

The Northern Road Stage 5

Urban Design and Visual Impacts
Consistency Assessment

Version 5 – 21 September 2018

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Contents

	Page Number
1 Introduction	1
1.1 Purpose of this report	2
1.2 How this report was prepared	2
2 PROPOSED Change	3
2.1 Description of the proposed change	3
3 ENVIRONMENTAL ASSESSMENT	4
3.1 Landscape character assessment	4
3.1.1 Effect of proposed changes on project magnitude	4
3.1.2 Landscape character impact assessment	5
3.1.3 Summary	6
3.2 Visual impact assessment	6
3.2.1 Visual impacts	6
3.2.2 Discussion and summary	15
4 CONSISTENCY ASSESSMENT	17
4.1 Minister's Conditions of Approval	17
4.2 Commonwealth Conditions of Approval	18
4.3 Consistency assessment of the proposed change	18
4.3.1 Review of proposed changes	18
4.3.2 Consistency with urban and landscape design directives	21
4.3.3 Review of urban and landscape design for consistency with SPIR mitigation measures	23
4.3.4 Summary	27
5 Summary and Conclusion	28
6 References	29

List of Tables

	Page Number
<i>Table 1: Landscape Character Impacts Consistency Assessment</i>	4
<i>Table 2: Landscape Character Impact Assessment – LCZ 3</i>	5
<i>Table 3: Landscape Character Impact Assessment – LCZ 5</i>	6
<i>Table 4: Visual Impact Assessment – Viewpoint 13</i>	7
<i>Table 5: Visual Impact Assessment – Viewpoint 14</i>	8
<i>Table 6: Visual Impact Assessment – Viewpoint 15</i>	9
<i>Table 7: Visual Impact Assessment – Viewpoint 16</i>	10
<i>Table 8: Visual Impact Assessment – Viewpoint 17</i>	11
<i>Table 9: Visual Impact Assessment – Viewpoint 18</i>	12
<i>Table 10: Visual Impact Assessment – Viewpoint 20</i>	14
<i>Table 11: Consistency with NSW Conditions of Approval 22 March 2018</i>	17
<i>Table 12: Design Changes Consistency Assessment</i>	18
<i>Table 13: Design Intent Consistency Assessment</i>	21
<i>Table 14: Environmental Management Measures Consistency Assessment</i>	23
<i>Table 15: Urban Design Mitigation Measures Consistency Assessment</i>	25

1 INTRODUCTION

Roads and Maritime Services (Roads and Maritime) completed a NSW Environmental Impact Statement/Commonwealth Draft Environmental Impact Statement (here in identified as the EIS) of The Northern Road Upgrade – Mersey Road, Bringelly to Glenmore Parkway, Glenmore in June 2017. The EIS identified a range of environmental, social and planning issues associated with the construction and operation of The Northern Road Upgrade – Mersey Road, Bringelly to Glenmore Parkway, Glenmore Park and proposed measures to mitigate and manage those potential impacts.

The EIS was publicly exhibited in June 2017. Following public exhibition, submissions from stakeholders and the community were received and addressed by Roads and Maritime in the Submissions and Preferred Infrastructure Report (SPIR) and the Final EIS in December 2017.

The *Environmental Planning and Assessment Act 1979* (EP&A Act) was updated in March 2018, following determination of the EIS and SPIR. Reference to Part 5.1 has been replaced with Division 5.2 under the new EP&A Act.

The Minister for Planning approved The Northern Road Upgrade – Mersey Road, Bringelly to Glenmore Parkway, Glenmore Park under Section 5.19 of the EP&A Act on 30 May 2018. The approval incorporated the Minister's Conditions of Approval (CoA).

The project must be carried out in accordance with the Division 5.2 Approval and the following documents:

- The Northern Road Upgrade – Mersey Road, Bringelly to Glenmore Parkway, Glenmore Park – NSW Environmental Impacted Statement/Commonwealth Draft Environmental Impact Statement (June 2017)
- The Northern Road Upgrade – Mersey Road, Bringelly to Glenmore Parkway, Glenmore Park – Submissions and Preferred Infrastructure Report (December 2017)
- The Northern Road Upgrade – Mersey Road, Bringelly to Glenmore Parkway, Glenmore Park – Final Commonwealth Environmental Impact Statement (December 2017)

A previous consistency assessment has been carried out for modifications to Stage 4 of the project.

For the purposes of this consistency assessment, the Approval issued by the NSW Minister for Planning for The Northern Road Upgrade – Mersey Road, Bringelly to Glenmore Parkway, Glenmore Park is referred to as the Division 5.2 Approval.

The Northern Road Upgrade – Mersey Road, Bringelly to Glenmore Parkway, Glenmore was referred to the Commonwealth Minister for the Environment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as the project may have a significant impact on Matters of National Environmental Significance (MNES), including a significant impact on Commonwealth land (i.e. Defence Establishment Orchard Hills (DEOH) and the Western Sydney Airport site) and was subject to separate assessment under the EPBC Act.

The Commonwealth Minister's approval was received on 15 June 2018 subject to a number of conditions being met. For the purposes of this consistency assessment, the approval issued by the Commonwealth Minister for the Environment for The Northern Road Upgrade – Mersey Road, Bringelly to Glenmore Parkway, Glenmore is referred to as the EPBC Approval.

This consistency assessment relates to the design refinements to the project between Littlefields Road and Glenmore Parkway approximately.

1.1 Purpose of this report

The purpose of this consistency assessment is to:

- Describe the proposed change relative to the Division 5.2 Approval and the EPBC Approval.
- Assess the environmental impacts associated with the proposed change relative to the Division 5.2 Approval and the EPBC Approval.
- Determine if the proposed change is consistent with the Division 5.2 Approval or whether further approval is required either for a modification application or a new project.
- Determine if the proposed change is consistent with the EPBC Approval. Or whether a variation to the conditions of approval / a conditioned action management plan or a new referral is required.

1.2 How this report was prepared

This report constitutes the urban design and visual impact consistency assessment and was prepared by Spackman Mossop Michaels (SMM) for Jacobs and Roads and Maritime.

Preparation of this Urban Design and Visual Impact Consistency Assessment report has involved the following:

- Review of relevant sections of the approval instruments including the Landscape Character and Visual Impact Assessment report prepared for the EIS (*Urban Design and Visual Impact Assessment Technical Paper. The Northern Road Upgrade, Mersey Road to Glenmore Parkway*)
- Review the proposed changes from the SPIR design
- Review and update of the landscape character and visual impact assessment, describing the impact of the proposed change design on the project's landscape character zones and viewpoints, and how these differ from the impacts identified for the SPIR design.
- Assess the proposed change for consistency with
 - NSW and Commonwealth Conditions of Approval
 - The project urban design objectives and principles
 - The project urban design vision, strategy and opportunities
 - Revised Environmental Management Measures and commitments made in the SPIR

2 PROPOSED CHANGE

Project approval has been sought for the upgrade of The Northern Road to generally two traffic lanes and a dedicated bus lane in each direction when demand requires, with three traffic lanes in each direction from Bradley Street to Glenmore Parkway.

The project as described in the Division 5.2 Approval and the EPBC Approval is detailed in Chapter 5 of the EIS and is amended in Chapter 4 of the SPIR and Final EIS.

Initially the project will be constructed as a four lane divided road consisting of two traffic lanes in each direction and a wide shoulder. The proposed change comprises a number of design refinements as a reflection of this reduced initial scope of construction relative to the SPIR design. It is noted that, in refining the project for initial construction, the design has made provision for future road widening into the median. Intersections have been designed to suit the final project and will include dedicated bus lanes.

2.1 Description of the proposed change

The project as described in the Division 5.2 Approval and the EPBC Approval is detailed in Chapter 5 of the EIS and amended in Chapter 4 of the SPIR and Final EIS.

