CHAPTER 19

Landscape and visual impacts

ILLABO TO STOCKINBINGAL ENVIRONMENTAL IMPACT STATEMENT

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19. Landscape and visual impacts

This chapter provides a summary of the landscape character and visual impact assessment for the Inland Rail—Illabo to Stockinbingal (I2S) project (the proposal). It describes the existing landscape character and visual environment, assesses the impacts from construction and operation of the proposal, and provides recommended mitigation and management measures. The full assessment reports are provided in Technical Paper 13: Landscape Character and Visual Impact Assessment (Technical Paper 13).

19.1 Overview

Minimising visual impact on sensitive receivers was taken into consideration during design development by maximising distances between the alignment and sensitive receivers. Urban design objectives have been incorporated into the concept design and would be further refined during detailed design.

The number of private residences that have visual access to the proposal is limited because the proposal is generally located on agricultural land; however, visual impacts during operation, and the need to consider mitigation strategies such as tree screening, was raised as an issue during stakeholder and community consultation.

During construction, there would be temporary changes to the visual amenity of the surrounding area due to views of general construction activities, earthworks, lighting for night works, and the presence of large machinery and workers. These impacts on visual amenity would depend on the nature and intensity of the construction activity at a given point during construction. Several viewpoints would experience lighting and vegetation clearance impacts, either temporarily during construction or permanently, which would be carried through to operation.

To address these impacts, standard measures would be applied through the Construction Environmental Management Plan (CEMP). Rehabilitation of disturbed areas would be undertaken progressively in accordance with the landscape and rehabilitation strategy implemented through detailed design, construction and rehabilitation stages of the proposal.

During operation, there would be permanent landscape and visual amenity impacts as a result of the introduction of new structures in the landscape, mainly associated with new rail infrastructure, embankments, signage at passive crossings and fencing along the rail corridor. These include new rail bridges and structures, including at Burley Griffin Way, Corbys Lane, Dudauman Road, Old Cootamundra Road and Dirnaseer Road.

To address these impacts, site-specific mitigation measures are proposed for 14 viewpoints during the operation phase of the proposal. These include the use of planting and the appropriate use and positioning of signage, where suitable. In addition, an urban design and landscape plan would consider the use of materials and treatments to minimise potential operational impacts with consideration of the surrounding landscape and context.

19.2 Approach

A summary of the approach to the assessment is provided in this section, including the legislation, guidelines and/or policies driving the approach and the methodology used to undertake the assessment. A more detailed description of the approach and methodology is provided in Technical Paper 13.

19.2.1 Legislative and policy context to the assessment

The landscape character and visual impact assessment was undertaken with reference to the following guidelines, policies and standards:

- EIA-N04 Environmental Impact Assessment Practice Note: Guideline for Landscape Character and Visual Impact Assessment (NSW Roads and Maritime Services (RMS), 2013b)
- Australian Standard (AS) 4282-2019 Control of the obtrusive effects of outdoor lighting (Standards Australia, 2019a)
- Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW (RMS, 2012)
- NSW Sustainable Design Guidelines Version 4.0 (Transport for NSW (TfNSW), 2017a)
- *Technical guideline for Urban Green Cover in NSW* (NSW Office of Environment and Heritage (OEH), 2015)
- Landscape and Visual Assessment AILA Guidance Note for Queensland (Australian Institute for Landscape Architects, 2018).

In addition, the NSW Land and Environment Court has developed planning principles that relate to visual impact assessment derived from two key cases: *Tenacity Consulting v Warringah Council* (2004) and *Rose Bay Marina PTY Limited v Woollahra Council* (2013). These were used as guidance when developing the visual assessment methodology, along with the EIA-N04.

19.2.2 Secretary's Environmental Assessment Requirements

The Secretary's Environmental Assessment Requirements (SEARs) relevant to landscape character and visual impacts, together with a reference to where they are addressed in the EIS, are provided in Appendix A.

19.2.3 Methodology

19.2.3.1 Study area

The study area for the landscape character and visual assessment has been defined as the proposal site and the extent of the proposal that can be seen from the surrounding landscape, as identified in Technical Paper 13.

19.2.3.2 Key tasks

The landscape character and visual impact assessment aims to ensure that all possible effects of change on views, visual amenity and landscape character are taken into account. It is concerned with how the surroundings of individuals or groups of people may be specifically affected by change in the landscape, both quantitatively and qualitatively. It also considers the overall impact of the proposal on the surrounding landscape character and sense of place. The landscape character overview and visual impact assessment was undertaken in accordance with best-practice principles, including those outlined in section 19.2.1.

A quantitative and qualitative assessment of the landscape character and visual impacts of the proposal was undertaken to comply with the SEARs and in accordance with EIA-N04. The assessment involved:

- desktop analysis
- site visit and analysis
- landscape character assessment
- identifying potential sensitive visual receivers
- assessing the potential for visual impacts during construction and operation
- assessing the potential for landscape character impact during operation. This is the phase where the landscape's ability to absorb the proposal is best assessed, as during the construction the impacts are temporary.
- assessing the potential for lighting impact during construction and operation
- developing mitigation measures to minimise the potential for negative impacts and enhance the potential for positive impacts.

The impact rating for landscape character, visual and lighting impacts during construction and operation was determined in accordance with EIA-N04. The impact rating was calculated using a matrix (shown in Table 19-1) based on a combination of sensitivity and magnitude of impact.

TABLE 19-1: IMPACT RATING AS A COMBINATION OF SENSITIVITY AND MAGNITUDE

	High magnitude	Moderate magnitude	Low magnitude	Negligible magnitude
High sensitivity	High	High–Moderate	Moderate	Negligible
Moderate sensitivity	High–Moderate	Moderate	Moderate–Low	Negligible
Low sensitivity	Moderate	Moderate–Low	Low	Negligible
Negligible sensitivity	Negligible	Negligible	Negligible	Negligible

19.2.3.3 Visual impact

Quantitative and qualitative values

The visual experience of an area and its landscape setting varies depending on the viewer's standpoint within and outside the site and from the viewer's personal perceptions of what they may appreciate in any given setting.

This requires an assessment to address both the quantitative characteristics of the landscape views (e.g. what elements form the scene, what features dominate and what breadth of view is offered—narrow vista or wide panorama) and the qualitative assessment of the values ascribed to those scenes.

The quantitative characteristics are less subjective than the qualitative characteristics (e.g. whether a view still be seen when the new built form is introduced). In this context, quantitative assessment does not necessarily imply a numerical assessment result but rather relates to a matter that can be evaluated objectively.

Viewpoints

Representative viewpoints were selected to assess potential visual impacts from across the study area considering a range of distances from, and perspectives of, the proposal, and varying landscapes and sensitivities. Selected viewpoints were defined under different categories and sensitivities in terms of their land use context and spatial relationship to the proposal site, and the landscape in which they are located. A visual impact rating was given for each viewpoint.

Visual impact rating

The visual impact rating assessment was undertaken using the EIA-N04 landscape character and visual impact rating matrix.

The overall visual impact rating of a proposal on any given viewpoint/visual receiver is based on a combination of magnitude and sensitivity, recorded using a four-band scoring system from negligible to high (refer to Table 19-1) based on a consideration of the following criteria:

- Sensitivity: each visual receiver type has an inherent and varied sensitivity to change in the visual scene based on the context in which their view is being experienced (i.e. at home, on the street, in a park, etc.). This sensitivity has a direct bearing on the perception of visual impact experienced by the receiver and qualifies the quantitative impacts. Sensitive visual receivers usually include:
  - occupiers of residences with views of the proposal site
  - communities with a landscape setting or views valued by the community and/or visitors
  - users of outdoor recreation areas whose attention or interest may be focused on the landscape
  - road users.
- Magnitude: a measure of the magnitude of the visual effects of the development within the landscape. A series of quantitative measures are studied, including distance from development, quantum of view, period of view and scale of change.
- Overall impact rating: the severity of these impacts is calculated using the matrix in Table 19-1.

The sensitivity and magnitude rating criteria are dependent on a number of factors, which are outlined in Table 19-2.

