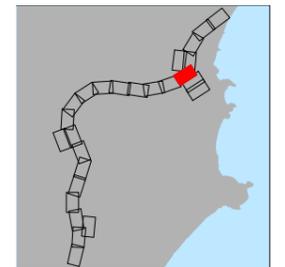


FIG B.89 21ST JUNE 3PM



Design elements

Bridges (BR18 and BR19)

- Introduction of twin bridges BR19 (over local road) and bridge BR18 (ramp bridge over local road), in slightly revised location in comparison to the EIS design

Retaining Wall

- Introduction of retaining wall RW403, RW509 and RW510 and changes to RW44 (revised length of 131.8m length and height of 6.6m)

Potential impacts

Consistent with the EIS design, the overshadowing will primarily be contained within the construction footprint.

By 3pm, the existing topography is anticipated to cast areas of the project and the surrounding landscape in to shade.

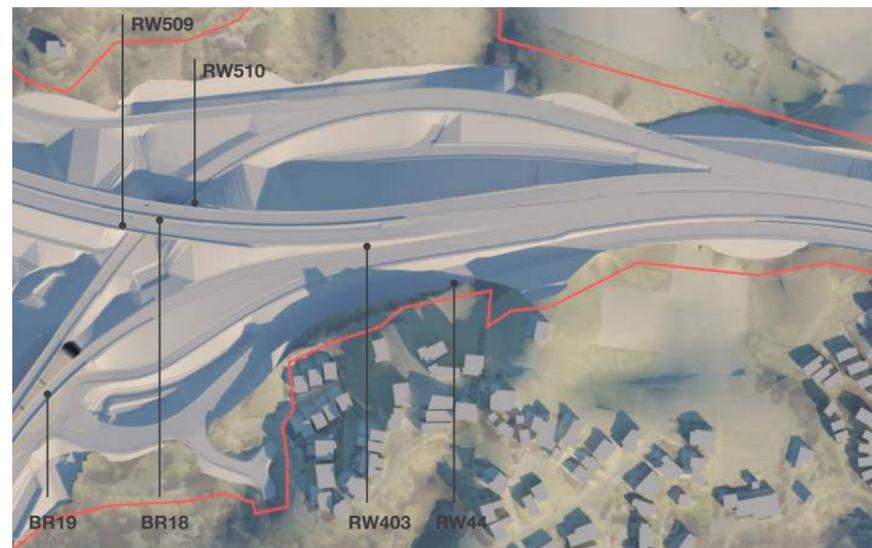


FIG B.90 21ST JUNE 7AM

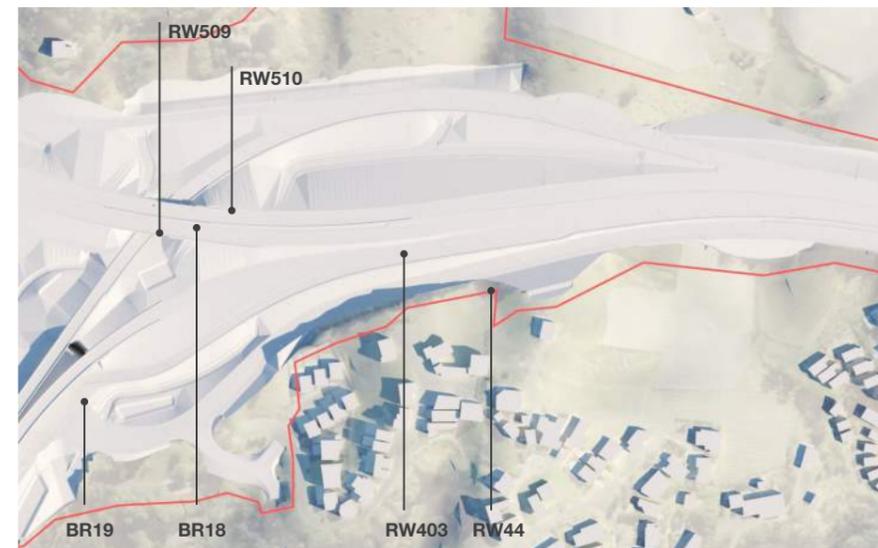


FIG B.91 21ST JUNE 9AM

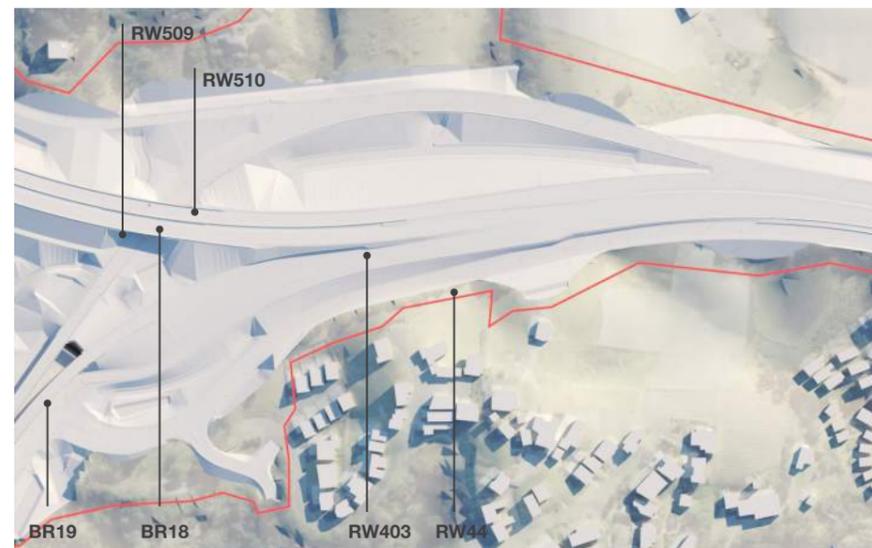
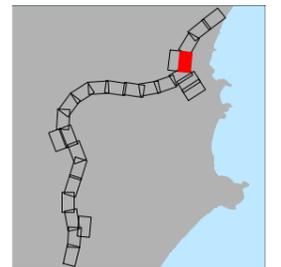


FIG B.92 21ST JUNE 1PM



FIG B.93 21ST JUNE 3PM



Design elements

Noise walls

- Solid noise wall NCA25 has decrease in length by 90m and increased in height by 0.5m
- Solid noise wall NCA26 has increased in length by 373m. No increase in height.

Retaining Wall

- RW52, 57, 53, 56, 59, 601, 515, 202 - Introduced
- RW41 - Amended - 136.6m decrease in length, 4.3m increase in height
- RW304 - Replacement - 1m increase in length, 0.8m decrease in height

Bus interchange

- Expansion of Kororo Hill public school bus interchange in comparison to the EIS design

Potential impacts

Figure B.100 illustrates that overshadowing would extend from RW52 to properties situated on Fern Tree Place. This extent of overshadowing is anticipated to be comparable to the existing vegetation which would be retained to the east of the retaining wall. As such, RW52 is not anticipated to introduce overshadowing beyond what is currently experienced by the existing vegetation.