The proposed changes to Stage 5 of the project are shown in Figure 2-1 and include:

- Reduced cross-sectional area between intersections while maintaining provisions for an ultimate eight lane configuration in the future as demand requires
- Removal of 5.0 m footway along the eastern edge of the mainline Refinements to batters in isolated areas to avoid constraints
- Raising of main alignment at Grover Crescent up to 2.8m to avoid impacting existing water main
- Raising of alignment along a portion of Vineyard Road by up to 0.4 m to maximise cover over an existing water main
- Other minor refinements to the vertical and horizontal alignment of the road at various locations
- Refinements to drainage including reduction in the length of transverse drainage and deletion of kerb, drainage pits and longitudinal pipes kerbside and replacement with a swale
- Refinements to water quality infrastructure at various locations
- Modifying shoulder width to taper with the road alignment at signalised intersections
- Removal of mid-block street lighting
- Removal of shared path lighting
- Two additional permanent stormwater detention basins within the approved operational project boundary on the south side of Kings Hill Road adjacent to the proposed intersection with Vineyard Road, designed to manage local hydrology
- Increased construction boundary associated with:
 - Amendment to a previously proposed construction compound off Kings Hill Road based on consultation to suit owner's operational requirements; and
 - An additional permanent stormwater detention basin off Littlefields Road to manage local hydrology
- Increased operational boundary and therefore further property acquisition associated with:
 - An additional permanent stormwater detention basin off Littlefields Road to manage local hydrology; and
 - Others based on consultation to suit owner's operational requirements
- Various changes to private accesses.

There are no changes at signalised intersections and from the Bradley Street intersection northward.

The proposed changes are generally consistent with the project as described in the Division 5.2 Approval and EPBC approval.

The design refinements detailed above can be accommodated within the construction and operational footprint assessed in the SPIR and Final EIS, with the exception of the enlarged construction footprint areas listed above.

3 ENVIRONMENTAL ASSESSMENT

3.1 Landscape character assessment

As outlined in the LCVIA prepared for the EIS, the landform and vegetation, views and vistas, settlement pattern and built structures within and adjoining the study area combine to define its landscape character. The contextual analysis undertaken for the combined EIS for TNR4, TNR5 and TNR6 identified five Landscape Character Zones (LCZs) along the length of the project, based on the interplay of existing natural and built features. Of these, two are located within the TNR 5 study area, and have been re-assessed taking into consideration the proposed changes identified in Section 2.

The TNR5 project area extends across two these LCZs, namely:

- LCZ 3: Luddenham Plateau
- LCZ 5: Mulgoa-Orchard Hills

The landscape character assessment undertaken as part of the LCVIA provided a qualitative assessment based on the affected LCZs.

SPIR landscape character impact review

The SPIR reviewed the likely landscape character impact ratings for the refined SPIR design and confirmed that

- Sensitivity of all LCZs remained the same
- The magnitude of the proposal remained unchanged
- The landscape character impact ratings of the SPIR design were unchanged from the EIS design.

3.1.1 Effect of proposed changes on project magnitude

The following section reviews the proposed changes outlined in Section 2 to determine whether they would result in any changes to the magnitude of the project, and therefore to the landscape character impacts identified in the SPIR.

It is noted that the proposed changes have essentially retained the same project alignment. Therefore, no additional LCZs are affected.

Table 1: Landscape Character Impacts Consistency Assessment

Proposed change	Implication for landscape character assessment
Changes affecting all LCZs	
– Deletion of kerb, drainage pits and longitudinal pipes kerbside and replacement with a swale	Refinements are generally minor and would not alter the overall magnitude of the project. The landscape character impact rating remains unchanged.
– Reduced median width	The reduction in project footprint represents a relatively small percentage of the overall project footprint. The magnitude of the project overall remains moderate. The landscape character impact rating remains unchanged.
– Removal of provision for a footway on the eastern side	Removal of the footway would impact on future access and connectivity. However, it would not alter the magnitude of the project overall. The landscape character impact rating remains unchanged.
– Reduced extent of median drainage mid block	Refinements are generally minor and would not alter the magnitude of the project overall. The landscape character impact rating remains unchanged.

Proposed change	Implication for landscape character assessment
↪ Reduction in length of transverse drainage	Refinements are generally minor and would not alter the magnitude of the project overall. The landscape character impact rating remains unchanged.
↪ Removal of mid-block street lighting	Refinements are generally minor and would not alter the magnitude of the project overall. The landscape character impact rating remains unchanged.
Changes affecting LCZ 3 only	
There are no design refinements that apply only in LCZ 3.	
Changes affecting LCZ 5 only	
↪ Raised main alignment near Grover Crescent up to 2.8m relative to SPIR design, to avoid an existing water main	The change increases the magnitude of the project locally by increasing the elevation of the road relative to surrounding areas, making it more prominent and therefore more difficult to be absorbed. Being a localised change, it does not alter the magnitude of the project overall which remains moderate. The landscape character impact rating remains unchanged.
↪ Raised vertical alignment of the Vineyard Road extension by about 0.4m, to maximise cover over an existing water main	The change is minor and localised. It would not alter the overall magnitude of the project. The landscape character impact rating remains unchanged.
↪ Enlarged construction boundary to provide for an increased construction compound near Kings Hill Road	The change is minor as it locally affects only a small area adjoining a previously identified ancillary site. The change would not alter the overall magnitude of the project. The landscape character impact rating remains unchanged.
↪ Increased operational boundary to reflect the need for an additional permanent basin near Littlefields Road, required to mitigate potential impacts on a series of dams downstream	The change is minor as it locally affects only a small area. The change would not alter the overall magnitude of the project. The landscape character impact rating remains unchanged.
↪ Introduction of two additional linear basins along Vineyard Road to provide additional water storage.	The change is minor and localised. It would not alter the overall magnitude of the project. The landscape character impact rating remains unchanged.

3.1.2 Landscape character impact assessment

Landscape Character Zone 3 - Luddenham Plateau

A detailed description of LCZ3 was provided in section of 6.2 of the LCVIA prepared for the EIS and has not changed since. Similarly, the sensitivity of the LCZ to change has not changed since the EIS was prepared. As outlined in Table 2, the overall magnitude of the project incorporating the proposed changes has remained consistent with the approved project.

Accordingly, the landscape character impact of the proposed works in LCZ 3 remains as per the following table:

Table 2: Landscape Character Impact Assessment – LCZ 3

Assessment Criterion	Rating	Change from SPIR
Sensitivity	High	Unchanged
Magnitude	Moderate	Unchanged
Landscape character impact	High to Moderate	Unchanged

Landscape Character Zone 5 – Mulgoa-Orchard Hills

A detailed description of LCZ5 was provided in section of 6.2 of the LCVIA prepared for the EIS and has not changed since. Similarly, the sensitivity of the LCZ to change has not changed since the EIS was prepared. As outlined in Table 3, the overall magnitude of the project incorporating the proposed changes has remained consistent with the approved project.

Accordingly, the landscape character impact of the proposed works in LCZ 3 remains as per the following table:

Table 3: Landscape Character Impact Assessment – LCZ 5

Assessment Criterion	Rating	Change from SPIR
Sensitivity	Moderate	Unchanged
Magnitude	Moderate	Unchanged
Landscape character impact	Moderate	Unchanged

3.1.3 Summary

The proposed changes have not altered the overall magnitude of the project as approved, either individually or cumulatively. As a result, the likely landscape character impacts of the project on the two affected LCZs remain as previously assessed.

3.2 Visual impact assessment

3.2.1 Visual impacts

The LCVIA prepared in support of the project EIS assessed the potential visual impacts of the project on a total of 19 viewpoints. Viewpoints were selected considering the existing pattern of land use and development adjoining the project area, including the number of potential viewers, and to be generally representative of the range of viewpoints within and beyond the road corridor.

Previously assessed viewpoints

Of the 19 viewpoints assessed for the combined project of TNR4, TNR5 and TNR6, the following six viewpoints fall within the TNR5 project area:

- Viewpoint 13: looking south-east along The Northern Road near Littlefields Road
- Viewpoint 14: looking west along Gates Road
- Viewpoint 15: looking north along The Northern Road near the Sydney Water Pipelines
- Viewpoint 16: looking north along Vineyard Road towards the Vineyard Road extension
- Viewpoint 17: looking south from Grover Crescent
- Viewpoint 18: looking south along The Northern Road

The visual impact ratings determined by the EIS as amended by the SPIR were reviewed for the above six viewpoints, taking into consideration the proposed changes identified in Section 2 to assess whether the visual impact ratings would change relative to the approved project.