TABLE 19-2: SENSITIVITY AND MAGNITUDE RATING CRITERIA

Factor	Description	Negligible	Low impact	Moderate impact	High impact
Sensitivity (Qualitative)					
Viewer sensitivity	▸ Each visual receiver type has an inherent and varied sensitivity to change in the visual scene based on the personal context in which their view is being experienced. This sensitivity has a direct bearing on the perception of visual impact experienced by the receiver and qualifies the quantitative impacts. ▸ Number of viewers also has a bearing on sensitivity. Viewpoints have a varied number of potential receivers depending on whether the viewpoint is public or private, the popularity of the viewing location and its ease of accessibility. Views from public reserves and open space are often given the highest weighting due to the increased number of viewers affected.	Vacant lot, uninhabited building, car park.	Minor roads, service providers.	Residential properties with limited views, commercial properties, scenic public roads (e.g. official tourist routes).	Public open space, public reserves, living areas or gardens /balconies of residential properties with direct views of proposal.
Magnitude of change (Quantitative)					
Quantum of view	The quantum of view relates to the openness of the view and the receiver's angle of view to the scene. A development located in the direct line of sight has a higher impact than if it were located obliquely at the edge of the view. Whether the view of the proposal is filtered by vegetation or built form also affects the impact, as does the nature of the view (panoramic, restricted, etc.). A small element within a panoramic view has less impact than the same element within a restricted or narrow view.	Only an insignificant part of the proposal is discernible.	An oblique, highly filtered or largely obscured view of the proposal or a view where the proposal occupies a very small section of the view frame.	A direct view of the proposal or its presence in a broader view where the proposal occupies a moderate proportion of the view frame.	A direct view of the proposal or its presence (sometimes in a very narrow or highly framed view), where the proposal occupies the greater proportion of the view frame.
Distance of view	The effect the proposal has on the view relating to the distance between the proposal and the visual receiver. The distances are from the approximate boundary of the proposal site.	Over 3,000 m.	Viewing distance of between 1000 and 3000 m.	Viewing distance between 100 m and 1000 m.	Viewing distance up to 100 m.
Period of view	The length of time the visual receiver is exposed to the view. The duration of view affects the impact of the proposal on the viewer—the longer the exposure the more detailed the impression of the proposed change in terms of visual impact.	Less than 1 second.	1 to 10 seconds: often from a road or walking past.	1 to 5 minutes: usually from a road/driveway entrance, walking past.	Significant part of the day: usually residential property.
Scale of change	Scale of change is a quantitative assessment of the change in compositional elements of the view. If the proposed development is largely similar in nature and scale to that of existing elements in the vicinity, the scale of change is low. If the development radically changes the nature or composition of the elements in the view, the scale of change is high. Distance from the development would accentuate or moderate the scale and variety of visible elements in the overall view and hence influence this rating.	Proposal barely discernible.	Elements and composition of the view would remain largely unaltered.	Elements within the view would be at odds with existing features in the landscape.	Elements within the view would greatly dominate existing features in the landscape.

19.2.3.4 Landscape character impact

A landscape character assessment helps to identify the unique combination of elements and features that make landscapes distinctive. It is used to establish the existing features of the landscape in order to provide a base for measuring the impact of a proposal on landscape character. Existing landscape character was considered to describe the wider context to the viewpoints selected for the visual impact assessment. A desktop analysis was carried out as part of the Landscape and Visual Impact Assessment (LVIA) (refer to Technical Paper 13), which examined built elements (such as villages) and non-built elements (such as land use and zoning). After completing a desktop analysis, onsite observations and analysis were used to complete the landscape character assessment for all Landscape Character Zones (LCZs) identified in proximity to the proposal and their ability to absorb the proposal elements. The assessment included impacts from the operation of the proposal only, as this phase is a permanent impact to the overall landscape character compared with the construction phase, which is temporary.

The landscape character impact rating assessment was undertaken using the EIA-N04 landscape character and visual impact rating matrix (as presented in Table 19-1).

The sensitivity of a LCZ was determined by its ability to absorb change as a result of the proposal in such a way that the defining characteristics of the LCZ would not be lost. As a result, the location and scale, and interaction of a proposal in relation to a LCZ is the defining influence of assigning landscape sensitivity. Landscape sensitivity is also influenced by policies or legislations that may apply to the area, such as a national park. The landscape sensitivity ratings are detailed in Table 19-3.

TABLE 19-3: LANDSCAPE CHARACTER SENSITIVITY CLASSIFICATIONS

Sensitivity	Description
High	The landscape has a highly distinctive character with a low capacity to accommodate change that would result from the proposal. Elements of the proposal could fundamentally alter the characteristics of the landscape and cause irreparable loss of features of the landscape.
Moderate	The landscape has a moderately distinctive character, with other similar examples in the wider area. The landscape has the ability to absorb some elements of the proposal without losing its defining characteristic.
Low	The landscape, while still important in contributing to the wider area, is not as valued as a High or Moderate landscape and has less unique characteristics. Examples of the landscape may be more widespread in the area. The landscape has the ability to absorb elements of the proposal.
Negligible	A landscape that is not highly valued for its character and has a high degree of ability to absorb a significant amount of change.

The magnitude of change to a landscape's character is influenced by both the proposal's scale and new elements that it would introduce to the landscape. Combined with this is the removal of elements that were a part of the landscape before the proposal, such as vegetation or topography. The landscape magnitude of change ratings are described in Table 19-4.

TABLE 19-4: LANDSCAPE CHARACTER MAGNITUDE OF CHANGE

Magnitude of change	Description
High	Significant/highly visible change. A very obvious change to a landscape would result from the proposal and would impact on a widespread area, altering the characteristics of the landscape. Changes would most likely be irreversible in the future.
Moderate	Appreciable change. Changes to the landscape characteristics would result over a potentially wide area and would have a noticeable change on the characteristics of the landscape.
Low	Observable change. A detectable change in landscape characteristics would result from the proposal, yet this would not change the overall character of the landscape.
Negligible	Imperceptible change. A barely noticeable change in landscape characteristics would result from the proposal.

A combination of the sensitivity of the existing landscape to change, and the magnitude of change that may result, was used to determine the overall rating of impact to an LCZ (refer to Table 19-1 for the impact rating matrix). Overall landscape impact rating definitions are provided in Table 19-5.

TABLE 19-5: LANDSCAPE CHARACTER IMPACT RATING AS A COMBINATION OF SENSITIVITY AND MAGNITUDE

Impact rating	Description
High	The proposal will impact in such a way that will may cause permanent or widespread damage to a unique landscape character. Continuation of the current proposal should not proceed and design modifications should be explored to avoid the impact on the landscape character.
High–moderate	The proposal will more than likely contribute to the further decline in landscape characteristics of the LCZ and may threaten the overall defining features of the landscape if the proposal is widespread. Design refinements should be undertaken to avoid the landscape impact.
Moderate	The proposal will reduce characteristics of the LCZ in a noticeable way; however the landscape has the ability to absorb elements of the proposal. The abundance of the environmental value ensures it is adequately represented in the region and that replacement, if required, is achievable.
Moderate–low	Elements of the landscape will be impacted in such a way that will not cause widespread loss of characteristics and should be largely reversable in the future.
Low	Changes to landscape characteristics are minimal. Elements of the proposal would most likely be consistent with elements in the surrounding area.

19.2.3.5 Lighting impact

Guidance for the lighting assessment has been taken *from AS4282:2019—Control of Obtrusive Effects of Outdoor Lighting*. The lighting impact assessment draws on the visual impact rating for each viewpoint identified for the proposal. Lighting impacts were considered for both construction and operation of the proposal and were assessed through a high-level qualitative assessment. Exact details of lighting such as locations, numbers and lux levels, for both the construction and operational phases, are yet to be determined and would be developed during detailed design.

Although no night observations of the viewpoint locations have been undertaken to measure existing light levels, anticipated existing lighting has been identified as a result of light sources observed during the day in order to provide a qualitative assessment. Although specific lighting details for both the construction and operation phase of the proposal are not available, judgement and previous experience has been used to assess potential lighting impacts.

The lighting impact rating assessment was undertaken using the EIA-N04 landscape character and visual impact rating matrix (see Table 19-1).

Sensitivity of each viewpoint was assessed using the visual impact rating for the operational phase of the proposal, as this is considered the most long-term sensitivity rating.

The magnitude of change to the representative views as a result of lighting is dependent on the scale and duration of the proposed lighting and the change that this would have on the existing visual scene. The lighting magnitude of change ratings are outlined in Table 19-6. The overall landscape impact rating matrix is provided in Table 19-1.

TABLE 19-6: LIGHTING MAGNITUDE OF CHANGE

Magnitude of change	Description
High	Highly visible level of change. What was previously a predominantly dark or barely lit environment will become brightly lit.
Moderate	Moderate change. Levels of lighting would increase in such a way that would be at odds with the existing light levels or number of light sources. Would not result in lighting levels changing in a drastic manner, such as a 'High' rating, but would increase the overall lighting level in the area, providing greater visibility.
Low	Somewhat noticeable change. The number of light sources within an area will increase, which will have a minimal impact on lighting levels; however, this would cause only a small increase in light levels, which would diminish with distance.
Negligible	Imperceptible change. Existing lighting levels would be impacted in such a way that would be largely unnoticeable.

19.2.4 Risks identified

The environmental risk assessment for the proposal (summarised in Appendix G) included an assessment of the potential impacts to the landscape character and visual amenity of the study area, associated with the construction and operation of the proposal.

The visual impact risks with an overall assessed rating of medium or above, as identified by the environmental risk assessment (pre-mitigated), included:

- visual amenity (operation)—permanent visual impacts on sensitive visual receivers as a result of the introduction of new infrastructure visible from a number of viewpoints (including new rail overbridges, crossing loops, ancillary infrastructure and access road).

19.2.5 How potential impacts have been avoided/minimised

The option development and assessment process for the Inland Rail location/route options is summarised in Chapter 6: Alternatives and proposal options. As noted in Chapter 6, the shortlist of route options was subject to a detailed assessment, and the proposed alignment was refined based on evaluation of key considerations, including environmental impacts.

Minimising visual impact on sensitive receivers was taken into consideration during route selection by giving favourable consideration to options that maximised distances between the alignment and sensitive receivers.

