

Jervis Bay Road Intersection Upgrade

Landscape character and visual impact
assessment supplementary paper

FINAL

Prepared for Transport for NSW | Spackman Mossop Michaels | 17 November 2021

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1. Introduction

1.1 Purpose of this paper

Transport for NSW (TfNSW) proposes to upgrade the intersection of Jervis Bay Road and the Princes Highway in the vicinity of Falls Creek, NSW. The intersection is located about 12 kilometres south of Nowra within the City of Shoalhaven local government area (LGA).

Jervis Bay Road provides the main east-west link from the Princes Highway to the coastal villages of Huskisson, Vincentia, Hyams Beach and Jervis Bay. The intersection of the Princes Highway and Jervis Bay Road has some of the highest traffic volumes south of Nowra and has been the location of multiple crashes and injuries. The proposal aims to provide a safer and more reliable intersection which is consistent with other planned upgrades of the Princes Highway further south.

The proposal forms part of the Princes Highway Upgrade Program and aligns with several strategic planning documents, such as *Future Transport 2056*, the *NSW Road Safety Strategy 2021*, the *Illawarra Shoalhaven Regional Plan*, and the *NSW Tourism and Transport Plan*.

The preferred option involved a grade separated interchange with a through alignment for the Princes Highway and with network access to Jervis Bay Road and the Old Princes Highway provided via dual at grade roundabouts serviced by on and off ramps. A Review of Environmental Factors (REF) was prepared for planning approval and placed on exhibition from 18 June 2021 to 25 July 2021.

Supporting the REF was the *Princes Highway Upgrade Program/ Jervis Bay Road Intersection Upgrade Urban Design Report and Landscape Character and Visual Impact Assessment (LCVIA)* prepared by Spackman Mossop Michaels for TfNSW in May 2021.

TfNSW has prepared a Submissions Report that addresses issues raised in submissions received during the exhibition of the REF. It also describes and assesses a number of proposed design refinements.

This *Landscape character and visual impact assessment supplementary paper* (this paper) forms an appendix to the Submissions Report and details any changes to the landscape character and visual impact assessment as a result of the design refinements undertaken since the REF. The purpose of this paper is to assess the revised design to determine whether the design refinements would:

- Be consistent with the urban design objectives and principles adopted for the upgrade (**Section 2**)
- Result in any changes to the landscape character and visual impacts identified in the LCVIA (**Section 3**).

In doing so, this paper focuses on areas of change between the REF design and the revised design. Changes are outlined in **Section 1.3** and further elaborated on where appropriate in **Section 3**. The assessment of the refined proposal design uses the same methodology as the assessment of the REF design. For a description of the assessment methodology refer to Section 1.6 of the LCVIA.

Aspects and elements of the design that have not changed since the REF are not discussed or assessed in this paper, as they have previously been assessed in the LCVIA. This paper should therefore be read in conjunction with the REF and the LCVIA which provides the landscape character and visual impact assessment for the majority of the design.

1.2 Proposal description

Key features of the proposal, as presented in the REF, include:

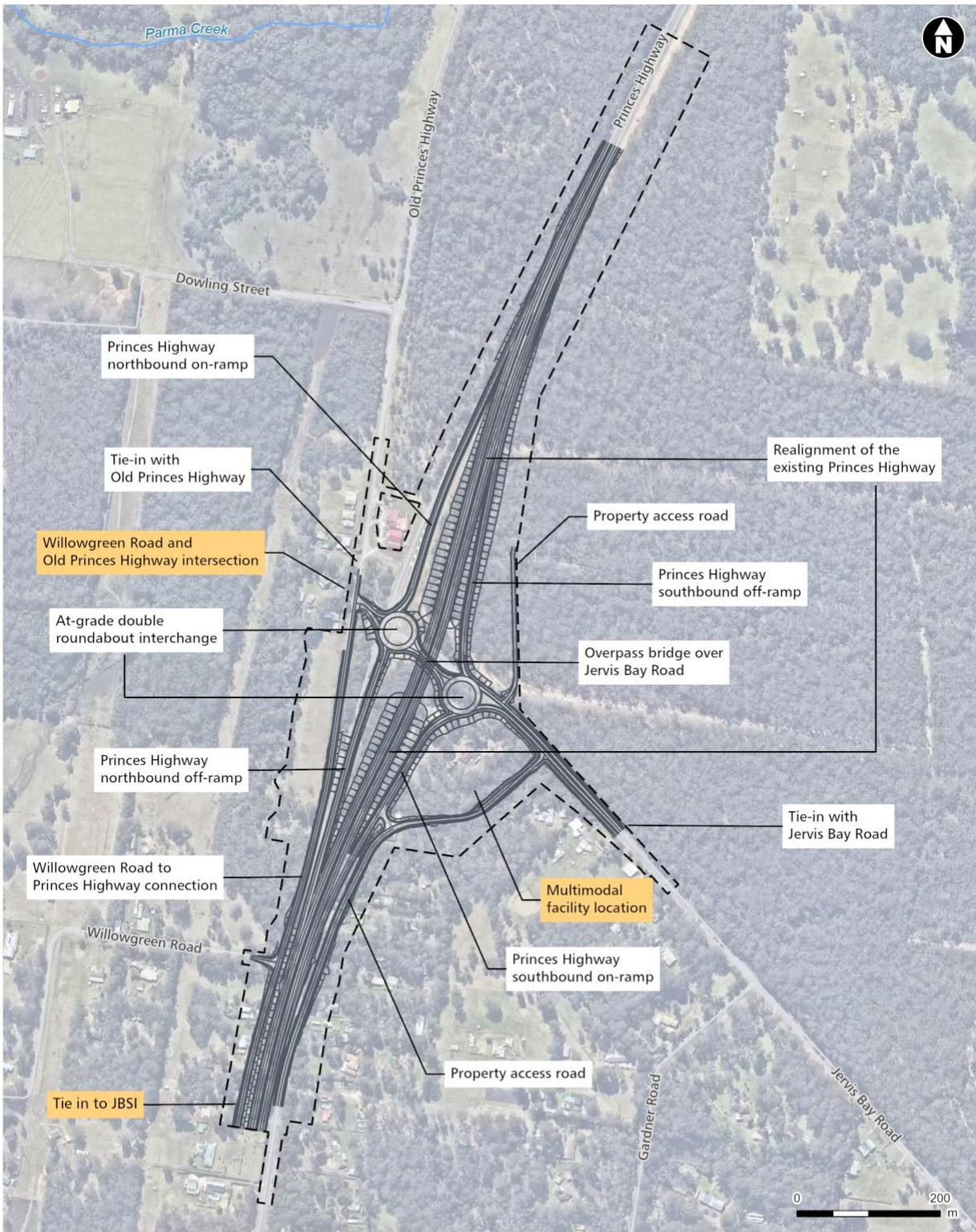
- A new intersection between Jervis Bay Road and the Princes Highway, incorporating:
 - Realignment of the existing Princes Highway, including widening from two lanes to a four-lane divided highway (two lanes in each direction) to provide an uninterrupted through alignment for the Princes Highway
 - An overpass bridge over Jervis Bay Road
 - An unsignalised single-lane at-grade double roundabout interchange providing:
 - Direct access from Jervis Bay Road and Old Princes Highway to the Princes Highway
 - Direct access from the Princes Highway to Jervis Bay Road and Old Princes Highway
 - Direct connection to existing properties and businesses at the Old Princes Highway
 - A connection from Willowgreen Road to the Old Princes Highway
 - Tie-ins with the Old Princes Highway and with Jervis Bay Road
- Access road to service Princes Highway properties south east of the intersection
- Shared user paths along Jervis Bay Road, connecting to the new bus bay and Jervis Bay Road and Old Princes Highway road shoulders
- Adjustments of drainage infrastructure and provision of new drainage infrastructure such as pit and pipe networks, culverts, open channels and retention basins
- Permanent water quality measures such as vegetated swales, bioretention swales and bioretention basins
- Adjustment, protection and relocation of existing utilities
- Other roadside furniture including safety barriers, signage, line marking, lighting and fencing
- A bus bay adjacent to the interchange, including kiss and ride car spots
- Establishment and use of temporary ancillary facilities during construction
- Property works including acquisition, demolition and adjustments to accesses, and at property noise treatments (where applicable)
- Rehabilitation of disturbed areas and landscaping.