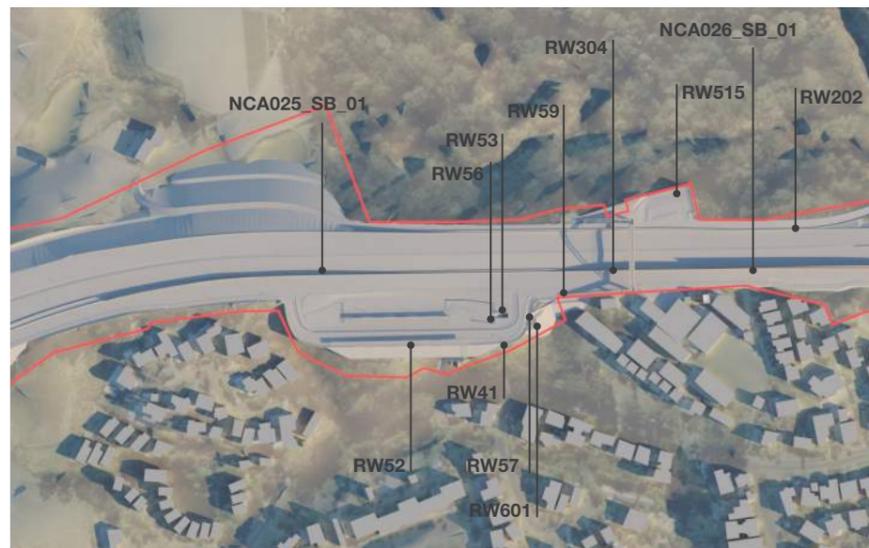


FIG B.98 21ST JUNE 7AM

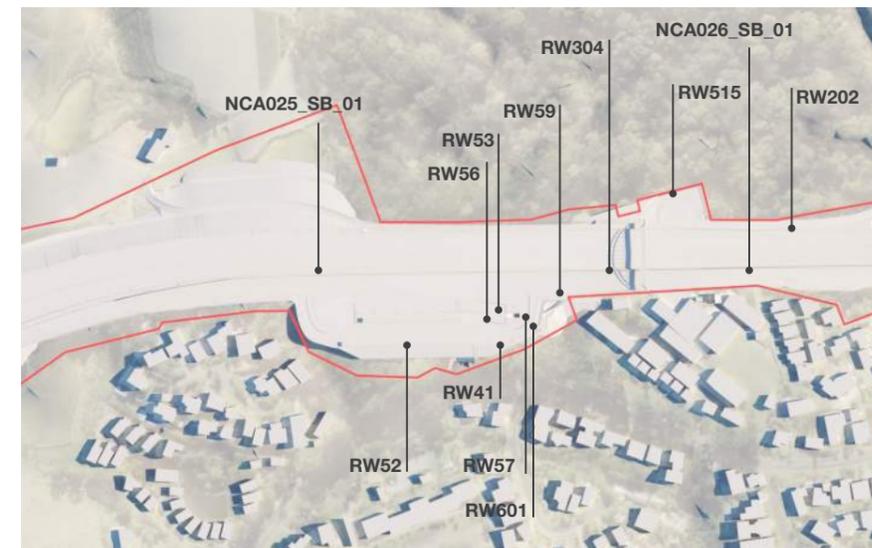


FIG B.99 21ST JUNE 9AM

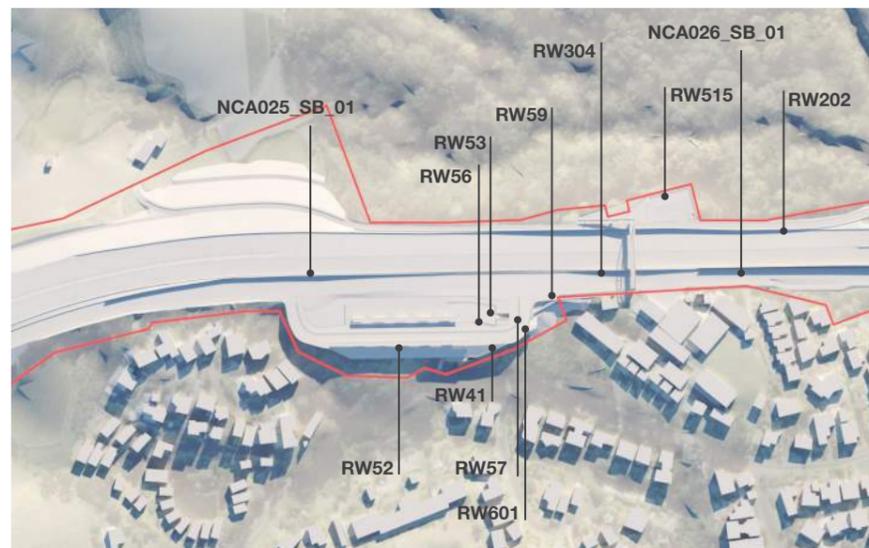
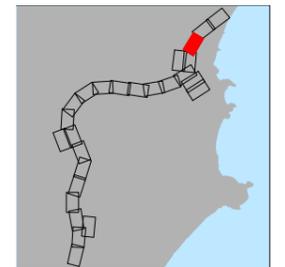


FIG B.100 21ST JUNE 1PM



FIG B.101 21ST JUNE 3PM



Design elements

Noise walls

- Solid noise wall NCA26 has increased in length by 373m. No increase in height
- Noise wall NW28 has decreased in length by 9m and increased in height by 0.5m.

Retaining Wall

- RW202 - Introduced
- RW304 - Replacement - 1m increase in length, 0.8m decrease in height
- RW01 - Amended - 367.7m decrease in length, 1.4m decrease in height
- RW305 - Replacement - 0.62m increase in length, 0.3m increase in height.

Bridge

- Relocation of Luke Bowen footbridge.

Potential impacts

Overshadowing arising from the increase in noise wall height are anticipated to be limited to the construction footprint.

Assessment consistent with the EIS assessment.

