CHAPTER 10

Landscape and visual amenity

HELIDON TO CALVERT ENVIRONMENTAL IMPACT STATEMENT

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

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10.1 Summary

The landscape between Helidon and Calvert is a populated working agricultural landscape. The landscape is characterised by generally flat, irrigated and non-irrigated croplands and undulating pastures, interspersed by a network of vegetated watercourses associated with Lockyer Creek and the Bremer River and set against a backdrop of forested ranges. The Helidon to Calvert (H2C) Project (the Project) proposes to introduce a 47 kilometre (km) single-track, dual-gauge railway with four crossing loops to accommodate double-stack container freight trains up to 1,800 metres (m) long. It will also involve the construction of an approximately 850 m long tunnel through the Little Liverpool Range to facilitate the required gradient across the undulating topography. The initial construction allows for 1,800 m long double-stack freight trains. The design does not preclude accommodating trains up to 3,600 metres (m) long in the future, based on business needs and subject to separate approval applications.The Project is classed as both greenfield and brownfield development as approximately 50 per cent of the alignment runs parallel to the West Moreton System rail corridor.

The alignment traverses a broad range of landscapes: from developed urban areas, isolated rural settlements, open woodland, pastoral and agricultural landscapes to the undulating and vegetated foothills of the Great Dividing and Little Liverpool ranges. Extensive areas within the Landscape and Visual Impact Assessment (LVIA) study area have been cleared for agricultural purposes and for the development of residential communities. The largest town in the LVIA study area is Gatton, situated between Ipswich and Toowoomba in the heart of the Lockyer Valley. Other towns in the region include, in order of population size: Laidley, Rosewood, Murphys Creek, Withcott, Helidon Spa, Grantham, Ma Ma Creek, Forest Hill, Grandchester, and Calvert.

Major roads through the LVIA study area include the Warrego Highway, Murphys Creek Road, Gatton Helidon Road, Gatton Clifton Road, Western Drive, Railway Street, Eastern Drive, Gatton Esk Road, Gatton Laidley Road, Forest Hill Fernvale Road, Laidley Plainlands Road, and Rosewood Laidley Road.

There are five regionally significant areas within the LVIA study area, which the Queensland Government has identified within the South East Queensland (SEQ) Regional Plan *ShapingSEQ* (Department of Infrastructure, Local Government and Planning (DILGP), 2017a). These areas include the mountain ranges of the Great Dividing Range, Little Liverpool Range, Marburg Range, Main Paradise Range, and elevated areas around Beins Mountain, the northern extent of the Mistake Mountains range.

To analyse the impact of the Project on landscape and visual amenity, the design and landscaping aspects of the Project were assessed against the urban, rural and natural fabric of the existing environment within the LVIA study area. The LVIA study area extends approximately 10 km from each side of the Project alignment and is located between Toowoomba and Ipswich, west of Brisbane, and includes areas within the Scenic Rim.

Within this LVIA study area, eight landscape character types (LCTs) have been identified to have up to 'high' sensitivity to changes in the landscape character and values of the area. These LCTs were further distinguished into landscape character areas (LCAs), which are single, unique areas, and are the discrete geographical areas of a particular LCT. The impacts of the Project on these eight LCTs were assessed, and it was found that one LCT may experience impacts of up to 'high' significance. The highest impacted LCT was Landscape Type H: Forested Uplands, which comprises the regionally significant Teviot and Little Liverpool Range scenic amenity areas.

Visual receptors are also considered in this chapter, as the LVIA study area includes several towns and settlements. Examples include residents in the various population centres close to the proposed alignment and transient receptors such as commuters on roads throughout the roads within the LVIA study area, including the Warrego Highway and tourist drives (including part of the Cobb and Co. trail).

Seventeen representative viewpoints have been referenced to assess potential impacts on existing views. Of these, three visual impacts of up to 'high' significance are anticipated during the operation of the Project. These comprise the impact of the Warrego Highway rail bridge on Viewpoint 3: Warrego Highway looking east; the impact of the large embankment close to residential properties at Viewpoint 10: Hardy Drive looking down Rampton Street in the new Valley Vista subdivision to the north of Laidley; and the impact of embankments and deep cuts at the foothills of the Little Liverpool Range at Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west, also in Laidley.

The greatest effect during construction is of up to 'moderate' significance. Construction impacts will be mitigated as far as reasonably practicable and the duration of many anticipated impacts are short-term during periods of construction only.

The highest potential visual effect of lighting was identified as being up to 'moderate' significance during construction (Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing).

Cumulative impacts, particularly the effects in combination with the adjoining Gowrie to Helidon (G2H) and Calvert to Kagaru (C2K) Inland Rail Projects and the Gatton West Industrial Zone (GWIZ) development site have been considered. The potential consequence of these cumulative impacts is 'low' during construction and up to 'medium' during operation.

The requirement for specific mitigation to manage landscape and visual amenity, beyond ARTC's standard mitigation measures, is constrained by practical and operational issues. The key mitigation proposed is the development of an Inland Rail Reinstatement and Rehabilitation Plan, which will include specific landscape objectives and principles, as well as outline landscape and rehabilitation treatments for each phase of the Inland Rail Program (Inland Rail). Visual representations have been included to highlight the potential for further visual mitigation measures for the Project.

10.2 Scope of chapter

Key objectives of the LVIA are to:

- Undertake a baseline assessment describing existing environmental aspects and their values for the LVIA study area with respect to landscape character and visual amenity including scenic viewpoints
- Describe the existing landscape, with reference to any values identified in planning schemes (landscape receptors), and identify those people who experience and value views of the landscape (visual receptors) Identify key Project risks on landscape and/or visual values during the day and consider the potential for any night-time impacts
- Evaluate the significance of the impacts of the Project activities on landscape, views and visual receptors during construction and operation during day and night
- Describe any Project modifications or management techniques that can mitigate identified landscape and visual impacts
- Illustrate the visual impacts (at representative locations) using visualisation techniques to assist in understanding potential impacts.

10.3 Terms of Reference requirements

This chapter has been prepared to address sections 10.11 (p) and 11.86 to 11.89 of the Terms of Reference (ToR) for the Project EIS, as depicted in Table 10.1, which also contains the relevant sections within this chapter that address each of the requirements.

These requirements are also addressed in more detail in the Appendix H: Landscape and Visual Impact Assessment Technical Report as described in Section 2.1: Project Terms of Reference.

Appendix B: Terms of Reference Compliance Table provides a cross-reference for each ToR against relevant sections in this EIS.

TABLE 10.1: TERMS OF REFERENCE—LANDSCAPE AND VISUAL AMENITY

Terms of Reference requirements		Where addressed
Proposed construction and operations		
10.11.	Describe the following information about the proposed project: (p) Landscaping and the rehabilitation of affected areas after construction and during operation	Section 10.8.3 Appendix H, Sections 6 and 11
Existing environment		
11.86.	Describe and illustrate the existing landscape character and environment, including key natural landscape features, major views, view sheds and outlooks that contribute to the amenity of the area	Section 10.6 Appendix H: Landscape and Visual Amenity Impact Assessment Technical Report, Sections 5.2, 5.3 and 7
Impact assessment		
11.87.	Describe and illustrate the visual impact of the construction and operation of the project. Include major views, view sheds, outlooks, and features contributing to the amenity of the area. Such views should be representative of public and private viewpoints, including places of residence, work, and recreation	Section 10.7.1 and 10.7.3.1 Appendix H; Landscape and Visual Amenity Impact Assessment Technical Report, Section 8
11.88.	Address the findings, requirements and recommendations of *South East Queensland Regional Plan 2005–2026 Implementation Guideline No 8—Identifying and Protecting Scenic Amenity Values* (2007)	Section 10.6.1.4 and 10.7.2 Appendix H; Landscape and Visual Amenity Impact Assessment Technical Report, Sections 3.2 and 7

Terms of Reference requirements		Where addressed
Mitigation measures		
11.89.	Describe any proposed measures to avoid, minimise or mitigate potential impacts on landscape character and visual amenity	Section 10.8 Appendix H; Landscape and Visual Amenity Impact Assessment Technical Report, Section 11 Chapter 23: Draft Outline Environmental Management Plan, Section 23.13.3

10.4 Legislation, policies, standards and guidelines

Table 10.2 outlines relevant legislation and policy level objectives/standards (whether qualitative or quantitative) that protect or manage landscape and visual values in the context of the Project. Further information is provided in Appendix H: Landscape and Visual Impact Assessment Technical Report.

TABLE 10.2: REGULATORY CONTEXT

Legislation, policy or guideline	Relevance to the Project
Commonwealth	
AS 4282-1997: *Control of the obtrusive effects of outdoor lighting* (Standards Australia, 1997a)	AS 4282-1997: *Control of the obtrusive effects of outdoor lighting* sets out guidelines for the control of the obtrusive effects of outdoor lighting and gives recommended limits for the relevant lighting parameters to contain these effects within tolerable levels. It refers to the potential effects of lighting systems on receptors, including nearby residents and users of adjacent roads. It does not apply to road lighting or lighting systems that are of a cyclic or flashing nature. Outdoor lighting is proposed as part of the Project. This standard is also required for consideration as part of the Dis-5 Light Pollution credit in the Infrastructure Sustainability (IS) Rating Scheme. This rating scheme is discussed in Chapter 7: Sustainability.
AS 4970-2009: *Protection of trees on development sites* (Standards Australia, 2009b)	AS 4970-2009: *Protection of trees on development sites* provides guidance on the principles for protecting trees on land subject to development. Where development is to occur, the standard provides guidance on how to decide which trees are appropriate for retention, and on the means of protecting those trees during construction work. The standard does not apply to the establishment of new trees.
Disability (Access to Premises—Buildings) Standards 2010 (Australian Government, 2010)	The *Disability (Access to Premises—Buildings) Standards* is a legislative standard that provides a nationally applicable set of provisions that detail what must be done to provide for non-discriminatory access to public buildings for people with disability. Accessibility needs have been considered where the Project passes through settlements, at pedestrian crossings and in recreational areas or walkways where people may be present close to the alignment.

Legislation, policy or guideline	Relevance to the Project
Queensland (State government)	
Crime Prevention through Environmental Design (CPTED) *Guideline for Queensland* (Queensland Government, 2007)	The *CPTED Guideline for Queensland* seeks to promote the incorporation of CPTED principles into the planning, design and management of development. CPTED principles have been considered where the alignment passes through settlements or where people may be present close to the alignment.
Road Landscape Manual (RLM) (Department of Transport and Main Roads (DTMR), 2013a)	The RLM aims to facilitate the understanding of, and procedures associated with, the assessment, design and management of roads as they affect the Queensland landscape. It sets out principles for the design of roads to assist with integration into the natural, cultural and urban landscape settings. The Project requires the realignment and redesign of several local and main roads.
South East Queensland Regional Plan (*ShapingSEQ*) (DILGP, 2017a)	*ShapingSEQ* is the regional plan for the SEQ region. It was given effect on 11 August 2017 and replaces the *South East Queensland Regional Plan 2009–2031*. *ShapingSEQ* provides a regional framework for growth management, and sets planning direction for sustainable growth, global economic competitiveness and high-quality living. *ShapingSEQ* ensures land use and infrastructure planning are integrated. *ShapingSEQ* is structured around the key themes of Grow, Prosper, Connect, Sustain and Live. *ShapingSEQ* provides a basis for valuing and protecting the natural environment (including landscapes and supporting rural communities). The Project is located within the local government areas (LGAs) of Lockyer Valley and Ipswich, of which *ShapingSEQ* is the relevant regional plan.
South East Queensland Regional Plan Implementation Guideline No. 8—Identifying and protecting scenic amenity values (DILGP, 2007)	The *South East Queensland Regional Plan Implementation Guideline* was developed to assist SEQ and councils to determine a framework for the protection of regional landscape values. It was developed to support the (now superseded) Scenic Amenity policies of the *Queensland Regional Plan 2009–2031*, but is still referenced as the SEQ regional amenity methodology in the current regional plan *ShapingSEQ*. The guideline establishes a methodology that centres around key concepts of scenic amenity, scenic preference, public viewing locations, seen landscape areas and view corridors. The guideline establishes a voluntary methodology that centres around several key concepts relevant to LVIA including scenic amenity and preferences, views and viewpoints. Further information is contained in Appendix H: Landscape and Visual Impact Assessment Technical Report. The simplistic empirical methodology for development assessment is not consistent with standard LVIA practice and is not considered to be suitable to use for the LVIA assessment method for Inland Rail. However, the key concepts have informed the methodology for the Project as described in Section 10.5.
Queensland (local government)	
Draft *Lockyer Valley Planning Scheme* (LVRC, forthcoming)	Lockyer Valley Regional Council (LVRC) is in the process of producing a draft *Lockyer Valley Planning Scheme*. Until its adoption, Lockyer Valley LGA is presently subject to the provisions of the *Gatton Shire Planning Scheme 2007* and the *Laidley Shire Planning Scheme 2003*. The Project traverses through the Lockyer Valley LGA.
Draft *Scenic Rim Regional Council Planning Scheme* (SRRC, forthcoming)	Scenic Rim Regional Council (SRRC) is in the process of producing a draft *Scenic Rim Planning Scheme*, which underwent public notification between 28 August 2019 and 30 September 2019. Until its adoption, Scenic Rim LGA is presently subject to the provisions of three separate planning schemes: *Beaudesert Shire Planning Scheme 2007, Boonah Shire Planning Scheme 2006* and *Ipswich City Planning Scheme 2006.* A small section of the LVIA study area passes through the Scenic Rim LGA, however this is not considered to have any implications for the LVIA for the Project, and therefore will not be considered further in this assessment.

Legislation, policy or guideline	Relevance to the Project
Gatton Shire Planning Scheme (Gatton Shire Council, 2007)	The *Gatton Shire Planning Scheme* is the primary planning document for land located within the former Gatton Shire (with the exception of land that is subject to the Grantham Reconstruction Area). This area now forms part of the Lockyer Valley LGA. The *Gatton Shire Planning Scheme* divides the former Gatton Shire into zones with associated codes. The Project is located within the former Gatton Shire, now Lockyer Valley LGA.
Grantham Reconstruction Area Development Scheme (Queensland Reconstruction Authority, 2011)	The *Grantham Reconstruction Area Development Scheme* outlines the blueprint for the reconstruction of Grantham after the flooding events in 2011. The Queensland Reconstruction Authority and Lockyer Valley Regional Council prepared the development scheme in consultation with the local community. The Project is located within the Grantham Reconstruction Area, where the provisions of the *Grantham Reconstruction Area Development Scheme* apply. The land use intent for the area as determined by the Development Scheme has been taken into consideration when determining impacts of the Project on future land use(es).
Ipswich Planning Scheme (Ipswich City Council, 2006)	The consolidated *Ipswich Planning Scheme* is the primary planning instrument for land within the Ipswich LGA. The planning scheme divides the LGA into eight localities: Urban Areas, City Centre, Regionally Significant Business Enterprise and Industry Areas, Amberley, Rosewood, Township Areas, Rural Areas, and Springfield. The planning scheme divides the area into zones, with character places overlays and development constraints overlays with associated codes. Implementation guidelines are also included for specific topics. The Project is partially located within the Ipswich LGA.
Laidley Shire Planning Scheme (LVRC, 2003)	The *Laidley Shire Planning Scheme* is the primary planning document for land located within the former Laidley Shire. This area now forms part of the Lockyer Valley LGA. The *Laidley Shire Planning Scheme* divides the former Laidley Shire LGA into zones with associated codes. The Project is located within the former Laidley Shire, now Lockyer Valley LGA.
Scenic Amenity of the Lockyer (Forest Images, 2002)	The *Scenic Amenity of the Lockyer* provides a comprehensive inventory and assessment of scenic quality within the Lockyer region and proposes a series of management objectives that will protect, maintain, and enhance scenic amenity. This study has been based on the approach developed by the Regional Landscape Strategy Advisory Committee (RLSAC), which was developed in response to the Regional Framework for Growth Management (SEQ 2021, 2000). This document includes recommendations and strategies for the management of scenic amenity, which informed the development of the planning schemes for Gatton, Laidley and Esk Shires. The Project is located within the former Gatton and Laidley Shires.

The following documents that apply to New South Wales (NSW) have also been considered and, where relevant, applied to the LVIA process for this Project to ensure consistency of approach for the landscape assessment and mitigation approach across the Queensland (Qld) and northern NSW sections of Inland Rail:

- *Beyond the Pavement: Roads and Transport Authority (RTA) urban design policy, procedures and design principles*, NSW Roads and Maritime Services (RMS) (RMS, 2014)
- *Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW*, NSW Road and Maritime Services (2012)
- *Crime prevention and the assessment of development applications*, NSW Department of Urban Affairs and Planning (2001)
- *Guideline for landscape character and visual impact assessment—Environmental impact assessment practice note EIA-N04, NSW RMS* (RMS, 2018)
- *Healthy Urban Development Checklist* (NSW Health, 2009)
- *NSW Sustainable Design Guidelines Version 3.0*, (Transport for NSW, 2013)
- *Urban Green Cover in NSW—Technical Guidelines*, (NSW Office of Environment and Heritage, 2015).

10.5 Methodology

The LVIA methodology has been developed with reference to guidelines and techniques used in Australia and internationally, including:

- *Australian Standard 4282—Control of Obtrusive Effects of Outdoor Lighting* (Standards Australia, 1997a)
- *Environmental Impact Assessment Practice Note—Guideline for Landscape Character and Visual Impact Assessment EIA–N04 (practice note EIA-N04)* (RMS, 2018)
- *Guidance Notes for Reduction of Obstructive Lighting*, (The Institution of Lighting Engineers UK, 2005)
- *Guidance Note for Landscape and Visual Assessment*, (Australian Institute of Landscape Architects (AILA) Queensland, 2018)
- *Guidelines for Landscape and Visual Impact Assessment*, Third Edition (The Landscape Institute and the Institute of Environmental Management and Assessment (2013) and Second Edition (2002))
- *Landscape Institute Advice Note 01/09: Use of photography and photomontage in landscape and visual assessment* (The Landscape Institute, 2011)
- *Landscape Institute Technical Guidance Note: Photography and Photomontage in Landscape and Visual Impact Assessment, Public Consultation Draft* (The Landscape Institute, 2018)
- *Landscape Character Assessment Guidance for England and Scotland* (Countryside Agency, 2002)
- *South East Queensland Regional Plan Implementation Guideline No. 8—Identifying and protecting scenic amenity values* (DILGP, 2007)
- *Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity* (Scottish Natural Heritage and The Countryside Agency, 2006).

The LVIA methodology is a significance assessment as described in Chapter 4: Assessment methodology of the EIS. The significance assessment method has been applied to environmental values that will be impacted by the Project where impacts cannot be quantified. The LVIA methodology has defined its own thresholds for sensitivity and magnitude that are based on the principles but differ from the criteria defined in Chapter 4: Assessment Methodology and follow criteria more widely-used for the assessment of landscape and visual impacts (refer Section 10.5.2).