1.3 Revised design

TfNSW have identified a number of design changes to the proposal since public display of the REF. These changes have arisen through the ongoing development of the concept design and in response to issues raised during the REF exhibition period. The changes are:

- Inclusion of a multi-modal transport facility (**Section 1.3.1**)
- Adjustment to the Jervis Bay Road to Sussex Inlet Road upgrade tie-in (**Section 1.3.2**)
- Willowgreen Road intersection refinement (**Section 1.3.3**)
- Elimination of an ancillary facility on Jervis Bay Road (**Section 1.3.4**).

Some of these changes to the proposal have resulted in a change to the proposal construction footprint. The revised proposal is shown in **Figure 1-1**.



— The proposal (updated design)
 [- -] Proposal construction footprint (revised)
 [Orange box] Indicates revisions to the proposal



Figure 1-1: The revised proposal

1.3.1 Inclusion of a multi-modal transport facility

The proposal as described in the REF includes provision of a bus bay with adequate space for two buses and two kiss and ride (i.e. drop off) spots. The REF also noted that a space-proofing assessment had been completed to ensure a multi-modal interchange could be provided in the future should the need be identified.

Following further investigation, TfNSW have considered a multi-modal transport facility as part of the proposal. Subject to identified need and funding availability, the proposed bus bay and kiss and ride spots described in the REF would be expanded or modified to include additional multi-modal transport facilities.

The multi-modal transport facility would be located southeast of the Jervis Bay Road intersection adjacent to the eastern roundabout wholly within the proposal construction footprint identified within the REF. The facility would be accessed from the southbound on ramp via a one way road that would connect in to Jervis Bay Road. The design and layout of the facility would be determined during detailed design and is planned to include:

- Bus bays, for around four buses
- Kiss and ride spots, for around five vehicles
- Car parking, for around 50 vehicles
- Bicycle racks, for around 30 bicycles
- Bus shelters, including seating for up to 20 people
- Lighting.

The multi-modal transport facility features listed above have been used to inform this assessment.

1.3.2 Adjustment to the Jervis Bay Road to Sussex Inlet Road upgrade tie-in

The planning and design of the Jervis Bay Road to Sussex Inlet Road upgrade (JBSI), a separate proposal that is part of TfNSW's Princes Highway Upgrade Program, is currently underway. The proposed JBSI upgrade would tie in to the southern end of the Jervis Bay Road intersection upgrade proposal.

The proposed JBSI tie-in alignment has been further developed since the time of REF public display. Following further JBSI design work, the alignment has been moved further to the west and, as a result, the proposal construction footprint and ultimate proposal design has been revised. These changes are shown in **Figure 1-2**. Separate environmental assessment and approval would be carried out for the JBSI upgrade.

Work to facilitate the tie-in may include:

- Earthworks and pavement work to join the two sections of highway
- Public utility adjustments and Intelligent Transport System (ITS) connections to enable tie-in completion
- Drainage work associated with tie-in, including basins, drains, channels and swales
- Installation of roadside furniture such as lighting, safety barriers, line marking, traffic signs and fencing, as described in Table 3-2 of the REF.

A two lane, two way connection to the existing Princes Highway and a cul-de-sac property access road on the eastern side of the highway would be provided in the interim until the future JBSI upgrade is completed, as described in the REF. The property access road would then connect to the existing Princes Highway under the ultimate design.