19.3 Existing environment

19.3.1 Existing landscape character

Landscape character is the combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place.

The proposal site and surrounding area is predominantly comprised of rural land and rural communities of various sizes in the broader landscape. The landscape character of the proposal site consists primarily of substantially cleared agricultural land with scattered isolated patches of native vegetation, in an undulating topography. The landscape also includes scattered residences and farm buildings.

Four LCZs have been identified for the proposal, which are shown in Figure 19.1 and discussed below.

19.3.1.1 LCZ 1—rural settlements

There are two villages within the study area—Stockinbingal to the north and Illabo to the south. The landscape character of these communities has historically been rail-related since the late 1800s with development within these communities being low scale and not an intrusive element in the region's landscape character.

Stockinbingal represents the only area of the proposal with an urbanised (village) character. It is a railway village that was settled in 1885. Stockinbingal had a population of 374 in the 2016 census. There are some elements of non-Aboriginal heritage within the town of Stockinbingal, and the village character largely reflects its Federation-era development. Its former commercial buildings remain intact as prime examples of the Australian vernacular style. Refer to Chapter 15: Cultural heritage on details of Aboriginal and non-Aboriginal heritage.

Illabo is a small locality that was settled in the late 1840s. Illabo had a population of 144 in the 2016 census.

19.3.1.2 LCZ 2—agricultural land

The majority of the study area and surrounds has been heavily modified by past and ongoing agricultural activities with some patches of remnant vegetation remaining. Zoning outside of the settlements of Illabo and Stockinbingal is predominantly RU1 (Primary Production) land, which is used primarily for cropping and grazing, as discussed in Chapter 18: Land use and property. The major industries in the area include livestock, wool and wheat. Further information on the surrounding land uses is provided in Chapter 18.

The general topography of the proposal site is comprised of undulating terrain among areas of wide-open, relatively flat land. This topography allows for long, unobstructed views of the proposal from several locations in the surrounding area.

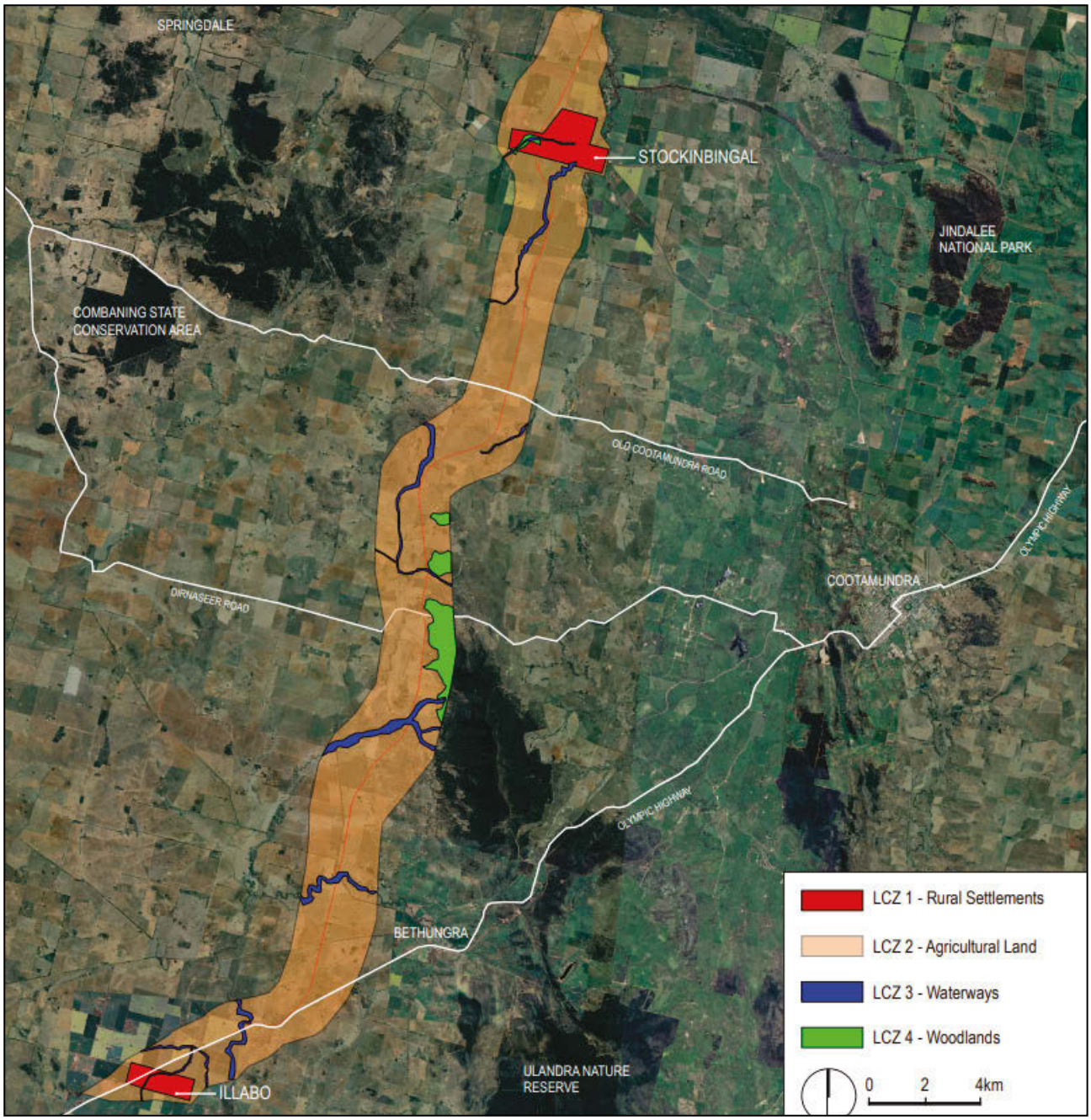


FIGURE 19.1: LANDSCAPE CHARACTER ZONES

19.3.1.3 LCZ 3—watercourses

The proposal site is located within the Murrumbidgee River and Lachlan River catchments, which are sub-catchments within the Murray Darling Basin. The proposal crosses nine creeks and numerous other crossings over small shallow ephemeral creeks and tributaries. More detail on the hydrology of the area can be found in Chapter 12: Hydrology and flooding.

19.3.1.4 LCZ 4—woodlands

The proposal site is located within the South Western Slopes Bioregion, which is comprised of an extensive area of foothills and isolated ranges incorporating the lower inland slopes of the Great Dividing Range. Vegetation communities that are dominant throughout the study area include woodlands and open woodlands of white box (*Eucalyptus albens*) and toward the west and north vegetation communities are dominated by grey box (*Eucalyptus microcarpa*). The South Western Slopes Bioregion has been intensively cleared and cultivated, leaving mostly fragmented vegetation. Vegetation communities within the proposal site are detailed in Chapter 10: Biodiversity.

19.3.2 Viewpoints

There were 14 public and private viewpoints selected to analyse visual impacts of the proposal. A greater number of public viewpoints were used than private viewpoints. This is because the visual accessibility from private residences was limited, as vegetation often screened the proposal. Table 19-7 and Figure 19.2 identifies the viewpoints from north to south and includes a description of its sensitivity and details of the character of these viewpoints.

TABLE 19-7: PROPOSAL VIEWPOINTS

Viewpoint #	Name	Distance from proposal (m)	Type	No. of viewers[1]	Sensitivity rating of receiver	Receivers	Public/ private viewpoint
1	122 Grogan Road (driveway)	50	Public	Low	Low	Road users, driveway entrance	Public
2	Private residence off Cambria Street	346	Private	Low	High	Property owners	Private
3	84 West Street	20	Private	Low	Moderate	Road users, residents of private dwelling	Private
4	Burley Griffin Way	20	Public	Low	Low	Vehicles using Burley Griffin Way	Public
5	Corbys Lane	60	Public	Low	Low	Road users	Public
6	Dudauman Road	35	Public	Moderate	Low	Road users	Public
7	Private residence off Dudauman Road	1300	Private	Low	High	Property owners	Private
8	Intersection of Dudauman Road & Old Cootamundra Road	50	Public	Moderate	Moderate	Road users	Public
9	Wattle Retreat off Old Cootamundra Road	570	Private	Low	Moderate	Property owners	Private
10	Dirnaseer Road	40	Public	Low	Low	Road users	Public
11	555 Ironbong Road (driveway)	185	Public	Low	Low	Road users, entrance driveway to private residence	Public
12	Old Sydney Road	10	Public	Low	Low	Road users	Public
13	Olympic Highway	60	Public	Moderate	Low	Road users	Public
14	Ironbong Road	10	Public	Low	Low	Road users	Public

1. Potential number of viewers that would access this viewpoint

Section 5.1 of Technical Paper 13 illustrates the existing views from each viewpoint. Viewpoints identified range between Low to High sensitivity.

19.2 Viewpoint locations

Coordinate System: GDA 1994 MGA Zone 55
Paper size: A3 Scale: 1:60,000
Date: 5/19/2021

Data Sources: ####

220_0110_EIS_19_2_Viewpoint_locations_r1v1.mxd

19.4 Impact assessment—construction

Construction of the proposal would require removal of some vegetation, including trimming and/or clearing of mature vegetation where rail infrastructure and level crossings are located, or where associated construction works and earthworks are required. Some of the vegetation contributes to the amenity and character of the local area and/or screens views from properties near the proposal site.