Table 10.3 provides a summary of the LVIA methodology which is discussed further in Appendix H: Landscape and Visual Impact Assessment Technical Report.

TABLE 10.3: LANDSCAPE AND VISUAL IMPACT ASSESSMENT METHODOLOGY

Method	Description
Desktop assessment	A desktop analysis of existing landscape character and visual amenity for the LVIA study area was undertaken to inform this assessment. The desktop analysis comprised assessment of the underlying topography, land cover and landscape values.
Field survey	A field assessment of the LVIA study area was carried out to ground truth the findings of the desktop assessment and to assess landscape character and visual amenity, including identifying sensitive viewpoints requiring further assessment.
Stakeholder and community consultation inputs	Relevant feedback from preliminary consultation activities undertaken by others (including as part of the Social Impact Assessment, Appendix Q: Social Impact Assessment Technical Report) has informed the landscape and visual amenity assessment, where appropriate.
Identification of potential Project impacts	This task included describing infrastructure that is likely to be associated with the Project, such as the presence of embankments, bridges, cuttings, fencing, noise barriers and level crossings. Potential impacts were then considered in the landscape and visual assessments.
Landscape assessment	A landscape assessment was carried out based on an analysis of landscape character, including those landscape features that contribute to the amenity of the area; particularly any landscape values identified in legislation or planning documents during the desktop phase or through community and stakeholder consultation. The landscape impact assessment defined the sensitivity of the landscape as well as the magnitude of change to the landscape. The significance of the potential impacts on the landscape character was then rated based on an evaluation of the sensitivity of the existing landscape to change and the magnitude of change that is likely to occur.

Method	Description
Visual assessment	A visual assessment was undertaken based on an analysis of views and viewsheds, particularly any major views or outlooks identified in legislation or planning documents during the desktop phase or through stakeholder and community consultation. Viewpoints and the visual receptor audiences they represent were defined and then rated for their sensitivity. Following this, the magnitude of change to views and visual amenity were determined. The magnitude of change is dependent on the nature, scale and duration of the change that is expected to occur. The magnitude of change also depends on the loss, change or addition of any feature in the field of view of the receptor, or any change to the backdrop to, or outlook from, a viewpoint. The significance of the overall potential impacts on visual amenity was then determined based on the sensitivity of existing views to change and the magnitude of change that is likely to occur.
Preparation of visualisations	Visualisations have been prepared to represent the potential visual impact of the presence of the Project from a selection of the representative viewpoints identified. Visualisations are illustrations/photomontages that aim to represent an observer's view of a proposed development.
Lighting assessment	A lighting assessment was carried out based on an analysis of representative views identified through the visual assessment. Lighting impacts were considered during both construction and operation phases of the Project. The sensitivity of the viewpoints with respect to changes in after-dark lighting conditions were defined based on elements such as proximity of the viewpoint to a lighting source associated with the Project and the accessibility of the viewpoint to viewers at night. The assessment determined that the magnitude of change to views and visual amenity due to lighting depends on the nature, scale and duration of the change to lighting that is expected to occur. The magnitude of change also considered any change to the backdrop to, or outlook from, the representative viewpoint. The significance of lighting impact in each representative viewpoint was then made by considering the sensitivity of each representative night-time viewpoint and the magnitude of change that is likely to occur.
Impacts mitigation	Following identification of impacts, consideration was given to how impacts can be mitigated. This included modification of the design (horizontal or vertical alignment and materiality), vegetation screening and, if necessary, liaison with landowners. Proposed mitigation measures listed in Section 10.8.3 were considered in the assessment and further landscape and additional visual mitigation opportunities were proposed where appropriate.
Residual impact assessment	A residual impact assessment was determined using the same process described above, to reassess the significance level after the proposed mitigation measures were applied. The initial significance levels were compared to the residual significance levels to assess the effectiveness of the proposed mitigation measures. Refer Section 10.9 for further details.

10.5.1 Landscape and visual impact assessment study area

For the purposes of the assessment, the LVIA study area has been defined as the area illustrated in Figure 10.1, which aims to establish the area within which the Project has potential to influence landscape and/or visual values and receptors. This is based on:

- Assumptions regarding the extent of visibility of projects of this nature, based on experience of previous similar projects in Australia such as the LVIA for the Southern Freight Rail Corridor (AECOM, 2010). It is considered unlikely that any visual receptors located beyond the boundary of the 10 km LVIA study area will be able to obtain views of the Project
- Horizontal and vertical alignment for the Project
- Visibility analysis mapping, which establishes the theoretical viewshed of the Project based on landform
- Refinement during the field survey stage.

10.5.2 Significance assessment criteria

The significance of a potential impact is assessed in terms of the sensitivity or vulnerability of the environmental aspect, and the magnitude of the potential impact. As previously noted, the LVIA methodology has defined its own thresholds for sensitivity and magnitude that are based on the principles but differ from the criteria defined in Chapter 4: Assessment methodology and follow criteria more widely used for the assessment of landscape and visual impacts.

The following sensitivity criteria (refer Table 10.4), magnitude criteria (refer Table 10.5) and significance criteria (refer Table 10.6) were used to determine potential impacts relating to the LVIA.

10.5.2.1 Sensitivity to change

The sensitivity categories used in this assessment are defined in Table 10.4. Separate definitions are provided for the sensitivity of:

- Landscape
- Viewpoint, and the visual receptor audiences it represents
- Representative viewpoint to changes in after-dark lighting conditions.

TABLE 10.4: DEFINITIONS OF SENSITIVITY

Sensitivity	Aspect	Attributes of categories
High	Landscape	A landscape protected by national designation (such as a national park) and/or widely acknowledged for its quality and value; a landscape with distinctive character and low capacity to accommodate the type of change envisaged.
	Visual sensitivity	Large numbers of viewers or those with proprietary interest and prolonged viewing opportunities, such as residents and users of attractive and/or well-used recreational facilities. Views from a regionally important location whose interest is specifically focused on the landscape, for example a national park.
	Sensitivity to lighting	Easily accessible at night with large numbers of viewers or those with proprietary interest and prolonged viewing opportunities located at very close distances (typically less than 200 m) to the light source.
Moderate	Landscape	A moderately valued landscape, perhaps a regionally important landscape and/or protected by regional/State designation, or where its character, land use, pattern and scale may have some capacity to accommodate a degree of the type of change envisaged.
	Visual sensitivity	Medium numbers of residents (e.g. rural communities and townships) and moderate numbers of visitors with an interest in their environment e.g. visitors to State forests, including bush walkers, horse riders, trail bikers. Larger numbers of travellers with an interest in their surroundings, for example, local designated scenic routes.
	Sensitivity to lighting	Relatively accessible at night with medium numbers of viewers and close to the site, or easily accessible with propriety interest but located some distance (typically up to 500 m) from the light source.
Low	Landscape	A landscape valued to a limited extent, perhaps a locally important landscape or where its character, land use, pattern and scale is likely to have the capacity to accommodate the type of change envisaged.
	Visual sensitivity	Small numbers of visitors with a passing interest in their surroundings or transient views e.g. those travelling along principal roads. Viewers whose interest is not specifically focused on the landscape, for example, workers, commuters, truck drivers.
	Sensitivity to lighting	Typically, location not accessed at night, with small numbers of visitors with a passing interest in their surroundings e.g. those travelling along principal roads or greater numbers of viewers but located at considerable distance from the light source (typically less than 1 km).
Negligible	Landscape	A landscape that is not valued for its scenic quality or where its character, existing land use, pattern and scale are tolerant of the type of change envisaged, and the landscape has capacity to accommodate that change.
	Visual sensitivity	Very occasional numbers of viewers with a passing interest in their surroundings, for example, those travelling along minor roads and views from the air.
	Sensitivity to lighting	Rarely accessed at night. Rural locations with very occasional numbers of viewers with a passing interest in their surroundings e.g. those travelling along minor roads and views from the air or located at greater than 1 km from the light source.

10.5.2.2 Magnitude of change

The magnitude of change categories used in this assessment are defined in Table 10.5. Separate definitions are provided for the magnitude of change to:

- Landscape
- Viewpoint, and the visual receptor audiences it represents
- Representative viewpoint to changes in after-dark lighting conditions.

There is no standard methodology for the quantification of the magnitude of effects; however, it is generally based on the scale or degree of change to the landscape or visual resource, the nature of the effect and its duration.

TABLE 10.5: DEFINITIONS OF MAGNITUDE OF CHANGE

Magnitude	Aspect	Attributes of categories
High	Landscape	Dominant change: A clearly evident and frequent/continuous change in landscape characteristics affecting an extensive area, which is likely to fundamentally change the character of the landscape.
	Visual	Dominant change: Major changes in view at close distances, affecting a substantial part of the view, continuously visible for a long duration, or obstructing a substantial part or important elements of view. Generally, short distances (typically less than 250 m) to the nearest Project infrastructure element.
	Lighting	Dominant change: Occurs when an intrinsically dark landscape becomes brightly lit.
Moderate	Landscape	Considerable change: A considerable change in landscape characteristics, frequent or continuous and over a wide area or a clearly evident change, but over a restricted area.
	Visual	Considerable change: Clearly perceptible changes in views at intermediate distances, resulting in either a distinct new element in a significant part of the view, or a more wide-ranging, less concentrated change across a wider area. Generally, short to medium views (typically 250 m – 1 km) to the nearest Project infrastructure).
	Lighting	Considerable change: Occurs when an intrinsically dark landscape becomes predominantly lit or a predominantly dark landscape becomes brightly lit.
Low	Landscape	Noticeable change: A noticeable change in landscape characteristics over a wide area or a considerable change over a restricted area but will not fundamentally change the character of the landscape.
	Visual	Noticeable change: Minor changes in views at long distances or visible for a short duration, and/or are expected to blend in with the existing view to a moderate extent. Generally, medium-to-long distance views (typically 1 km – 2.5 km) to the nearest Project infrastructure.
	Lighting	Noticeable change: Occurs when an intrinsically dark landscape becomes predominantly dark, a predominantly dark landscape becomes predominantly lit or a predominantly lit landscape becomes brightly lit.
Negligible	Landscape	Barely perceptible change: An imperceptible, barely or rarely perceptible change in landscape characteristics.
	Visual	Barely perceptible change: Change that is barely visible at a very long distance or visible for a very short duration, and/or is expected to blend with the existing view. Distant views (generally greater than 2.5 km) to the nearest Project infrastructure.
	Lighting	Barely perceptible change: Occurs when a landscape experiences negligible changes from the existing lighting conditions to the proposed lighting conditions.
No impact	Landscape, visual and lighting	No change in landscape, visual or lighting characteristics.

10.5.2.3 Significance of impact

An evaluation of overall potential effect has been based on a combination of the sensitivity to change and the magnitude of change that is likely to occur and has been determined using the matrix presented in Table 10.6. As described in Section 10.5 and Section 10.5.2, the LVIA significance matrix has been modified slightly from the criteria defined in Chapter 4: Assessment methodology.

TABLE 10.6: SIGNIFICANCE OF IMPACT MATRIX

Level of effect		Magnitude of change			
		High (dominant change)	Moderate (considerable change)	Low (noticeable change)	Negligible (barely perceptible change)
Sensitivity	High	Major	High	Moderate	Low
	Moderate	High	Moderate	Low	Low
	Low	Moderate	Low	Negligible	Negligible
	Negligible	Low	Low	Negligible	Negligible

Table notes:
Where magnitude of change is 'No impact' the level of effect is 'No impact'.

10.6 Existing environment

10.6.1 Regional landscape context

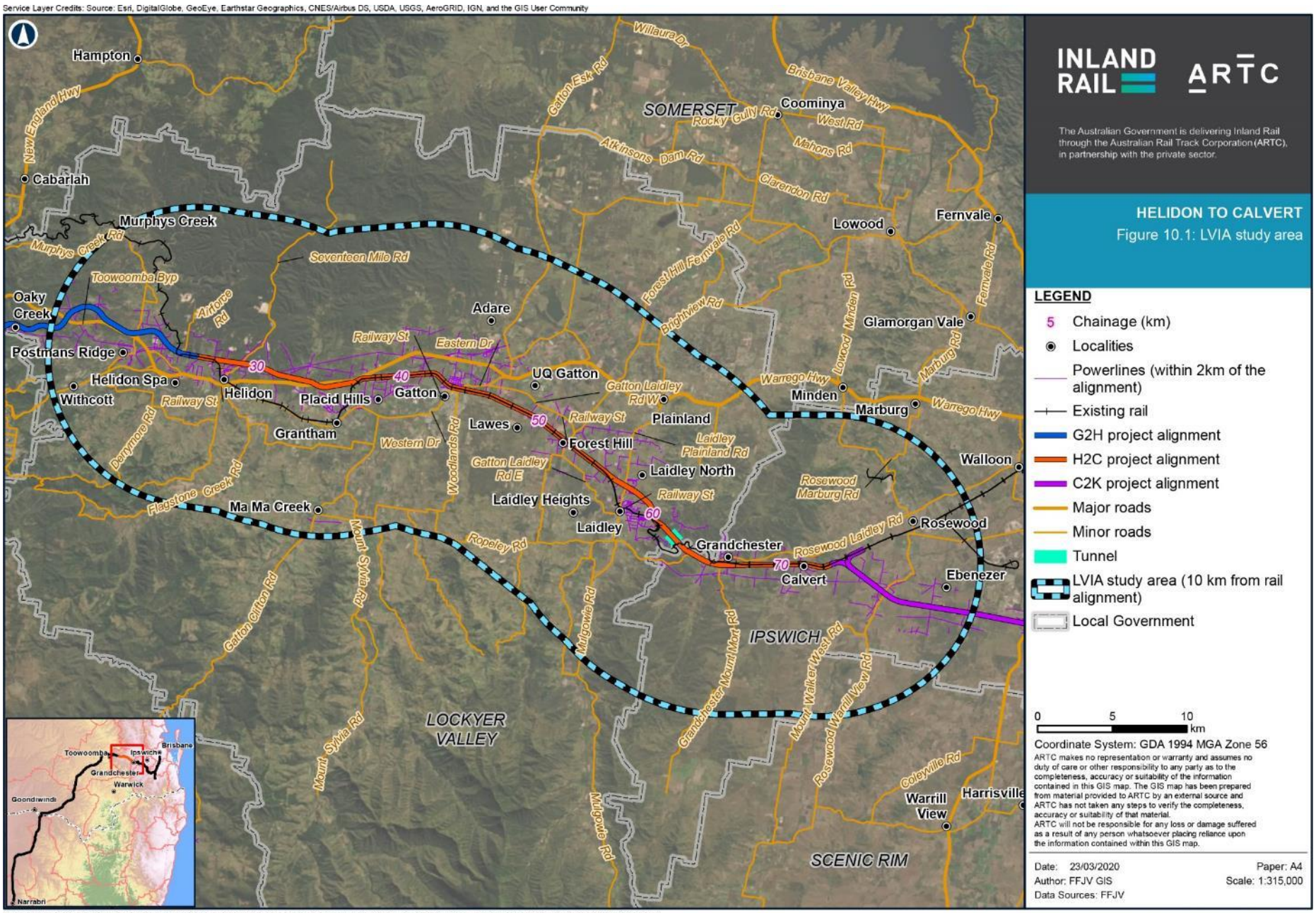
The LVIA study area is located between Toowoomba and Ipswich, west of Brisbane, and includes small areas within the Scenic Rim, a popular tourist destination recognised for its scenic beauty, and the Lockyer Valley LGA, renowned for its fertile agricultural landscapes and referred to as 'Australia's salad bowl'. In the eastern part of the LVIA study area, the alignment passes through the Ipswich LGA and the undulating uplands of Little Liverpool Range, a dominant feature in the landscape that separates the fertile arable floodplains of the Fassifern and Lockyer Valleys. Within the LVIA study area, large areas of land have been cleared for pasture, agricultural production and for rural and urban residential settlements. Tracts of remnant vegetation are also present, limited to the steep, hilly landscapes of Lockyer National Park, Gatton National Park and the Little Liverpool Range.

The Project and the LVIA study area are provided as Figure 10.1.

10.6.1.1 Settlement

The alignment traverses a range of landscapes, from developed urban areas, isolated rural settlements, open woodland, pastoral and agricultural landscapes to the undulating and vegetated foothills of the Great Dividing and Little Liverpool Ranges. Extensive areas within the LVIA study area have been cleared for agricultural purposes and for the development of residential communities.

The largest town in the LVIA study area is Gatton, situated between Ipswich and Toowoomba in the heart of the Lockyer Valley, approximately 90 km west of Brisbane with a population of 7,101 (Australian Bureau of Statistics (ABS) 2016 Census data). Laidley is the second-largest town, situated 83 km west of Brisbane with a population of 3,808 (ABS 2016). Rosewood is situated 17 km west of Ipswich in the eastern extent of the LVIA study area with a population of 2,835 (ABS 2016); however, Rosewood lies closest to the Inland Rail C2K alignment. Smaller rural settlements within the LVIA study area comprise Murphys Creek (population 664); Withcott (population 1,000); Helidon Spa (population 538); Grantham (population 634); Ma Ma Creek (population 394); Forest Hill (population 968); Grandchester (population 444); and Calvert (population 310) (ABS, 2016). There are also several areas of acreage estates and emerging rural residential communities within the vicinity of Postmans Ridge, Helidon Spa, Grantham, Placid Hills, Adare, Plainland, Laidley North and Laidley Heights.


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
INLAND RAIL
ARTC
The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.
HELIDON TO CALVERT
Figure 10.1: LVIA study area
LEGEND
5 Chainage (km)
Localities
Powerlines (within 2km of the alignment)
Existing rail
G2H project alignment
H2C project alignment
C2K project alignment
Major roads
Minor roads
Tunnel
LVIA study area (10 km from rail alignment)
Local Government
Hampton
Cabarlah
Murphys Creek
Oaky Creek
Postmans Ridge
Helidon Spa
Withcott
Helidon
Placid Hills
Gatton
Grantham
Adare
UQ Gatton
Lawes
Forest Hill
Plainland
Laidley North
Laidley Heights
Laidley
Ma Ma Creek
Grandchester
Calvert
Lowood
Fernvale
Glamorgan Vale
Minden
Marburg
Walloon
Rosewood
Ebenezer
Warrill View
Harrisville
Coominya
SOMERSET
IPSWICH
LOCKYER VALLEY
SCENIC RIM
Seventeen Mile Rd
Toowoomba Byp
Railway St
Eastern Dr
Western Dr
Gatton Laidley Rd W
Gatton Laidley Rd E
Laidley Plainland Rd
Rosewood Marburg Rd
Rosewood Laidley Rd
Forest Hill Fernvale Rd
Brighview Rd
Warrego Hwy
Clarendon Rd
Mahons Rd
Atkinsons Dam Rd
Rocky Gully Rd
West Rd
Brisbane Valley Hwy
Gatton Esk Rd
Willaura Dr
New England Hwy
Murphys Creek Rd
Airforce Rd
Derrymore Rd
Flagstone Creek Rd
Gatton Clifton Rd
Mount Sylvia Rd
Ropeley Rd
Mulgowie Rd
Grandchester Mount Mort Rd
Mount Walker West Rd
Rosewood Warrill View Rd
Coleyville Rd
Lowood Minden Rd
Fernvale Rd
Marburg Rd
30
40
50
60
70
0 5 10 km
Coordinate System: GDA 1994 MGA Zone 56
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Scale: 1:315,000
Data Sources: FFJV
Toowoomba
Brisbane
Ipswich
Grandchester
Warwick
Goondiwindi
Narrabri
Map by: CW/RB/MEF/GN Z:\GIS\GIS_General\Tasks\Environment\390-ELE-201808061159_LVIA\H2C\390-ELE-201808061159_ARTC_Fig10.1_LVIA_v4.mxd Date: 25/03/2020 16:44

10.6.1.2 Geology, landform and hydrology

The geology underlying the LVIA study area is largely volcanic in origin, with large areas of sedimentary deposits, and is characterised by flat to gently undulating lowlands, through to ranges on igneous, metamorphic, and sedimentary rocks. Landform across the LVIA study area varies greatly and is characterised as broad cultivated alluvial plains surrounded by steep, densely vegetated hilly to sub-mountainous basaltic uplands.