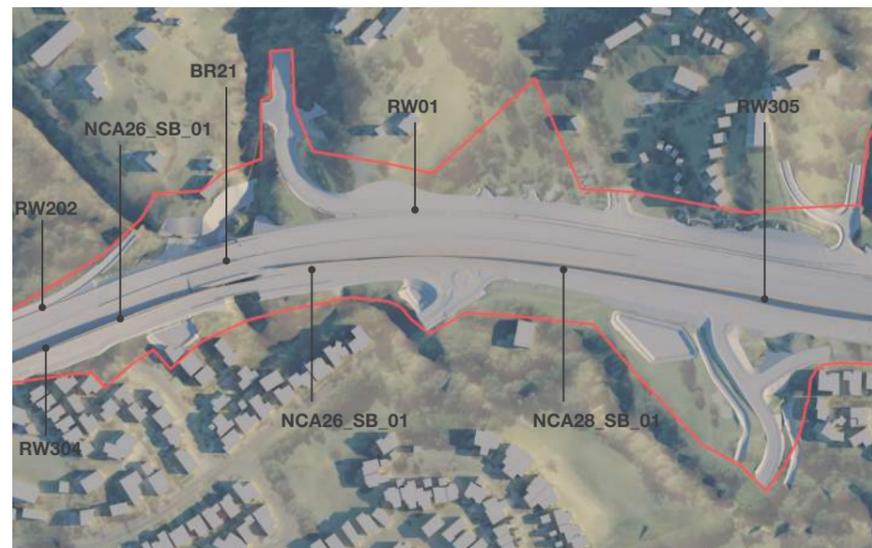


FIG B.102 21ST JUNE 7AM

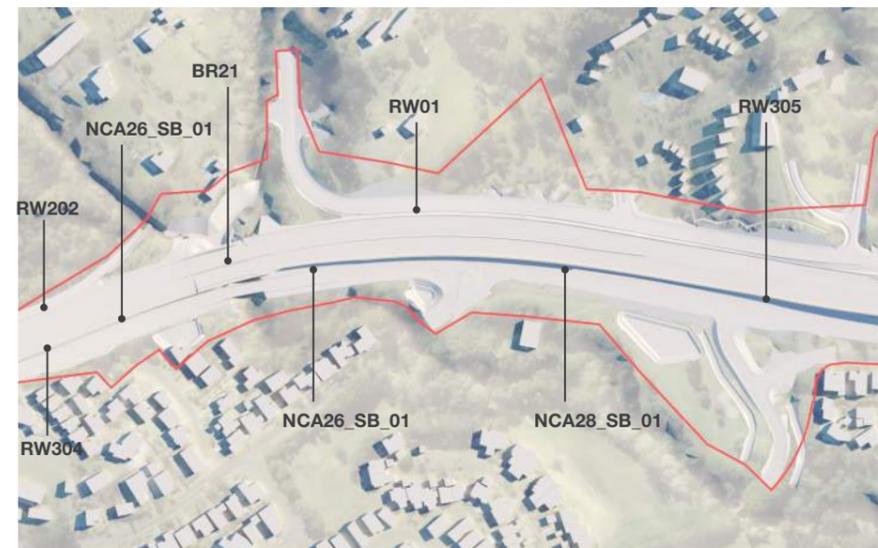


FIG B.103 21ST JUNE 9AM

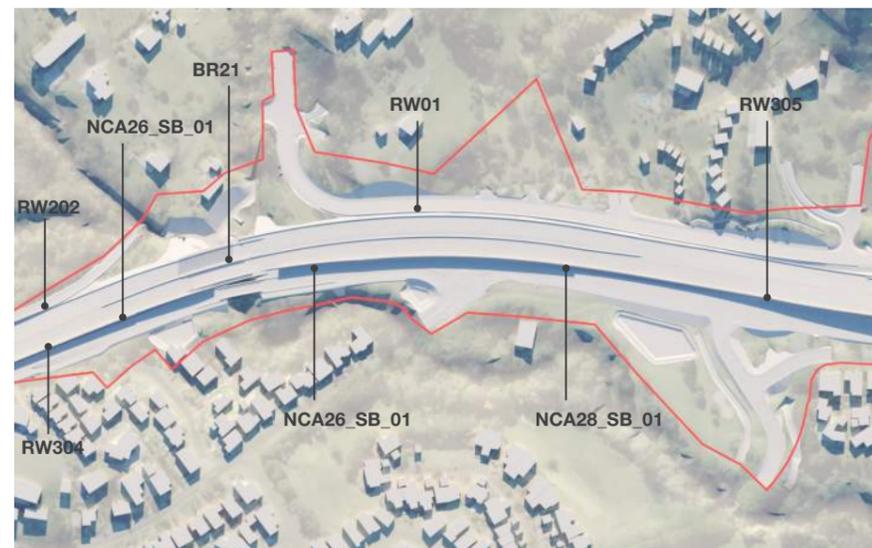
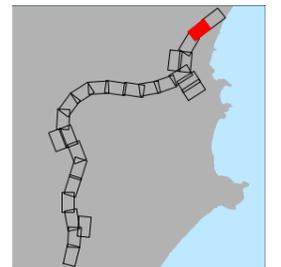


FIG B.104 21ST JUNE 1PM



FIG B.105 21ST JUNE 3PM



Design elements

Noise walls

- Noise wall NW28 has decreased in length by 9m and increased in height by 0.5m.

Retaining Wall

- RW305 - Replacement - 0.62m increase in length, 0.3m increase in height.
- RW18 - Amended - 6m increase in length, 0.9m decrease in height.
- RW19 - Amended - 7m increase in length, 2.8m decrease in height.
- RW306 - Replacement - 0.6m decrease in length, 0.6m decrease in height.
- RW45 - Amended - 19.5m increase in length, 3.1m increase in height
- RW50 - Amended - 78.1m decrease in length, 2m decrease in height.
- RW303 - Replacement - 31.8m decrease in length, 1.3m decrease in height.

Potential impacts

Overshadowing arising from the increase in noise wall height are anticipated to be limited to the construction footprint.