Construction equipment, stockpiles and other materials would be within the view of neighbouring properties and existing road users but impacts would be temporary. Earthworks including cuttings and embankments would be required. Permanent spoil mounds are not anticipated to be required for the project as any surplus material would be reused or taken offsite for reuse or disposal where it is unsuitable for reuse or there is insufficient space (refer to Chapter 21: Waste).

19.4.1 Visual impact

As a result of the proposal being generally located on agricultural land, the number of private receivers that have visual access to the proposal is limited. The largest concentration of private residences that will register a visual impact during construction are located on the western side of Stockinbingal, nearest to the realignment of Burley Griffin Way and earthworks north of Dudauman Creek. Although this is the single largest concentration of residences, the number is still low (about seven dwellings), with the majority surrounded by mature vegetation, either screening or creating highly filtered views.

During construction, identified viewpoints are likely to experience some level of visual impacts compared to operations, due to views of construction equipment, site compounds and storage areas along with the following additional temporary visual impacts:

- clearing of vegetation
- setting up site compounds
- stockpiling
- earthworks
- site fencing
- increased site traffic including heavy vehicles.

For the communities of Illabo and Stockinbingal, visual impacts during construction would be low to moderate due to the existing rail corridor and roads. Earthworks, vegetation clearance and construction equipment would have impacts here, and visual impacts would be temporary, and consistent with existing visual features in these locations as described in section 19.3.1. Stockinbingal has low visual sensitivity relative to the receivers in open landscapes due to its limited viewsheds and proximity to existing road and rail infrastructure; however, the major earthworks associated with the realignment and elevation of Burley Griffin Way, and longer construction timeframes here would result in moderate construction-phase impacts. Details of the magnitude ratings during construction for each quantitative factor assessed are presented in Table 19-8.

For the proposal site between the communities of Illabo and Stockinbingal, overall visual impact is moderate/high as the proposal introduces new infrastructure components (e.g. rail, track and bridges) into an open landscape and would result in longer range views of construction equipment and activity. Figure 19.3 shows overall visual impact rating for each viewpoint during the construction of the proposal. Details on the potential construction impacts on each viewpoint are presented in Table 19-9.

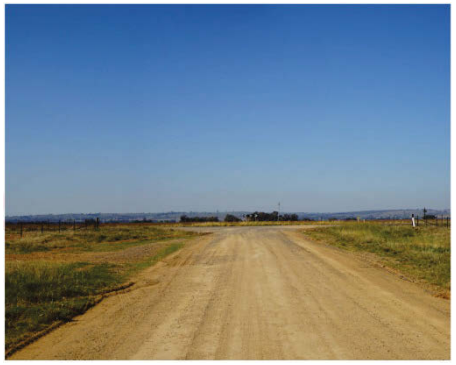
TABLE 19-8: MAGNITUDE RATING FOR VISUAL IMPACTS DURING CONSTRUCTION AS A COMBINATION OF ALL FOUR QUANTITATIVE FACTORS

Viewpoint #	Magnitude—distance	Magnitude—quantum of view	Magnitude—period of view	Magnitude—scale of change	Overall magnitude rating
1	High	Negligible	Low	Low	Low
2	Moderate	Moderate	Moderate	High	Moderate
3	High	High	High	High	High
4	High	High	Low	High	High
5	High	Moderate	Moderate	Moderate	Moderate
6	High	Low	Low	Low	Low
7	Low	Negligible	Negligible	Negligible	Negligible
8	High	High	Low	High	High
9	Moderate	Low	Moderate	Low	Low
10	High	High	Low	High	High
11	High	Low	Low	Low	Low
12	High	Low	Low	Moderate	Moderate
13	High	Low	Moderate	Low	Moderate
14	High	Low	Low	Moderate	Moderate

FIGURE 19.3: VISUAL IMPACTS DURING CONSTRUCTION AT VIEWPOINT LOCATIONS

TABLE 19-9: VISUAL IMPACTS ASSOCIATED WITH CONSTRUCTION OF THE PROPOSAL

Viewpoint #	Name	Impact summary	Sensitivity rating of receiver	Overall magnitude rating	Overall impact rating	Viewpoint
1	122 Grogan Road (driveway)	A temporary construction visual impact would occur in the form of ground disturbance and increased equipment in the area during the construction period in order to upgrade the existing track. Overall, this is considered to be negligible as a result of no construction compound proposed within the area of the viewpoint. Furthermore, the majority of visual receivers will be transitory in nature (traveling along Grogan Road), with views from the neighbouring residential property filtered by surrounding vegetation.	Low	Low	Low	
2	Private residence off Cambria Street	A temporary construction visual impact would occur in the form of ground disturbance and increased equipment in the area during the construction period in order to upgrade the existing track. Elements of the proposed site compound may be visible, as would equipment undertaking earthworks directly in line with the viewpoint. As a result, the level of movement and activity within the viewpoint would be increased during this period, which would increase the sensitivity and period of view for the property owners.	High	Moderate	High–Moderate	
3	84 West Street	Views of the proposed construction compound in the distance will be possible. Construction of new rail track, as well as earthworks, in order to accommodate both the new track and over railroad that will occur as a result of the realignment of Burley Griffin Way will be highly visible. Visibility of machinery and construction workers will also significantly increase the level of activity occurring within the viewpoint.	Moderate	High	High–Moderate	

Viewpoint #	Name	Impact summary	Sensitivity rating of receiver	Overall magnitude rating	Overall impact rating	Viewpoint
4	Burley Griffin Way	A distinct change to the visual scene will occur as a result of the proposal. The realignment of Burley Griffin Way will result in the view to the distant mature vegetation being largely obscured at its highest point as a result of the banks of the raised road, with only the top of some of the larger trees still remaining visible over this. Distant vegetation will become more visible again as Burley Griffin Way beings to descend. Although the visual scene will be significantly altered as a result of the realignment of Burley Griffin Way, current public access to this location will no longer exist, resulting in the viewpoint switching to a private viewpoint and the number of visual receivers dropping dramatically from current levels and restricting the number of viewers to private landowners.	Low	High	Moderate	
5	Corbys Lane	A temporary construction compound will be visible to the left of the visual scene. During the construction of the level crossing it is anticipated that temporary works, such as establishment of traffic controls and temporary diversion requirements, will be visible, as well as construction machinery. Activity within the view will also be increased through an elevated number of people (construction workers) and associated movements of machinery.	Low	Moderate	Moderate–Low	
6	Dudauman Road	No construction compounds will be visible from this location; however, machinery and construction workers associated with the construction of the new track will be visible during the construction period. As a result, activity within the visual scene will increase during this period. This would temporarily reduce long-distance views for vehicles traveling along Dudauman Road.	Low	Low	Low	

Viewpoint #	Name	Impact summary	Sensitivity rating of receiver	Overall magnitude rating	Overall impact rating	Viewpoint
7	Private residence off Dudauman Road	As a result of distance, topography and existing mature vegetation, construction elements of the proposal will not be visible from this location.	High	Negligible	Negligible	
8	Intersection of Dudauman Road & Old Cootamundra Road	Construction compounds to the north and south of Old Cootamundra Road will be visible. Traffic controls, temporary hoardings and site access for plant and materials will also be highly visible during the construction period. As a result of construction activities, activity within the visual scene will increase.	Moderate	High	High–Moderate	
9	Wattle Retreat off Old Cootamundra Road	Construction compounds will not be visible from this location. Machinery (and workers) associated with the construction of the new track will be visible and, as a result, the level of perceptible activity in the visual scene will increase during this period; however, this is tempered somewhat by the distance between the viewpoint and the construction footprint.	Moderate	Low	Moderate–Low	

Viewpoint #	Name	Impact summary	Sensitivity rating of receiver	Overall magnitude rating	Overall impact rating	Viewpoint
10	Dirnaseer Road	A construction compound to the south of Dirnaseer Road will be visible (to the right of the visual scene). Traffic controls, temporary hoardings and site access for plant and materials will also be highly visible during the construction period. As a result of construction processes, activity within the visual scene will increase.	Low	High	High–moderate	
11	555 Ironbong Road (driveway)	No construction compounds will be visible from this location, however machinery and construction workers associated with the construction of the new track will be visible during the construction period. As a result, activity within the visual scene will increase during this period and introduce new elements currently absent from the view (namely moving machinery).	Low	Low	Low	
12	Old Sydney Road	A temporary construction compound will be visible to the left of the visual scene. During the construction of the level crossing it is anticipated that temporary works such as establishment of traffic controls and temporary diversion requirements will be visible, as well as construction machinery. Activity within the view will also be increased through an elevated number of people (construction workers) and associated movements of machinery.	Low	Moderate	Moderate–Low	

Viewpoint #	Name	Impact summary	Sensitivity rating of receiver	Overall magnitude rating	Overall impact rating	Viewpoint
13	Olympic Highway	No construction compounds will be visible from this location; however machinery and construction workers associated with the construction of the new track will be visible during the construction period. As a result, activity within the visual scene will increase during this period and introduce new elements currently absent from the view (namely moving machinery).	Low	Moderate	Moderate–Low	
14	Ironbong Road	A temporary construction compound will be to the left of the view but is unlikely to be visible from this location as a result of the mature vegetation. During the construction of the level crossing it is anticipated that temporary works, such as establishment of traffic controls and temporary diversion requirements will be visible, as well as construction machinery. Activity within the view will also be increased through an elevated number of people (construction workers) and associated movements of machinery.	Low	Moderate	Moderate–Low	

19.4.2 Landscape character impact

Landscape character impacts were not assessed for the construction of the proposal. The landscape character assessment is focused on the ability of each LCZ to absorb the proposal as a permanent addition to the landscape, which relates to the operational phase as the construction phase is temporary. Any impacts as a result of the construction phase, such as site compounds, stockpiles and hoardings, should be 'made good' in line with the rehabilitation strategy for the proposal.