The most notable landscape features within the LVIA study area are the mountainous regions of the Great Dividing, Main Paradise, Little Liverpool, Mistake Mountains and Marburg ranges. Within the LVIA study area there are several local peaks including Wards Hill, Vinegar Hill, Stringybark Mountain, Evans Hill and Mount Grandchester.

The LVIA study area falls within the Lockyer and Bremer River Catchments, both of which are sub-basins of the Brisbane River Basin. The Bremer River sub-basin collects runoff from the eastern slopes of the Little Liverpool and Marburg ranges, while the Lockyer Creek sub-basin collects runoff from the western slopes of the Little Liverpool and Marburg ranges as well as the eastern slopes of the Great Dividing Range and the slopes of the Main Paradise and Mistake Mountain ranges. Lockyer Creek is a macro channel, capable of containing all levels of flood except the most extreme events (DES, 2016). Several waterways within these catchments intersect the alignment and flow throughout the LVIA study area, including (from west to east) Lockyer Creek, Sheep Station Creek, Dinner Corner Gully, Sandy Creek (Grantham), Sandy Creek (Forest Hill), Laidley Creek and Western Creek.

10.6.1.3 Soils, vegetation and land use

Existing land use within the LVIA study area is largely characterised by rural activities such as grazing, irrigated horticulture and production forestry, in particular, on a variety of allotment sizes. However, a diverse range of other land uses are found in the area, including rural properties, urban development, tourism, industrial areas, major transport routes, and more localised specialist land uses including orchards, explosives storage and production, commercial sandstone mining, poultry farms, golf courses, rifle ranges, hobby farms, The University of Queensland (UQ) Gatton campus, Gatton racecourse and the South Queensland Prison Precinct.

Low-lying areas of the Lockyer Valley and Fassifern Valleys are renowned for their fertile soils and productive agricultural landscapes. The most productive soils within these valleys are the black alluvial clays, typically found on flat, slightly sloping and undulating land along watercourses in low-lying flood-prone areas, which support irrigated agricultural production. These productive landscapes are surrounded by dryland cropping and cattle grazing, predominately beef cattle, on the poorer gently undulating foothills of the surrounding mountain ranges. These ranges are characterised by densely vegetated undulating to mountainous areas (including reserves and national parks), on siliceous sands, sandstones and basalts.

Approximately half the catchment has been cleared for agricultural, urban development and industrial land use, particularly within the low-lying fertile floodplains. Despite this, the region is rich in biodiversity and still has several distinct remnant ecosystems. Native remnant vegetation comprises remnant patches of open Blue Gum woodlands and endangered Brigalow and Swamp Tea-tree forests on alluvial plains, Brigalow and dry scrub communities on alluvial terraces, patches of rainforest and semi-evergreen vine thickets in steeper escarpment areas, tree belts associated with the edge of local and State-controlled roads and scattered riparian vegetation along waterways (Department of Environment and Science (DES), 2016b).

Low-lying alluvial river and creek flats have been extensively cleared and remnant patches of open forest woodlands on floodplains are typically confined to constrained gullies with limited access and creek channels. These fringing woodlands are typically comprised of Blue Gum (*Eucalyptus tereticornis*), River She-oak (*Casuarina cunninghamiana*) and Paperbark (*Melaleuca spp.*), with Grey Box (*E. moluccana*) and Red Ironbark (*E. crebra*) sometimes present in more elevated areas of the floodplain.

Vegetated swamps, limited to isolated areas near Lake Clarendon, are dominated by *Cyperus* spp., *Schoenoplectus* spp. and *Eleocharis* spp. and include a wide range of sedges—grasses with some instances of emergent *Melaleuca spp.* occurring.

Undulating landscapes and foothills within the LVIA study area are dominated by open eucalypt forests on sedimentary rocks, typically comprised of Brown Bloodwood (*Corymbia trachyphloia subsp. trachyphloia*), Lemon-Scented Gum (*Corymbia citriodora subsp. variegata*), Narrow-Leaved Ironbark (*E. crebra*), or Red Ironbark (*E. fibrosa subsp. fibrosa).* Within elevated parts of the Great Dividing Range, there are remnant pockets of Narrow-Leaved Ironbark woodland, which contains Narrow-Leaved Ironbark (*E. crebra*), Blue Gum (*Eucalyptus tereticornis*), Moreton Bay Ash (*Corymbia tessellaris*), Smooth-Barked Apple (*Angophora spp.*), and Silver-Leaved Ironbark (*E melanophloia*).

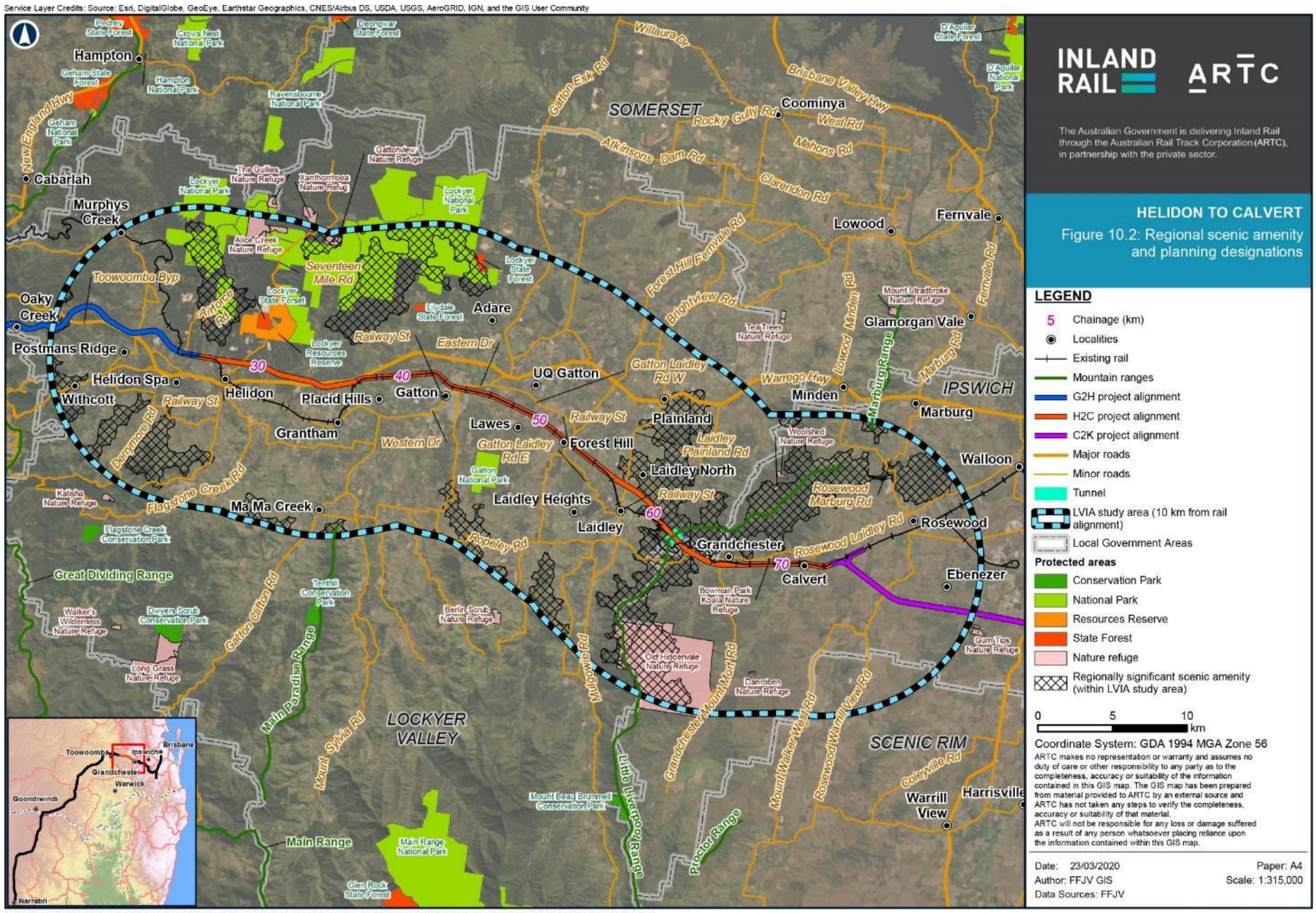
Elevated areas on basalt plains and hills (e.g. Great Dividing Range) are dominated by scrubby open woodland on igneous rocks, comprised of Red Ironbark (*E. crebra*), Blue Gum (*Eucalyptus tereticornis*), Yellow Box (*E. melliodora*), Scribbly Gum (*E. racemosa*), Smooth Branched Ironbark (*E. dura*) and Lemon-Scented Gum (*Corymbia citriodora subsp. variegata*). The higher regions also support areas of heath and open woodland as well as small remnant patches of semi-evergreen vine thicket, limited to steep gullies and slopes on both sedimentary and basalt rocks which can be easily identified in the landscape as bands of dark green low vegetation in contrast to the surrounding bushland (Healthy Land and Water, 2018). This endangered vegetation community is mostly seen to the south of the alignment within the Great Dividing Range, Paradise Range and Mistake Mountains. Key species include Narrow-Leaved Bottle Tree (*Brachychiton rupestris*), Crows Ash (*Flindersia australis*), Rosewood (*Acacia fasciculifera*) and Small-Leaved Fig (*Ficus obliqua*). Scattered trees of Brigalow (*Acacia harpophylla*) are also present.

There are two national parks with the LVIA study area—Lockyer National Park and Gatton National Park—and two State forests—Lockyer State Forest and Lilydale State Forest. The Lockyer National Park (11,079 hectares (ha)) is located north of Gatton and is made up of Lockyer National Park (2,677 ha) and Lockyer National Park (Recovery) (7,790 ha) and is adjacent to the Lockyer Resource Reserve (612 ha) and Lockyer State Forest (818 ha). Gatton National Park covers 426 ha and was gazetted in 2006 in recognition of the important biodiversity and conservation values of the area (Department of National Parks, Recreation, Sport and Racing, 2013).

The LVIA study area also includes several nature refuge areas and conservation estates. These areas are commonly used for tourism and recreation. The fauna links between the various sections of these resource and conservation areas provide greater visual amenity. These national parks and nature refuge areas are all located within elevated, vegetated areas, which are considered to have high scenic amenity value.

10.6.1.4 South East Queensland Regional Plan regional landscape values

ShapingSEQ (DILGP, 2017a) includes mapping of areas of 'regionally significant scenic amenity' on 'Map 5c Sustain – regional landscape values'. This is based on the SEQ regional amenity methodology identified in the *SEQRP Implementation Guideline No 8—Identifying and protecting scenic amenity values* (DILGP, 2007) (refer Figure 10.2).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HELIDON TO CALVERT
Figure 10.2: Regional scenic amenity and planning designations
LEGEND
Chainage (km)
Localities
Existing rail
Mountain ranges
G2H project alignment
H2C project alignment
C2K project alignment
Major roads
Minor roads
Tunnel
LVIA study area (10 km from rail alignment)
Local Government Areas
Protected areas
Conservation Park
National Park
Resources Reserve
State Forest
Nature refuge
Regionally significant scenic amenity (within LVIA study area)
0 5 10 km
Coordinate System: GDA 1994 MGA Zone 56
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Data Sources: FFJV
Hampton
Cabarlah
Murphys Creek
Oaky Creek
Postmans Ridge
Helidon Spa
Withcott
Helidon
Placid Hills
Gatton
Grantham
Adare
UQ Gatton
Lawes
Forest Hill
Plainland
Laidley North
Laidley Heights
Laidley
Ma Ma Creek
Grandchester
Calvert
Lowood
Fernvale
Glamorgan Vale
Minden
Marburg
IPSWICH
Walloon
Rosewood
Ebenezer
SOMERSET
LOCKYER VALLEY
SCENIC RIM
Main Range
Great Dividing Range
Warrill View
Harrisville
Toowoomba Byp
Railway St
Eastern Dr
Western Dr
Seventeen Mile Rd
Forest Hill Fernvale Rd
Brightview Rd
Gatton Laidley Rd W
Gatton Laidley Rd E
Laidley Plainland Rd
Rosewood Marburg Rd
Rosewood Laidley Rd
Flagstone Creek Rd
Ropeley Rd
Gatton Clifton Rd
Main Paradise Range
Mount Sylvia Rd
Middle Rd
Little Liverpool Range
Grandchester Mount Mort Rd
Mount Walker West Rd
Rosewood Warrill View Rd
Coleyville Rd
Proctor Range
Brisbane Valley Hwy
Atkinsons Dam Rd
Rocky Gully Rd
Mahons Rd
Clarendon Rd
Lowood Minden Rd
Marburg Range
Warrego Hwy
Gatton Esk Rd
Willaura Dr
New England Hwy
Railway St
Lockyer National Park
Lockyer State Forest
Lockyer Resources Reserve
Alice Creek Nature Refuge
The Gullies Nature Refuge
Xanthorrhoea Nature Refug
Gattonview Nature Refuge
Ravensbourne National Park
Hampton National Park
Geham National Park
Geham State Forest
Crows Nest National Park
Deongwar State Forest
Peckey State Forest
D'Aguilar National Park
D'Aguilar State Forest
Lilydale State Forest
Tea Trees Nature Refuge
Mount Stradbroke Nature Refuge
Woolshed Nature Refuge
Gatton National Park
Kalisha Nature Refuge
Flagstone Creek Conservation Park
Tenthill Conservation Park
Dwyers Scrub Conservation Park
Walker's Wilderness Nature Refuge
Long Grass Nature Refuge
Berlin Scrub Nature Refuge
Bowman Park Koala Nature Refuge
Old Hiddenvale Nature Refuge
Clanroben Nature Refuge
Gum Tips Nature Refuge
Mount Beau Brummel Conservation Park
Main Range National Park
Glen Rock State Forest
Toowoomba
Ipswich
Brisbane
Grandchester
Warwick
Goondiwindi
Narrabri
Map by: CW/RB/MEF/GN Z:\GIS\GIS_General\Tasks\Environment\390-ELE-201808061159_LVIA\H2C\390-ELE-201808061159_ARTC_Fig10.2_RSAS.mxd Date: 25/03/2020 16:53

The following five key areas within the LVIA study area are identified as being regionally significant based on the assessment outlined in Appendix H: Landscape and Visual Impact Assessment Technical Report:

- Great Dividing Range: encompassing the area of the Main Range National Park to Don River State Forest corridor and Emu Creek to Mt Lawson corridor and including the peaks of Vinegar Hill (north of the alignment), Wards Hill (west of the alignment), and Mount Sugarloaf, Stringybark Mountain, Evans Hill and Mount Ma Ma (south of the alignment)
- Little Liverpool Range: encompassing the area of the Little Liverpool Range corridor extending from Hatton Vale area near Mount Grandchester down to Mount Beau Brummell Conservation Park and the area of the Mount Grandchester to Pine Mountain corridor, including Perrys Knob and Stirling Road Reserve
- Marburg Range: encompassing the area of the Mount Grandchester to Mount Hancock corridor, including Two Tree Hill
- Main Paradise Range: encompassing the area around Mount Whitestone and elevated areas south-east of Ma Ma Creek
- Elevated areas around Beins Mountain, the northern extent of the Mistake Mountains range.

10.6.1.5 Lockyer regional landscape values

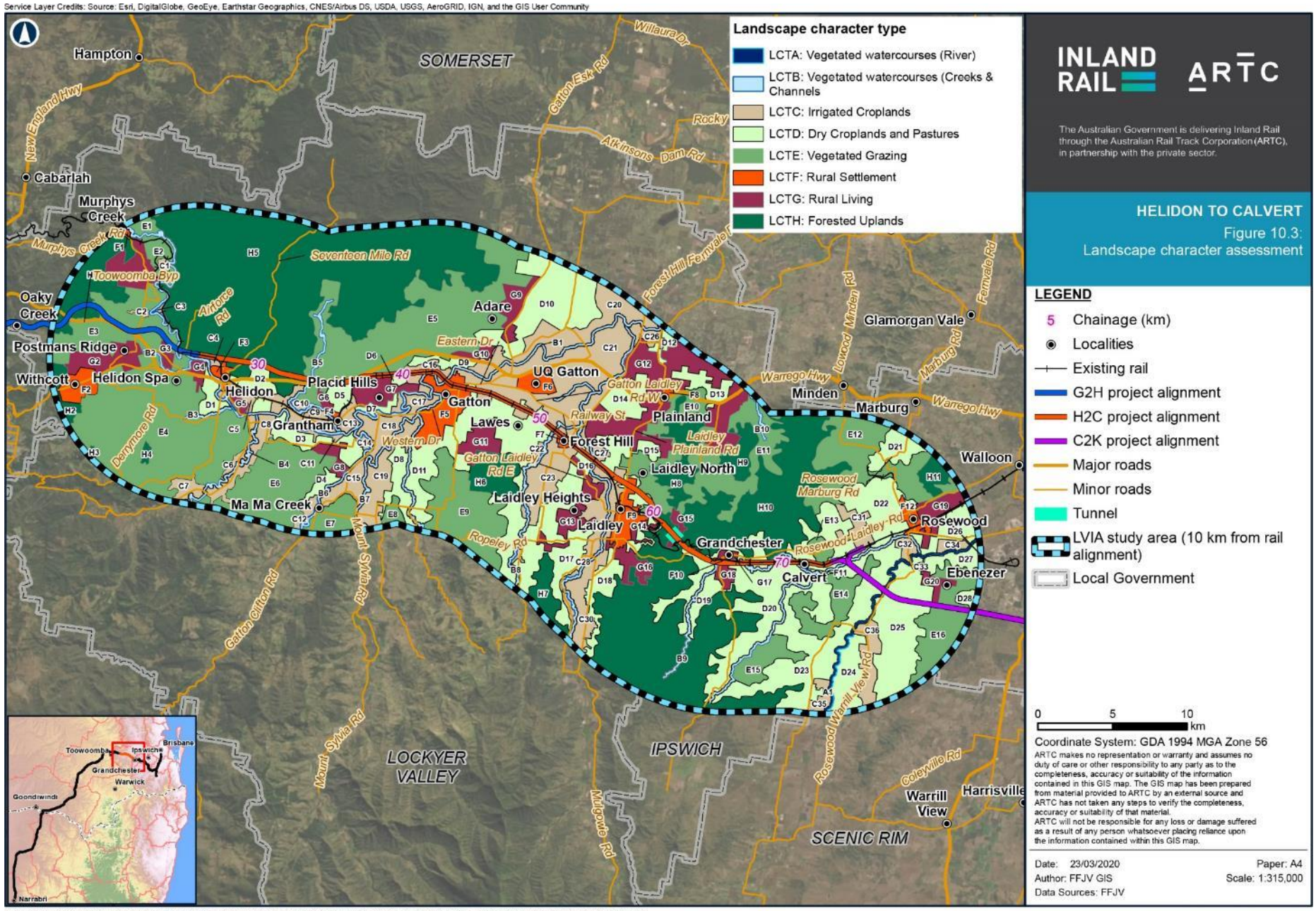
The *Scenic Amenity of the Lockyer* (Forest Images, 2002) includes mapping of areas of high scenic amenity value, as identified within the LVIA study area. This study was also based on the approach developed by the RLSAC, which was developed in response to the Regional Framework for Growth Management (SEQ 2021, 2000).