New viewpoints

Due to the locally significant design change that has raised the main alignment near Grover Crescent vertically about 2.8m relative to the SPIR design, the inclusion of an additional viewpoint has been considered appropriate to determine the visual impacts on the nearby cluster of residential dwellings. The visual impact of the proposed change on this viewpoint is assessed below.

Viewpoint 13: looking south-east along The Northern Road near Littlefields Road

Viewpoint 13 is located along The Northern Road, adjoining the property at 2-18 Littlefields Road, Luddenham and looking south-east. The review of the visual impact assessment is provided in the following table:

Table 4: Visual Impact Assessment – Viewpoint 13

Assessment Criterion		
SPIR design	Final design incorporating the proposed change	Change from SPIR
Potential Viewers		
Motorists. Residents in surrounding rural areas travelling along The Northern Road to Penrith or to access the local centre at Luddenham.	Unchanged	Unchanged
Visible project elements		
<ul style="list-style-type: none"> – Widening of The Northern Road including additional lanes, shared path, level changes and associated earthworks – Land acquisition/ conversion of farm land to arterial road corridor – Vegetation clearing – Landscape works. 	SPIR design changes plus <ul style="list-style-type: none"> – Removal of kerbs and changes to drainage – Reduced cross-sectional area – Changes to batters – Removal of mid block street lighting 	Minor change relative to the project's overall scale
Sensitivity		
High. The view is located along one of the most scenic sections of The Northern Road. The road is currently a two lane rural road along pastures separated from the road by a line of trees. The view has relatively little capacity to absorb the proposed changes and residents in adjoining rural properties would be sensitive to changes in the visual environment.	High	Unchanged
Magnitude		
The upgrade would fundamentally alter the existing scale and character of The Northern Road in this view. It would result in a large increase in road infrastructure, more than doubling the existing road width into areas of existing pasture. It would replace the outlook over pastures with a major arterial road.	High	Unchanged
Visual Impact		
High	High	Unchanged

Viewpoint 14: looking west along Gates Road

Viewpoint 14 is located along Gates Road, looking west towards the intersection with The Northern Road. The review of the visual impact assessment is provided in the following table:

Table 5: Visual Impact Assessment – Viewpoint 14

Assessment Criterion		
SPIR design	Final design incorporating the proposed change	Change from SPIR
Potential Viewers		
Motorists and residents in the rural residential cluster along Gates Road.	Unchanged	Unchanged
Visible project elements		
<ul style="list-style-type: none"> – Widening, re-grading and re-alignment of Gates Road – T-intersection with the new link road connecting Littlefields Road to Gates Road – Upgrade of the intersection with The Northern Road including widened verges – Cut and fill embankments – Vegetation clearing – Landscape works 	SPIR design changes plus <ul style="list-style-type: none"> – Reduced cross-sectional area – Changes to batters – Removal of mid block street lighting 	Minor change relative to the project's overall scale
Sensitivity		
High. The view is along the existing small rural road. It would be seen by residents in the rural living cluster along Gates Road. These residents are likely to be sensitive to changes in their visual environment. The adjoining rural landscape including tree cover framing the road are important visual elements and have a low capacity to absorb major changes.	High	Unchanged
Magnitude		
The construction of the new link road through a greenfield site, widening and re-grading of Gates Road and associated tree and shrub removal would result in notable changes to the view, placing a greater focus on the road infrastructure in the view. It would change the existing character of Gates Road, increase road infrastructure and remove a large amount of vegetation.	High	Unchanged – magnitude of the project was previously assessed high
Visual Impact		
High. It may reduce somewhat over time as vegetation establishes and matures.	High	Unchanged

Viewpoint 15: looking north along The Northern Road near the Sydney Water Pipelines

Viewpoint 15 is located at 2,567 The Northern Road, Mulgoa, looking north along The Northern Road. The review of the visual impact assessment is provided in the following table:

Table 6: Visual Impact Assessment – Viewpoint 15

Assessment Criterion		
SPIR design	Final design incorporating the proposed change	Change from SPIR
Potential Viewers		
Motorists. Adjoining rural residents as well as residents in surrounding rural areas travelling along The Northern Road.	Unchanged	Unchanged
Visible project elements		
<ul style="list-style-type: none"> – Widening of The Northern Road including additional lanes, depressed median, shared path, level changes and associated earthworks – Changes to property and access arrangements of existing private dwelling – Land acquisition/ conversion of small rural holdings land to arterial road corridor – Vegetation clearing – Landscape works 	SPIR design changes plus <ul style="list-style-type: none"> – Removal of kerbs and changes to drainage including reduced median drainage – Reduced cross-sectional area – Changes to batters – Removal of mid block street lighting 	Minor change relative to the project's overall scale
Sensitivity		
High. The view is characterised by the mix of rural dwellings, remnant vegetation and glimpses of the Blue Mountains. The Northern Road itself is a two lane rural road that is subservient to the larger landscape setting. The view has relatively little capacity to absorb the proposed changes and residents in adjoining rural properties would be sensitive to changes in the visual environment.	High	Unchanged
Magnitude		
The upgrade would fundamentally alter the existing scale and character of The Northern Road in this view. It would result in a large increase in road infrastructure, more than doubling the existing road width. Large fill batters would extend into areas of small rural holdings.	High	Unchanged
Visual Impact		
High.	High	Unchanged

Viewpoint 16: looking north along Vineyard Road towards the Vineyard Road extension

Viewpoint 16 is located at the corner of Longview and Vineyard Roads, looking north. The review of the visual impact assessment is provided in the following table:

Table 7: Visual Impact Assessment – Viewpoint 16

Assessment Criterion		
SPIR design	Final design incorporating the proposed change	Change from SPIR
Potential Viewers		
Motorists. Residents of Vineyard Road.	Unchanged	Unchanged
Visible project elements		
<ul style="list-style-type: none"> – Extension of Vineyard Road to connect to Kings Hill Road through the existing unmade road reserve, associated earthworks – T-intersection with Longview Road, including upgrades to Longview Road and Vineyard Road on the approach to the intersection such as re-grading, widened shoulders and earthworks – Vegetation clearing – Landscape works 	SPIR design changes plus <ul style="list-style-type: none"> – Raised vertical alignment and potentially additional tree removal – Two additional linear storage basins – Removal of kerbs and changes to drainage – Reduced cross-sectional area – Changes to batters – Removal of mid block street lighting 	Minor changes relative to the project’s overall scale
Sensitivity		
High. The natural vegetated setting of the unmade road reserve has a low capacity to absorb new road infrastructure. Rural residents are likely to be sensitive to changes in the visual environment.	High	Unchanged
Magnitude		
The extension of the road would change the view from a setting dominated by pasture and remnant vegetation to looking along a new road. Removal of mature trees along the boundary with 23-33 Longview Road would further change the outlook and open up views into the private property.	High	Unchanged
Visual Impact		
High.	High	Unchanged

Viewpoint 17: looking south from Grover Crescent

Viewpoint 17 is located at Grover Crescent, looking south towards The Northern Road. The review of the visual impact assessment is provided in the following table:

Table 8: Visual Impact Assessment – Viewpoint 17

Assessment Criterion	Final design incorporating the proposed change	Change from SPIR
SPIR design		
Potential Viewers		
Residents of Grover Crescent.	Unchanged	Unchanged
Visible project elements		
<ul style="list-style-type: none"> – Grover Crescent including closure of existing southern entrance from The Northern Road – Widening of The Northern Road including additional lanes, depressed median, shared path, level changes and associated earthworks – Upgrade of the intersection of The Northern Road with Kings Hill Road – Vegetation clearing – Landscape works 	SPIR design changes plus <ul style="list-style-type: none"> – Removal of kerbs and changes to drainage – Reduced cross-sectional area – Changes to batters – Removal of mid block street lighting 	Minor changes relative to the project’s overall scale
Sensitivity		
High. The view is characterised by an existing informal road providing access to a small rural residential cluster. Remnant and planted trees provide important elements in the view. Residents are likely to be sensitive to changes in the visual environment.	High	Unchanged
Magnitude		
The widening of The Northern Road itself would be difficult to perceive due to the angle of the view. However, associated earthworks and removal of trees currently framing and terminating the view will be highly noticeable changes.	High	Unchanged
Visual Impact		
High.	High	Unchanged