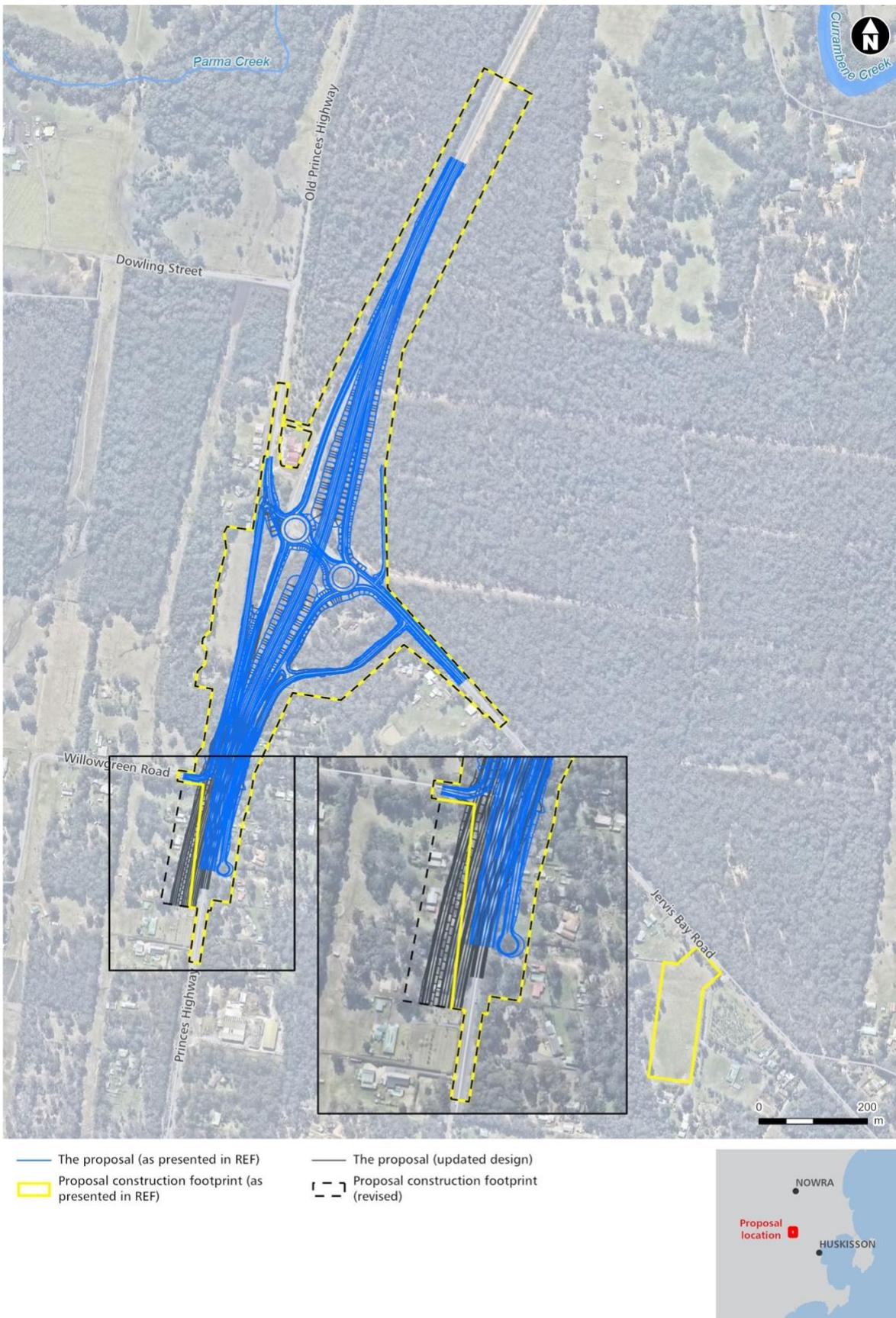


Figure 1-2: Updated proposal construction footprint and design

1.3.3 Willowgreen Road intersection refinement

As described in the REF, the Willowgreen Road access to the Princes Highway would be relocated to the proposed at grade roundabout interchange. The proposed design assessed in the REF shows a tight curve through alignment for connection to the Old Princes Highway near the western roundabout. The design has since been optimised to a T-intersection, as shown in **Figure 1-3**.

The T-intersection is suitable for a 12.5 metre single unit check vehicle and achieves relevant sight distance criteria. The updated design provides improved accessibility for larger vehicles, including school buses and service vehicles.

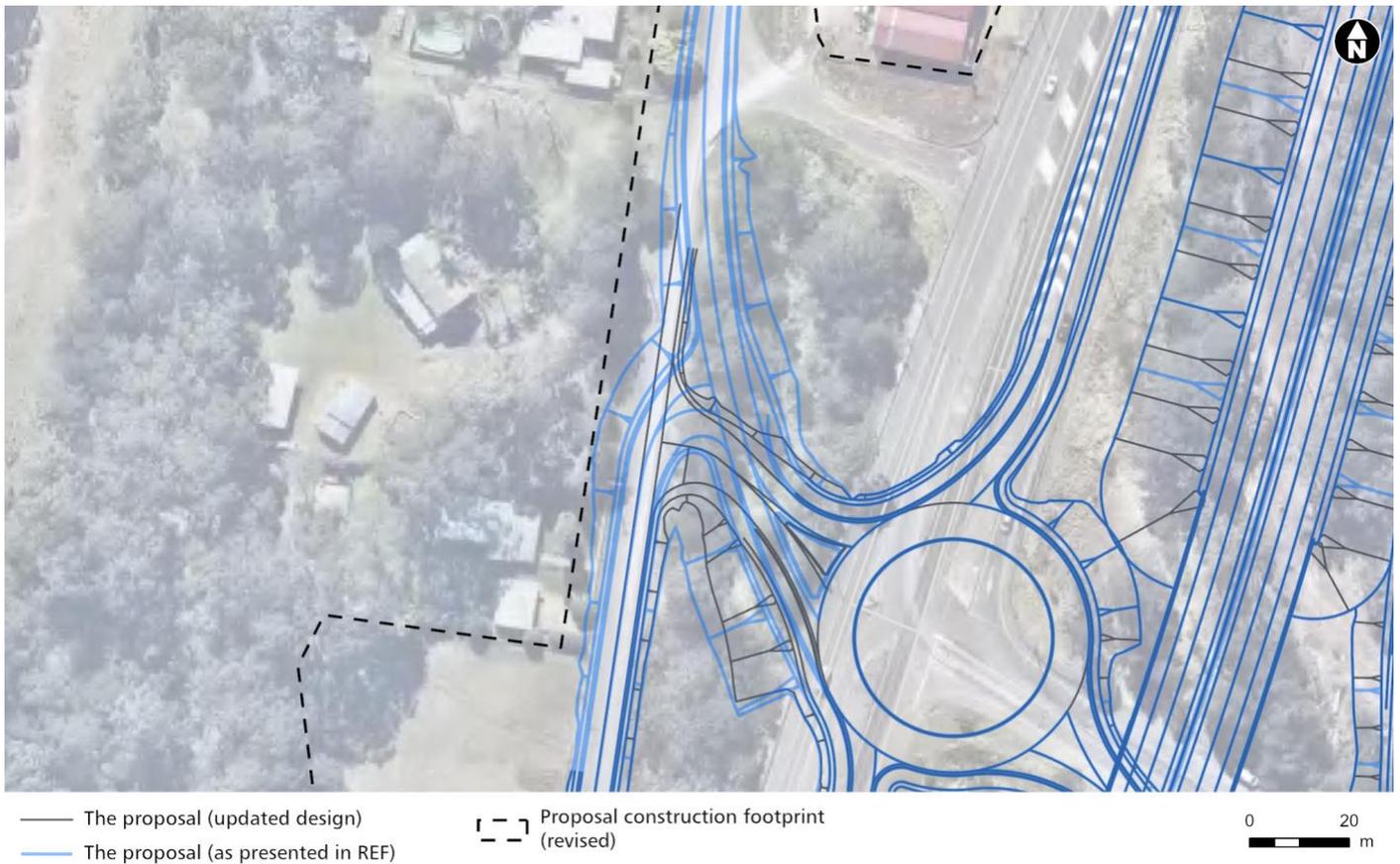


Figure 1-3: Willowgreen Road intersection updated T-intersection design

1.3.4 Removal of an ancillary facility on Jervis Bay Road

The provision for an ancillary facility on Jervis Bay Road was assessed in the REF. This site will no longer be used for the proposal, and therefore is not included in the revised proposal construction footprint.