This study identifies the following areas within the LVIA study area as having high levels of regionally significant scenic amenity value, that should be protected:

- Elevated parts of the Great Dividing Range in the vicinity of Toowoomba
- Elevated parts of the Main Range and the ranges around Mt Mistake and extending north into the Lockyer Valley
- Elevated parts of Little Liverpool Range
- Forest areas associated with Gatton National Park
- Parts of Helidon Hills near gorges and peaks.

10.6.2 Landscape character assessment

The identified LCTs and LCAs falling within the LVIA study area are shown in Figure 10.3 and summarised in Table 10.7. Full descriptions of each LCT are provided in Appendix H: Landscape and Visual Impact Assessment Technical Report.


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Landscape character type
LCTA: Vegetated watercourses (River)
LCTB: Vegetated watercourses (Creeks & Channels
LCTC: Irrigated Croplands
LCTD: Dry Croplands and Pastures
LCTE: Vegetated Grazing
LCTF: Rural Settlement
LCTG: Rural Living
LCTH: Forested Uplands
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HELIDON TO CALVERT
Figure 10.3:
Landscape character assessment
LEGEND
Chainage (km)
Localities
Existing rail
G2H project alignment
H2C project alignment
C2K project alignment
Major roads
Minor roads
Tunnel
LVIA study area (10 km from rail alignment)
Local Government
Hampton
Cabarlah
Murphys Creek
Oaky Creek
Postmans Ridge
Withcott
Helidon Spa
Helidon
Placid Hills
Adare
UQ Gatton
Gatton
Grantham
Lawes
Forest Hill
Laidley North
Laidley Heights
Laidley
Ma Ma Creek
Plainland
Glamorgan Vale
Minden
Marburg
Walloon
Rosewood
Grandchester
Calvert
Ebenezer
Warrill View
Harrisville
SOMERSET
LOCKYER VALLEY
IPSWICH
SCENIC RIM
Seventeen Mile Rd
Toowoomba Byp
Airforce Rd
Eastern Dr
Western Dr
Railway St
Gatton Laidley Rd E
Gatton Laidley Rd W
Laidley Plainland Rd
Warrego Hwy
Rosewood Marburg Rd
Rosewood Laidley Rd
Ropeley Rd
Derrymore Rd
Gatton Clifton Rd
Mount Sylvia Rd
Rosewood Warrill View Rd
Coleyville Rd
Mudgeeraba Rd
New England Hwy
Gatton Esk Rd
Atkinsons Dam Rd
Forest Hill Fernvale Rd
Fernvale Rd
Lowood Minden Rd
Marburg Rd
Willaura Dr
Rocky
0 5 10 km
Coordinate System: GDA 1994 MGA Zone 56
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TABLE 10.7: LANDSCAPE CHARACTER TYPES AND AREAS

Landscape character type	Associated landscape character areas
LCT A: Vegetated Watercourses—Rivers	▸ Bremer River Vegetated Watercourse (LCA A1)
LCT B: Vegetated Watercourses—Creeks and Channels	▸ Plain Creek Vegetated Watercourse (LCA B1) ▸ Western Creek Vegetated Watercourse (LCA B2) ▸ Warrill Creek Vegetated Watercourse (LCA B3) ▸ Purga Creek Vegetated Watercourse (LCA B4) ▸ Bundamba Creek Vegetated Watercourse (LCA B5) ▸ Teviot Brook Vegetated Watercourse (LCA B6)
LCT C: Irrigated Croplands	▸ Rosewood Irrigated Croplands (LCA C1) ▸ Bremer River Irrigated Croplands (LCA C2) ▸ Mount Walker Irrigated Croplands (LCA C3) ▸ Warrill View Irrigated Croplands (LCA C4) ▸ Yamanto Irrigated Croplands (LCA C5) ▸ Willowbank Irrigated Croplands (LCA C6) ▸ Warrill Creek West Irrigated Croplands (LCA C7) ▸ Peak Crossing Irrigated Croplands (LCA C8) ▸ Warrill Creek East Irrigated Croplands (LCA C9) ▸ Hillside Irrigated Croplands (LCA C10) ▸ Teviot Brook Irrigated Croplands (LCA C11) ▸ Logan River West Croplands (LCA C12) ▸ Gleneagle Irrigated Croplands (LCA C13) ▸ Logan River East Croplands (LCA C14)
LCT D: Dry Croplands and Pastures	▸ Summerholm Dry Croplands and Pastures (LCA D1) ▸ Ashwell Dry Croplands and Pastures (LCA D2) ▸ Cottonvale Dry Croplands and Pastures (LCA D3) ▸ Lower Mount Walker Dry Croplands and Pastures (LCA D4) ▸ Thagoona Dry Croplands and Pastures (LCA D5) ▸ Mount Forbes Dry Croplands and Pastures (LCA D6) ▸ Willowbank Dry Croplands and Pastures (LCA D7) ▸ Mutdapilly Dry Croplands and Pastures (LCA D8) ▸ Warrill View Dry Croplands and Pastures (LCA D9) ▸ Purga Dry Croplands and Pastures (LCA D10) ▸ Limestone Ridges Dry Croplands and Pastures LCA D11) ▸ Goolman Dry Croplands and Pastures (LCA D12) ▸ Wyaralong Dry Croplands and Pastures (LCA D13) ▸ Deebing Heights Dry Croplands and Pastures (LCA D14) ▸ South Ripley Dry Croplands and Pastures (LCA D15) ▸ Undullah Road Dry Croplands and Pastures (LCA D16) ▸ Allenview Dry Croplands and Pastures (LCA D17) ▸ Veresdale Dry Croplands and Pastures (LCA D18)
LCT E: Vegetated Grazing	▸ Calvert Vegetated Grazing (LCA E1) ▸ Lower Mount Walker Vegetated Grazing (LCA E2) ▸ Mount Mort Vegetated Grazing (LCA E3) ▸ Mount Walker Vegetated Grazing (LCA E4) ▸ Mount Forbes Vegetated Grazing (LCA E5) ▸ Amberly Vegetated Grazing (LCA E6) ▸ Willowbank Vegetated Grazing (LCA E7) ▸ Mutdapilly Vegetated Grazing (LCA E8) ▸ Peak Crossing Vegetated Grazing (LCA E9) ▸ Limestone Ridges Vegetated Grazing (LCA E10) ▸ Milbong Vegetated Grazing (LCA E11)
LCT F: Rural Settlement	▸ Grandchester (LCA F1) ▸ Calvert (LCA F2) ▸ Rosewood (LCA F3) ▸ Amberly RAAF Base (LCA F4) ▸ Peak Crossing (LCA F5) ▸ Harrisville (LCA F6)

Landscape character type	Associated landscape character areas
LCT G: Transitional Landscapes	▸ New Oakleigh Coal Mine (LCA G1) ▸ Willowbank (LCA G2) ▸ Purga Quarry (LCA G3) ▸ Limestone Hills (LCA G4)
LCT H: Forested Uplands	▸ Marburg Range Forested Uplands (LCA H1) ▸ Little Liverpool Range Forested Uplands (LCA H2) ▸ Mount Mort Forested Uplands (LCA H3) ▸ Mount Walker Forested Uplands (LCA H4) ▸ Teviot Range Forested Uplands (LCA H5) ▸ Spring Mountain Forested Uplands (LCA H6) ▸ Cedar Vale Forested Uplands (LCA H7)
LCT I: Rural Living	▸ Thagoona Rural Living (LCA I1) ▸ Willowbank Rural Living (LCA I2) ▸ Deebing Heights Rural Living (LCA I3) ▸ Flagstone Rural Living (LCA 14) ▸ Cedar Grove Rural Living (LCA I5)
LCT J: Suburban Living	▸ Yamanto Urban Living (LCA J1) ▸ Ripley Valley Urban Living (LCA J2) ▸ Flagstone Urban Living (LCA J3)

10.6.3 Visual assessment

10.6.3.1 Visual audiences and receptors

A number of visual receptor audiences were assessed to have the potential to be affected by the Project including:

- Local residents and workers in towns and rural settlements (including Rosewood, Calvert, Grandchester, Forest Hill and Laidley)
- Local residents and workers on rural and acreage properties
- Travellers on main and local roads
- Tourists on roads and scenic drives and staying in tourist accommodation within the LVIA study area
- Tourists on the Westlander train
- Recreational users of the landscape, particularly using walking and biking trails within the national parks, State forests and other nature reserves, which provide vistas within the LVIA study area and may experience visual impacts.

10.6.3.2 Viewpoint selection

The identified viewpoints for the LVIA are summarised in Table 10.8. These viewpoints were selected as they consider key natural landscape features, major views, view sheds, and outlooks that contribute to the amenity of the area.

TABLE 10.8: VIEWPOINT SELECTION

Viewpoint name	Anticipated approximate distance to alignment	Key visual receptors
Viewpoint 1: Airforce Road near 45 and 47 Airforce Road, looking north-west	Alignment is approximately 190 m north of this viewpoint.	Represents typical and accessible views of nearby rural residents and of travellers travelling along Airforce Road.
Viewpoint 2: Seventeen Mile Road looking north	Alignment is approximately 120 m north of this viewpoint.	Represents typical and accessible views of rural residents and of visitors travelling along Seventeen Mile Road towards Lockyer National Park.
Viewpoint 3: Warrego Highway looking East	Alignment is approximately 140 m to the north-east of this viewpoint.	Represents typical and accessible views of those travelling along the Warrego Highway towards Brisbane and Ipswich.

Viewpoint name	Anticipated approximate distance to alignment	Key visual receptors
Viewpoint 4: Beavan Street looking south-west towards existing Lockyer Creek rail bridge	Alignment is approximately 250 m to the south-west of this viewpoint	Represents typical and accessible views of residents of Gatton and of visitors, workers and tourists travelling along Beavan Street. Also representative of views from William Kemp Park.
Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing	Alignment is approximately 20 m to the north of this viewpoint	Represents typical and accessible views of visitors, workers and tourists visiting Gatton and Gatton RSL.
Viewpoint 6: Spencer Street near Gatton Showgrounds	Alignment is approximately 250 m to the north of this viewpoint	Represents typical and accessible views of visitors, workers and tourists travelling along Spencer Street and those visiting Gatton Showgrounds and the Lockyer Valley Sports and Aquatic Centre.
Viewpoint 7: Gordon Street looking north-east towards level crossing	Alignment is approximately 40 m to the north-east of this viewpoint	Represents typical and accessible views of, residents of Forest Hill and of visitors, workers and tourists travelling along Gordon Street.
Viewpoint 8: Laidley Plainlands Road towards bridge crossing	Alignment is approximately 70 m to the north of this viewpoint	Represents typical views of travellers along Laidley Plainlands Road and nearby residents on the northern outskirts of Laidley.
Viewpoint 9: Patrick Street towards underpass	Alignment is approximately 80 m to the north-east of this viewpoint	Represents typical views of residents and visitors of the Valley Vista Estate. Is also representative of typical views from the nearby Cunningham Park residential estate.
Viewpoint 10: Hardy Drive looking north-east down Rampton Street over new subdivision	Alignment is approximately 220 m to the north of this viewpoint	Represents typical and accessible views of residents and visitors of Valley Vista and Cunningham Park residential estates.
Viewpoint 11: Branell Homestead Luxury Cabins on Paroz Road looking west	Alignment is approximately 1.2 km to the west of this viewpoint	Represents typical and accessible views of nearby rural residents and of residents and visitors of McInnes Field at Laidley residential estate.
Viewpoint 12: McInnes Drive near existing rail line	Alignment is approximately 380 m to the north-east of viewpoint	Represents typical and accessible views of nearby rural residents and of residents and visitors of McInnes Field at Laidley residential estate.
Viewpoint 13: Kessling Drive, looking south-west towards western tunnel portal	Alignment is approximately 135 m to the south-west of this viewpoint.	Represents accessible views of residents of 208–212 Kessling Drive.
Viewpoint 14: Cunningham's Crest Lookout, looking south-west towards Laidley	Alignment is approximately 960 m to the south-west of this viewpoint	Represents typical and accessible views of visitors and tourists visiting Cunningham's Crest Lookout—a scenic viewpoint with picnic facilities, artwork and information signage on local heritage.
Viewpoint 15: Laidley Rosewood Road near properties 113–117, looking east	Alignment is approximately 175 m to the north-east of this viewpoint	Represents typical and accessible views of rural residents and of visitors, workers and tourists travelling along Laidley Rosewood Road.
Viewpoint 16: Grandchester State School, looking north toward alignment and old railway station	Alignment is approximately 135 m north of this viewpoint	Represents typical and accessible views of rural residents, students, teachers and visitors of Grandchester State School and community hall and of those travelling along School Road.
Viewpoint 17: End of Calvert School Road, looking west near properties 917–923	Alignment is approximately 15 m north of this viewpoint	Represents typical and accessible views of residents of Calvert and people driving down Calvert School Road.

10.7 Potential impacts

The following sections include a summary of the potential landscape and visual amenity impacts that are associated with the Project. Further details are included in Appendix H: Landscape and Visual Impact Assessment Technical Report.

10.7.1 Project phases

10.7.1.1 Construction phase

The construction activities that will create a potential impact are detailed in Table 10.9, along with indicative imagery (e.g. from other similar projects) to represent potential Project works and activities.

TABLE 10.9: POTENTIAL LANDSCAPE AND VISUAL IMPACTS DURING CONSTRUCTION PHASE

Construction activities and infrastructure	
Demolition of existing infrastructure The alignment will involve crossovers of existing redundant rail infrastructure where sections of the existing track will be removed and replaced with new infrastructure. Approximately 24 km of the alignment is within a brownfield corridor. This may result in short-term impacts on landscape and visual values.  Source: Lat27	**Bridge construction** Bridges, culverts and viaducts will be constructed over creeks, rivers, flood plains and existing road corridors. A total of 31 bridges and viaducts and 86 culverts are proposed to be constructed throughout the alignment. The construction of new infrastructure will convey construction traffic to, and within, the construction areas resulting in short-term impacts on landscape and visual values.  Source: ARTC
Road and rail construction The construction of new infrastructure along the Project alignment will result in construction traffic travelling to, and within, the construction areas and may result in short-term impacts on landscape and visual values.  Source: ARTC	**Creation of stockpiles (existing material from site)** Stockpiles of materials cleared from site will be present in the laydown areas in the temporary disturbance footprint, where they will be stored prior to use, re-use or disposal. This includes ballast from the West Moreton System rail corridor; rail tracks and soil from cut-and-fill sites.  Source: Lat27

Vegetation clearing and associated earthworks

Approximately 24 km of the alignment (between Chainage (Ch) 37.50 km to Ch 55.50 km and Ch 67.50 km to Ch 73.40 km) is already cleared for the existing rail infrastructure. Much of the remaining landscape is already cleared for agricultural purposes, although parts of the western and eastern Project alignment pass through forested landscapes (e.g. Ch 28.95 km to Ch 33.00 km and Ch 60.50 km to Ch 63.10 km). The clearance of vegetation will be required to facilitate the construction of new and realigned road infrastructure, which will be particularly evident in the following locations:

- Ch 26.80 km to Ch 29.10 km: Realignment of Airforce Road, Warringal Road, Wright Road, and Seventeen Mile Road
- Near Ch 31.39 km: Realignment of Connors Road
- Ch 36.80 km to Ch 38.00 km: Realignment of Philps Road and Brooks Road
- Ch 41.00 km to Ch 43.50 km: realignment of Jamieson Road and Smithfield Road
- Near Ch 43.20 km: Realignment of Old College Road and Beavan Street
- Ch 43.80 km to Ch 44.20 km: Hickey Street works
- Near Ch 44.30 km: Construction of Eastern Drive Road bridges and realignment of Crescent Street, Golf Links Drive, and Chadwick Road
- Ch 52.40 km to Ch 52.60 km: realignment of Glenore Grove Road, Railway Street, and Gordon Street
- Near Ch 57.40 km: Realignment of Laidley Plainlands Road, Old Laidley Forest Hill Road, and Boundary Road
- Near Ch 61.50 km: Realignment of Railway Street
- Ch 63.80 km to Ch 64.95 km: Realignment of Rosewood Laidley Road and Doonans Road
- Near Ch 66.00 km: Realignment of Grandchester Mt Mort Road and School Road
- Ch 69.95 km to Ch 70.50 km: Realignment of Neumann's Road.

Where required, large-scale machinery will be used to assist in vegetation clearance or trimming activities. This will generate traffic on surrounding roads. Temporary stockpiles of cleared vegetation may also be present. Topsoil, subsoil, rock and other unsuitable materials will be removed where necessary to create stable and level areas for infrastructure to be constructed. This will result in the temporary presence of exposed areas of land.

Source: ARTC

Creation of stockpiles (material delivered to site)

Stockpiles of materials delivered to site will be present in the laydown areas and beside the West Moreton System rail corridor, where they will be stored prior to use. This includes ballast, soil stockpiles (no soil from outside disturbance corridor), rock protection and rail materials including tracks and sleepers.