Viewpoint 18: looking south along The Northern Road

Viewpoint 18 is located at Defence Establishment Orchard Hills, opposite 2,359-2,365 The Northern Road, Mulgoa, looking south along The Northern Road. The Northern Road. The review of the visual impact assessment is provided in the following table:

Table 9: Visual Impact Assessment – Viewpoint 18

Assessment Criterion		
SPIR design	Final design incorporating the proposed change	Change from SPIR
Potential Viewers		
Motorists. Adjoining rural residents as well as Defence personnel and residents in surrounding rural areas travelling along The Northern Road.	Unchanged	Unchanged
Visible project elements		
<ul style="list-style-type: none"> – Widening of The Northern Road including additional lanes, depressed median, shared path, level changes and associated earthworks – Boundary adjustments at the Defence Establishment/ conversion of Defence land to arterial road corridor – Vegetation clearing – Landscape works 	SPIR design changes plus <ul style="list-style-type: none"> – Removal of kerbs and changes to drainage – Reduced cross-sectional area – Changes to batters – Removal of mid block street lighting 	Minor changes relative to the project's overall scale
Sensitivity		
High. The view is characterised by a mix of woodland remnants and open pasture at the interface to the DEOH, and small rural holdings to the west. The Northern Road itself is a two-lane rural road that is subservient to the larger landscape setting. The view is generally open and has little capacity to absorb the proposed changes. Residents in adjoining rural properties would be sensitive to changes in the visual environment	High	Unchanged
Magnitude		
The upgrade would fundamentally alter the existing scale and character of The Northern Road in this view. It would result in a large increase in road infrastructure, more than doubling the existing road width.	High	Unchanged
Visual Impact		
High.	High	Unchanged

New Viewpoint at 1 Grover Crescent, Mulgoa

An additional viewpoint (viewpoint 20) has been included in this assessment to determine the visual impact on residents' views in Grover Crescent as a result to the change in vertical alignment. The viewpoint has been selected for the following reasons:

- The change in vertical alignment is greatest around CH 3,020, or opposite to the entrance to Grover Crescent. Here the vertical alignment resulting from the proposed change is up to 2.8m higher than the SPIR vertical alignment. This is a substantial change being equivalent to almost the height of a single building storey.
- The change in vertical alignment leads to an increased road footprint relative to the SPIR design.
- The proposed change will result in additional tree removal at the interface with properties in Grover Crescent.
- Design levels as a result of the proposed change are up to 2.2m higher than existing ground, whereas the SPIR design levels resulted in the project being situated in cut. There are a number of residents in Grover Crescent whose look-out would be affected by this change, most notably the view from the residence at 1 Grover Crescent but neighbouring and nearby residences would also be affected.
- Grover Crescent constitutes the densest housing cluster along the route, that is, there is a higher concentration of potential viewers than for other areas adjoining the project.

New viewpoint location

The aerial photograph below shows the proposed new viewpoint 20 near 1 Grover Crescent in red. The area of greatest design change near chainage 3,020 is marked indicatively.



The following photograph illustrates the existing view from viewpoint 20 at 1 Grover Crescent. This viewpoint is the closest publicly accessible viewpoint that would be similar to what the adjoining residents would see.

(source: Google Streetview, https://www.google.com.au/maps/@-33.8253339,150.6833629,3a,90y,117.84h,86.88t/data=!3m6!1e1!3m4!1sXX6_5qvszf7aFOMU49avGw!2e0!7i13312!8i6656?dcr=0; accessed 09 April 2018)



Visual impact assessment

The visual impact assessment for the new viewpoint at 1 Grover Crescent is provided in the following table. It assesses the final design incorporating the proposed change as described in section 2.

Table 10: Visual Impact Assessment – Viewpoint 20

Assessment Criterion
<p>Potential Viewers</p> <p>Residents of Grover Crescent.</p>
<p>Visible project elements</p> <ul style="list-style-type: none"> – Grover Crescent including closure of existing southern entrance from The Northern Road – Widening of The Northern Road including fill batters and level changes with finished levels up to 2.2m above existing ground level, additional lanes, central median, shared path, property adjustments and drainage works within DEOH. – Upgraded T- intersection with The Northern Road (left-in/ left-out only) including fill embankments Vegetation clearing – Landscape works
<p>Sensitivity</p> <p>Moderate.</p> <p>The view is characterised by an existing informal rural road providing access to a small rural residential cluster. An avenue of Cumberland Plain Woodland trees frames the view. The view is terminated by remnant vegetation within DEOH land. Both provide important elements in the view. Due to the perpendicular angle to The Northern Road, the view has a moderate capacity to absorb the proposed changes. Residents are likely to be sensitive to changes in the visual environment.</p>

Assessment Criterion

Magnitude

High

The upgrade would fundamentally alter the existing scale and character of The Northern Road in this view. It would result in a large increase in road infrastructure, more than doubling the existing road width. It would raise the upgraded road noticeably above existing ground levels, increasing the visual prominence of the road in the view. Vegetation currently framing and terminating this view would be removed, resulting in a loss of visual buffer and privacy for adjoining residents. Views to DEOH lands would be partially blocked by the elevated road alignment.

Visual Impact

Moderate to high.

Visual impacts may reduce over time as vegetation establishes and matures, in particular screening vegetation and tree cover.

3.2.2 Discussion and summary

Viewpoints 13 to 18

Whilst there are a number of proposed changes that would be perceptible from EIS viewpoints 13, 14, 15, 16, 17 and 18, the changes to the visual impact as assessed previously have been assessed to be relatively minor in nature, given the overall scale of the project. The magnitude of the visual effect of the project was previously assessed as high for all viewpoints. The refinements to the design have not altered the magnitude rating. Visual sensitivity has also remained the same, resulting in no changes to the visual impact assessment of these viewpoints. As a consequence, the visual impact on these viewpoints is considered consistent with the visual impacts as identified for the SPIR design.

The proposed change is considered to be notably different relative to the SPIR design in the area around Grover Crescent, as a result of the change in vertical alignment. The raising of the vertical alignment of up to 2.8m relative to the SPIR design will locally affect the magnitude of the project and will be visible by a number of residents in the area. An additional viewpoint (20) was introduced to assess the visual impact of the proposed change on this view.

Viewpoint 20

The new viewpoint 20 at 1 Grover Crescent was assessed to have a moderate to high visual impact rating. While this view was not assessed as part of the SPIR, it is likely that the SPIR design would also have resulted in a similar visual impact rating.

Both the SPIR design and the final design incorporating the proposed change would result in a notable increase in road infrastructure, more than doubling the width of the existing road and removing large amounts of remnant trees on the eastern side.

The SPIR design was located in cut. Given the perpendicular angle of view and being located lower than adjoining residential properties, residential viewers would look across the full width of the upgraded road, resulting in a large increase of paved surfaces in the view, as well as multiple lanes of moving traffic.

The proposed change would alter the 3-dimensional form of the project and result in residents looking at a raised and vegetated embankment instead, including vehicles travelling along the north-bound carriageway. While the raised form would be more prominent, the most visible element of the project would be the vegetated embankment. Road pavements would not be able to be seen and the width of the road would be difficult to perceive, as would vehicles travelling along the south-bound carriageway. This may be perceived as less visually intrusive by some than visual exposure to the full width of the upgraded road.

While the SPIR design had greater potential for tree retention at the Grover Crescent interface, due to a smaller footprint, the proposed change would not affect the ability to reinstate vegetation at the interface of the project and Grover Crescent.

An important visual impact mitigation measure identified in the EIS for the area around Grover Crescent was the provision of Cumberland Woodland vegetation to provide a visual buffer and screen residents' views. The proposed change would not result in the need for different or new mitigation measures, and would not preclude the implementation of the SPIR mitigation measures. As vegetation matures over time, the visual impacts of the project would reduce and likely reduce the difference in visual impact between the SPIR design and the final design incorporating the proposed change.