2. Urban design strategy

2.1 Introduction

An urban design strategy was included in Section 3 of the LCVIA. The urban design strategy comprises of urban design objectives and principles, as well as a series of strategies developed in order to:

- Reduce the potential visual impacts of the proposal
- Ensure the proposal integrates well with the surrounding natural, built and community context.

These strategies guide the design of proposal elements such as the bridge and retaining walls, embankments, pedestrian and cyclist connections and revegetation to assist in maintaining the existing character of the local area.

The purpose of the urban design strategy is to articulate how urban design can contribute to the successful achievement of the overall proposal objectives.

2.2 Assessment of design changes against the proposal urban design strategy

An urban design strategy for the proposal was described in the LCVIA. The proposal urban design strategy is comprised of urban design objectives and principles as well as design strategies that were adopted to achieve the urban design objectives and principles.

Table 2-1 lists the urban design objectives, principles and design strategies for the Jervis Bay Road intersection upgrade as described in the LCVIA and determines whether the refined design remains consistent with the urban design strategy.

Table 2-1: Consistency of the revised proposal design with the urban design strategy

Aspect of the urban design strategy (from LCVIA)	Assessment of consistency of the refined design
<p>OBJECTIVE 1</p> <p>Achieve a proposal that fits sensitively within the existing environment as well as other Princes Highway upgrades.</p> <p>Principles:</p> <ul style="list-style-type: none">• Maintain and reinforce the existing landscape character including existing land uses, views and spatial character• Maximise local native vegetation, through minimising the proposal footprint and maximising revegetation, to maintain ecological values and assist in biodiversity protection and recovery• Use distinct vegetation to mark the approach to and arrival at the intersection	<p>The refined design is consistent with Objective 1 in respect of all design changes.</p> <p>The implementation of the design principles for objective 1 will not be impeded as a result of the design refinements.</p>

Aspect of the urban design strategy (from LCVIA)	Assessment of consistency of the refined design
<ul style="list-style-type: none"> Respond to other Princes Highway upgrades in terms of planting and materials Consider the selection of materials including their form, texture and colour, in the design process to achieve an integrated structure that is complementary to the setting and minimises visual impact Planting and material selection to be low maintenance, and be easily accessible for maintenance purposes. 	
<p>OBJECTIVE 2</p> <p>To ensure the proposal is integrated and responsive with the surrounding landform.</p> <p>Principles:</p> <ul style="list-style-type: none"> Design major proposal elements and earthworks to integrate into the existing natural topography Design structures as a simple and elegant, which avoid unnecessary bulk and clutter. 	<p>The refined design is consistent with Objective 2 in respect of all design changes.</p> <p>The implementation of the design principles for objective 2 will not be impeded as a result of the design refinements.</p>
<p>OBJECTIVE 3</p> <p>Contribute to the accessibility and connectivity into and through the area.</p> <p>Principles:</p> <ul style="list-style-type: none"> Design the intersection so that it is legible and easy to navigate Provide safe, convenient and comfortable access for local residents to adjacent land uses and bus stops Maximise the accessibility and connectivity for pedestrians and cyclists across and along the road corridor. 	<p>The refined design is consistent with Objective 3 in respect of all design changes.</p> <p>The implementation of the design principles for objective 3 will not be impeded as a result of the design refinements.</p> <p>The revised proposal will further enhance accessibility and connectivity through the provision of the multi-modal transport facility which increases available transport options, delivering an improved outcome.</p>
<p>OBJECTIVE 4</p> <p>Minimise impacts on the public realm and surrounding land uses</p> <p>Principles:</p> <ul style="list-style-type: none"> Use screen planting to provide visual privacy and reduce the scale of infrastructure for residential properties Ensure all lighting and signage is unobtrusive in the landscape, including at night 	<p>The refined design is consistent with Objective 4 in respect of all design changes.</p> <p>The implementation of the design principles for objective 4 will not be impeded as a result of the design refinements.</p>

Aspect of the urban design strategy (from LCVIA)	Assessment of consistency of the refined design
<ul style="list-style-type: none"> Planting to consider bushfire resilience strategies in terms of species selection, location and density. 	
<p>STRATEGIES ADOPTED TO ACHIEVE THE URBAN DESIGN OBJECTIVES AND PRINCIPLES:</p> <ul style="list-style-type: none"> Re-vegetate disturbed areas with a planting palette that responds to the existing plant communities and Shoalhaven Council’s suggested species list Use vegetation to help provide an enclosed spatial experience within the road corridor while maintaining required sight lines Signal the approach to the intersection through feature tree planting of species local to the area. The species are to be resolved during detailed design but may include <i>Corymbia gummifera</i> (Red Bloodwood) and <i>Corymbia maculata</i> (Spotted Gum) Use distinct native trees within the town of Falls Creek to differentiate from the proposal and respond to the existing character and provide visual interest Use accent planting near the bridge to signal the arrival at the intersection Use dense vegetation to help screen the proposal from existing properties Embankments to be integrated in to the natural landform and setting, where practicable, with gentle slopes and consistent planting with the adjoining landscape Materials of the bridge to respond to the existing rural context as well as other bridges along Princes Highway The shared path to be set back from the road, where possible, with planting and canopy trees to provide shade Safe pedestrian access which responds to Crime Prevention through Environmental Design (CPTED) principles including lighting and passive surveillance A shade structure and seating to be provided at the bus stop Property access to be maintained and fences reinstated/upgraded. 	<p>The refined design is consistent.</p> <p>The implementation of the design strategies will not be impeded as a result of the design refinements.</p> <p>The revised proposal will provide increased and enhanced public transport facilities relative to the shaded bus stop and seating included in the REF design.</p>

The assessment in **Table 2-1** demonstrates that the refined proposal design performs at least equally well against all aspects of the urban design strategy. Relative to the REF design, the revised design performs better against objective 3 by delivering enhanced accessibility and connectivity through the provision of the multi-modal transport facility which will increase available transport options.