Source: ARTC

Associated construction equipment and activities

Large-scale construction equipment and machinery such as cranes, excavators, trucks, water trucks, scrapers, graders, heavy bulldozers, generators, road headers and dump trucks will be required for construction activities. In particular, it is noted the intention to tunnel through the Little Liverpool Range using either roadheader and/or drill and blast methods.

Source: ARTC

Construction workers

The construction workforce on site for the Project is expected to peak at 410 full-time equivalents between weeks 56 and 57. The average number of full-time equivalent workforce on site across the full construction period is in the order of 190.

Source: ARTC

Construction traffic movement

There will be increased traffic movement on existing state-controlled roads and side roads. This will include a variety of vehicle types. The traffic report detailed within Chapter 19: Traffic, transport and access, outlines the potential impacts to traffic on local and State-controlled roads.

Source: Lat27

Temporary construction lighting

Site preparation activities undertaken to provide access to the rail corridor are commonly conducted during daylight hours. However, some activities may be undertaken outside of standard daytime hours. Security night lighting would be required at site offices, traffic management/road diversions and fuel storage areas. The primary light source will likely be from temporary security lighting and lighting towers. The number and details of the lighting requirements is yet to be determined and will be available after detailed design is completed and a construction plan has been developed.

Source: FFJV

Embankments and mounding

Embankments and mounding will be created to accommodate the proposed rail corridor. This will be evident in areas where there is a change in levels with the existing ground, for example, major cuts. In addition, culverts and bridges will be constructed over creeks and existing road corridors.

Source: Lat27

Site offices and associated car parking areas

The Project will require a number of temporary buildings to facilitate construction activities. This will include site offices and workshops, as well as car parking areas. This will bring additional traffic, staff and machinery to the LVIA study area. The new, temporary built forms may be seen as uncharacteristic elements in a predominantly rural landscape.

Four locations are being considered for potential temporary construction site offices:

- Connors Road (Ch 30.70 km)
- Warrego Highway (Ch 35.40 km)
- Off Boundary Road (Ch 58.00 km)
- Rosewood Laidley Road (Ch 64.00 km).

Source: FFJV

Drainage infrastructure including concrete piping

Temporary and permanent drainage infrastructure will be present, including areas in close proximity to (and potentially visible from) existing road corridors, examples include:

- Near Airforce Road, Helidon (Ch 27.04 km to Ch 27.40 km)
- Near Warrego Highway, Grantham (Ch 34.30 km)
- Near Chadwick Road, Gatton (Ch 44.43 km)
- Near Luck Road, Laidley (Ch 58.80 km)
- Near Paroz Road, Laidley (Ch 59.61 km to Ch 59.66 km)
- Near Rosewood Laidley Road, Grandchester (Ch 64.78 km)
- Near Grandchester-Mount Mort Road and School Road, Grandchester (Ch 65.87 km to Ch 66.48 km).

Source: FFJV

Construction activities and infrastructure	
Shipping containers and storage sheds Shipping containers will be delivered to construction sites via crane trucks and then stored in laydown areas. The containers commonly contain construction equipment.  Source: FFJV	**Signage** A large number of signs will be displayed around construction sites, especially where existing road corridors are in close proximity to the proposed rail corridor. Signage will include speed signs, stop signs, and safety signs and construction signage (truck access for example).  Source: FFJV

10.7.1.2 Operation phase

The operation activities that will create a potential impact, along with indicative imagery (e.g. from other similar projects) to represent potential permanent Project infrastructure are provided in Table 10.10.

TABLE 10.10: POTENTIAL LANDSCAPE AND VISUAL IMPACTS DURING OPERATION PHASE

Operation activities and infrastructure	
Lighting infrastructure Permanent lighting infrastructure will comprise security lighting in key locations, including tunnel portals. There will also be standard flashing lights located at all public level crossings. Emergency lighting will also be provided to rail tunnels in accordance with relevant standards, including adjacent to the egress walkway and exit signs.  Source: ARTC	**Maintenance sidings** There are no rail yards proposed for the Project. Maintenance sidings are provided at each crossing loop location. The maintenance siding has a minimum clear length of 250 m. This includes hard standing and storage space for temporary maintenance activities.  Source: FFJV

Level crossings

Crossings occur where the Project alignment intersects a road. Infrastructure includes rail tracks, crossing protection measures (as required) and signage. The Project has seven active (lit) level crossings as follows:

- Connors Road, Helidon
- Jamiesons Road, Gatton
- Dodt Road, Forest Hill
- Glenore Grove Road, Forest Hill
- Grandchester Mount Mort Road, Grandchester
- Calvert Station Road, Calvert
- Neumann Road, Calvert.

No passive level crossings are proposed.

Source: FFJV

Railway tracks

Where buffers (for example, vegetation and topographic features) do not exist, the railway tracks are likely to become a visible element of infrastructure in the landscape, commonly sighted from adjacent roads and residents' properties.

In addition, there will be four locations with crossing loops: Helidon, Gatton, Laidley and Calvert. The rail corridor is of sufficient width to accommodate the proposed crossing loops.

Source: ARTC

Freight trains

Trains may be visible, at times, in the landscape from existing roads and residential properties. The current assumption is that there will be on average 33 services per day in 2026 (likely to increase to an average of 47 train services per day in 2040). The Project is designed to accommodate double-stack freight trains 6.5 m high initially up to 1,800 m long, with capacity for train lengths to increase to 3,600 m. It is expected to take between one and approximately 2.5 minutes for a train to pass. The train will have headlights.

Approximately 50 per cent of the Project alignment is currently operational, so some receptors already experience impacts from moving trains.

Note: This assessment is based on the allowance for 1,800 m long trains, including double stacking. The construction of future crossing loops to accommodate 3,600 m long trains will be subject to separate approval applications in the future.

Source: ARTC

Source: ARTC

Road and rail bridges

Bridges are an obvious built landmark for motorists and are provided to cross over rivers, creeks, rail tracks and roads. The Project has 31 bridges proposed including:

- 13 rail bridges over waterways
- 6 rail bridges over waterways and roads
- 6 rail bridges over roads
- 4 road bridges over rail
- 1 rail bridge over existing rail
- 1 pedestrian bridge over rail.

Road bridge over rail

Source: Lat27 (visualisation)

Rail bridge over road

Source: Lat27 (visualisation)

Rail bridge over waterway

Source: Lat27 (visualisation)

The rail bridges are typically proposed as single-track, Super-T girder type structures. Anti-throw screens are likely to be required for both road bridges. Key bridges are proposed to be:

- Paroz Road Rail Bridge: 92 m, four spans
- Sandy Creek 1 Rail Bridge: 418 m, 11 spans
- Lockyer Creek Rail Bridge: 122 m, four spans
- Lockyer Creek Queensland Rail (QR) Rail Bridge: 122 m, four spans
- Lagoon Creek 1 Rail Bridge: 760 m, 20 spans
- Lagoon Creek 1 Loop Rail Bridge: 760 m, 20 spans
- UT1 Sandy Creek Bridge Rail Bridge: 437 m, 19 spans.
- UT1 Sandy Creek Rail Bridge: 437 m, 19 spans
- UT1 Laidley Creek Rail Bridge: 28 m, two spans
- UT2 Laidley Creek Rail Bridge: 28 m, two spans
- Sandy Creek 2 Rail Bridge: 29 m, two spans
- Sandy Creek 3 Rail Bridge: 44 m, three spans
- Laidley Creek Rail Bridge: 128 m, nine spans
- Lagoon Creek 2 Rail Bridge: 437 m, 19 spans
- Lagoon Creek 2 Loop Rail Bridge: 437 m, 19 spans
- Western Creek 1 Rail Bridge: 516 m, 22 spans
- Western Creek 2 Rail Bridge: 31.8 m, three spans
- UT Western Creek Rail Bridge: 56 m, four spans
- Western Creek 3 Rail Bridge: 84 m, six spans
- Western Creek 4 Rail Bridge: 47.2 m, four spans.
- Warrego Highway Rail Bridge: 184 m, four spans
- Philps Road Rail Bridge: 69 m, three spans
- Laidley Plainlands Road Rail Bridge: 75 m, three spans
- Francis Road Rail Bridge: 38 m, one span
- Luck Road Rail Bridge: 69 m, three spans
- Rosewood Laidley Road Rail Bridge: 148 m, six spans.
- QR Rail Bridge: 90 m, six spans.
- Airforce Road Bridge: 24 m, one span
- Eastern Drive Bridge Northbound: 103 m, three spans
- Eastern Drive Bridge Southbound: 103 m, three spans
- QR Access Road Bridge: 83.6 m, six spans
- Gatton Station Pedestrian Bridge: 36 m, one span.

Culverts

Culverts (including multiple barrel culverts) are required where the route crosses small creeks, drainage lines and waterways. These comprise:

- 51 reinforced concrete pipe locations (multiple cells in places)
- 35 are reinforced concrete box culvert locations.

Source: ARTC

Cuttings with associated retaining walls

Cuts will be created through areas of elevated landform, for example in the Little Liverpool Range, to accommodate the proposed rail infrastructure. This includes:

- Approximately 3,600,000 m3 of cuts to a maximum depth of 38 m, spanning approximately 7.6 km.

A range of treatments may be used across the Project for the stabilisation of cut slopes including shotcrete (where batters are 1 Vertical (V) : 1 Horizontal (H)); geosynthetics with high-tensile steel wire nets and meshes (where batters are between 1V: 1H and 1V: 1.5H and landscape where batters are 1V: 2H or shallower).

Source: ARTC

Embankments, abutments and retaining walls

Embankments and mounding will be created to accommodate the proposed rail infrastructure. This includes:

- Approximately 34 km of embankments and mounding, excluding structures, to accommodate the proposed rail infrastructure. The maximum height of mounding will be 23 m.

Source: Lat27

Fencing and noise barriers

Fencing will be provided along the rail corridor, where required. The alignment will be fenced with three- or four-strand barbed wire fence (except where noted otherwise). Where superior fencing is required near roads, or where trespass is occurring, a 1.8 m chain wire fence is proposed (e.g. at rail yards and where crossing loops are in close proximity to roads, or where critical infrastructure is to be protected). Fauna fencing is also required in some places—refer Chapter 11: Flora and fauna for more detail.

Noise barriers are not currently included within the design. At detailed design phase the provision of noise barriers and other potential feasible and practicable mitigation options to reduce and control noise and noise-related impacts at sensitive land uses may be considered, in particular in the vicinity of Gatton, Forest Hill and potentially Valley Vista Estate in Laidley. Therefore, the potential visual impact of noise barriers has been considered in this assessment. More information regarding noise barriers can be found in Chapter 15: Noise and vibration.

Source: FFJV

Source: FFJV

Operation activities and infrastructure	
Tunnels with associated tunnel portals and service buildings An approximate 850 m tunnel will be created through the Little Liverpool Range, to accommodate the proposed rail infrastructure. At each tunnel entry a portal will be created with an associated ventilation building. Service buildings will be located at both portals. The tunnel will be naturally ventilated (exhaust emitted from tunnel portals through a piston effect during train passage) with no ventilation stacks proposed for the Project.  Source: ARTC	

10.7.2 Landscape impact

The following sections include a summary of the impact assessment for landscape and visual amenity associated with the Project (refer Section 10.5.2). Further details are included in Appendix H: Landscape and Visual Impact Assessment Technical Report.

10.7.2.1 Landscape character impact assessment

Eight LCTs have been identified within the LVIA study area. Seven of these LCTs are directly intersected by the alignment, as follows:

- LCT B: Vegetated Watercourses—Creeks and Channels
- LCT C: Irrigated Croplands
- LCT D: Dry Croplands and Pastures
- LCT E: Vegetated Grazing
- LCT F: Rural Settlement
- LCT G: Rural Living
- LCT H: Forested Uplands.

One other LCT is present in the LVIA study area—LCT A: Vegetated Watercourses—Rivers. However, as this LCT is not intersected by the alignment, no meaningful impacts are anticipated to this LCT and it has not been considered further.

The seven LCTs and associated LCAs are described in Table 10.11 to Table 10.17. These tables assess the likely sensitivities for each identified LCT in relation to the Project. A preliminary indication of the likely magnitude of change and consequent likely significance of that effect on landscape amenity has also been provided.

Construction impacts on landscape character are temporary and result from things such as the removal of vegetation, which persist into the operational phase. Therefore, the landscape character impact assessment presented below is a combined assessment of impacts during both construction and operation, reflecting elements removed or disturbed during construction as well as the introduction of structures that affect the perception and character of the landscape over the longer term.

Landscape character type A

This LCT falls within the LVIA study area and comprises the river corridor and riparian vegetation associated with the Bremer River. As this LCT is not affected by the Project alignment, it is not considered further.

Landscape character type B

TABLE 10.11: SUMMARY DESCRIPTION OF LCT B: VEGETATED WATERCOURSES—CREEKS AND CHANNELS

Type B: Vegetated watercourses—creeks and channels

Landscape baseline assessment

- This landscape type is located throughout the LVIA study area, associated with the many small tributaries of the Brisbane River (to the west of Little Liverpool Range) and Bremer River (to the east of Little Liverpool Range)
- There are nine LCAs of this type in the LVIA study area—the Lockyer Creek Vegetated Watercourse (LCA B1); Gatton Creek Vegetated Watercourse (LCA B2); Soda Spring Creek Vegetated Watercourse (LCA B3); Flagstone Creek Vegetated Watercourse (LCA B4); Sandy Creek Vegetated Watercourse (LCA B5); Ma Ma Creek Vegetated Watercourse (LCA B6); Tenthill Creek Vegetated Watercourse (LCA B7); Laidley Creek Vegetated Watercourse (LCA B8); and the Western Creek Vegetated Watercourse (LCA B9).

Key characteristics

- Includes creeks and low-lying effluent channels that form part of Brisbane River and Bremer River catchments, conveying large amounts of runoff away from the steep surrounding ranges in rainfall events
- Remnant areas of flood-dependent forest/woodlands and wetlands
- Natural landscape with few built infrastructure elements.

Precedent modifications and infrastructure elements

- Relatively natural landscape with minimal infrastructure, comprising road and existing rail bridges over the main creek channels within the LVIA study area
- Generally fringing vegetation has been retained and creates a buffer between adjacent land uses
- Telecommunication infrastructure, including telegraph poles, typically follows the road alignment.

Landscape character sensitivity assessment

- Moderate degree of perceived naturalness, with some instances of evidence of human uses and modifications to the waterways
- Areas of fringing vegetation in some locations contain views to and from creek lines, reducing the sensitivity. Vegetation is sparser in low-lying agricultural areas
- The overall sensitivity is considered to be 'low'. This recognises that there are no formal landscape designations associated with this LCT and the landscape does not appear to be used by the local community for recreation. Additionally, parts of the LCT are already affected by the presence of road and rail infrastructure, so it has capacity to accommodate further change.

Typical character images

Type B: Vegetated watercourses—creeks and channels

Impact assessment

Magnitude of change assessment

- The proposed alignment typically follows the existing West Moreton System rail corridor. Where it deviates from the existing alignment, it traverses a variety of landscapes and land uses, including the vegetated undulating foothills of the Great Dividing and Little Liverpool ranges rural landscapes, intensive agricultural areas and the urban areas fringing existing townships
- The introduction of new rail infrastructure into the rural and urban setting will include thirteen creek crossings, where the alignment crosses the upper tributary of Sandy Creek, Sandy Creek, Lockyer Creek, upper tributary of Laidley Creek, Laidley Creek, Lagoon Creek and Western Creek
- LCT B1: Lockyer Creek, B5: Sandy Creek, B8: Laidley Creek and B9: Western Creek will be traversed by the alignment
- New bridge and railway infrastructure, as well as associated drainage infrastructure (e.g. culverts) will result in localised removal of vegetation and will affect the natural and rural character of this landscape type
- Changes to the landscape character associated with creek and floodplain infrastructure will be evident from the Warrego Highway, Sandy Creek Road, Old Laidley Forest Hill Road, Grandchester-Mt Mort Road, Stokes Road, Rosewood Laidley Road, Calvert Station Road, Marin Road, Bugeja Road, Hiddenvale Road and Neumann Road
- The overall magnitude of change is predicted to be 'moderate'.

Significance of effect

- The effect of the Project on LCT B: Vegetated Watercourses—Creeks and Channels is 'low'.

Landscape character type C

TABLE 10.12: SUMMARY DESCRIPTION OF LCT C: IRRIGATED CROPLANDS

Type C: Irrigated croplands

Landscape baseline assessment

- This landscape type is located within the alluvial valleys and fertile floodplains of the Brisbane River and Bremer River catchments
- There are 36 LCAs of this type in the LVIA study area—the Upper Lockyer Irrigated Croplands (LCA C1); Murphys Creek Road Irrigated Croplands (LCA C2); Lockyer Irrigated Croplands (LCA C3); Airforce Road Irrigated Croplands (LCA C4); Helidon Irrigated Croplands (LCA C5); Flagstone Creek West Irrigated Croplands (LCA C6); Flagstone Creek Irrigated Croplands (LCA C7); Flagstone Creek East Irrigated Croplands (LCA C8); Grantham North Irrigated Croplands (LCA C9); Sandy Creek Road Irrigated Croplands (LCA C10); Grantham South Irrigated Croplands (LCA C11); Placid Hills Croplands (LCA 12); McLucas Road Irrigated Croplands (LCA 13); Winwill Irrigated Croplands (LCA 14); Ma Ma Creek Irrigated Croplands (LCA 15); Gatton North Irrigated Croplands (LCA 16); Gillespies Road Irrigated Croplands (LCA 17); Gatton West Irrigated Croplands (LCA 18); Tenthill Creek Irrigated Croplands (LCA 19); Lockyer Creek North Irrigated Croplands (LCA 20); Lockyer Creek South Irrigated Croplands (LCA 21); Sandy Creek Irrigated Croplands (LCA 22); Forest Hill Irrigated Croplands (LCA 23); Woodlands Road Irrigated Croplands (LCA 24); Blenheim Irrigated Croplands (LCA 25); Glenore Grove Irrigated Croplands (LCA 26); Laidley Irrigated Croplands (LCA 27); Laidley Heights Irrigated Croplands (LCA 28); Laidley Creek West Irrigated Croplands (LCA 29); Laidley Creek East Irrigated Croplands (LCA 30); Lanefield Irrigated Croplands (LCA 31); Rosewood Irrigated Croplands (LCA 32); Ebenezer Irrigated Croplands (LCA 33); Thagoona Irrigated Croplands (LCA 34); Mt Walker Irrigated Croplands (LCA 35); and the Mt Forbes Irrigated Croplands (LCA 36). These LCAs are typically located in areas with highly fertile vertosol soils.

Key characteristics

- Extensively developed agricultural areas
- Irrigation channels occur in flatter areas, particularly around the areas of Helidon, Gatton, Forest Hill and Laidley North
- Typically located in areas with highly fertile vertosol soils
- The vertosols, are typically cracking clay soils with high nutrients capable of supporting agriculture
- Extensive large and relatively flat open fields of irrigated cropland
- Landscape substantially cleared of vegetation, except at the periphery, along creek-lines (LCT A and LCT B) on the skyline and local roads
- In addition to irrigated production, current land-use activities include grazing and dryland farming with localised recreation.