It is noted that ground-level views from Grover Crescent to DEOH would also change, being partially blocked by the raised embankment. The proposed visual buffer planting of the SPIR design would have had the same effect. For both the SPIR and the final design incorporating the proposed changes, views into the DEOH land would continue to be possible when exiting Grover Crescent to enter The Northern Road.

On this basis of the above and given the highly localised change in visual impact, the level of the assessed visual impact of the final design incorporating the proposed change is considered broadly consistent with the visual impacts identified in the SPIR.

Summary

The review of the visual impact assessment found that

- the visual impacts of the proposed changes on the six viewpoints assessed as part of the EIS remain generally consistent with the visual impacts identified in the SPIR
- the visual effect of the proposed changes on the new viewpoint 20, while different in nature, are considered to be similar in magnitude than they would have been for the SPIR design. The difference in visual effect would be highly localised and limited to the area around Grover Crescent, constituting a minor portion of the overall project area. The visual impact of the proposed change would be able to be effectively managed by the mitigation measures identified in the EIS as amended by the SPIR.

4 CONSISTENCY ASSESSMENT

4.1 Minister's Conditions of Approval

Draft conditions of approval were issued on 22 March 2018, in accordance with section 5.19 of the EPAA for Critical State Infrastructure (CSSI). The following table summarises the conditions of relevance to the urban design and visual impacts together with the findings of the consistency assessment and cross references to relevant sections of this report.

Table 11: Consistency with NSW Conditions of Approval 22 March 2018

Condition	Discussion	Consistent	
General			
A1	The CSSI must be carried out in accordance with the terms of this approval and generally in accordance with the description of the CSSI in the EIS as amended by the SPIR.	The proposed changes do not require a change to the intent or overall outcomes of this condition.	Yes
Urban Design and Visual Amenity			
E60	The CSSI must be designed to retain as many trees as possible. The planting, retention and replacement of trees is to be carried out in accordance with the EIS. Trees removed during construction that are not within an endangered ecological community are to be replaced at a rate of two trees for every tree removed. Tree planting must occur within the CSSI boundary unless otherwise envisaged in the EIS, in consultation with the relevant Council, or otherwise agreed by the Secretary.	The IFT design refinements do not alter the potential to achieve this condition. This is a compliance requirement for the detailed design Urban Design and Landscape Plans that have been developed since the SPIR.	Yes
E61	Tree species selection is to be consistent with the plans and planting palette in the EIS. Pot sizes of selected tree species are to be consistent with part 3.2.1 (Rural road reserves) in the RMS Landscape Guideline (April 2008), subject to the long-term viability of the plant.	The IFT design does not warrant reconsideration of this condition. The meaning and outcome of the condition is the same as it was for the SPIR design. Detailed design Urban Design and Landscape Plans have been developed since the SPIR	Yes
E62	An Urban Design and Landscape Plan must be prepared based on the detailed design, and in accordance with the commitments made in the documents listed in Condition A1.	The IFT design does not warrant reconsideration of this condition. The meaning and outcome of the condition is the same as it was for the SPIR design. Detailed design Urban Design and Landscape Plans have been developed since the SPIR.	Yes
E63	The Urban Design and Landscape Plan must incorporate monitoring and maintenance procedures for the built elements, rehabilitated and replacement vegetation and landscaping (including visual screening and weed control) and performance indicators, responsibilities, timing and duration and contingencies where rehabilitation of vegetation and landscaping measures fail.	This is a compliance requirement for the detailed design Urban Design and Landscape Plans that have been developed since the SPIR.	Yes

Condition	Discussion	Consistent
<p>E64 The Urban Design and Landscape Plan must be finalised following consultation with the relevant Councils and the community. The Urban Design and Landscape Plan shall incorporate evidence of consultation on the proposed urban design and landscape measures and the monitoring and maintenance procedures.</p>	<p>The IFT design does not warrant reconsideration of this condition. The meaning and outcome of the condition is the same as it was for the SPIR design.</p> <p>Detailed design Urban Design and Landscape Plans have been developed since the SPIR.</p>	<p>Yes</p>
<p>E65 The Urban Design and Landscape Plan must be made publicly available and submitted to the Secretary for information prior to the commencement of works for which the Urban Design and Landscape Plan requires community consultation under the Plan, or within another timeframe agreed by the Secretary.</p>	<p>Not affected by IFT design refinements. The meaning and outcome of the condition is the same as it was for the SPIR design.</p> <p>This is a compliance requirement for the detailed design Urban Design and Landscape Plans that have been developed since the SPIR.</p>	<p>Yes</p>

4.2 Commonwealth Conditions of Approval

Conditions of approval were issued on the 15th of June in accordance with sections 130(1) and 133 of the Environment Protection and Biodiversity Conservation Act 1999 (EPBCA). The conditions were reviewed as part of preparing this assessment and were deemed as not relevant to the proposed change from an urban design and visual impact point of view. The proposed change can be accommodated within the Commonwealth Conditions of Approval.

4.3 Consistency assessment of the proposed change

The overarching framework for the consistency review is provided by the urban and landscape design concept outlined in the LCVIA, including the urban design strategy, principles and objectives.

4.3.1 Review of proposed changes

The following table provides an assessment of the proposed design changes against the approved project, in terms of consistency with the urban design principles and objectives. The “Key Area of Concern” column refers to the respective urban design objective and principles identified in the LCVIA.

Table 12: Design Changes Consistency Assessment

Design change	Key area of concern	Consistent
Deletion of kerb, drainage pits and longitudinal pipes kerbside and replacement with a swale.	Objective 2: Provide a flowing road alignment that is responsive to, and integrated with the natural and built landscape: <ul style="list-style-type: none"> • Visual and landscape character • Drainage infrastructure 	Yes: <ul style="list-style-type: none"> → The urban design sought to maximise green infrastructure over hard engineering structures. Replacement of kerbs is consistent with this principle. → The urban design sought to retain the rural character along TNR5. Shoulders and grass swales are considered to be more consistent with a rural setting than kerbs
Reduced median width	Objective 2: Provide a flowing road alignment that is responsive to, and integrated with the natural and built landscape: <ul style="list-style-type: none"> • Road footprint • Visual and landscape character 	Yes: <ul style="list-style-type: none"> → The reduction in median width reduces the overall project footprint, reducing the amount of clearing of vegetation required which will assist in protecting the existing landscape character.
Removal of provision for a footway on the eastern side	Objective 3: Facilitate good urban design outcomes for areas adjoining the road: <ul style="list-style-type: none"> • Accessibility, connectivity and safety 	Yes: <ul style="list-style-type: none"> - Changes to paths provision were identified in the SPIR with paths to be provided as required - Ease of access to bus stops is realised as per the urban design principles
Reduced extent of median drainage mid block.	Objective 2: Provide a flowing road alignment that is responsive to, and integrated with the natural and built landscape: <ul style="list-style-type: none"> • Visual and landscape character 	Yes: <ul style="list-style-type: none"> → The urban design sought to maximise green infrastructure over hard engineering structures. Less hard drainage infrastructure is consistent with this principle.
Reduction in length of transverse drainage.	Objective 2: Provide a flowing road alignment that is responsive to, and integrated with the natural and built landscape: <ul style="list-style-type: none"> • Visual and landscape character • Biodiversity/ecological links 	Yes: <ul style="list-style-type: none"> → Transverse drainage such as culverts have limited visual exposure. → Changes to culvert design are considered to contribute to enhanced ecological links relative to the SPIR.
Removal of mid-block street lighting.	Objective 2: Provide a flowing road alignment that is responsive to, and integrated with the natural and built landscape: <ul style="list-style-type: none"> • Visual and landscape character Objective 3: Facilitate good urban design outcomes for areas adjoining the road: <ul style="list-style-type: none"> • Safety/ security. 	Yes: <ul style="list-style-type: none"> → The SPIR provided for "lighting as required". → Bus stops are located at intersections which will be lit. → Limited lighting is generally consistent with what would be expected of a rural road and consistent with the principle of retaining the rural landscape character. The absence of lighting may affect the safety and user numbers along the shared path. Given the limited residential catchment, demand for night-time use is likely to be low.