3. Assessment of design refinements

3.1 Landscape character assessment

3.1.1 Overview of landscape character zones

The LCVIA identified three landscape character zones (LCZs) within the study area (**Figure 3-1**). **Table 3-1** identifies the location of proposal design refinements relative to the LCZs. The table highlights that there is a need to review the potential landscape character impacts of the proposal on LCZ 1 and LCZ 2 in order to ascertain whether the proposed design refinements would result in a change to the impact rating identified in the LCVIA.

Table 3-1: Proposal design refinements relative to landscape character zones

Landscape character zone	Proposed design refinements
LCZ 1 – Rural residential	<ul style="list-style-type: none">• Elimination of the ancillary facility on Jervis Bay Road• Inclusion of a multi-modal transport facility south-east of the intersection• Re-alignment of the proposal to the west to tie in with the Jervis Bay Road to Sussex Inlet upgrade.
LCZ 2 – Mixed use	<ul style="list-style-type: none">• Change to the Willowgreen Road/Old Princes Highway intersection configuration.
LCZ 3 – Bushland	<ul style="list-style-type: none">• Change to the Willowgreen Road/Old Princes Highway intersection configuration.

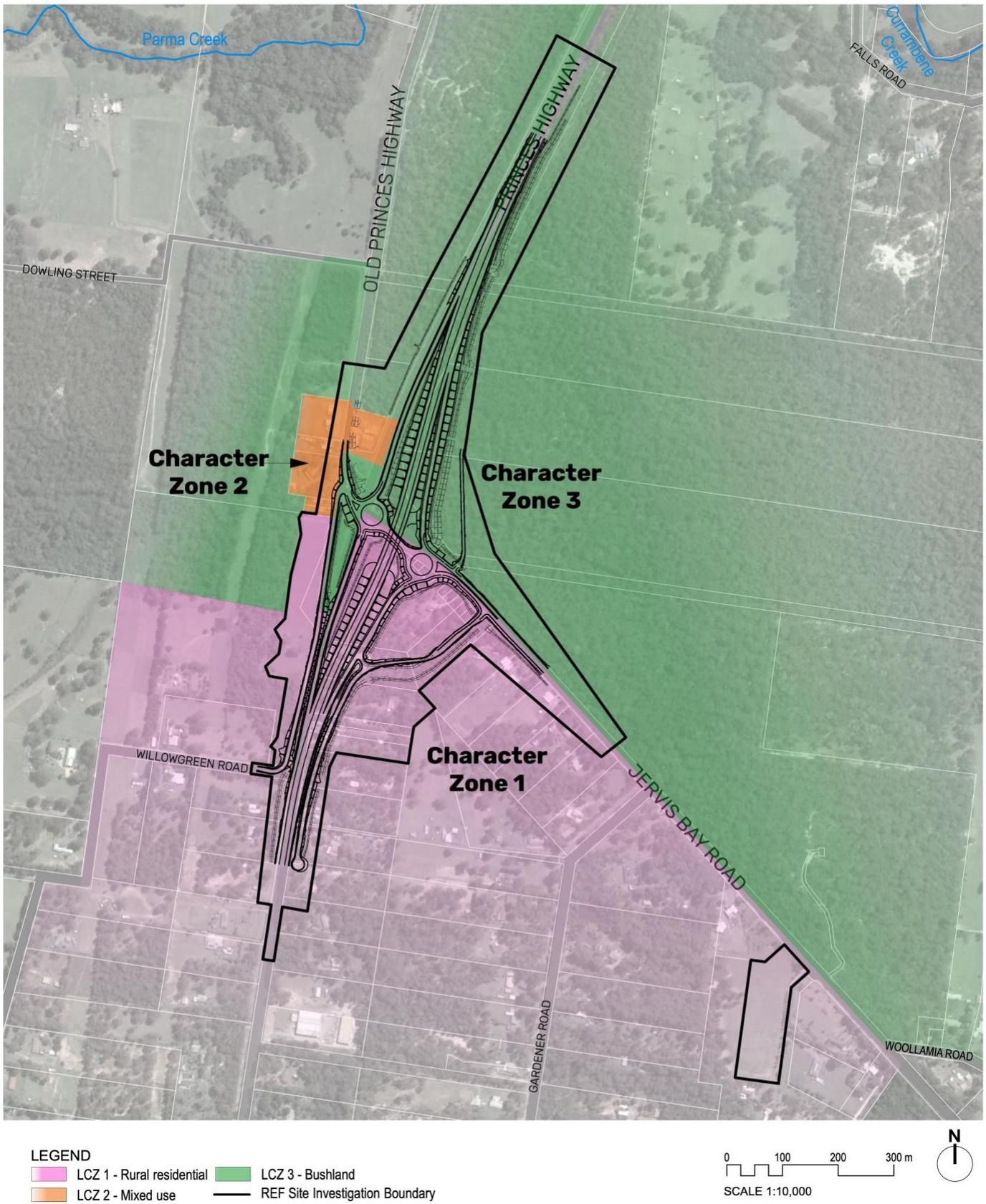


Figure 3-1: Landscape character zones in the study area as per the LCVIA

3.1.2 Assessment of magnitude of the revised design

The following sections provide an assessment of the magnitude of the revised proposal design, relative to the REF design. Changes in the landscape character impact rating would result from changes to the proposal's magnitude in any given LCZ. Also refer to the assessment methodology in Section 1.6 of the LCVIA.

LCZ 1 – Rural Residential

The magnitude of the proposed Jervis Bay Road intersection upgrade in this zone was assessed as high in the LCVIA, the highest rating available within the assessment methodology. The proposed design changes would therefore not further increase the magnitude of the proposal in this zone. While the impact of the proposal on LCZ 1 as a whole remains consistent with the REF design, the revised design would lead to locally perceptible higher long-term impacts including the removal of dwellings located west of the Princes Highway within the construction footprint.