Precedent modifications and infrastructure elements

- To enhance agricultural productivity, modifications have been made to the floodplain to improve land used for grazing, dryland cropping and irrigated cropping
- Typically, works such as channels have been constructed to manage and store irrigation and domestic water. These channels are particularly evident near Helidon, Gatton, Forest Hill and Laidley North
- Diverted flows from creeks within the catchment supply water to Lake Atkinson, Lake Clarendon and Lake Dyer, and to off-stream storage facilities providing recreational opportunities, and to supply water to the Central Lockyer irrigation scheme.

Typical character images






Type C: Irrigated croplands

Landscape character sensitivity assessment

- The Irrigated Croplands landscape type is predominantly visually open, with a sparsely settled rural character and no large-scale infrastructure elements. It has long distant views and strong skylines
- Vegetation within low-lying areas is extensively cleared and very sparse, with denser remnant vegetation along waterways
- Due to the extensively modified character of the landscape and local value of the landscape, in terms of landscape amenity, the overall inherent sensitivity is considered to be 'low'.

Impact assessment

Magnitude of change assessment

- The primary impact will be on private land where new rail infrastructure is being introduced
- Typically, the alignment follows the West Moreton System rail corridor when passing through this LCT
- LCA C4: Airforce Road, C16: Gatton North, C21: Lockyer Creek, C23: Sandy Creek and C27: Laidley would be directly affected
- The impact on private land and valuable irrigated areas will be most evident to the west of Laidley (LCA C27 and LCA C28), where the alignment deviates from the existing railway corridor
- New earthwork infrastructure within this landscape will not be inconsistent with the current landscape character
- The overall magnitude of change is predicted to be 'low'.

Significance of effect

- The effect of the Project on LCT C: Irrigated Croplands is 'negligible'.

Landscape character type D

TABLE 10.13: SUMMARY DESCRIPTION OF LCT D: DRY CROPLANDS AND PASTURES

Type D: Dry croplands and pastures

Landscape baseline assessment

- This landscape extends across a considerable part of the LVIA study area and is largely defined by extensively cleared, often undulating, open rural properties utilised for agriculture and livestock production
- There are 28 LCAs of this type in the LVIA study area—the Black Flagstone Road Dry Croplands and Pastures (LCA D1), Helidon Croplands and Pastures (LCA D2), Verdilla Dry Croplands and Pastures (LCA D3), Ma Ma Creek - Walker Dry Croplands and Pastures (LCA D4), Grantham Dry Croplands and Pastures (LCA D5), Placid Hills Dry Croplands and Pastures (LCA D6), Old Toowoomba Road Dry Croplands and Pastures (LCA D7), Lower Tenthill Dry Croplands and Pastures (LCA D8), Gatton North Dry Croplands and Pastures (LCA D9), Morton Vale Dry Croplands and Pastures (LCA D10), Gatton South Dry Croplands and Pastures LCA D11), Glenore Grove Dry Croplands and Pastures (LCA D12), Hatton Vale Dry Croplands and Pastures (LCA D13), Plainland Dry Croplands and Pastures (LCA D14), Laidley Dry Croplands and Pastures (LCA D15), Forest Hill Dry Croplands and Pastures (LCA D16), Blenheim Dry Croplands and Pastures (LCA D17), Laidley South Dry Croplands and Pastures (LCA D18), Grandchester Dry Croplands and Pastures (LCA D19), Calvert Dry Croplands and Pastures (LCA D20), Marburg Dry Croplands and Pastures (LCA D21), Rosewood Dry Croplands and Pastures (LCA D22), Lower Mount Walker Dry Croplands and Pastures (LCA D23), Mount Walker Dry Croplands and Pastures (LCA D24), Ebenezer Dry Croplands and Pastures (LCA D25), Thagoona Dry Croplands and Pastures (LCA D26), Jeebropilly Dry Croplands and Pastures (LCA D27) and the Mutdapilly Dry Croplands and Pastures (LCA D28).

Key characteristics

- The landscape is typically found on the undulating, poorer foothills of the LVIA study area surrounding the low-lying alluvial floodplains (LCT C–Irrigated Croplands)
- Soils typically comprise sodosols, dermosols, tenosols and kurosols
- The sodosols have a gravelly, sandy character, often exposed in areas and vulnerable to tunnel and gully erosion
- Dermosols are associated with previous volcanic activity and are found in higher rainfall coastal regions. They are used for intensive crop production
- Tenosols have generally shallow, stony soils with low fertility and low water-holding capacity
- Kurosols are strongly acid and occur predominately in upland regions with higher rainfall
- Land use is predominately rural, characterised by dryland cropping and pastoral properties for livestock production
- Vegetation comprises native roadside shelter belts and sporadic riparian vegetation associated with creek lines
- Transport corridors are typically straight in character, reflecting the flat topography, with subtle kinks associated with topographic variation that connect the key settlements and rural properties. State-controlled roads are sealed but other roads are typically unsealed gravel
- Open and exposed character with long distant views and strong skylines, except where views are contained by roadside or creek-side vegetation
- Sparsely settled landscape, with only property homesteads and cottages, and small rural villages, such as Grantham and Calvert. Farmsteads are typically located on gently elevated areas
- Harmonious but fairly typical rural character, which is valued at a local level by local communities and visitors.

Typical character images

Type D: Dry croplands and pastures

Precedent modifications and infrastructure elements

- Highly modified for agricultural practices, including clearing and levelling of land for cultivation of arable farmland and pastures for grazing
- Construction of roads, railways and bridges
- Telecommunication infrastructure including telegraph poles.

Landscape character sensitivity assessment

- The Dry Croplands and Pastures LCT is predominantly visually open, with a sparsely settled rural character and few large-scale infrastructure. It has long distant views and strong skylines
- Roadside shelter belts and sporadic riparian vegetation associated with creek lines and flood channels provide some screening
- Due to the simple character of the landscape and local value of the landscape, which is not protected in any planning scheme, the overall inherent sensitivity is considered to be 'low'.

Impact assessment

Magnitude of change assessment

- Parts of LCA D2: Helidon, D5: Grantham, D6: Placid Hills, D11: Gatton South, D16: Forest Hill, D19: Grandchester, D20: Calvert, D22: Rosewood and D23: Lower Mount Walker would be directly affected
- Impact on private land, including agricultural and pastoral areas, will be evident in the vicinity of Grantham and Laidley (LCA D5 and LCA D15), where the proposed alignment deviates from the existing railway corridor
- The Project will be introducing new infrastructure into what is a relatively intact rural environment
- Impacts within this LCA will be due to localised vegetation removal, major earthworks (e.g. cuts and embankments) and proposed road and creek bridges
- Therefore, overall, the impact on this LCT is 'high'.

Significance of effect

- The effect of the Project on LCT D: Dry Croplands and Pastures is 'moderate'.

Landscape character type E

TABLE 10.14: SUMMARY DESCRIPTION OF LCT E: VEGETATED GRAZING

Type E: Vegetated grazing

Landscape baseline assessment

- This landscape type is typically located in elevated parts of the LVIA study area, and is characterised by poorer-quality soils, remnant vegetation and cattle and sheep grazing
- There are 16 LCAs of this type in the LVIA study area—the Murphys Creek Vegetated Grazing (LCA E1), Upper Lockyer Vegetated Grazing (LCA E2), Postmans Ridge Vegetated Grazing (LCA E3), Derrymore Vegetated Grazing (LCA E4), Gatton Vegetated Grazing (LCA E5), Lilydale Vegetated Grazing (LCA E6), Upper Tenthill Vegetated Grazing (LCA E7), Ingoldsby Vegetated Grazing (LCA E8), Ropeley Vegetated Grazing (LCA E9), Laidley North Vegetated Grazing (LCA E10), Sommerholm Vegetated Grazing (LCA E11), Tallegalla Vegetated Grazing (LCA E12), Calvert Vegetated Grazing (LCA E13), Lower Mount Walker Vegetated Grazing (LCA E14), Mount Mort Vegetated Grazing (LCA E15) and Mount Forbes Vegetated Grazing (LCA E16).

Key characteristics

- Very sparsely settled landscape with large land holdings (stations) and scattered farmsteads
- Pastureland with broad areas of open wooded remnant vegetation, typically denser along creek and drainage lines and hill tops
- Roads are typically straight in character and unsealed gravel. Views in most instances are contained by roadside shelter belts.
- Harmonious but fairly typical rural character.

Precedent modifications and infrastructure elements

- Typically, limited levels of modification for agricultural practices, with some localised vegetation clearing
- Roads are typically unsealed.

Landscape character sensitivity assessment

- The vegetated grazing landscape type is predominantly visually contained, with a sparsely settled rural character and few large-scale infrastructure. Long distant views are possible at breaks in roadside shelter
- Harmonious but fairly typical rural character, which is valued at a local level by local communities and visitors
- Due to the simple character of the landscape and local value of the landscape, the overall inherent sensitivity is considered to be 'low'.

Typical character images

Impact assessment

Magnitude of change assessment

- Very small parts of LCA E5: Gatton, E10: Laidley North and E13: Calvert would be directly affected
- Impact on private land, including vegetated pastoral areas will be most evident near Grantham in LCA E5 and LCA E10: Summerholm
- The Project will introduce new infrastructure into what is a relatively intact rural environment
- Impacts within this LCT will be due to localised vegetation removal, major earthworks including large cuts and embankments in places and proposed road and creek bridges
- Overall, the impact on this LCT is 'moderate'.

Significance of effect

- The effect of the Project on LCT E: Vegetated Grazing is 'low'.

Landscape character type F

TABLE 10.15: SUMMARY DESCRIPTION OF LCT F: RURAL SETTLEMENT

Type F: Rural settlement

Landscape baseline assessment

- Twelve rural settlements are located within the LVIA study area. They include the towns of Grandchester, Rosewood, Peak Crossing and Harrisville, the small settlement of Calvert and RAAF Base Amberly
- Accordingly, there are 12 LCAs in the LVIA study area: Murphys Creek (LCA F1), Withcott (LCA F2), Helidon (LCA F3), Grantham (LCA F4), Gatton (LCA F5), UQ Gatton Campus (LCA F6), Forest Hill (LCA F7), Plainland (LCA F8), Laidley (LCA F9), Grandchester (LCA F110), Calvert (LCA F11), Rosewood (LCA F12).

Key characteristics

- Small rural towns, villages and communities are low-scale built form with limited services
- Typically, single-storey buildings of varying age and condition
- The larger settlements of Murphys Creek, Withcott, Helidon, Grantham, Gatton, Forest Hill, Plainland, Laidley, Grandchester and Rosewood have social infrastructure including parks, public schools and sport facilities
- The alignment typically follows the alignment of the existing West Moreton System rail corridor, while remnants of the historic branch railway lines are located throughout the corridor
- Murphys Creek (LCA F1) is a small town located at the foot of the Great Dividing Range, 22 km from Toowoomba. The existing Main Line runs through the centre of the town and the decommissioned Murphys Creek railway complex is heritage listed
- Withcott (LCA F2) is a small town located on the Warrego Highway, 10 km east of Toowoomba at the base of the Great Dividing Range
- Helidon (LCA F3) is a small town situated on Lockyer Creek, 21 km east of Toowoomba. The Warrego Highway runs through the centre of the town. To the north of the town, sandstone mining operations are discreetly tucked into the undulating and forested foothills of the Great Dividing Range, large extents of which are part of Lockyer National Park
- Grantham (LCA F4) is a small rural town 28 km east of Toowoomba and 9 km west of Gatton. Surrounded by premier agricultural land, Grantham is one of the largest producers of vegetables in Australia
- Gatton (LCA F5) is a town and the administrative centre of the Lockyer Valley LGA. The Warrego Highway runs east-west to the north of the town
- The UQ Gatton Campus (LCA F6) is a heritage-listed university campus located at Lawes, on the Warrego Highway, approximately 6 km east of Gatton
- Forest Hill (LCA F7) is a picturesque rural village and part of the Cobb & Co. tourist route, 5 km south of the Warrego Highway to the west of Laidley. The existing West Moreton System rail corridor runs through the centre of the town
- Plainland (LCA F8) is a locality in the Locker Valley, north of Laidley and 75 km west of Brisbane. A service centre and Woolworths are situated on the Warrego Highway
- Laidley (LCA F9) is a town situated 83 km west of Brisbane. The existing West Moreton System rail corridor runs through the centre of the town
- Grandchester (LCA F10) is a small rural town located south-west of Rosewood. The existing West Moreton System rail corridor runs through the centre of town. The historic Grandchester Station is a local tourist destination
- Calvert (LCA F11) is a small rural community. The existing West Moreton System rail corridor runs alongside the town the north of the rural residential properties
- Rosewood (LCA F12) is a small town with services including three schools, located in the northern extent of the LVIA study area. Rosewood is the terminus of the Ipswich and Rosewood railway line, providing commuter services to Ipswich and Brisbane.

Typical character images

Type F: Rural settlement

Precedent modifications and infrastructure elements

- Highly modified for urban land uses, including clearing of remnant vegetation and levelling of land for construction
- Presence of roads, railways and bridges
- Telecommunication infrastructure including telegraph poles.

Landscape character sensitivity assessment

- The Rural Settlements landscape type has a settled rural character. Smaller rural communities such as Calvert are very sparsely settled
- Buildings, street trees and remnant vegetation are of local value
- The sensitivity of these settlements is considered to be 'moderate'. While not listed within the planning schemes as of value, these settlements have a distinctive character with some elements of interest (such as heritage buildings and silos) and are also likely to be valued by the people that reside in or visit them.

Significance of effect

- The effect of the Project on LCT F: Rural Settlement is 'moderate'.

Impact assessment

Magnitude of change assessment

- The alignment passes directly through the towns of Gatton, Forest Hill and Grandchester, and adjacent to the edge of the towns of Helidon, Laidley and Calvert to the north
- While Rosewood is within the LVIA study area, the impact of the C2K Inland Rail Project is closer and would have a potentially greater influence than the Project, so Project impacts on Rosewood are considered in the C2K LVIA
- The UQ Gatton Campus is approximately 3 km north of the alignment and will experience elevated views towards the alignment; however, it is noted that the proposed rail line is situated within the existing railway corridor in this area
- Similarly, Murphys Creek is situated approximately 5.3 km from the alignment; therefore, the G2H Inland Rail Project is closer to the township so Project impacts on Murphys Creek are considered in the G2H LVIA
- Grantham is 4 km south of the alignment, and residents of the town will not be impacted, however residents in the newer parts of Grantham to the north of the town will have elevated views towards the alignment
- The alignment would directly affect parts of LCA F3: Helidon, F5: Gatton, F7: Forest Hill, F9: Laidley and F10: Grandchester
- Residents of Helidon, Gatton, Forest Hill, Laidley, Grandchester and Calvert are situated close to existing railway infrastructure and will be affected by the proposed Project alignment
- In Gatton, Forest Hill and Calvert the alignment follows the existing railway corridor and would be consistent with the current landscape character
- In Helidon, Laidley and Grandchester the alignment deviates from the existing railway corridor so would contrast more markedly with the existing character
- The primary impact will be in residential areas where new rail infrastructure is being introduced. This will be particularly evident in the vicinity of Helidon and Laidley (LCA F3 and LCA F9)
- The alignment passes to the north of Helidon, deviating from the existing railway. As such, rural residents to the north of the town will be directly affected by the introduction of rail infrastructure along the proposed alignment
- The alignment passes through Gatton, following the existing railway corridor
- The alignment passes through Forest Hill, following the existing railway corridor. Residents of Forest Hill experience close views towards the alignment and the existing level crossing will be relocated
- Plainland is approximately 6.3 km north-east of the proposed alignment, and residents of the locality will not be impacted
- The alignment passes to the north of Laidley, deviating from the existing railway corridor and passing through growing residential areas and existing rural residential communities. Residents of Valley Vista and Cunningham Park residential estates will experience very close views of the proposed alignment and embankments, while residents of McInnes Field at Laidley residential estate and nearby rural residents will experience close views towards the alignment and large cuts. The alignment passes through the centre of Grandchester to the south of Western Creek and the existing railway and heritage-listed Grandchester Railway Station. Typically, views to the alignment for residents of Grandchester will be screened by vegetation along Western Creek. Nearby rural residents to the south of the town will be affected by the proposed alignment. Impacts on these rural residents are discussed below within LCT G
- The alignment passes to the north of Calvert, following the existing West Moreton System rail corridor. Residents of Calvert will experience close views towards the alignment
- Rosewood is approximately 4 km from the alignment and will not be impacted. While Rosewood is located within the LVIA study area, it has been assessed in the C2K study, due to its distance from the Project alignment
- Overall, the impact on this LCT is considered to be 'moderate' as there would be limited loss of features of value, although in places, such as Laidley, the introduction of embankments will change the perception of character.

Landscape Character Type G

TABLE 10.16: SUMMARY DESCRIPTION OF LCT G: RURAL LIVING

Type G: Rural living

Landscape baseline assessment

- This landscape type is typically located in elevated parts of the LVIA study area, near major transport infrastructure with access to towns and services, and is characterised by large-lot rural residential development, and is typically somewhat vegetated
- There are 21 LCAs of this type in the LVIA study area—the Upper Lockyer Rural Living (LCA G1), Withcott Rural Living (LCA G2), Postmans Ridge Rural Living (LCA G3), Helidon Spa Rural Living (LCA G4), Helidon Rural Living (LCA G5), Grantham Rural Living (LCA G6), Placid Hills Rural Living (LCA G7), Veradilla Rural Living (LCA G8), Adare North Rural Living (LCA G9), Adare South Rural Living (LCA G10), Gatton Rural Living (LCA G11), Regency Downs Rural Living (LCA G12), Laidley Heights Rural Living (LCA G13), Laidley Rural Living (LCA G14), Cunninghams Crest Rural Living (LCA G15), Laidley South Rural Living (LCA G16), Grandchester Rural Living (LCA G17), Grandchester South Rural Living (LCA G18), Calvert Rural Living (LCA G19), Thagoona Rural Living (LCA G20) and the Ebenezer Rural Living (LCA G21).

Key characteristics

- Private residential dwellings on large lots, typically on elevated and undulating topography, with low-scale built form and limited local services
- Typically, single-storey buildings of varying age and condition
- Typically, views from low-lying rural residential areas are limited, due to the presence of screening remnant vegetation and local topography
- Open and close views towards the alignment are possible for elevated properties in close proximity to the alignment, particularly those located in the newer residential areas of Grantham
- Highly visible landscape type throughout the LVIA study area.

Precedent modifications and infrastructure elements

- Highly modified for urban land uses, including clearing of remnant vegetation and levelling of land for construction
- Presence of roads, railways and bridges
- Telecommunication infrastructure including telegraph poles.