Assessment consistent with the EIS assessment.

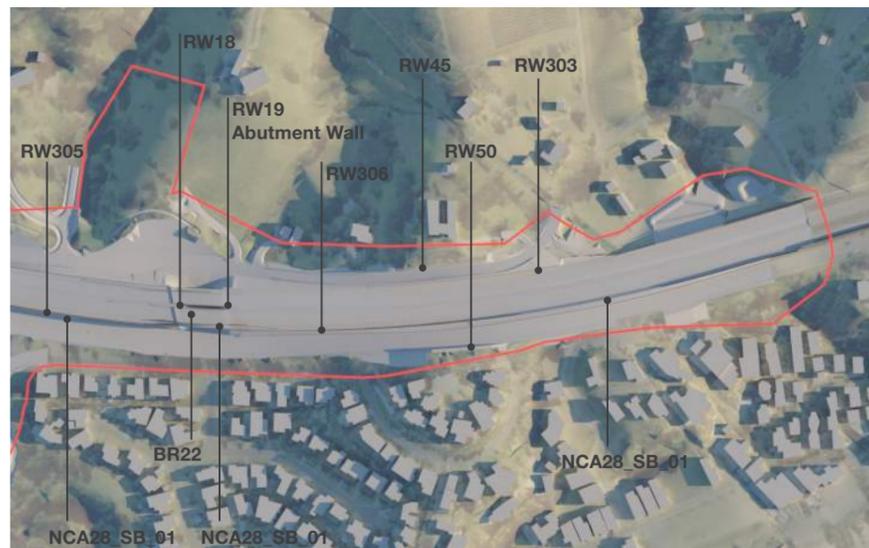


FIG B.106 21ST JUNE 7AM

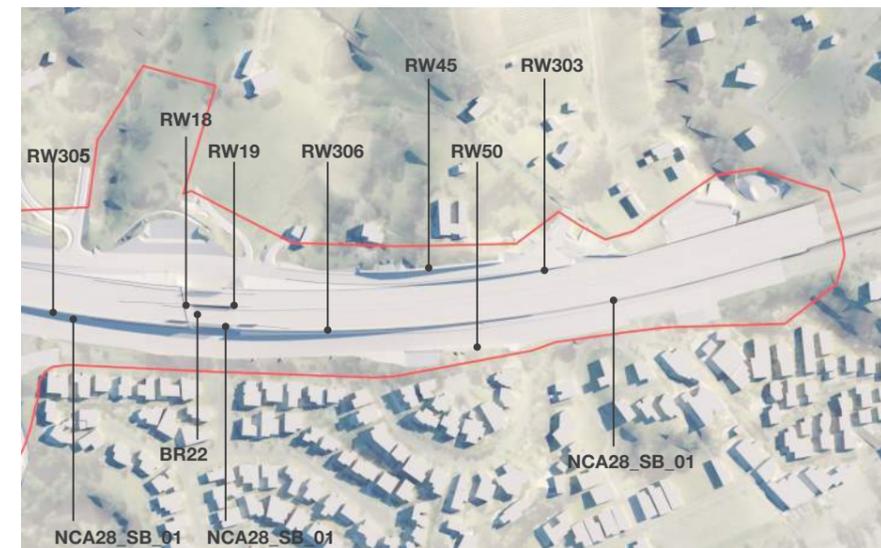


FIG B.107 21ST JUNE 9AM

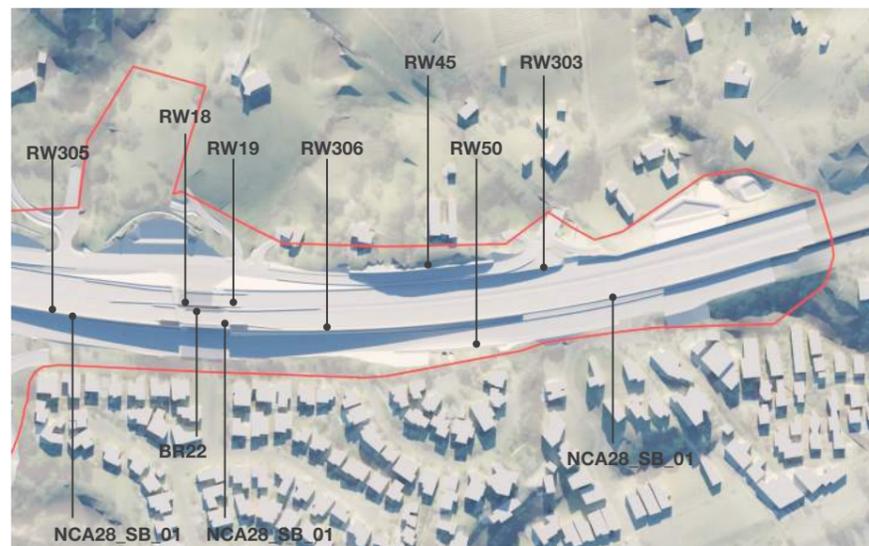
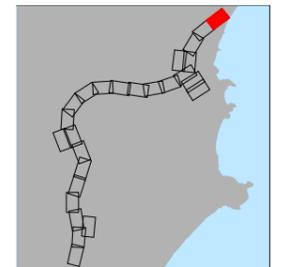