Landscape character impacts are assessed in section 19.5.2.

19.4.3 Lighting impact

Lighting for construction activities will comprise night-time lighting of compounds and work areas where activities outside of standard working hours (6 am–6 pm) may be required. Within compounds, visible light sources would most likely originate from lighting towers and security lighting.

Construction compounds and associated temporary lighting would be visible from viewpoint 2, 3, 4, 8 and 10, which would introduce new lighting sources during construction. The lighting impact rating for construction at each viewpoint is presented in Table 19-10.

TABLE 19-10: LIGHTING ASSESSMENT AT EACH VIEWPOINT FOR CONSTRUCTION OF THE PROPOSAL

Viewpoint #	Construction impact summary	Sensitivity rating of receiver	Magnitude of change	Overall impact rating
1	▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours ▸ No construction compound in the area with lighting elements.	Low	Negligible	Negligible
2	▸ Temporary lighting associated with the construction compound to the west of the viewpoint may be visible, which will introduce new light sources to the view ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours.	High	Moderate	Moderate
3	▸ Temporary lighting associated with three construction compounds proposed in this area will be visible, which will introduce a number of temporary lighting elements during the construction phase ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours.	Moderate	Moderate	Moderate
4	▸ Temporary lighting associated with three construction compounds proposed in this area will be visible, which will introduce a number of temporary lighting elements during the construction phase ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours.	Low	Moderate	Moderate
5	▸ Temporary lighting associated with a small construction compound to the left of the view may introduce lighting elements if temporary security lighting is used; however, given the small size of the proposed compound this would have a minimal impact ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours.	Low	Low	Low
6	▸ No construction compounds would be visible from this location ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours.	Low	Negligible	Negligible
7	▸ No construction compounds would be visible from this location ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours.	High	Negligible	Negligible

Viewpoint #	Construction impact summary	Sensitivity rating of receiver	Magnitude of change	Overall impact rating
8	▸ Construction compounds would be visible from this location ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours ▸ Temporary security lighting would be visible, which would introduce a number of lighting sources currently absent from this location.	Moderate	Moderate	Moderate
9	▸ No construction compounds would be visible from this location ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours.	Moderate	Negligible	Negligible
10	▸ Construction compounds would be visible from this location ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours ▸ Temporary security lighting would be visible, which would introduce a number of lighting sources currently absent from this location.	Low	Moderate	Moderate
11	▸ No construction compounds would be visible from this location ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours.	Low	Negligible	Negligible
12	▸ Temporary lighting associated with a small construction compound to the left of the view may introduce lighting elements if temporary security lighting is used; however, given the small size of the proposed compound, this would have a minimal impact ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours.	Low	Low	Low
13	▸ No construction compounds would be visible from this location ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours.	Low	Negligible	Negligible
14	▸ Temporary lighting associated with a small construction compound to the left of the view may introduce lighting elements if temporary security lighting is used; however, given the small size of the proposed compound this would have a minimal impact and vegetation would help to screen this. ▸ Proposed construction hours are 6 am–6 pm, limiting work during night hours.	Low	Low	Low

19.5 Impact assessment—operation

The proposal would result in the introduction of permanent infrastructure in a rural landscape. This would result in potential changes to the landscape character of the proposal's viewshed, and permanent impacts to visual receivers.

The main built-form elements of the proposal with the potential for landscape character and visual impacts are:

- new rail infrastructure (e.g. track, ballast)
- embankments at locations where the proposal is above natural ground levels
- Burley Griffin Way diversion
- eight new bridges at watercourses and three bridges on public roads, including the road-over-rail bridge for Burley Griffin Way
- signage and infrastructure at level crossings
- fencing along the rail corridor.

19.5.1 Visual impact

Visual impacts are generally rated from negligible to moderate due to the low scale of the proposal, separation distances to visual receivers, filtered views and/or relatively low viewer sensitivity.

The greatest visual impacts generally occur where the proposal includes major new infrastructure, including the road realignment and associated bridge at Burley Griffin Way. The realigned Burley Griffin Way will be the most noticeable change from a public viewpoint, both looking towards the new alignment as well as travelling on it. For other areas, the magnitude of impact is lower, as the visibility of the proposal is reduced due to filtering of view through mature vegetation and undulating topography, or because of the relatively long distance from viewpoints to the proposal. For example, from viewpoint 8 there would be a noticeable change in the viewshed with the introduction of a bridge over Old Cootamundra Road, increasing the perception of built elements from this location.

Visual receivers are generally limited near minor roads (e.g. Old Sydney Road and Ironbong Road), as these roads are used less by vehicles than major roads. The highest concentration of visual receivers is the seven private residences on the eastern side of Stockinbingal, nearest to the realignment of Burley Griffin Way and associated earthworks north of Dudauman Creek. The seven residential dwellings in this area are surrounded by mature vegetation to screen or create highly filtered views. Isolated residences in proximity to the proposal experience negligible to low visual impacts, primarily as a result of being removed from any of the major built form interventions (such as bridges), with the track creating a minor visual intervention, which, when combined with distance, further limits the visual impact. Outside of this area, receivers experience negligible-to-low impacts as they are removed from any of the major built-form elements, such as bridges, while the track itself is only a minor visual intervention.

Details of the magnitude ratings during operation for each quantitative factor assessed are presented in Table 19-11.

Figure 19.4 and Table 19-12 show the overall impact rating at each viewpoint for operation of the proposal. Details on the visual impacts for each viewpoint are presented in Table 19-13.

TABLE 19-11: MAGNITUDE RATING FOR VISUAL IMPACTS DURING OPERATION AS A COMBINATION OF ALL FOUR QUANTITATIVE FACTORS

Viewpoint #	Magnitude—distance	Magnitude—quantum of view	Magnitude—period of view	Magnitude—scale of change	Overall magnitude rating
1	High	Negligible	Low	Negligible	Negligible
2	Moderate	Moderate	Moderate	High	Moderate
3	High	High	Moderate	High	High
4	High	High	Low	High	High
5	High	Moderate	Low	Moderate	Moderate
6	High	Low	Low	Low	Low
7	Low	Negligible	Negligible	Negligible	Negligible
8	High	High	Low	High	High
9	Moderate	Low	Low	Low	Low
10	High	High	Low	High	High
11	High	Low	Low	Low	Low
12	High	Low	Low	Moderate	Moderate
13	High	Low	Low	Low	Low
14	High	Low	Low	Moderate	Moderate

FIGURE 19.4: VISUAL IMPACTS DURING OPERATION AT VIEWPOINT LOCATIONS

TABLE 19-12: VISUAL IMPACTS ASSOCIATED WITH OPERATION OF THE PROPOSAL

Viewpoint #	Name	Impact summary	Sensitivity rating of receiver	Overall magnitude rating	Overall impact rating
1	122 Grogan Road (driveway)	Any work required in this area in order to integrate the new line with the existing would result in a negligible permanent visual impact, as a result of the existing track and level crossing already being part of the visual scene.	Low	Negligible	Negligible
2	Private residence off Cambria Street	The proposed route diverges from the existing line approximately 1 km to the north of this position in a south–west direction. As a result of this, the proposed alignment will encounter a change in topography, which will result in the need for earthworks in the form of cuttings and embankments to the existing hill. This will result in a noticeable change to the existing scene as a result of earthworks and the removal of a significant grouping of mature vegetation visible on the hill in the middle of the scene. As a result of the proposal a noticeable 'opening up' of the view will change the horizon line by removing the mature stand of vegetation in the middle of the visual scene, creating a more open view of the sky than is currently available. Refer to Figure 19.5 for the potential visual impact at viewpoint 2 resulting from the proposal.	High	Moderate	High–moderate
3	84 West Street	The realigned Burley Griffin Way will become a highly noticeable new element in the visual scene, crossing over the existing rail line in the distance before cutting through the stand of mature trees visible in the scene and occupying the view to the left of the scene. Current open rural land will be replaced by a two-lane asphalted road with a verge on either side. In order to accommodate the road, a number of the existing mature trees will need to be removed, which will create a more open view corridor to more distant vegetation and existing rail line. Refer to Figure 19.6 for the potential visual impact at viewpoint 3 resulting from the proposal.	Moderate	High	High–moderate
4	Burley Griffin Way	A distinct change to the visual scene will occur as a result of the proposal. The realignment of Burley Griffin Way will result in the view to the distant mature vegetation being largely obscured at its highest point as a result of the banks of the raised road, with only the top of some of the larger trees still remaining visible over this. Distant vegetation will become more visible again as Burley Griffin Way begins to descend. Although the visual scene will be significantly altered as a result of the realignment of Burley Griffin Way, current public access to this location will no longer exist, resulting in the viewpoint switching to a private viewpoint, and the number of visual receivers dropping dramatically from current levels and restricting the number of viewers to private landowners. Refer to Figure 19.7 for the potential visual impact at viewpoint 4 resulting from the proposal.	Low	High	Moderate
5	Corbys Lane	The proposal will be highly visible from this location as it crosses near the junction of Corbys Lane. A number of signs will be present at this passive crossing in order to inform road users to be aware of and look out for trains before entering or leaving Corbys Lane. As this is a passive crossing, the visual impact is less significant as the use of barriers and lights will not be present.	Low	Moderate	Moderate–low
6	Dudauman Road	The proposal will be visible through filtered views as a result of existing mature vegetation running parallel to Dudauman Road. The current view of open rural land will have a noticeable built-form addition with a slightly elevated rail line and track ballast to either side of this from this location. Foreground and distant views will be unaffected due to the limited vertical scope of the rail line, limiting the visual impact to mid ground.	Low	Low	Low