Landscape character sensitivity assessment

- The Rural Living landscape type is predominantly visually closed with a sparsely settled rural character. Typically, services are limited
- Street trees and remnant vegetation provide some screening effect
- The sensitivity of these rural residential areas is considered to be 'moderate'. These areas have a distinctive character but is valued at the local level, principally by residents.

Typical character images

Type G: Rural living

Impact assessment

Magnitude of change assessment

- The alignment directly affects LCA G5: Helidon, G6: Grantham G7: Placid Hills, G15: Cunninghams Crest, G17: Grandchester and G18: Grandchester South
- The rural residential areas of Veradilla, Adare North, Adare and Laidley South (LCA G8, G9, G10 and G16) are at a significant distance from the alignment so there would be no direct impacts on landscape character
- Due to the distance of residents of Upper Lockyer, Withcott, Postmans Ridge (LCA G1, G2 and G3) from the H2C alignment, the impact of the Project on these rural residential areas will be discussed in the Gowrie to Helidon (G2H) LVIA
- Due to the distance of residents of Thagoona and Ebenezer (LCA G20 and LCA G21) from the H2C alignment, the impact of the Project on these rural residential areas will be discussed in the C2K LVIA
- Impacts within this LCA will be due to localised vegetation removal, major earthworks (e.g. cuts and embankments) and proposed road and creek bridges
- It is considered that the impact on the proposed alignment will be most evident for rural residents of Grantham, Laidley, Cunninghams Crest and Grandchester (G6, G14, G15 and G18), where new infrastructure is proposed within privately owned land in close proximity to rural residential properties and social infrastructure
- Residents in elevated rural residential areas of Grantham (G6) will have direct views to the proposed alignment and embankments, but the LCT is only affected along the periphery of the area
- Rural residential properties on the outskirts of Laidley (G14) will have close, direct views to the proposed alignment and major earthworks
- Elevated rural residents of Cunninghams Crest (G15) will have elevated close views towards the alignment, including tunnel portals and ventilation buildings. However, most of the impact through this section is in tunnel, so will not affect the character at the surface level
- The alignment passes through Grandchester (G18), largely at ground level, with the exception of the Western Creek rail bridge, limiting the influence of the alignment of landscape character
- While the rural residential areas of Helidon Spa, Helidon, Placid Hills, Gatton, Regency Downs, Laidley Heights and Grandchester (LCA G4, LCA G5, LCA G7, LCA G11, LCA G12, LCA G13 and LCA G17) are within relatively close proximity to the alignment, the proposed alignment follows the existing railway corridor and the alignment is buffered by remnant vegetation
- Overall, the impact on this LCT is at most 'moderate'.

Significance of effect

- The effect of the Project on LCT G: Rural Living is 'moderate'.

Landscape Character Type H

TABLE 10.17: SUMMARY DESCRIPTION OF LCT H: FORESTED UPLANDS

Type H: Forested uplands

Landscape baseline assessment

- This landscape type is typically associated with elevated, undulating areas of the Great Dividing Range, Little Liverpool Range, Main Paradise Range, Mistake Mountains and Marburg Range
- There are 11 LCAs of this type in the LVIA study area—the Murphys Creek Forested Uplands (LCA H1), Redwood Forested Uplands (LCA H2), Mount Davidson Forested Uplands (LCA H3), Stringybark Mountain Forested Uplands (LCA H4), Lockyer National Park Forested Uplands (LCA H5), Gatton National Park Forested Uplands (LCA H6), Mantheys Knob Forested Uplands (LCA H7), Laidley Forested Uplands (LCA H8), Sommerholm Forested Uplands (LCA H9), Little Liverpool Range Forested Uplands (LCA H10) and the Perrys Knob Forested Uplands (LCA H11).

Key characteristics

- Elevated and undulating topography, typically above 100 m
- Areas of very steep slopes
- Distinctive landform including mountain peaks and prominent ridgelines, such as those of the Great Dividing Range and Little Liverpool Range
- Incised dry creek valleys where waterways drain the elevated area
- Typically, eucalyptus woodland or forest, but microclimatic variation includes areas of other vegetation including fragment rainforest
- Generally, an enclosed landscape with limited public access and limited views
- Highly visible landscape type throughout the LVIA study area
- Most elevated areas of this type, including peaks of the Great Dividing Range, Little Liverpool Range, Main Paradise Range, Mistake Mountains and Marburg Range, are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay.

Precedent modifications and infrastructure elements

- Due to the undulating steep terrain, much of the vegetation is remnant due to the past inaccessibility to clear the areas
- Natural landscape with limited settlement (some rural residential properties along prominent ridgelines near Laidley) and few large-scale infrastructure elements
- Cunningham's Crest scenic lookout is located within the Little Liverpool Range
- The existing West Moreton System rail corridor transects both the Great Dividing Range and Little Liverpool Range
- Some telecommunications towers and powerlines in elevated locations
- Extensive sandstone quarry operations, both historic and present near Helidon. Typically, these operations are screened by dense native vegetation.

Landscape character sensitivity assessment

- This landscape character type has little capacity to accommodate development as this would require vegetation clearance, which would be visually intrusive in this elevated and undulating landscape
- Key areas of this landscape are also protected for their scenic qualities in the area and are of State significance (e.g. Peaks of the Great Dividing Range, Little Liverpool Range, Main Paradise Range, Mistake Mountains and Marburg Range)
- Therefore, the landscape sensitivity of this landscape type is considered to be up to 'high'.

Typical character images






Type H: Forested uplands

Impact assessment

Magnitude of change assessment

- The alignment directly transects LCA H5: Lockyer National Park and H10: Little Liverpool Range
- Within LCA H5, the alignment passes through privately owned land. The alignment is approximately 2 km south of the Lockyer National Park boundary. The key impact within this area will be due to extensive clearing due to proposed earthworks to facilitate the construction of the railway corridor, embankments and new road infrastructure
- Within LCA H10, the alignment deviates from the existing railway corridor, passing through privately owned land located on the Little Liverpool Range. The key impact within this area will be from clearing due to proposed earth works during construction, embankments, large cuts and tunnels, which may be visible from Cunninghams Crest Lookout, and elevated residential properties on Range Crescent and Kessling Drive (discussed further in Section 10.7.3)
- A portion of the alignment within the Little Liverpool Range will be tunnelled, reducing the surface impact of the Project on landscape values
- Elsewhere, this landscape type is not within proximity to the alignment, therefore the impacts on this landscape type would be indirect
- The impact will fundamentally change the character of the landscape from natural and rural landscape (of regional significance) to a landscape dominated by infrastructure. However, this affects only a small area of this landscape type which results in an overall 'moderate' magnitude of change.

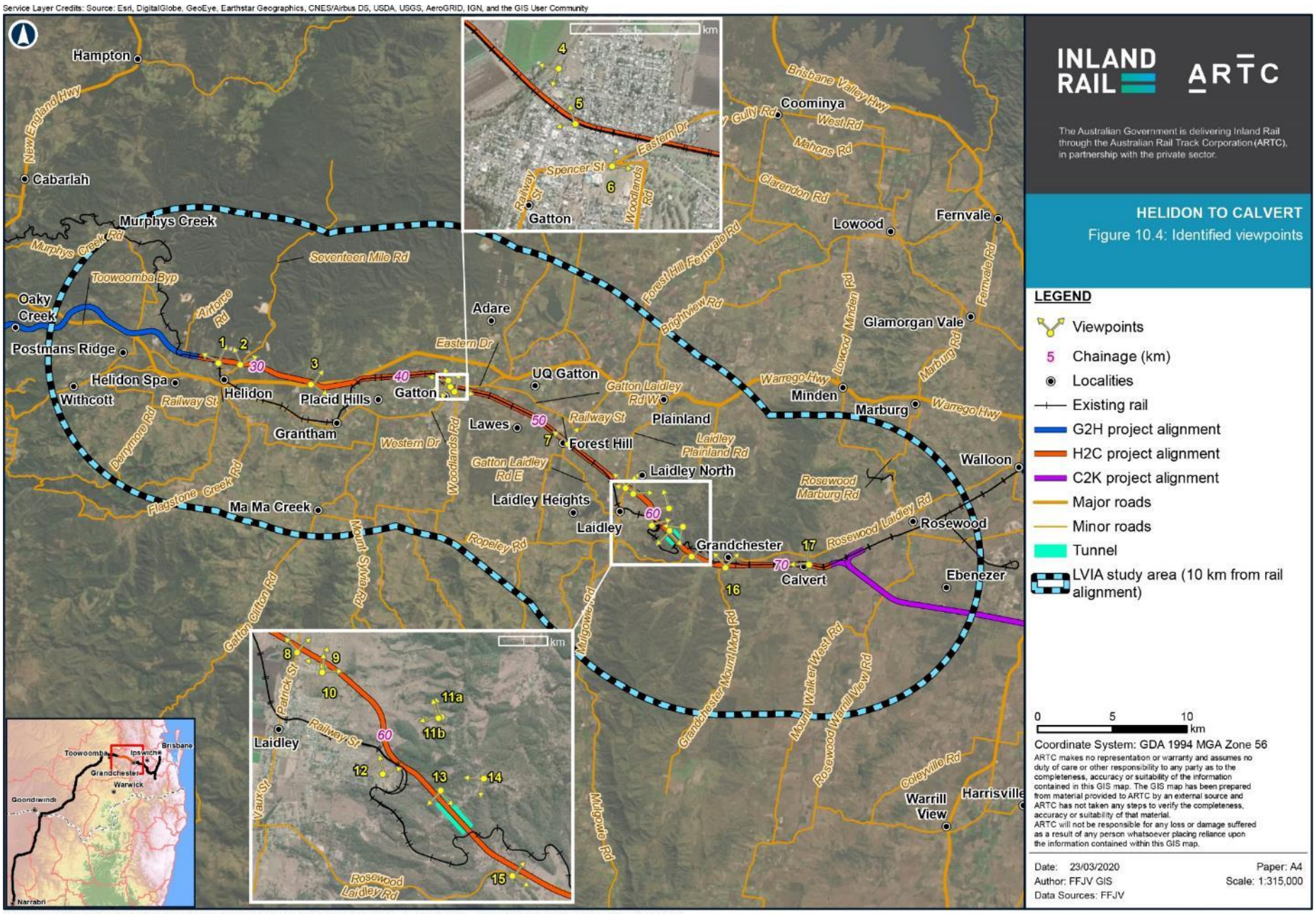
Significance of effect

- The effect of the Project on LCT H: Forested Uplands is 'high'.

10.7.3 Visual impact

10.7.3.1 Viewpoint assessment

The identified viewpoints are shown on Figure 10.4 and the assessment of each is described in Table 10.18 to Table 10.34.


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
INLAND RAIL
ARTC
The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.
HELIDON TO CALVERT
Figure 10.4: Identified viewpoints
LEGEND
Viewpoints
Chainage (km)
Localities
Existing rail
G2H project alignment
H2C project alignment
C2K project alignment
Major roads
Minor roads
Tunnel
LVIA study area (10 km from rail alignment)
0 5 10 km
Coordinate System: GDA 1994 MGA Zone 56
ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material.
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Date: 23/03/2020
Paper: A4
Author: FFJV GIS
Scale: 1:315,000
Data Sources: FFJV
Hampton
Cabarlah
Murphys Creek
Oaky Creek
Postmans Ridge
Helidon Spa
Withcott
Helidon
Placid Hills
Gatton
Grantham
Adare
UQ Gatton
Lawes
Forest Hill
Plainland
Laidley North
Laidley Heights
Laidley
Ma Ma Creek
Grandchester
Calvert
Rosewood
Ebenezer
Walloon
Minden
Marburg
Glamorgan Vale
Lowood
Fernvale
Coominya
Warrill View
Harrisville
Toowoomba Byp
Seventeen Mile Rd
Eastern Dr
Western Dr
Railway St
Forest Hill Fernvale Rd
Brighview Rd
Warrego Hwy
Rosewood Laidley Rd
Ropeley Rd
Mulgowie Rd
Gatton Clifton Rd
Flagstone Creek Rd
Derrymore Rd
Woodlands Rd
Laidley Plainland Rd
Rosewood Marburg Rd
Clarendon Rd
Mahons Rd
West Rd
Brisbane Valley Hwy
New England Hwy
Spencer St
Railway St
Patrick St
Vaux St
Rosewood Laidley Rd
Coleyville Rd
Rosewood Warrill View Rd
Mount Walker West Rd
Grandchester Mount Mort Rd
Toowoomba
Ipswich
Brisbane
Grandchester
Warwick
Goondiwindi
Narrabri
Map by: CW/RB/MEF/GN Z:\GIS\GIS_General\Tasks\Environment\390-ELE-201808061159_LVIA\H2C\390-ELE-201808061159_ARTC_Fig10.4_Viewpoints_v4.mxd Date: 25/03/2020 16:48

Viewpoint 1

TABLE 10.18: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 1

Viewpoint 1: Airforce Road near 45 and 47 Airforce Road, looking north-west

Visual baseline assessment

Existing view from Viewpoint 1

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°32'25.446" S 152°7'20.34" E
- Elevation: 160.0 m
- North-westerly view from Airforce Road towards proposed road-over-rail bridge and future access road to Lockyer National Park
- Proposed alignment is approximately 190 m north of this viewpoint, while proposed road-over-rail bridge is approximately 300 m north-west of this viewpoint
- Represents typical and accessible views of nearby rural residents and of travellers travelling along Airforce Road
- Due to road realignment works associated with the Project, this viewpoint is also representative of future views that will be experienced by visitors to Lockyer National Park
- Relatively dense vegetated shelter belt along Airforce Road and vegetation to the west of the existing rail line on private rural property contribute to rural character of this viewpoint
- Elevated areas to the north of this viewpoint are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay; however, this particular viewpoint is not located in the overlay area
- North-westerly views from this point provide views towards the proposed alignment, Airforce Road road-over-rail bridge, and landscapes typical of LCA H: Forested Uplands (LCA H5: Lockyer National Park Forested Uplands).

Key visual sensitivities

- Receptors include a small number of rural residents, workers and other travellers experiencing transient views along Airforce Road (Annual Average Daily Traffic (AADT) around 567 per day), of which up to 9 per cent are heavy vehicles
- The presence of the existing rail line and existing infrastructure (power poles and powerlines) and reduces the overall sensitivity of this view
- This viewpoint is considered to have a 'low' sensitivity overall to the change proposed, due to the low number and interest of viewers (i.e. small numbers of nearby rural residents and travellers along Airforce Road).

Viewpoint 1: Airforce Road near 45 and 47 Airforce Road, looking north-west

Visual evaluation

Visualisation from Viewpoint 1

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Construction

Magnitude of change assessment

- The proposed alignment, realignment of Airforce Road, Warrigal Road, Seventeen Mile Road and associated earthworks will introduce considerable construction works into the view. This change will be exacerbated by the proximity of the isolated rural residences to the works in this location
- The key impacts will relate to the presence of construction plant and disturbance due to the construction of the alignment, Airforce Road Bridge (minimum 7.1 m clearance over road), realignment of local roads, associated embankments and laydown area in the vicinity of this viewpoint
- The construction of the proposed alignment will require the resumption and demolition of a nearby property situated on Warrigal Road (close to but not visible in this viewpoint)
- The proposed location of a laydown area north-west of this viewpoint would cause a temporary reduction in visual amenity
- Substantial vegetation-clearing for the construction of the proposed alignment, bridge structures and laydown area will reduce the density of screening vegetation, increasing the visibility of the alignment from the rural properties near this viewpoint
- Earthworks associated with the proposed alignment will require large volumes of material to be imported
- While construction works will be clearly evident and occupy a large proportion of the view from this vantage point, the impact of these is temporary, which represents a considerable change and 'moderate' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 1 during construction is considered to be 'low'.

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 190 m to the north of this viewpoint. The skyline is already affected by the presence of powerlines and the existing operational rail line is seen within the view.
- The magnitude of change on this receptor is anticipated to be dominant, therefore high, due to:
  - Widespread change in the view due to the introduction of new rail infrastructure to the north of the existing rail line, realignment of Airforce Road, Warrigal Road and Seventeen Mile Road, construction of the Airforce Road Bridge (approximately 7.5 m clearance over rail with associated anti-throw barriers) and associated extensive vegetation removal
  - Vegetation-clearing for the construction of the proposed alignment, service road and laydown area will reduce the density of screening vegetation upon completion of the works and open views to the alignment, existing railway line and permanent infrastructure
  - Close views to the Project alignment and new road infrastructure from local rural properties (the key visual receptor audience in this location) will be possible, due to the extensive embankments and earthworks required to facilitate the road-over-rail bridge (heights of up to 22 m)
  - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character
- At this close distance, the proposed alignment will be highly evident and will change the fundamental visual character of the landscape as currently experienced, as it will be introducing additional rail and road infrastructure into what is a relatively intact natural/rural setting. This represents a 'high' magnitude of change.

Viewpoint 1: Airforce Road near 45 and 47 Airforce Road, looking north-west

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be clearly evident due to the elevated level of the railway track. Trains will be evident to travelers passing over Airforce Road Bridge, but only experienced occasionally due to the low number and transient nature of travelers on this road. Therefore, the magnitude of impact is considered to be 'low'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 1 during operation is considered to be 'moderate'.

Viewpoint 2

TABLE 10.19: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 2

Viewpoint 2: Seventeen Mile Road looking north

Visual baseline assessment

Existing view from Viewpoint 2

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description;

- GPS Location: 27°32'29.657" S 152°8'12.485" E
- Elevation: 185.0 m
- North-easterly view from Seventeen Mile Road, the access road to Lockyer National Park
- Proposed alignment is approximately 120 m north of this viewpoint
- Represents typical and accessible views of rural residents and of visitors travelling along Seventeen Mile Road towards Lockyer National Park
- Dense vegetated areas beyond private residential property, including sections of Lockyer National Park, contribute to large remnant tracts of vegetation in this part of the LVIA study area
- Elevated areas in Lockyer National Park in close proximity to this viewpoint are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay and also acknowledged in the Scenic Amenity of the Lockyer study; however, this particular viewpoint is not located in the overlay area
- North-easterly views from this viewpoint provide views towards the proposed alignment including landscapes typical of LCA H: Forested Uplands (LCA H5 Lockyer National Park Forested Uplands).

Key visual sensitivities

- Receptors include a small number of rural residents, workers and other travellers experiencing transient views along Seventeen Mile Road (AADT around 220 per day, of which up to 24 per cent are heavy vehicles)
- The presence of existing infrastructure (power poles and powerlines) and housing reduces the overall sensitivity of this view
- This viewpoint is considered to have a 'low' sensitivity overall to the change proposed, due to the low number and interest of viewers (i.e. small numbers of nearby rural residents and travellers along Seventeen Mile Road).

Viewpoint 2: Seventeen Mile Road looking north

Visual evaluation

Please note that no visualisation has been provided for this viewpoint. Visualisations have been selected on the basis of those illustrating key infrastructure elements likely to be of interest to the community and/or the most sensitive viewpoints, such as from regionally significant scenic lookouts.