FIG B.108 21ST JUNE 1PM

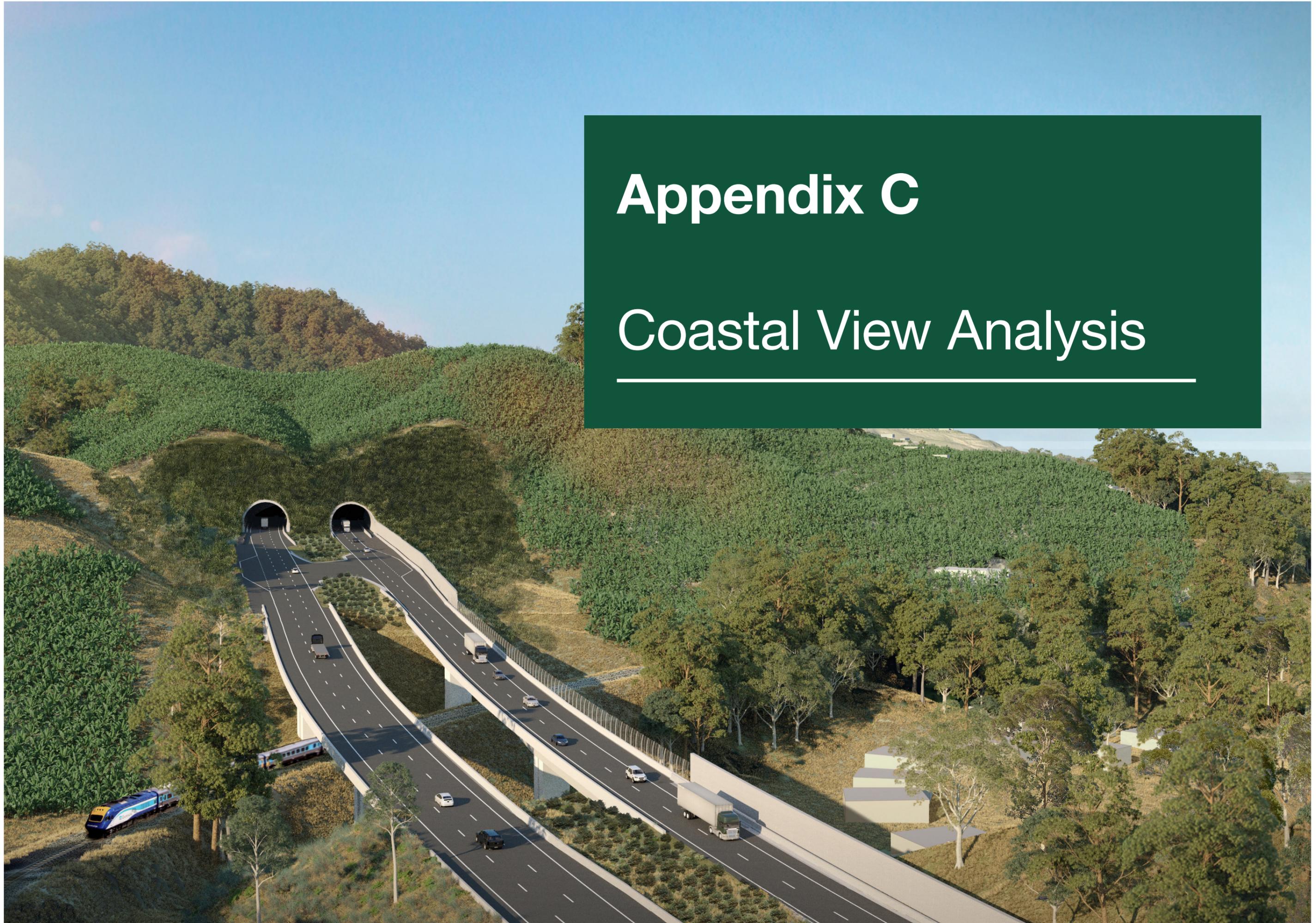


FIG B.109 21ST JUNE 3PM



Appendix C

Coastal View Analysis





Coastal views

Methodology

The methodology for the assessment of the amended design has been carried out in accordance with the methodology used for the EIS (refer to Urban Design, Landscape Character and Visual Impact Assessment Report, Arup 2019). This includes the following steps:

- A 3D terrain model was created using 2m DEM derived from C3 LiDAR data downloaded from ELVIS - Elevation and Depth - Foundation Spatial Data (<http://elevation.fsdf.org.au>)
- VEMs have been generated from properties situated to the west of the project, representing the extent of visibility
- The amended design VEMs have been compared against the EIS design VEMs.