Viewpoint #	Name	Impact summary	Sensitivity rating of receiver	Overall magnitude rating	Overall impact rating
7	Private residence off Dudauman Road	As a result of distance, topography and existing mature vegetation, the proposal will not be visible from this private residence. A number (or all) of these factors are also present for a number of private residences in the vicinity of the proposal, which also result in negligible visual impacts.	High	Negligible	Negligible
8	Intersection of Dudauman Road & Old Cootamundra Road	From here, a noticeable change in the view scene will occur with the introduction of a bridge over Old Cootamundra Road, increasing the perception of built elements from this location. The bridge will eliminate distant views of the rolling topography; however, given the speed that vehicles travel along this road (approximately 100 km/h) this will be a momentary loss of view, with the original view returning once passing under the bridge. Refer to Figure 19.8 for the potential visual impact at viewpoint 8 resulting from the proposal.	Moderate	High	High–moderate
9	Wattle Retreat off Old Cootamundra Road	From this location, the proposal will be visible in the distance but will form a minor element of the visual scene. A line of mature trees approximately 27 m from the western side of the residence, as well as a stand of mature trees approximately 90 m from the residence means that this view is only possible when standing within a gap between the trees closest to the house and looking north–west. This significantly limits the amount that this view will be seen from the residence, with people required to position themselves at a specific location. No significant vegetation is located along the northern edge of the residence, which allows open views towards the rail line; however, as a result of the distance, it is unlikely that elements of the proposal would be perceptible.	Moderate	Low	Moderate–low
10	Dirnaseer Road	A noticeable visual change will occur as a result of the proposed bridge at this location. Some vegetation clearing to the left and right of the view will also be required. Although the level of built form will be noticeably increased, this will be relatively short-lived due to the speed that vehicles are traveling along the road. No public footpaths are located in proximity to this location, meaning the likelihood of people on foot is remote and therefore generally will not result in a greater viewing period for receivers. Refer to Figure 19.9 for the potential visual impact at viewpoint 10 resulting from the proposal.	Low	High	Moderate
11	555 Ironbong Road (driveway)	From this location, the steel track and ballast will be visible through filtered views to the open rural land. The line will form a minor part of the view given the extent of mature vegetation bordering the road, as well as the limited vertical height of the line. Although this viewpoint is located at the entrance to a private driveway, views from the residence to the proposal would not be possible as a result of existing vegetation surrounding the house and throughout the property.	Low	Low	Low
12	Old Sydney Road	Removal of mature vegetation from either side of the road will be necessary to accommodate the proposed line. As this a passive crossing, signs will be located on either side of the line, as well as stop lines in order to ensure that any road users are aware that they will need to look for any oncoming trains. A small elevation in the road will be noticeable in order to draw level with the existing line but this will be brief before returning to existing levels.	Low	Moderate	Moderate–low

Viewpoint #	Name	Impact summary	Sensitivity rating of receiver	Overall magnitude rating	Overall impact rating
13	Olympic Highway	From this location, the new rail track will be seen receding northwards between two low-level hills to either side of the track. Given the low vertical nature of the new line embankment, combined with the visibility of an existing rail line in the foreground of the view, means that the new track will form a minor new element within the visual scene, particularly for vehicles traveling at pace along the Olympic Highway.	Low	Low	Low
14	Ironbong Road	Removal of mature vegetation to the right of the view will be necessary to accommodate the proposal. As this is active crossing, signs will be located on either side of the road, as well as barrier arms and flashing lights.	Low	Moderate	Moderate–low

Viewpoint Location Before.

Viewpoint Location After.

Viewpoint Location - Wider Context.

Viewpoint Location - looking west from private property.

FIGURE 19.5: VIEWPOINT 2: VIEW FROM PRIVATE RESIDENCE OFF CAMBRIA STREET

**indicative only, subject to change during detailed design*

Viewpoint Location Before.

Viewpoint Location After.

Viewpoint Location - Wider Context.

Viewpoint Location.

FIGURE 19.6: VIEW OF THE PROPOSAL LOOKING EAST TOWARD WEST STREET ADJACENT TO HIBERNIA STREET

**indicative only, subject to change during detailed design*

Viewpoint Location - Wider Context.

Viewpoint location - existing Burley Griffin Way looking north towards proposed realigned Burley Griffin Way.

*This viewpoint is taken from Burley Griffin Way and has been included to give a better long distance (and wider) view of the proposed works.

Viewpoint Location Before.

Viewpoint Location After.

FIGURE 19.7: VIEW OF EXISTING BURLEY GRIFFIN WAY LOOKING NORTH TOWARDS PROPOSED REALIGNED BURLEY GRIFFIN WAY

**indicative only, subject to change during detailed design*

Viewpoint Location Before.

Viewpoint Location After.

Viewpoint Location - Wider Context.

Viewpoint Location - looking west from the intersection of Old Cootamundra Road and Dudauman Road.

FIGURE 19.8: VIEWPOINT 8: VIEW LOOKING WEST FROM THE INTERSECTION OF OLD COOTAMUNDRA ROAD AND DUDAUMAN ROAD

**indicative only, subject to change during detailed design*

Viewpoint Location Before.

Viewpoint Location After.

Viewpoint Location - Wider Context.

Viewpoint Location - looking east along Dirnaseer Road.

FIGURE 19.9: VIEWPOINT 10: VIEW LOOKING EAST ALONG DIRNASEER ROAD

**indicative only, subject to change during detailed design*

19.5.2 Landscape character impact

Landscape character impacts are generally rated from negligible to low due to the low scale of the proposal, existing modified landscape and/or filtered views.

The proposal would have low to moderate landscape character impact on rural settlements, as there is existing rail infrastructure at both Stockinbingal and Illabo (including sheds and silos). Landscape character for agricultural land may be impacted by the proposal, as vegetation clearing would increase the distance from which the proposal can be viewed; however, the impact rating is low. There would be negligible impact on watercourses, as surrounding vegetation will obstruct views of the proposal from the watercourses. Woodlands in the surrounding area are limited and therefore have a higher value within the wider landscape. The proposal would have moderate-to-low impact to vegetation, due to vegetation clearing and woodland fragmentation, for where the new infrastructure is proposed.

The impact rating for each LCZ (as discussed in section 19.3.1) is outlined in Table 19-13.

TABLE 19-13: LANDSCAPE CHARACTER IMPACT

LCZ	Key characteristics	Impact summary	Sensitivity rating	Magnitude of change	Overall impact rating
1—rural settlements	▸ small villages/townships ▸ limited populations ▸ low scale built-form (predominately single storey-buildings) ▸ limited services such as post offices and public schools ▸ rest areas and facilities to service drivers covering large distances ▸ largely surrounded by agricultural land.	▸ as a result of proximity to already established rail infrastructure, the settlements are familiar with elements consistent with the proposal ▸ the main impact to the settlements will be the realignment of Burley Griffin Way with the associated road-over-rail infrastructure but is restricted to a relatively small area in relation to the full extent of the proposal.	Moderate	Low	Moderate–low
2—agricultural land	▸ land use is mainly rural in nature ▸ large levels of clearing in order to accommodate agricultural practices ▸ large lot sizes ▸ sporadic groupings of remnant vegetation ▸ long-distance views often available as a result of the openness of the landscape, generally interrupted by either sporadic tree groupings or topography ▸ low-density settlement with sporadic housing, often not visible to one another.	▸ removal of vegetative elements ▸ addition of new infrastructure such as bridges, level crossings and new rail line ▸ removal of vegetative elements and addition of new infrastructure will often be viewed from a distance or obstructed through surrounding vegetation or landform.	Low	Low	Low
3—watercourses	▸ located at top of the catchments ▸ largely dry creeks ▸ most likely to only flow during rainfall events ▸ mixture of vegetation on creek embankments comprising trees, shrubs and grasses.	▸ the proposal crosses nine named creeks as well as a number of ephemeral watercourses ▸ new bridge infrastructure over watercourses will be developed, as will associated infrastructure such as culverts ▸ some clearing of riparian vegetation, which will be limited in width ▸ visual changes to watercourses will generally be highly obstructed as a result of surrounding vegetation.	Low	Low	Low
4—woodlands	▸ wider spacing of trees than found in forests or rainforests ▸ greater penetration of light through the canopy ▸ support a variety of flora and fauna types ▸ eucalyptus form a dominant feature.	▸ woodlands in the Dudauman Creek area will be most impacted as a result of new rail lines and a bridge ▸ vegetation clearing will occur to accommodate the proposed infrastructure ▸ fragmentation of woodlands would occur where new infrastructure is proposed, primarily within the Dudauman Creek location.	Moderate	Low	Moderate–low

19.5.3 Lighting impact

Permanent lighting associated with the proposal will be minimal, comprising only of transitory lighting from passing trains, safety lighting associated with active level crossings, and road lighting associated with the realigned Burley Griffin Way.