The provision of the multi-modal transport facility reduces the extent to which bushland would be able to be restored relative to what the LCVIA urban design concept envisaged. Consistent with the LCVIA, the portions of the site not required for the multi-modal transport facility would be revegetated with vegetation representative of the Red Bloodwood – Hard-leaved Scribbly Gum – Silvertop Ash open forest community (PCT 1082). This would assist in maximising the realisation of the urban design concept including assisting biodiversity protection and recovery.

The elimination of the ancillary facility on Jervis Bay Road would somewhat reduce the temporary magnitude of impact during construction but would not alter the impact resulting from operation of the proposal. The operational landscape character impact of the revised design remains consistent with the REF design.

LCZ 2 – Mixed use

The proposed modification of the Willowgreen Road/Old Princes Highway intersection is expected to deliver a more accessible connection for larger vehicles and therefore constitutes a beneficial change relative to the REF design. The footprint of the optimised intersection configuration is more closely aligned with the existing intersection footprint. The magnitude of the proposed works in this zone continues to remain low.

LCZ 3 - Bushland

The proposed modification of the Willowgreen Road/Old Princes Highway intersection would be more closely aligned with the existing intersection footprint, potentially reducing the amount of vegetation clearing that would be required. This constitutes a beneficial change relative to the REF design. However relative to the level of change throughout this zone, the potential reduction in cleared vegetation is relatively minor. . There would be no change to the magnitude of the proposal within LCZ 3. Magnitude continues to remain high.

3.1.3 Summary of landscape character impacts

Table 3-2 provides a comparison of the potential landscape character impacts associated with the REF design and with the revised design. The table illustrates that the revised proposal design would not alter the magnitude of the proposed works within each of the three LCZs. Consequently, proposal refinements would not result in any changes to the landscape character impact ratings identified in the LCVIA.

Table 3-2: Landscape character impact comparison

Landscape character zone	Sensitivity	Magnitude		Landscape character impact rating
		REF design	Revised design	
LCZ 1 – Rural residential	Moderate	High	High	High - moderate
LCZ 2 – Mixed use	Moderate	Low	Low	Moderate - low
LCZ 3 – Bushland	High	High	High	High

3.2 Visual impact assessment

3.2.1 Viewpoint overview

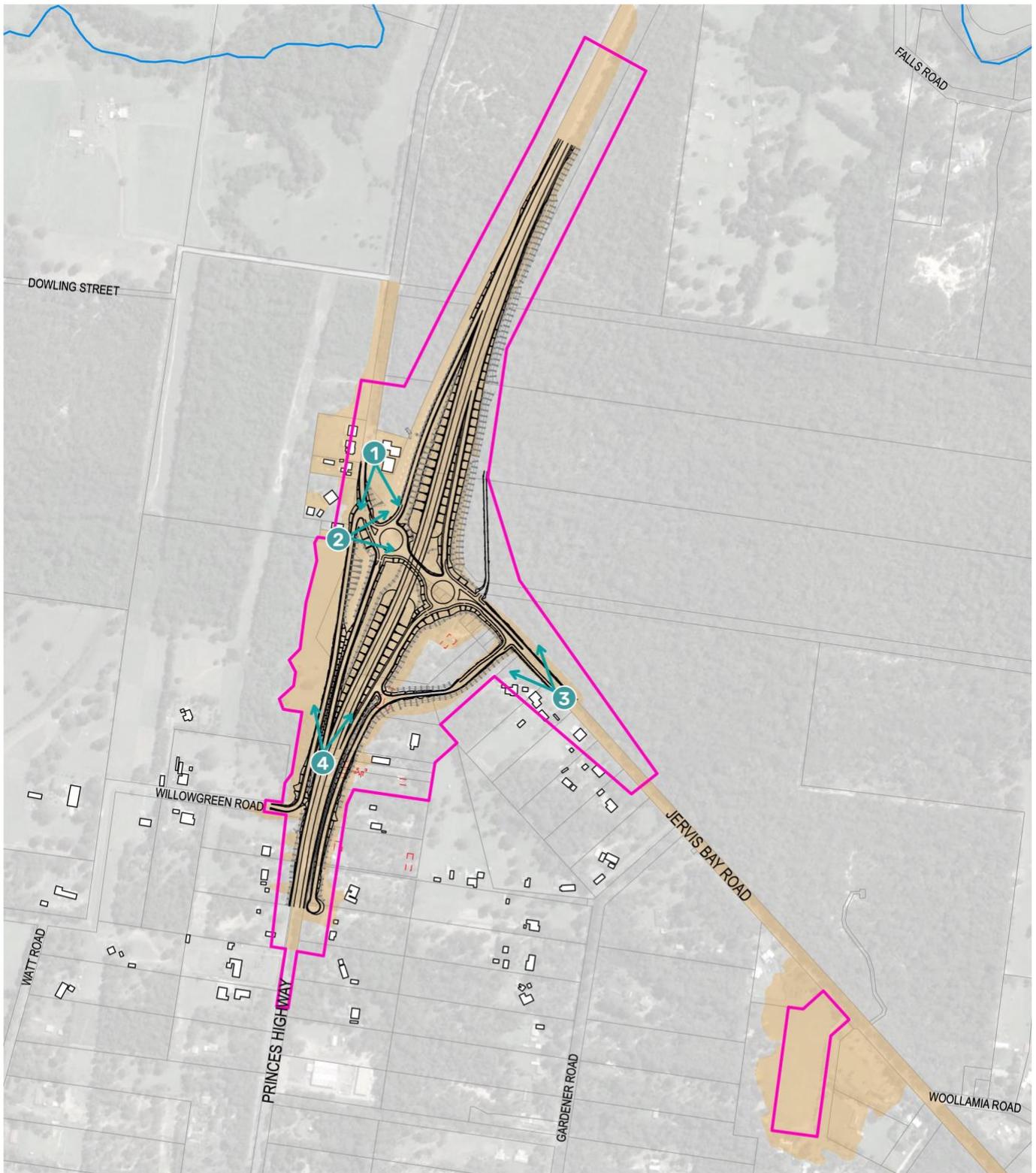
The LCVIA identified the potential visual impact of the proposed Jervis Bay Road intersection upgrade through the selection and assessment of four representative viewpoints within the proposal’s visual envelope (**Figure 3-2**). It is noted that the visual envelope of the refined proposal would increase as a result of the inclusion of the multi-modal transport facility: the site of the multi-modal transport facility would be included within the visual envelope of the revised proposal design.

Table 3-3 identifies the viewpoints that would potentially see the proposed design refinements. The table highlights that there is a need to review the potential visual impacts of the proposal on viewpoints 1, 3 and 4 in order to ascertain whether the proposed design refinements would result in a change to the impact ratings identified in the LCVIA.