Limitations

- Whilst every effort has been used to create an accurate model, the approximation of dwelling height and form means that the output should only be used as a guide
- The proposed landscape planting illustrated within the landscape design has not been included within the 3D analysis due to the variation in vegetation establishment and to assist with analysing coastal views on completion of the works. It should be noted that the proposed planting has the potential to screen or filter coastal views as the vegetation matures
- The purpose of this study is to determine impacts on properties with existing coastal views. Properties without views of the coastline and the ocean have not been included within this study.

Summary

The amended design coastal view analysis identified one property, property 102, which has the potential to experience a change in coastal views in comparison to the EIS design.

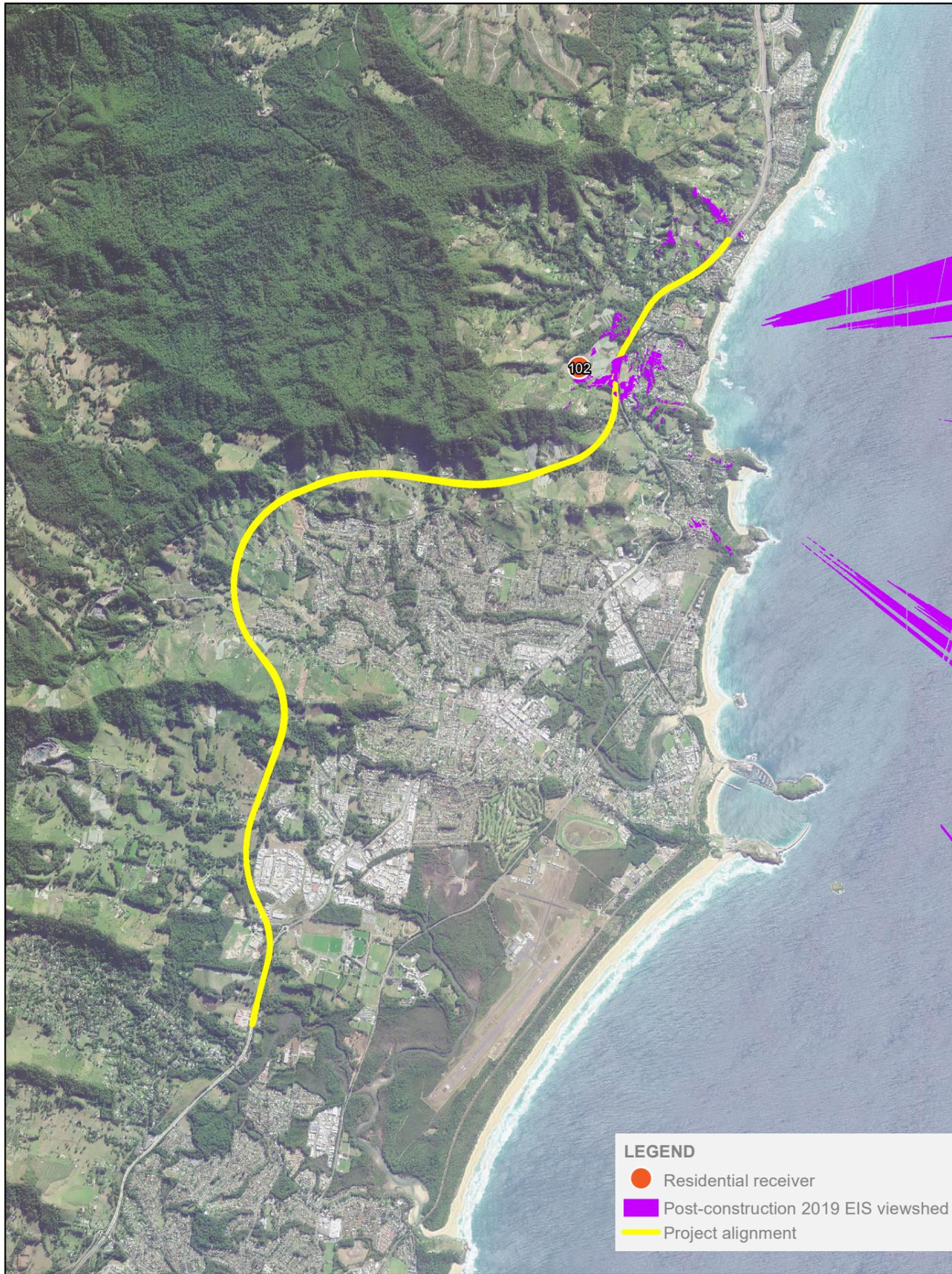
Property 102 review

The amended design results in an altered vertical alignment, increasing the height of the project by approximately 10m within the property view line. In addition, the amended design includes a reduction in the construction footprint in areas, which results in a reduced vegetation clearance area. The vegetation which is retained as part of the amended design offers a degree of visual screening for this property, reducing the extent of coastal view in comparison to the EIS design.