Fixed lighting associated with the realigned Burley Griffin Way will become visible at viewpoints 3 and 4, as well as lighting from train activities and vehicle headlights using the new road. The lighting impact rating at each viewpoint for the operation of the proposal is presented in Table 19-14.

TABLE 19-14: LIGHTING ASSESSMENT AT EACH VIEWPOINT FOR THE OPERATION OF THE PROPOSAL

Viewpoint #	Operation impact summary	Sensitivity rating of receiver	Magnitude of change	Operation impact rating
1	▸ Currently a passive crossing is visible from this location with no lighting elements ▸ Transitory light from passing trains (already present but long-term increase in frequency as a result of the proposal).	Low	Negligible	Negligible
2	▸ No fixed lighting ▸ Transitory light from passing trains (already present, but long-term increase in frequency as a result of the proposal).	High	Negligible	Negligible
3	▸ Fixed lighting associated with the realigned Burley Griffin Way will become visible ▸ Transitory headlights from vehicles using realigned Burley Griffin Way ▸ Transitory light from passing trains (already present but long-term increase in frequency as a result of the proposal).	Moderate	Moderate	Moderate
4	▸ Fixed lighting associated with the realigned Burley Griffin Way will become visible ▸ Transitory headlights from vehicles using realigned Burley Griffin Way ▸ Transitory light from passing trains (already present but long-term increase in frequency as a result of the proposal).	Low	Moderate	Moderate
5	▸ A passive crossing with no fixed lighting elements is proposed for this location ▸ Transitory light from passing trains.	Low	Negligible	Negligible
6	▸ No fixed lighting elements would be visible ▸ Transitory light from passing trains.	Low	Negligible	Negligible
7	▸ No fixed lighting elements would be visible ▸ Transitory light from passing trains.	High	Negligible	Negligible
8	▸ No fixed lighting elements would be visible ▸ Transitory light from passing trains.	Moderate	Negligible	Negligible
9	▸ No fixed lighting elements would be visible ▸ Transitory light from passing trains.	Moderate	Negligible	Negligible
10	▸ No fixed lighting elements would be visible ▸ Transitory light from passing trains.	Low	Negligible	Negligible
11	▸ No fixed lighting elements would be visible ▸ Transitory light from passing trains.	Low	Negligible	Negligible
12	▸ A passive crossing with no fixed lighting elements is proposed for this location ▸ Transitory light from passing trains.	Low	Negligible	Negligible
13	▸ No fixed lighting elements would be visible ▸ Transitory light from passing trains.	Low	Negligible	Negligible
14	▸ An active crossing, which will have flashing lights only while trains are passing over Ironbong Road, highly limiting the time that lighting will be introduced to this area ▸ Transitory light from passing trains.	Low	Negligible	Negligible

19.6 Mitigation and management

19.6.1 Approach to mitigation and management

The assessment identified that the proposal would result in visual impacts at some viewpoints and landscape character changes for some landscape character zones. There would also be temporary visual impacts during construction.

19.6.1.1 Approach to managing the key potential impacts identified

Landscape and rehabilitation strategy

ARTC is committed to minimising the environmental impact of the proposal and is investigating opportunities to reduce landscape character, visual and lighting impacts where practicable.

Landscape and rehabilitation for the proposal would primarily be guided through the ARTC Inland Rail Landscape and Rehabilitation Strategy for the proposal. This strategy provides guidance to deliver a consistent approach to the integration of environmental management measures and design treatments through landscape design and establishment across all delivery phases of the individual Inland Rail projects and the Program. The strategy includes a series of typical landscape scenarios that demonstrate how components, including rail engineering, road realignments, structures and temporary works areas can be integrated through the landscape design, where required, to achieve desired or conditioned outcomes. In accordance with this strategy, the proposal would be developed in context to the surroundings and reference to the landscape types identified in the assessment.

The approach to mitigation and management would also be guided by the following:

- EIA-N04
- Guidelines for Landscape and Visual Impact Assessment (Third Edition) (Landscape Institute of the Institute of Environmental Management and Assessment (UK), 2013).

Landscape and habitat rehabilitation would be required along the length of the proposal site. The urban design and landscape plans developed during the detailed design phase would incorporate a landscape and rehabilitation strategy. The strategy would include consideration of the following:

- rehabilitation of riparian areas disturbed during construction
- rehabilitation of temporary construction areas to agreed pre-existing conditions
- rehabilitation of temporary construction areas where existing native vegetation is adjacent and the landholder agrees
- establishment of appropriate native grass species within the rail corridor, where practicable, to minimise exposed surfaces
- rehabilitation of agricultural land.

The specific landscape rehabilitation recommendations would be developed in response to the following proposal requirements:

- implement low maintenance landscape
- minimise exposed surfaces
- reinstate native vegetation to match local ecological communities
- provide for fauna habitat and connectivity as far as possible
- select species to ensure biosecurity issues and adjoining landholder activities are considered
- consideration of a staged approach for agricultural land.

The landscape and rehabilitation strategy would be implemented through detailed design, construction and rehabilitation stages of the proposal.

Proposal design

The proposal would continue to be designed and constructed to minimise landscape character, visual and lighting impact during operation. Further design and pre-construction activities would seek to minimise impacts during construction.

This will include measures such as using appropriate construction materials, built-form articulation, and colours for bridges and level crossings to ensure that these new built elements will have as minimal visual impact as possible and integrate as sympathetically as possible with the surrounding landscapes.

Construction mitigation

During the construction period, all viewpoints studied are likely to have increased visual impacts. Views of site compounds, storage areas and increased site traffic (including heavy vehicles) would lead to a reduction in visual amenity. These impacts would be temporary in nature.

Several viewpoints would experience lighting impacts, either temporarily during construction or permanently, and carried through to operation.

Management of construction impacts would occur through the CEMP, which would include measures to reduce visual and lighting impacts to surrounding receivers.

Measures to reduce impacts will include selecting laydown areas and other ancillary sites to reduce visual and lighting impacts. Hoarding and other visual screening methods may also be considered. Lighting would also be selected to reduce light spill during night work.

Rehabilitation

Landscape character approaches

Mitigation measures would be guided by landscape character types relevant to the areas surrounding the proposal. The assessment has identified the following landscape character types:

- rural settlements
- agricultural land
- watercourses
- woodlands.

Mitigation and management measure approaches include the following:

- rural landscape—focus on enhancing and ensuring the design responds to the natural patterns of the rural landscape
- ecologically sensitive areas—provide opportunities for ecological gain to benefit biodiversity through diverse planting and seed mixes
- townships—complement the local context through microclimatic design, green infrastructure, multifunctional design, permeable surfacing, and sustainable water systems to deliver social, environmental and economic benefits to local communities.

Rehabilitation through planting from specific viewpoints on properties outside the proposal site may also be considered to mitigate visual impacts. The strategic use of planting could effectively filter views of the proposal. The use of this measure would be subject to further discussion with landowners.

19.6.1.2 Approach to managing other impacts

Other mitigation measures are listed in Table 19-15.

19.6.2 Expected effectiveness

Urban design objectives have been incorporated into the concept design and would be further refined during detailed design. A range of mitigation measures are provided. These measures, combined with implementing the urban design and landscape plan and rehabilitation strategy, would develop a solution that maximises the protection of the existing visual values and landscape character of the proposal site and adjoining areas.

Audits and reporting of the effectiveness of environmental management measures is generally carried out to show compliance with management plans and other relevant approvals and would be outlined in detail in the CEMP. The rehabilitation strategy would include procedures for monitoring and maintaining landscaped areas to ensure planting becomes established and ensure these treatments are appropriately implemented and maintained.

19.6.3 Interaction between measures

Measures to mitigate and manage the potential for biodiversity, heritage, socio-economic, and land use and property impacts would also assist in mitigating the potential for visual impacts, discussed in Chapter 10:

Biodiversity, Chapter 15: Cultural heritage, Chapter 17: Social and economic and Chapter 18: Land use and property.

19.6.4 Recommended mitigation measures

To manage and mitigate the potential impacts to the landscape character and visual environment, the mitigation measures listed in Table 19-15 would be implemented.