Table 3-3 further illustrates that all proposed design changes would be visible from the viewpoints selected for assessment as part of the LCVIA (**Figure 3-2**). It should be noted that the assessed viewpoints are representative of a range of similar views nearby, as outlined in the methodology in Section 1.6 of the LCVIA. This confirms that the existing viewpoints are sufficient to assess the potential visual impacts of the revised design, in accordance with TfNSW policy as set out in the *Guideline for landscape character and visual impact assessment, Environmental impact assessment practice note EIA-N04* (TfNSW 2020).

Table 3-3: Viewpoints and proposal design refinements

Viewpoint	Design refinements potentially visible from viewpoint
1: Jervis Bay Stock Feeds driveway (125 Old Princes Highway) looking south-east	<ul style="list-style-type: none">• Change to the Willowgreen Road/Old Princes Highway intersection configuration.
2: Residence at 142 Old Princes Highway looking east	<ul style="list-style-type: none">• No design refinements visible within this view.
3: Driveway at 40 Jervis Bay Road looking west	<ul style="list-style-type: none">• Inclusion of a multi-modal transport facility south-east of the intersection
4: Existing Princes Highway north of Willowgreen Road looking north	<ul style="list-style-type: none">• Inclusion of a multi-modal transport facility south-east of the intersection• The re-alignment of the proposal to the west to tie in with the Jervis Bay Road to Sussex Inlet upgrade would be visible from views nearby for which viewpoint 4 is representative.



LEGEND

- Visual catchment
- 1 Viewpoint
- REF Site Investigation Boundary

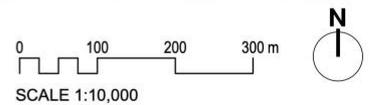


Figure 3-2: Visual envelope of the proposal and viewpoint assessed in the LCVIA

3.2.2 Assessment of magnitude of the revised design

The following sections provide an assessment of the magnitude of the revised proposal design within each viewpoint, relative to the REF design. The assessment methodology in Section 1.6 of the LCVIA was considered for this assessment. Changes in the visual impact rating would result from changes to the proposal's magnitude in any given view.

Viewpoint 1 - Jervis Bay Stock Feeds driveway (125 Old Princes Highway) looking south-east

The magnitude of the proposed Jervis Bay Road intersection upgrade in this viewpoint was assessed as moderate in the LCVIA. Proposal elements that contribute to change in this viewpoint include the western roundabout, the elevated Princes Highway including fill embankments and retaining walls, the new connection from the roundabout to the Old Princes Highway and vegetation removal. The retention of the Old Princes Highway on its existing alignment would be visible in this view and would be beneficial due to a potential reduction in vegetation clearing and the elimination of fill batters along the road connecting to the roundabout. The level of change within this viewpoint was assessed as moderate for the REF design, largely due to the changes as a result of major proposal elements including the elevated alignment of the Princes Highway and removal of bushland vegetation in the background. The design refinements constitute a comparatively small change and would not affect the overall magnitude of the proposal within this view or from nearby viewpoints. The magnitude of the revised proposal design within this viewpoint therefore remains moderate.

Viewpoint 2 - Residence at 142 Old Princes Highway looking east

The design refinements would be unlikely to be visible from this view. Nearby views for which this viewpoint is representative would benefit from the retention of the Old Princes Highway on its current alignment which would locally reduce the need for earthworks and potentially vegetation clearing. The major change to the view would result from the road connection from the western roundabout to the Old Princes Highway and from associated vegetation clearing and fill embankments. These aspects of the proposal design would remain essentially the same relative to the REF design. The magnitude of the proposal in this view would remain consistent with the LCVIA.

Viewpoint 3 - Driveway at 40 Jervis Bay Road looking west

The magnitude of impact on this viewpoint derives largely from the removal of vegetation along Jervis Bay Road and within the ancillary facility located south-east of the interchange, between the southern entry ramp, the private access road and Jervis Bay Road. The new multi-modal transport facility would be located on the site of this ancillary facility. Therefore, no vegetation removal in addition to that identified in the LCVIA would be required for the revised design.

Due to the indicative nature of the multi-modal transport facility design, the potential for and extent of revegetation is unknown but would be less than the revegetation proposed by the REF urban design concept which underpinned the moderate magnitude rating identified for this view in the LCVIA. Given the more limited scope for revegetation, the magnitude of change for this viewpoint has been revised from moderate to **high**.

Viewpoint 4 - Existing Princes Highway north of Willowgreen Road looking north

Design refinements in the vicinity of this view include the multi-modal transport facility about 220 metres to the north-east and the alignment shift to the west associated with the adjustment to the southern tie-in which is located further south relative to this viewpoint. These design refinements are unlikely to be visible within this viewpoint, although they would be visible from nearby viewpoints for which this view is representative.

As identified in the LCVIA, the nearby views for which this viewpoint is representative would undergo significant change as a result of the proposed intersection upgrade. The majority of the change would be derived from road widening, the grade-separated interchange (including embankments, roundabouts and the overbridge), the property access road and vegetation removal. As a result, the magnitude of change within this viewpoint was assessed as high in the LCVIA, the highest rating available within the assessment methodology. The proposed design refinements would also lead to the removal of dwellings. As the degree of change to this viewpoint was previously assessed as high, the refined design would not further increase the magnitude of the proposed upgrade within this viewpoint. As a result, there would be no change to the magnitude rating for this viewpoint.

3.2.3 Summary of visual impacts

Table 3-4 provides a comparison of the potential visual impacts associated with the REF design and with the revised design. The table integrates the findings of the assessment of changes in magnitude in **Section 3.2.2** to determine any resulting changes to visual impact in accordance with the methodology outlined in Section 1.6 of the LCVIA.

The table illustrates that the revised proposal design would not alter the magnitude of change as a result of the proposed works within the majority of viewpoints. The visual impact of the revised design would remain consistent with the REF design for three of the four assessed viewpoints.

The magnitude of change as a result of the revised design would increase for viewpoint 3 relative to the REF design. This would result in a high level of visual impact of the revised design on viewpoint 3, compared to a high-moderate level of visual impact for the REF design.

Opportunities for potential mitigation of the additional visual impact are described in **Section 5**.