In comparison to the view currently experienced by the property, the amended design is considered to align the proposed coastal view more closely with the properties current situation.

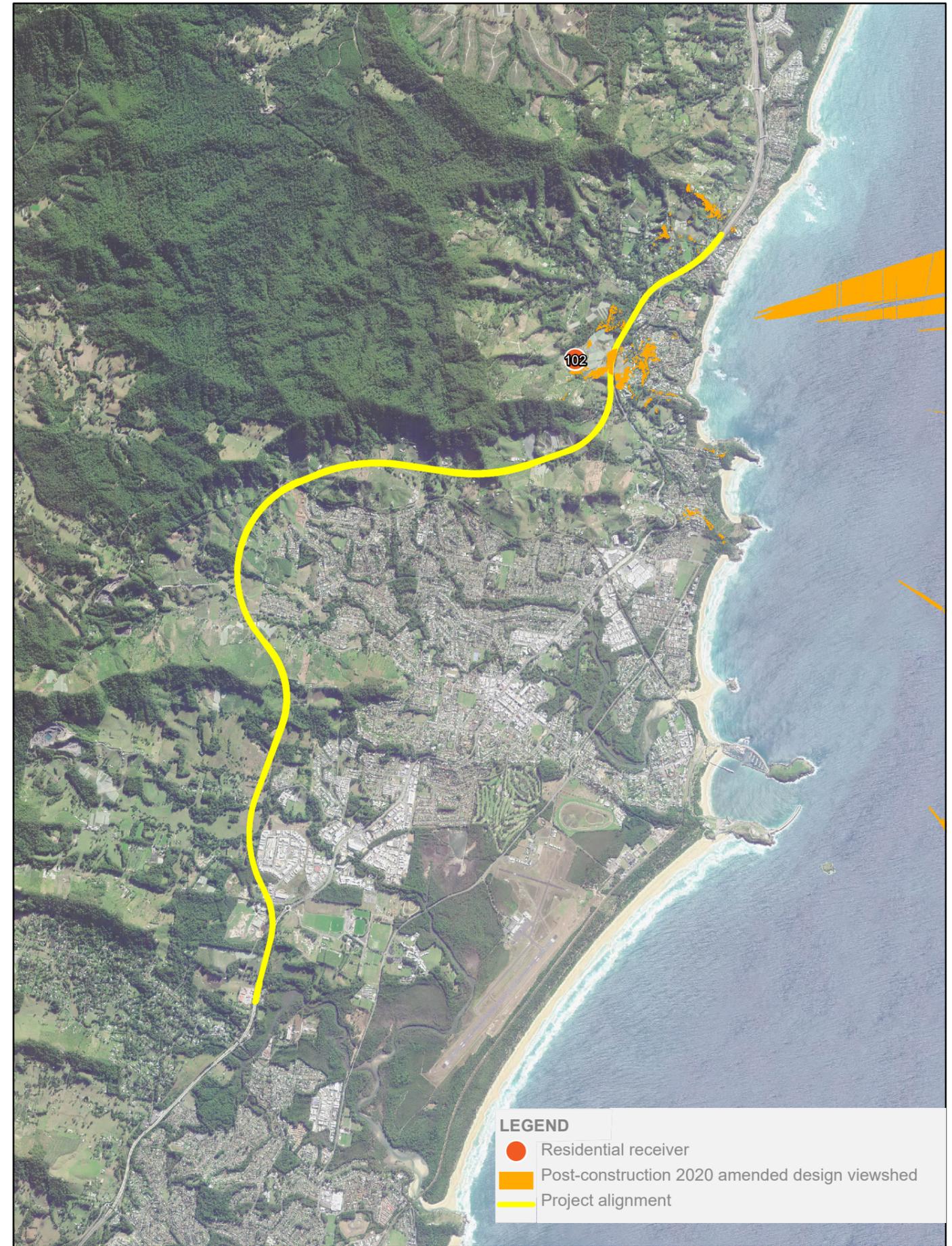


Property ocean view analysis run on a pre-construction amendment report elevation model



Property ocean view analysis run on a post-construction 2019 EIS elevation model

SCALE @A3 - 1:60,000
 0 750 1500m
 Grid: GDA 1994 MGA Zone 56



Property ocean view analysis run on a post-construction 2020 amended design elevation model

SCALE @A3 - 1:60,000
 0 750 1500m
 Grid: GDA 1994 MGA Zone 56