Design change	Key area of concern	Consistent
<p>Raised main alignment near Grover Crescent up to 2.8m relative to SPIR design, to avoid an existing water main.</p>	<p>Objective 1: Protect and enhance existing views, character and cultural values of the corridor:</p> <ul style="list-style-type: none"> Views Maximise integration <p>Objective 2: Provide a flowing road alignment that is responsive to, and integrated with the natural and built landscape:</p> <ul style="list-style-type: none"> Road footprint Utilities and vegetation Privacy Noise 	<p>Yes:</p> <ul style="list-style-type: none"> The proposed change maximises integration by avoiding conflicts with existing utilities (water main). The proposed change will affect views from Grover Crescent into DEOH lands. These views would have been blocked by the SPIR design as a result of the proposed visual impact mitigation measures, namely reinstatement of vegetation to provide a visual buffer between the project and adjoining residents. The proposed change will alter the outlook form looking across a wide paved area to looking at a vegetated embankment. The proposed change will not inhibit reinstatement of vegetation. The proposed change replaces cut with fill – both are equally ‘unnatural’ landforms that would be expected of any major road infrastructure project.
<p>Raised vertical alignment of the Vineyard Road extension by about 0.4m, to maximise cover over an existing water main.</p>	<p>Objective 2: Provide a flowing road alignment that is responsive to, and integrated with the natural and built landscape:</p> <ul style="list-style-type: none"> Visual and landscape character Road footprint 	<p>Yes:</p> <ul style="list-style-type: none"> Refinements are minor and were flagged in the SPIR.
<p>Enlarged construction boundary to provide for an increased construction compound near Kings Hill Road.</p>	<p>Objective 3: Facilitate the provision of good urban design outcomes for areas adjoining the road.</p> <ul style="list-style-type: none"> Visual and landscape character Amenity of adjoining areas 	<p>Yes:</p> <ul style="list-style-type: none"> Use of the area for a construction compound is temporary only It is not anticipated that the enlargement of the construction boundary will lead to additional clearing or changes to the existing dam. No additional visual and landscape character impacts are anticipated as a result from this change.
<p>Increased operational boundary to reflect the need for an additional permanent basin near Littlefields Road, required to mitigate potential impacts on a series of dams downstream</p>	<p>Objective 1: Protect and enhance existing views, character and cultural values of the corridor:</p> <ul style="list-style-type: none"> Views Visual and landscape character <p>Objective 2: Provide a flowing road alignment that is responsive to, and integrated with the natural and built landscape:</p> <ul style="list-style-type: none"> Protect existing waterways 	<p>Yes:</p> <ul style="list-style-type: none"> The area was previously included in the construction boundary which may have resulted in removal of existing trees.

Design change	Key area of concern	Consistent
Introduction of two additional linear basins along Vineyard Road to provide additional water storage	<p>Objective 1: Protect and enhance existing views, character and cultural values of the corridor:</p> <ul style="list-style-type: none"> Visual and landscape character <p>Objective 2: Provide a flowing road alignment that is responsive to, and integrated with the natural and built landscape:</p> <ul style="list-style-type: none"> Protect existing waterways Road footprint 	<p>Yes:</p> <ul style="list-style-type: none"> The proposed change assists in protecting downstream receivers from flooding and may assist water quality in receiving waterways. . The proposed change eliminates the need for work to other farm dams in the area, reducing the extent of works and potential environmental impacts overall.

Summary

The review of the proposed design changes indicates that the project remains consistent with the urban design principles and objectives as articulated in the EIS and as amended by the SPIR. The proposed changes largely constitute refinements, which is a continuation of the design refinement process that commenced with the exhibition of the project EIS.

The most notable refinement is the change in vertical alignment near Grover Crescent. This was further discussed in section 3 above.

4.3.2 Consistency with urban and landscape design directives

The urban design directives include the urban design vision, strategy and opportunities as identified in the EIS and amended by the SPIR.

The following table summarises the urban design opportunities and strategies as per the EIS as amended by the SPIR, and describes to what extent they are reflected in the design. The third column provides an assessment of consistency against the SPIR.

Table 13: Urban Design Directives Assessment

Urban Design Directive	Discussion	Consistent
Urban Design Opportunities		
Design the road corridor to reinforce and reflect the distinction between rural lands in the north and future airport and employment lands to the	The proposed changes do not affect the ability of the project to meet to realise this opportunity.	Yes – the proposed change can be accommodated.
Protect scenic and landscape values by minimising the scale of the infrastructure where possible and by reinforcing the existing landscape and scenic character.	The proposed changes do not affect the ability of the project to meet to realise this opportunity. Design refinements have somewhat reduced the project footprint.	Yes – the proposed change can be accommodated.
Retain views to the Blue Mountains and, to maintain the sense of place and a visually exciting drive.	The proposed changes do not affect the ability of the project to meet to realise this opportunity.	Yes – the proposed change can be accommodated.
Protect and enhance remnant vegetation.	The proposed changes do not affect the ability of the project to meet to realise this opportunity.	Yes – the proposed change can be accommodated.

Urban Design Directive	Discussion	Consistent
Design the road to maintain the opportunity for a future a pedestrian/ cyclist connection linking open space systems on both sides of the corridor	Provision for east-west crossing of the road corridor has been made at all intersections and is unaffected by the proposed change.	Yes – the proposed change can be accommodated.
Provide a safe pedestrian/cyclist crossing through all signalised and unsignalised intersections	Provision for pedestrian/ cycle movement has been made at all intersections consistent with path provision and is unaffected by the proposed change.	Yes – the proposed change can be accommodated.
Celebrate creek crossings and design them to enhance their potential as ecological links, as well as potential future regional pedestrian cycle links as identified in the <i>Sydney Green Grid</i> .	The proposed changes do not affect the ability of the project to meet to realise this opportunity. Design refinements have enhanced culverts as potential ecological links.	Yes – the proposed change can be accommodated.
Urban design strategy recommendations for the TNR5 project area		
Complement and reinstate the existing character of mixed areas of woodland and paddock.	The proposed changes do not affect the ability of the project to meet to realise this opportunity.	Yes – the proposed change can be accommodated.
Complement existing woodland to provide a visual buffer to residents fronting The Northern Road.	The proposed changes do not affect the ability of the project to meet to realise this opportunity.	Yes – the proposed change can be accommodated.
Provide vegetation to enhance the intersections as attractive entrance to the rural residential clusters.	The proposed changes do not affect the ability of the project to meet to realise this opportunity.	Yes – the proposed change can be accommodated.
Maintain views to Orchard Hills and Mulgoa Valley Scenic Landscapes	The proposed changes do not affect the ability of the project to meet to realise this opportunity.	Yes – the proposed change can be accommodated.
Maintain views along the Water NSW supply pipelines	The proposed changes do not affect the ability of the project to meet to realise this opportunity.	Yes – the proposed change can be accommodated.
Reinstate the avenue along Littlefields Road	The proposed changes do not affect the ability of the project to meet to realise this opportunity.	Yes – the proposed change can be accommodated.
Stabilise cuttings with Cumberland Plain Woodland and endemic vegetation as appropriate	The proposed changes do not affect the ability of the project to meet to realise this opportunity.	Yes – the proposed change can be accommodated.
Provide for views to the Blue Mountains and the Orchard Hills Golf Course/ DEOH	The proposed changes do not affect the ability of the project to meet to realise this opportunity.	Yes – the proposed change can be accommodated.

Summary

The assessment indicates that the proposed change does not affect the ability of the project to realise the urban design directives, objectives and principles as identified in the EIS and amended by the SPIR.

4.3.3 Review of urban and landscape design for consistency with SPIR mitigation measures

The table on the following pages summarises the mitigation measures contained within the SPIR that are of relevance for the urban and landscape design and for managing or mitigating the identified landscape character and visual impacts. A number of biodiversity mitigation measures are also included as they overlap with or affect the landscape design requirements. The assessment considers whether the proposed change would affect the potential for mitigation measures to be realised, and whether therefore any change to environmental management measures would be required.