Table 3-4: Visual impact comparison

Viewpoint	Sensitivity	Magnitude		Visual impact rating	
		REF design	Revised design	REF design	Revised design
Viewpoint 1	Moderate	Moderate	Moderate	Moderate	Moderate
Viewpoint 2	High	Moderate	Moderate	High - moderate	High - moderate
Viewpoint 3	High	Moderate	High	High - moderate	High
Viewpoint 4	Moderate	High	High	High - moderate	High - moderate

4. Mitigation measures

As discussed in **Section 3**, additional visual impacts and localised landscape character impacts are derived primarily from the inclusion of the multi-modal transport facility. The following identifies potential additional mitigation measures to be integrated into the proposal during future design stages in order to:

- Reduce the visual and localised landscape character impacts of the revised design on LCZ 1 as much as possible
- Implement the LCVIA urban design strategy to the fullest extent possible
- Maximise integration of the revised proposal with the natural, built and community context.

The mitigation measures identified in the following section complement the urban design strategies (refer Section 3 of the LCVIA) and the mitigation strategies developed for the REF design (refer to Section 5.4 of the LCVIA). The latter remain valid for the revised proposal design and will need to be considered during future proposal stages. A summary of all mitigation measures for the refined proposal is provided in **Section 4.2**.

4.1 Additional mitigation measures for the multi-modal transport facility

Inclusion of the multi-modal transport facility is associated with an increase in the visual impact of the proposal on views from Jervis Bay Road, as well as with localised greater landscape character impacts within LCZ 1, noting that landscape character impacts on the zone as a whole were previously assessed as high.

There is a need to balance bushland restoration with the provision for sightlines for both vehicle movements and for passive surveillance reasons in accordance with CPTED principles.

In addition to the mitigation measures identified in the LCVIA, the following strategies would be considered during detailed design of the proposal:

- Develop the design of the multi-modal transport facility to adopt a compact footprint that uses space efficiently in order to maximise opportunities for bushland restoration
- Seek to locate the multi-modal transport facility as far to the north and east as possible within the site where potential for passive surveillance is greater due to the proximity of residences and slower moving local traffic along Jervis Bay Road and the property access road
- Ensure that perimeter vegetation along Jervis Bay Road and the property access road allows for sight-lines into the facility for safety and passive surveillance.

Implementation of these additional strategies represents an opportunity to reduce the visual impacts of the revised design on viewpoint 3 to a level of impact consistent with the REF design.

4.2 Revised mitigation strategy

Section 5.4 of the LCVIA outlined a number of strategies to minimise and mitigate the proposal's likely landscape character and visual impacts. They included both urban design and landscape strategies to minimise and improve the proposal impacts for residents and motorists and additional measures to be adopted during the detailed design.

Urban and landscape design strategies proposed to minimise and improve the proposal impacts for residents and motorists are:

- Fill batters screened where practicable using native shrubs and trees
- The selection of plant species to complement and integrate with existing context, existing plant communities and Shoalhaven Council's suggested species list
- All opportunities to reduce 2:1 embankments to integrate into existing landform and maximise vegetation establishment should be explored
- Fill batters rounded to help integrate into the existing landform and create a more natural appearance
- The design of the abutments of the bridge to complement the existing context and other bridges along Princes Highway
- Large shrubs and accent planting in front of the abutment walls to help reduce its visual impact. Further design measures such as variation in materials of the abutments to be explored in detailed design
- Variation in planting along the 2:1 embankments to provide visual interest while maintaining a native bushland theme
- Maximising screen planting, where possible, near to existing residential properties along Old Princes Highway, Jervis Bay Road and the new access also providing a headlight screen
- The re-vegetation of acquired properties and roads with species from the existing plant community types
- Tree planting has been maximised where practicable to reinforce the enclosed spatial character.

The following measures are to be adopted during the detailed design stage. Additional measures to those presented in the LCVIA to mitigate the impacts of the revised design are shown in bold:

- All reasonable measures taken to minimise the loss of existing vegetation along the proposal corridor. Those measures will include minimise clearing of trees for construction access, rationalisation of maintenance access
- Further opportunities investigated to increase landscape zones within the road corridor
- Lighting and signage to be well-considered in its placement and should not detrimentally add to the visual impact
- At locations where greater visual impacts have been identified, the specification and planting of more mature sized shrubs and trees would be adopted to help reduce the visual impact upon opening of the road since the proposed planting would take a number of years (approximately between three to 10 years) to establish at adequate height
- Management of the natural environment to include rehabilitation of any affected areas of important native habitat and creek embankments; use of endemic vegetation in these and other areas where habitat values are important; during the Detailed Design phase identify and retain as many mature trees as possible; rehabilitate and replace of any lost public space

- Site compounds: rehabilitate with native grasses/ plant community type (PCT) in consultation with land owners
- **Develop the design of the multi-modal transport facility to adopt a compact footprint that uses space efficiently in order to maximise opportunities for bushland restoration**
- **Seek to locate the multi-modal transport facility as far to the north and east as possible within the site where potential for passive surveillance is greater due to the proximity of residences and slower moving local traffic along Jervis Bay Road and the property access road**
- **Ensure that perimeter vegetation along Jervis Bay Road and the property access road allows for sight-lines into the facility for safety and passive surveillance.**

5. Conclusion

This paper has reviewed design changes proposed following public exhibition of the Jervis Bay Road intersection upgrade REF in order to determine whether the proposed design refinements would alter the landscape character and visual impacts likely to be experienced as a result of the proposal. The proposed changes were also assessed against the urban design objectives and principles developed for the proposal, as well as against the urban design strategy.

The assessment has found that:

- Urban design strategy
 - The revised proposal design remains consistent with the urban design objectives and principles adopted for the proposal
 - The proposed design refinements do not preclude implementation of the urban design strategy developed for the proposal.
- Landscape character and visual impact assessment
 - Irrespective of localised design differences, the landscape character impact ratings for the revised design remain consistent with the REF design
 - The design refinements are able to be assessed with the same viewpoints that were assessed for the REF
 - The visual impacts associated with the proposal would remain the same for three of the four viewpoints assessed
 - The likely visual impact on viewpoint 3 along Jervis Bay Road would increase from high-moderate to high due to the inclusion of the multi-modal transport facility.
- Mitigation measures
 - Implementation of additional mitigation measures offers an opportunity to reduce the visual impacts on viewpoint 3 to a level of impact consistent with the REF design
 - The localised landscape character changes within LCZ 1 would be mitigated by establishing a bushland setting for the multi-modal transport facility, consistent with the LCVIA urban design proposal
 - The urban design strategies and mitigation measures identified in the LCVIA remain valid.