TABLE 19-15: MITIGATION MEASURES

Ref	Impact	Mitigation measure	Timing
LV-1	Minimising the potential for visual and landscape impacts	Detailed design and construction planning would seek to minimise the construction and operation footprints, and avoid impacts on mature native vegetation as far as reasonably practicable.	Detailed design/ pre-construction
LV-2	Minimising the potential for visual and landscape impacts	An urban design and landscape plan would be prepared to provide a consistent approach to design and landscaping. The urban design and landscape plan would include: ▸ vegetation screening in strategic locations to visually mitigate impacts from new structures and rail operations, including around bridges and locations where the proposal would be visible from sensitive receivers, where the presence of screening does not impact safe rail operations ▸ appropriate species that respond to the existing landscape character setting and environmental conditions ▸ design guidelines to minimise the visual impacts of bridges, with consideration of the existing landscape and visual context and with regard to *Bridge aesthetics: design guidelines to improve the appearance of bridges in NSW* (RMS, 2012). Detailed design would be undertaken in accordance with the urban design objectives developed for the design, and the urban design and landscape framework and plan.	Detailed design/ pre-construction
LV-3	Batter slopes in contrast with the existing landform	Batter slopes would be integrated into the surrounding landscape as far as practicable. Appropriate slope stabilisation would be integrated into batter design to ensure successful rehabilitation and stabilisation.	Detailed design/ pre-construction
LV-4	Visual impacts of construction compounds	Construction compounds would be located, as far as practicable, within cleared areas and away from sensitive receivers. Construction compounds would be designed and orientated to minimise visual impacts. This would include locating areas of low visual amenity away from sensitive receivers, and erecting boundary screening around construction compounds where appropriate.	Construction
LV-5	Landscape character and visual impacts	Rehabilitation of disturbed areas would be undertaken progressively in accordance with the rehabilitation strategy (mitigation measure BD-8 and the Appendix of the Landscape character and visual impact assessment for the proposal) to be undertaken during detailed design and individual property agreements (where relevant).	Construction
LV-6	Minimising light spill	Lighting of work areas, construction compounds, and work sites would be oriented to minimise glare and light spill impact on adjacent receivers.	Construction
LV-7	Visual impacts of construction	Mitigation measures for visual impacts would be included in the CEMP, including (where relevant): ▸ selecting laydown areas and other ancillary sites to reduce visual impacts ▸ locating construction compounds as far from sensitive receivers as possible ▸ use of hoarding and other visual screening methods ▸ keeping stockpile height to a minimum in the vicinity of sensitive receivers. Any existing ground surface or vegetation that has been disturbed in order to replace any existing track would be reinstated to match the adjoining landscape surface in order to maintain the current visual scene.	Construction
LV-8	Landscape character and visual impacts	Vegetation provided in accordance with the rehabilitation strategy (mitigation measure BD-8) and the urban design and landscape plan (mitigation measure LV-2) would be subject to ongoing monitoring and maintenance in accordance with ARTCs standard operating procedures.	Operation

19.6.4.1 Site-specific mitigation measures

The assessment has also considered the potential landscape character, visual and lighting impact from the proposal at selected viewpoints. To mitigate the identified impacts at these locations, a number of site-specific mitigation measures are proposed for the operation phase of the proposal. These are outlined in Table 19-16 and would be considered further during detailed design.

TABLE 19-16: SITE SPECIFIC APPLIED MITIGATION MEASURES

Viewpoint	Location	Recommended mitigation
1	122 Grogan Road	In order to maintain the current visual scene, any land that was disturbed during the construction period would be reinstated as per the proposal Landscape and Rehabilitation Plan (Landscape and Rehabilitation Strategy Inland Rail, Issue 0, ARTC, 2019).
2	Private residence off Cambria Street	The strategic use of planting in the foreground would be undertaken to filter views of the proposed earthworks as well as address the removal of the mature vegetation currently visible. Planting would take time to mature (depending on at what stage of maturity they are planted) and therefore would not have maximum effectiveness immediately but would increase in effectiveness over time. A mixture of trees as well of shrubs would be considered for filtering any adverse views of the proposal from this position.
3	84 West Street	The use of planting along the verge of the realigned road would be undertaken to create highly filtered views of the road, although the presence of the road will still be perceptible from this location. Additional planting could also achieve improved framing of views of the existing train line and associated structures such as signs and lights that are currently visible through the patchy existing tree line.
4	Burley Griffin Way	The design and use of appropriate materials that are widely recognisable and accepted in comparable projects will ensure that although the visual changes are significant, they will sit as sympathetically as possible within the landscape and be recognisable to any visual receivers in the area due to the existence of similar infrastructure projects throughout Australia.
5	Corbys Lane	In order to create a safe crossing point that allows road users to be aware that they are responsible for checking for oncoming trains before crossing over the line, any attempts to visually screen the crossing would be avoided to allow for open views of the surrounding area. In order to minimise the visual impact as much as possible, the appropriate use and positioning of signage should be employed to ensure a safe crossing but should not be excessive in number to minimise impacts as much as possible. Due to the need to create a safe crossing area for road users, the ability to mitigate the visual impact is limited and will not have any impact on the original impact rating.
6	Dudauman Road	The use of planting at strategic locations along Dudauman Road would minimise the amount that the line would be visible; however, in order to maintain instances of long-distance views, the use of planting would not be uniform or excessive as this would result in the loss of any long-distance views that are characteristic of the area.
7	Private residence off Dudauman Road	No mitigation measures are specifically required.
8	Intersection of Dudauman Road & Old Cootamundra Road	As the bridge is a significant structure, the ability to minimise the visual impact is limited. Alleviation through the use of sensitive design of the bridge would be most beneficial to ensure the bridge fulfils its purpose but results in the best possible design outcome, through considered design and materiality appropriate for its location, which follows best practice. This will ensure that the visual impact is not heightened through poor design and material selection.
9	Wattle Retreat off Old Cootamundra Road	The use of strategic tree planting within the gap of trees bordering the western edge of the residence would create a filtered view of the line and would reduce the visual impact to negligible, requiring anyone on the property to go beyond this line of trees in order to have a fully unobstructed view of the line that is currently available.
10	Dirnaseer Road	As the bridge is a significant structure, the ability to minimise the visual impact is limited. Alleviation through the use of sensitive design of the bridge would be most beneficial to ensure the bridge fulfils its purpose but results in the best possible design outcome through considered design and materiality appropriate for its location, which follows best practice. This will ensure that the visual impact is not heightened through poor design and material selection.

Viewpoint	Location	Recommended mitigation
11	555 Ironbong Road (driveway)	The use of strategic tree and shrub planting running parallel to the road could further reduce the visual accessibility of the line, especially when taking into consideration that no public footpaths are located in the area, generally restricting the views to people within cars.
12	Old Sydney Road	In order for the safe operation of the level crossing the use of any mitigation techniques to minimise the visual accessibility of the crossing is not recommended. Given that Old Sydney Road is a minor road, the number of people viewing this crossing is highly limited.
13	Olympic Highway	The strategic use of new planting could be used in order to partially filter views of the new rail line receding into the distance. Given the agricultural nature of the surrounding land it is unlikely the landowners would want widespread revegetation of their land; however, small tracts and groupings of tree plantings would help mitigate views of the rail line.
14	Ironbong Road.	In order to create a safe crossing point that allows road users to be aware that they are responsible for checking for oncoming trains before crossing over the line, any attempts to visually screen the crossing would be avoided to allow for open views of the surrounding area.

19.6.5 Managing residual impacts

Residual impacts are impacts of the proposal that may remain after implementation of:

- design and construction planning measures to avoid and minimise impacts (see Chapter 6: Alternatives and proposal options and Chapter 8: Proposal description—construction)
- specific measures to mitigate and manage identified potential impacts (see section 19.6.1).

The key potential landscape character and visual issues and impacts originally identified by the environmental risk assessment (see section Appendix G) are listed in Table 19-17. The (pre-mitigation) risks associated with these impacts, which were identified by the environmental risk assessment, are provided. Further information on the approach to the environmental risk assessment, including descriptions of criteria and risk ratings, is provided in Appendix G.

The potential issues and impacts identified by the environmental risk assessment were considered as part of the landscape character and visual impact assessment, summarised in sections 19.4 and 19.5. The mitigation and management measures (listed in Table 19-15) that would be applied to manage these impacts are also identified.

The significance of potential residual impacts (after application of these mitigation measures) is rated using the same approach as the original environmental risk assessment. The approach to managing significant residual impacts (considered to be those rated medium or above) is also described.

TABLE 19-17: RESIDUAL IMPACT ASSESSMENT—LANDSCAPE CHARACTER AND VISUAL IMPACT

		Pre-mitigated risk			Mitigation measures (refer to Table 19-15)	Residual risk			How residual impacts would be managed
Phase	Potential impacts	Likelihood	Consequence	Risk rating		Likelihood	Consequence	Risk rating	
Operation	▸ Permanent visual impacts on sensitive visual receivers as a result of the introduction of new infrastructure visible from a number of viewpoints (including new rail overbridges, crossing loops, ancillary infrastructure and access road).	Likely	Moderate	High	LV-1 to LV-8	Possible	Moderate	Medium	The urban design and landscape plan would consider the use of materials and treatments to minimise potential impacts with consideration of the surrounding landscape and context.