Table 14: Environmental Management Measures Consistency Assessment

Ref #	Potential Impact	Environmental Management Measure	Consistent
UD-1	Urban design	<p>The urban design and landscape concept developed for the project would be adopted during detailed design. This would include design treatments for:</p> <ul style="list-style-type: none"> – Location and identification of existing vegetation and proposed landscaped areas, including species to be used – Built elements including retaining walls and Adams Road Bridge – Design treatments for stormwater quality measures and infrastructure – Pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings – Fixtures such as seating, lighting, fencing and signs – Details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage – Procedures for monitoring and maintaining landscaped or rehabilitated areas. 	Yes – generally consistent. Refer to Sections 4.3.1. and 4.3.2 for detailed assessment.
UD-2	Lighting impacts	The design of temporary lighting must avoid unnecessary light spill on adjacent residents or sensitive receivers and be designed in accordance with AS 1158.1-1986.	Yes – Consistent. Road lighting not significantly altered by IFT design.
UD-3	Visual impacts from construction sites	Consider the provision of barriers to screen views from visually sensitive nearby areas such as rural dwellings, residential and recreational areas.	N/A– Construction phase requirement. Not related to urban and landscape design.
UD-4	Visual impacts from construction sites	Contain construction activities within the construction works zone boundary and occupy the minimum area practicable for limiting impacts on adjoining areas, including the extent of native vegetation clearing.	N/A– Construction phase requirement. Not related to urban and landscape design.
UD-5	Visual impacts as a result of vegetation loss	Construction programming must show how progressive rehabilitation of disturbed areas would be undertaken to minimise the duration and extent of temporary visual and landscape character impacts and to minimise soils exposure and the potential for erosion and dust generation.	N/A– Construction phase requirement. Not related to urban and landscape design.
UD-6	Visual impacts as a result of vegetation loss	Existing trees to be retained within construction areas are to be identified, protected and maintained in accordance with AS4970 Trees on Development Sites, or as otherwise directed by a qualified ecologist or arborist.	N/A– Construction phase requirement. Not related to urban and landscape design.

Ref #	Potential Impact	Environmental Management Measure	Consistent
B-1	General Construction Impacts	<p>A Flora and Fauna Management Plan (FFMP) would be developed for the project. The plan would include procedures for preclearance surveys that are consistent with the Roads and Maritime Biodiversity Guidelines (RTA, 2011). The FFMP would outline:</p> <ul style="list-style-type: none"> → Details of pre-construction surveys to verify the construction boundaries/ footprint of the project and to confirm the vegetation to be cleared as part of the project, identify habitat trees to be felled in a staged approach and identification of fauna release areas should fauna be encountered during vegetation removal → Updated sensitive aerial vegetation maps based on clearance surveys and previous survey work → Exclusion zones and fencing or other means to demarcate vegetation to be retained (endangered ecological communities) in close proximity to the works → Clearing of vegetation and removal of bush rock (Guide 7) including implementation of the pre-clearing process (Guide 1) and the associated staged habitat removal process where hollow-bearing trees, habitat trees or bush rock is to be removed → Weed management (see Guide 6) through the use of mechanical weed control methods such as slashing or mowing, as well as a range of herbicides → Pathogen management (see Guide 7) through the implementation of hygiene protocols such as the provision of vehicle and boot wash down facilities and ensuring vehicles and footwear are free of soil before entering or exiting the site, as well as the establishment of exclusion zones and designated access tracks → Mechanism for the monitoring, review and 	Yes – Preparation and implementation of a FFMP is not affected by IFT design requirements.
B-6	Removal of native vegetation, threatened species and threatened species habitat	Native vegetation would be re-established in accordance with Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (NSW Roads and Traffic Authority, 2011). These measures would be outlined in the FFMP and would include monitoring and review procedures to be implemented to ensure the effective implementation of these measures.	Yes – Preparation and implementation of a FFMP is not affected by IFT design requirements. Not related to urban and landscape design
B-14	Fragmentation of identified biodiversity links and habitat corridors	Identified connectivity measures have been considered at Surveyors Creek and Badgerys Creek to be further considered during design in accordance with the Wildlife Connectivity Guidelines for Road Projects (RMS inprep). In particular, design where connectivity has been considered is to include culvert design, lighting and fencing. Opportunities for increasing the height of culverts proposed to provide fauna underpass at these locations would be investigated during detailed design of the project where reasonable and feasible.	N/A – Not related to urban and landscape design.

Ref #	Potential Impact	Environmental Management Measure	Consistent
B-19	Impacts to riparian corridors	A Vegetation Management Plan (VMP) would be prepared in consultation with DPI Water prior to construction commencing.	Yes – VMP to be prepared prior to construction. Preparation and implementation of a VMP is not affected by IFT design refinements.
B-21	Revegetation	Roads and Maritime would consider reuse of topsoil as part of the Urban Design Landscape Plan (UDLP) for the project.	Yes – Preparation of respective specifications is not affected by IFT design refinements.
B-22	Revegetation	Roads and Maritime would consider transplanting native species from areas to be cleared into revegetation areas, depending on the type of species being removed and the likely success of transplanting. Plants to be used in revegetation would be sourced from local provenance seed where appropriate and available, and associated seed collection would be undertaken prior to clearing.	Yes – Preparation of respective specifications is not affected by IFT design refinements.
B-23	Revegetation	Rehabilitation of the disturbed areas of the site would be undertaken in accordance with Roads and Maritime Batter Stabilisation Guidelines and Roads and Maritime contractor specifications.	Yes – Preparation of respective specifications is not affected by IFT design refinements.

In respect of mitigation measure UD-1, it should be noted that the project LCVIA included a number of additional mitigation measures and recommendations for further investigation and integration into the detailed design. Consistency with those measures is assessed in the following table.

Table 15: Urban Design Mitigation Measures Consistency Assessment

LCVIA mitigation measure	Consistent
Road Design	
Consider relocating the proposed north-bound heavy vehicle inspection area away from the rural residential cluster in Grover Crescent, to maintain residential amenity and minimise noise, exhaust and light pollution for adjoining residents.	Yes. Vehicle inspection area removed in SPIR design.
Review road design levels to ensure residents' views to the Blue Mountains are maintained	Yes. The proposed change does not alter views to the Blue Mountains relative to the SPIR design.
Investigate opportunities for localised increases in batter steepness to reduce the corridor footprint and to maximise retention of remnant vegetation and farm dams	Yes. Batters have been locally steepened by the proposed changes.
Review typical road sections and reduce the median widths, where possible based on geometric constraints and potential for future widening, to reduce the overall footprint of the corridor, while maintaining sufficient median width for vegetation	Yes. Median widths have been reduced by the proposed changes.
Review the lengths of concrete nosings at intersections to minimise their lengths. Maximise soft landscaping in the median on the approaches to intersections using appropriate frangible and low-growing species to provide for sightlines	Yes. The proposed change does not preclude realisation of the management measure.

LCVIA mitigation measure	Consistent
Review the allocation and placement of the utility corridors to ensure they do not inhibit vegetation, in particular the provision of tree cover, along the corridor	Not applicable in TNR 5.
Review the design for opportunities to mitigate level changes through the median to reduce the extent of earthworks required and associated impacts on views and vegetation.	Not applicable in TNR 5.
Access and Connectivity	
Review the design to ensure access to residual lands particularly between The Northern Road and the Western Sydney Airport, where there are no current provisions.	Not applicable in TNR 5.
Consider access to employment lands in the detailed design phase, including for pedestrians and cyclists.	Not applicable in TNR5.
Investigate the feasibility and desirability of a shared path link along the existing The Northern Road to Luddenham, to provide a connection from the proposed new alignment to Luddenham town centre. This applies to both intersections with the Luddenham bypass. The proximity of the town centre from the southern intersection, combined with re-alignment of the existing The Northern Road provides a major opportunity to provide such a link as part of detailed design.	Not applicable in TNR5.
Review the design to ensure it does not prevent the creation of future pedestrian and cycle links along the creek system in accordance with the principles of the Sydney Green Grid. In particular Badgerys Creek is planned to run through planned urban residential areas where it has the potential to function as an open space, recreation and ecological corridor.	Yes. All intersections continue to provide for pedestrian and cyclist movement across the road corridor.
Public Domain and Private Recreation Areas	
In consultation with the club, design adjustments to the Orchard Hills Golf Course to maintain existing functionality and PAR levels.	Yes. Orchard Hills Golf Course access not substantially altered by IFT design adjustments.
Lighting	
Design temporary and permanent lighting in accordance with Australian Standard AS1158 Lighting for roads and public spaces (AS1158) and to avoid unnecessary light spill on adjacent residents or sensitive receivers.	Yes. Road lighting not substantially altered by IFT design.
Bridges	
Review the structural design of the bridge to provide an elegant form	
Consider increasing the length of the bridge over Adams Road to span over Cosgrove Creek to maintain the integrity of the creek system and the character of the valley with a series of cascading dams along a natural watercourse	Not applicable in TNR5.
Review the road design to provide a safety barrier between the carriageway and the shared path.	
Design the bridge and potential future widening of Adams Road to allow for tree planting in a central median and behind safety barriers	

LCVIA mitigation measure	Consistent
Drainage Design	
Review the drainage design to minimise hard structures. Integrate WSUD and maximise soft landscape solutions to drainage channels and swales to maximise ecological outcomes and protect the water quality of major creeks.	Yes. Drainage and hydrology were reviewed as part of the proposed change, and amended to include a greater share of soft landscape treatments.
Minimise the extent of infill of existing farm dams to retain them as essential features of the rural landscape.	Yes. Drainage and hydrology reviewed as part of the proposed change to minimise the overall extent of modifications to existing dams.
Biodiversity	
Investigate opportunities to provide a fauna crossing to support existing riparian and ecological corridors in the Duncans Creek catchment.	Not applicable in TNR5.
Review the design of bridges and culverts as fish friendly crossings and ensure that they do not create barriers to fish and that impacts to the existing hydrology are minimized.	Subject to confirmation by hydrological and ecological consistency assessment.
Ensure replacement or reinstatement of habitat in accordance with Roads and Maritime Biodiversity Guidelines, to maximise creek restoration vegetation to ecological corridors.	Yes. The provision of reinstated habitat is not affected by the proposed change.
Enhance and restore native vegetation communities along watercourses. Ensure appropriate riparian buffers are provided for waterways and streams, in accordance with the Biodiversity Assessment Report (Appendix I of the EIS). Integrate the use of excess local materials such as rock and timber to help recover biodiversity and create habitat.	Yes. Opportunities to enhance native vegetation communities are not affected by the proposed change.
Landscape and Vegetation	
Review the engineering design to minimise the removal of existing vegetation within the proposed construction boundary and maximise reinstatement of native vegetation through use of appropriate species.	Yes. Subject to biodiversity consistency assessment. The landscape plans for the IFT design make provisions for reinstatement of native vegetation.
If the north-bound heavy vehicle inspection area near Grover Crescent cannot be re-located, investigate opportunities to provide additional visual screening to maximise residential amenity and privacy.	Yes. Heavy vehicle inspection area removed.

4.3.4 Summary

The above assessment indicates that the proposed changes would not alter the potential for the environmental mitigation measures and commitments to be realised. A number of commitments and mitigation measures have been addressed as a result of the proposed change, resulting in an enhanced outcome relative to the approved project.

5 SUMMARY AND CONCLUSION

This Urban Design Consistency Assessment has reviewed the proposed design for the TNR5 project design for consistency with the Conditions of Approval for the project. This has involved a review and assessment of the proposed change against the EIS design as amended by the SPIR, to determine whether the project has remained consistent with the SPIR design and commitments and the NSW Conditions of Approval. It is noted that Commonwealth Conditions of Approval were deemed as not relevant to this assessment from an urban design and visual impact point of view.

A number of factors were considered in the review and assessment including

- The implications of the proposed change on the landscape character impacts identified in the EIS as amended by the SPIR
- The implications of the proposed change on the visual impacts identified in the EIS as amended by the SPIR
- Whether the proposed change would result in an inconsistency with the Conditions of Approval, in the sense that it would prevent any conditions from being met
- Whether the proposed changes would result in an inconsistency with the project urban design objectives
- Whether the proposed change would prevent SPIR environmental mitigation measures or commitments to be realised.

The review and assessment found the following:

- The landscape character impact ratings of the project as amended by the proposed change would remain consistent with those identified in the SPIR: the proposed change does not alter the identified landscape character impacts of the approved project.
- The visual impacts of the proposed change are considered consistent with those that would have resulted from the SPIR design:
 - The visual impact ratings of the proposed changes on the six viewpoints assessed as part of the EIS remain consistent with the visual impacts identified in the SPIR: the proposed change would not alter the visual effect and therefore the visual impacts of the approved project on those six viewpoints.
 - The visual effect of the proposed changes on a newly assessed viewpoint at Grover Crescent, while different in nature to the visual effects that would have resulted from the SPIR design, are considered to be similar in magnitude than those that would have resulted from the SPIR design. The difference in visual effect would be highly localised and limited to the area around Grover Crescent, constituting a minor portion of the overall project area. The visual impact of the proposed change would be able to be effectively managed by the mitigation measures identified in the EIS as amended by the SPIR.
- The proposed change would not result in an inconsistency with the Conditions of Approval from an urban design and visual point of view: the proposed change can be accommodated within the conditions.
- The proposed change would not lead to the project being inconsistent with the urban design objectives for the approved project: the proposed change supports the project objectives.
- The proposed change would not affect the ability to implement the environmental mitigation measures and commitments identified in the SPIR, including the urban design and visual mitigation measures identified in the EIS: the proposed change is consistent with the Statement of Commitments and environmental management measures incorporated as part of the EPAA Part 5.2 Approval.

In light of the above findings, the proposed change is considered to be consistent with the approved project in respect of urban and landscape design, and landscape character and visual impacts.

6 REFERENCES

The following documents were reviewed as part of this assessment:

- GHD Woodhead 2018: *Penrith City Council Area. MR 154 – The Northern Road Upgrade. Stage 5 between Littlefields Road and Glenmore Parkway. Landscaping and Site Envelope (LS). Landscaping Plan*, Sheets 1 to 34, Revision 5 (Draft Construction Issue; 22 March 2018), prepared for Transport for NSW
- GHD Woodhead 2018: *Penrith City Council Area. MR 154 – The Northern Road Upgrade. Stage 5 between Littlefields Road and Glenmore Parkway. Landscaping and Site Envelope (LS). Landscaping Sections and Schedules*, Sheets 1 to 11, Revision 5 (Draft Construction Issue; 22 March 2018), prepared for Transport for NSW
- GHD Woodhead 2018: *Penrith City Council Area. MR 154 – The Northern Road Upgrade. Stage 5 between Littlefields Road and Glenmore Parkway. Road Cross Sections (RC)*. Sheets 1 to 161, Revision 6 (Draft Construction Issue; 02 March 2018), prepared for Transport for NSW
- GHD Woodhead 2018: *Penrith City Council Area. MR 154 – The Northern Road Upgrade. Stage 5 between Littlefields Road and Glenmore Parkway. Road Cross Sections (RC)*. Sheets 1 to 162, Revision 3 (Issued Design for Review; 11 September 2017), prepared for Transport for NSW
- GHD Woodhead 2018: *The Northern Road Stage 5. Roads and Maritime Services. Urban Design Report – 100% Detailed Design – REDESIGN. March 2018, Rev F*, prepared for Roads and Maritime Services
- Jacobs Australia 2017: *The Northern Road Upgrade – Mersey Road, Bringelly to Glenmore Parkway, Glenmore Park. Submissions and Preferred Infrastructure Report*, prepared for Roads and Maritime Services, December 2017, Publication Number RMS 17.629
- NSW Minister for Planning 2018: *Infrastructure approval. Section 5.19 of the Environmental Planning & Assessment Act 1979 in respect of Critical State Significant Infrastructure (CSSI): Construction and operation of approximately 16 kilometres of The Northern Road between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Park*, draft conditions, issued 22 March 2018
- Roads and Traffic Authority 2008: *Landscape Guideline. Landscape design and maintenance guidelines to improve the quality, safety and cost effectiveness of road corridor planting and seeding*, RTA/Pub.08.109
- Spackman Mossop Michaels 2017: *Urban Design and Visual Impact Assessment Technical Paper. The Northern Road Upgrade, Mersey Road to Glenmore Parkway*, Version 10, 31 May 2017, prepared for Transport for NSW