Construction

Magnitude of change assessment

- The proposed alignment and associated earthworks will introduce considerable construction works into the view. This change will be exacerbated by the proximity of the isolated rural residences to the works in this location
- The key impacts will relate to the presence of construction plant and disturbance due to the construction of the alignment, associated cuts and the close proximity of a laydown area to this viewpoint
- The construction of the proposed alignment will require the resumption and demolition of a nearby property situated at 133 Seventeen Mile Road (close to but not visible in this viewpoint)
- The proposed location of a laydown area immediately west of this viewpoint (left-hand side of the view) would cause a temporary reduction in visual amenity
- Substantial vegetation clearing for the construction of the proposed alignment, bridge structures and laydown area will reduce the density of screening vegetation, increasing the visibility of the alignment from the rural properties near this viewpoint as well as glimpsed longer distance views from the Warrego Highway
- Earthworks associated with the proposed alignment will require large volumes of material and vegetation to be removed
- While construction works will be clearly evident and occupy a large proportion of the view from this vantage point, the impact of these is temporary, which represents a considerable and therefore 'moderate' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 2 during construction is considered to be 'low'.

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 120 m to the north of this viewpoint. The skyline is already affected by the presence of powerlines
- The magnitude of change on this receptor is anticipated to be dominant, therefore 'high', due to:
  - Widespread change in the view due to the introduction of new rail infrastructure into the rural landscape within a large cut, including the Seventeen Mile Road Bridge (approximately 22 m clearance over rail), and associated extensive vegetation removal
  - Vegetation-clearing for the construction of the proposed alignment, service road and laydown area will reduce the density of screening vegetation upon completion of the works and open views to the cut and permanent infrastructure
  - However, views to the Project alignment from local rural properties (the key visual receptor audience in this location) will be limited, as the alignment is at a lower elevation than the remaining surrounding properties due to the cut (depths of up to 22 m)
  - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character.
- At this close distance, the proposed alignment will be highly evident and will change the fundamental visual character of the landscape as currently experienced, as it will be introducing new rail infrastructure into what is a relatively intact natural/rural residential setting. This represents a 'high' magnitude of change.

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be predominately screened due to the lower design level of the railway track. The realignment of Seventeen Mile Road will further limit viewing opportunities in this location, and it is anticipated that this view will only be experienced by nearby isolated rural residential residents. Views may be possible from the realigned Seventeen Mile Road (to the north of this viewpoint and the Project alignment); however, these views will be transient and only experienced by a low number of travellers on this road. Therefore, the magnitude of impact is considered to be 'low'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 2 during operation is considered to be 'moderate'.

Viewpoint 3

TABLE 10.20: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 3

Viewpoint 3: Warrego Highway looking east

Visual baseline assessment

Existing view from Viewpoint 3

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°33'12.731" S 152°11'5.693" E
- Elevation: 141.0 m
- Easterly view in the direction of Gatton from the Warrego Highway
- Proposed alignment is approximately 140 m to the north-east of this viewpoint
- Represents typical (and safely accessible) views of those travelling along the Warrego Highway towards Brisbane and Ipswich
- Location is a stopping bay and help-phone location but is intended to represent more generally the views from the Warrego Highway towards the alignment
- Easterly views from this viewpoint provide close views towards the proposed alignment, Sandy Creek Rail Bridge and Warrego Highway Rail Bridge, including landscapes typical of LCT E: Vegetated Grazing (E5: Gatton Vegetated Grazing) landscape type and close to LCT B: Vegetated Watercourse—Creeks (B5: Sandy Creek)
- Views are partially screened by existing roadside vegetation.

Key visual sensitivities

- A high number of receptors travel along the Cunningham Highway (AADT around 15,138 per day, of which up to 15 per cent are heavy vehicles) and would experience changes to the view. However, it is noted that these viewers are passing at speed and would only experience transient views
- This viewpoint is considered to have a 'moderate' sensitivity overall to the change proposed, due to the large number of viewers tempered with the transience of and lack of specific interest in the views.

Visual evaluation

Photomontage view from Viewpoint 3: Warrego Highway looking east

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Viewpoint 3: Warrego Highway looking east

Construction

Magnitude of change assessment

- The proposed alignment and associated earthworks will introduce considerable construction works into the view
- Substantial vegetation clearing for the construction of the proposed alignment, bridge structures and laydown area will reduce the density of screening vegetation, increasing the visibility of the alignment from the Warrego Highway and surrounding rural properties
- Earthworks associated with the proposed alignment will require the movement of large volumes of material
- The presence of plant constructing the alignment, Sandy Creek Rail Bridge (12.8 m clearance), Warrego Highway Rail Bridge (8.1 m clearance), service road, cuts and embankments will temporarily change the character of the landscape, creating a considerable change in the landscape character of this viewpoint
- While construction works will be clearly evident from this vantage point, the impact of these is temporary, which represents a considerable and therefore 'moderate' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 3 during construction is considered to be 'moderate'.

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 135 m to the north-east of this viewpoint, while the proposed Warrego Highway Rail Bridge is approximately 260 m to the east. The infrastructure is anticipated to be dominant, therefore a 'high' magnitude of change, due to:
  - Change due to the provision of new rail infrastructure, including Sandy Creek Rail Bridge, large embankments and the Warrego Highway Rail Bridge (6.5 m minimum clearance over road) in the central right-hand side of the view
  - Vegetation-clearing for the construction of the proposed alignment, Sandy Creek Rail Bridge, Warrego Highway Rail Bridge and laydown area will reduce the density of screening vegetation, increasing the visibility of the alignment from the Warrego Highway and surrounding rural properties
  - Fencing provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character
- At this distance, the alignment, Sandy Creek Rail Bridge and Warrego Highway Rail Bridge will be highly evident and will have a dominant impact on the character of the landscape as it will be introducing new rail infrastructure into what is currently a relatively intact and vegetated rural setting as experienced from the highway. This represents a 'high' magnitude of change.

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be highly evident from the Warrego Highway due to the elevated design level of the railway track. While experienced by a large number of motorists, these views are of a transient nature and will be only occasional. Therefore, the magnitude of change is considered to be 'moderate'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 3 during operation is considered to be 'high'.

Viewpoint 4

TABLE 10.21: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 4

Viewpoint 4: Beavan Street looking south-west towards existing Lockyer Creek rail bridge

Visual baseline assessment

Existing view from Viewpoint 4

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°33'5.747" S 152°16'40.704" E
- Elevation: 100.0 m
- South-westerly view towards Lockyer Creek, Gatton Railway Bridge and William Kemp Park beyond
- Proposed alignment is approximately 250 m to the south-west of this viewpoint
- Represents typical views of residents located on the western edge of Gatton and of visitors, workers and tourists travelling along Beavan Street. This viewpoint is also representative of views obtained from William Kemp Park
- South-westerly views from this point provide open views towards the existing Lockyer Creek Rail Bridge and the proposed alignment, as well as landscapes typical of LCT B: Vegetated Watercourse—Creek (B1: Lockyer Creek), LCT F: Rural Settlement (F5: Gatton) and LCT C: Irrigated Cropland (C16: Gatton North).

Key visual sensitivities

- Receptors, including a relatively high number of nearby residents, visitors to William Kemp Park and workers and travellers along Beavan Street
- The presence of existing infrastructure (power poles, powerlines, and existing road- and rail-bridge structures) reduces the overall sensitivity of this view
- This viewpoint is considered to have a 'moderate' sensitivity overall to the change proposed, due to the relatively large number of nearby residential viewers with a specific interest in this view and the proximity of this viewpoint to William Kemp Park, which accommodates overnight caravan parking.

Visual evaluation

Photomontage view from Viewpoint 4

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Viewpoint 4: Beavan Street looking south-west towards existing Lockyer Creek rail bridge

Construction

Magnitude of change assessment

- The construction of the alignment and construction of Lockyer Creek Rail Bridge will result in extensive disturbance, creating a considerable temporary change in the landscape character of this viewpoint
- Vegetation clearing for the construction of the proposed alignment, bridge structures, laydown area, and realignment of Smithfield Road reduce the density of screening vegetation, increasing the visibility of the alignment from nearby residential properties and Beavan Street
- This represents a 'moderate' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 4 during construction is considered to be 'moderate'.

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 250 m to the south-west of this viewpoint. The skyline is already affected by the presence of powerlines, power poles and the existing Lockyer Creek Rail Bridge and Smithfield Road Bridge. The magnitude of change on this receptor is anticipated to be considerable, therefore 'moderate', due to:
  - Vegetation-clearing for the construction of the proposed alignment, bridge structures, laydown area, and realignment of Smithfield Road
  - Introduction of new infrastructure, including the realignment of Smithfield Road, and the provision of a new road and road bridge between Beavan Street and further along Beavan Street, the Smithfield Road Bridge (approximately 4.7 m clearance), which will be a new element in the view
  - Duplication of the Lockyer Creek Rail Bridge (approximately 4.7 m clearance), which will also be a new element in the view
  - Provision of the new road bridge will provide elevated views over the general landscape and alignment, increasing the visibility of the Project
  - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character
- At this distance, the alignment and new Smithfield Road Bridge and Lockyer Creek Rail Bridge will be highly evident and will have a considerable impact on the character of the landscape, as it will be replacing the existing Smithfield Road Bridge with a much larger structure and introducing new modern rail bridge infrastructure into the current view. This represents a 'moderate' magnitude of change.

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be highly evident due to the elevated situation of the railway track and Lockyer Creek Rail Bridge. Close views to the alignment will be possible for travellers passing over the new Smithfield Road Bridge. While anticipated to be experienced by numerous motorists, these views are of a transient nature, and the key visual receptors will be nearby residents. The existing rail line and rail bridge currently facilitate freight train movements, albeit single stacked. Therefore, the magnitude of change is considered to be 'low'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 4 during operation is considered to be 'moderate'.

Viewpoint 5

TABLE 10.22: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 5

Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing

Visual baseline assessment

Existing view from Viewpoint 5

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°33'19.787" S 152°16'45.198" E
- Elevation: 107.0 m
- North-easterly view towards Gatton Rail Station and pedestrian bridge from the Gatton RSL car park off Crescent Street
- Proposed alignment is approximately 20 m to the north of this viewpoint
- Represents typical and accessible views of visitors, workers and tourists visiting the Gatton CBD and Gatton RSL
- North-easterly views from this point provide open views towards the proposed alignment, existing Gatton Station and pedestrian bridge and therefore are considered to be partially representative of views from Gatton Station
- Views encompass LCT F: Rural Settlement (F5: Gatton).

Key visual sensitivities

- Receptors, including a relatively high number of nearby residents, workers and travellers driving along Crescent Street and visitors to Gatton RSL
- The presence of existing infrastructure (power poles, powerlines, lights and rail infrastructure) reduces the overall sensitivity of this view
- This viewpoint is considered to have a 'high' sensitivity overall to the change proposed, due to the Gatton CBD location with a high number of receptors, most of whom would have an interest in views from this location e.g. nearby residents and members and visitors of Gatton RSL and nearby residents, albeit that this is not a particularly scenic viewpoint, which includes existing railway infrastructure and is not specifically visited for its scenic amenity value.

Visual evaluation

Please note that no visualisation has been provided for this viewpoint. Visualisations have been selected on the basis of those illustrating key infrastructure elements likely to be of interest to the community and/or the most sensitive viewpoints, such as from regionally significant scenic lookouts.

Construction

Magnitude of change assessment

- Construction activities associated with the proposed alignment within the West Moreton System rail corridor will result in disturbance, which will create a noticeable change in the landscape character of this viewpoint
- The lack of existing vegetation enables open views to be obtained from nearby residential properties to the proposed alignment and laydown areas located to both the north and south of the alignment
- The presence of plant constructing the alignment, Gatton Station Pedestrian Bridge, and realignment of Hickey Street, will temporarily change the character of the landscape during construction, creating a noticeable change in the landscape character of this viewpoint
- This represents a 'low' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 5 during construction is considered to be 'moderate'.

Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 20 m to the north of this viewpoint
- The skyline is already affected by the presence of power poles, powerlines, lights and rail infrastructure. The change in view will be noticeable, due to:
  - the introduction of a new single-track dual-gauge railway to the north of the existing rail line, in low cut through most of this section and consistent with the existing visual character of the landscape
  - Realignment of Hickey Street
  - Replacement of the existing pedestrian bridge (timber structure) with the proposed Gatton Station Pedestrian Bridge (approximately 7.1 m clearance over rail and 12.5 m height above rail level), which will include perforated mesh and anti-throw screens
  - The proposed bridge structure will be significantly larger and more visually dominant than the existing timber structure, due to requirements to comply with QR pedestrian overbridge design specifications and access requirements
  - The extension to the existing station platforms will be required to provide a connection to proposed lift and stairs structures
- Due to the sparse nature of existing vegetation, vegetation clearing for the construction of the proposed alignment, and laydown areas will not have an impact on the visibility of the permanent rail infrastructure
- Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing will comprise standard QR station fencing
- At this distance, the alignment will be noticeable, however, it will not change the fundamental visual character of the landscape, as it will be introducing new rail infrastructure into the West Moreton System rail corridor. This represents a 'low' magnitude of change
- Concept options for noise attenuation are currently being explored, including an option that includes the provision of noise barriers within the vicinity of this location (to the northern side of the railway line adjacent to Hickey Street). If noise barriers were installed at this location, the magnitude of change would be increased and considered to be up to 'high'.

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be highly evident due to the open views of the railway track from this viewpoint. Close views to the alignment will be possible for travellers along Hickey Street and Crescent Street and those parking in the Gatton RSL carpark, as well as pedestrians passing over the new Gatton Station Pedestrian Bridge. While experienced by a relatively high number of motorists and pedestrians, these views are of a transient nature, and the key visual receptors will be nearby residents. The existing rail line and rail bridge currently facilitate freight train movements, albeit single stacked. Therefore, the magnitude of change is considered to be 'low'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 5 during operation is considered to be 'moderate'
- If noise barriers are installed in this location, the effect of the Project during operation would be increased and would be considered to be 'major'.

Viewpoint 6

TABLE 10.23: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 6

Viewpoint 6: Spencer Street looking north-east near Gatton Showgrounds

Visual baseline assessment

Existing view from Viewpoint 6

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°33'30.371" S 152°16'55.673" E
- Elevation: 103.0 m
- North-easterly view towards Eastern Drive road bridge from Spencer Street looking north-east near Gatton Showgrounds
- Proposed alignment is located approximately 250 m to the north of this viewpoint
- Represents typical views of visitors, workers and tourists travelling along Eastern Drive/Spencer Street and is also representative of viewers visiting Gatton Showgrounds and the Lockyer Valley Sports and Aquatic Centre
- North-easterly views from this viewpoint provide open views towards the proposed Eastern Drive Road Bridge within LCT F: Rural Settlement (F5: Gatton)

Key visual sensitivities

- Relatively high number of receptors include nearby residents, visitors to Gatton Showgrounds, Gatton Indoor Equestrian Centre and Lockyer Valley Sports and Aquatic Centre, as well as workers and travelers along Eastern Drive (AADT around 11,941 per day, of which up to around 11 per cent are heavy vehicles)
- The urban character including the presence of industrial properties and existing infrastructure (power poles, powerlines, and streetlights) reduces the overall sensitivity of this view
- This viewpoint is considered to have a 'moderate' sensitivity overall to the change proposed, due to the relatively high number and sensitivity of viewers (e.g. large numbers of travelers on Eastern Drive and nearby residents) but recognising that this is not a scenic viewpoint specifically visited for the purposes of appreciating visual amenity.

Visual evaluation

Photomontage view from Viewpoint 6 (Initial mitigation)

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Viewpoint 6: Spencer Street looking north-east near Gatton Showgrounds

Photomontage view from Viewpoint 6 (value-add 1 mitigation)

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Photomontage view from Viewpoint 6 (value-add 2 mitigation)

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Construction

Magnitude of change assessment

- Significant construction areas proposed within this viewpoint
- Removal of vegetation within the disturbance area to facilitate development will be clearly evident, including existing mature vegetation located within the disturbance area that is likely to be removed to facilitate the reconfiguration of the bridge and road alignment
- Construction of proposed embankments, cuts, rail, Eastern Drive Road Bridge infrastructure and the realignment of Chadwick Road, Golf Links Drive and Crescent Street will cause disturbance within the landscape
- The construction of the proposed realignment of Chadwick Road will require the resumption of the Christian Life Centre facility located on the corner of Golf Links Drive and Woodlands Road (right hand side of view)
- At this close distance, construction works and laydown areas will be highly evident and change the visual character of the landscape. As this change will be temporary, this is considered to be a 'moderate' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 6 during construction is considered to be 'moderate'.

Viewpoint 6: Spencer Street looking north-east near Gatton Showgrounds

Operation

Magnitude of change assessment—permanent infrastructure

- The Eastern Drive Road Bridges (7.5 m clearance over rail) are the main permanent infrastructure, which are located approximately 300 m to the north-east of this viewpoint. Other visible changes include local road realignments of Golf Links Drive, Chadwick Road and Crescent Street.
- The magnitude of change on this receptor is anticipated to be considerable, due to:
  - Existing presence of a road bridge over the railway in this location
  - The skyline already being affected by the presence of power poles and street lighting
  - Proposed earthworks including a new road bridge (clearance of around 7.9 m) with associated anti-throw barriers, with the alignment passing beneath this approximately parallel to the existing rail line
  - Height of proposed embankments varies, with the maximum proposed height being approximately 8.7 m above natural ground, and the deepest cut being approximately 8.7 m below existing surveyed level
  - Due to the relatively sparse nature of existing vegetation, vegetation clearance will have minimal impact on the screening of the alignment
  - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character
  - At this distance, the alignment and associated infrastructure will be clearly evident, and represent a considerable change to the view, although will largely accord with the existing character of the landscape. Therefore, it is considered to be up to 'moderate' magnitude of change.

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of 6.5 m will be partially screened from this vantage point, because the Project alignment will be below the rail bridge, behind abutments. However, views of passing freight trains will be possible from the new Eastern Drive road bridges. The existing rail line and rail bridge currently facilitate freight train movements, albeit single stacked. As these would be glimpsed transient views, the magnitude of impact is considered to be 'low'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 6 during operation is considered to be 'moderate'.

Viewpoint 7

TABLE 10.24: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 7

Viewpoint 7: Gordon Street looking north-west towards level crossing

Visual baseline assessment

Existing view from Viewpoint 7

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°35'24.167" S 152°21'30.395" E
- Elevation: 91.0 m
- North-westerly view towards Anzac Park, and the existing controlled level crossing
- Proposed alignment is approximately 40 m to the north-east of this viewpoint
- Represents typical views of residents of Forest Hill and of visitors, workers and tourists travelling along Gordon Street
- North-westerly views from this viewpoint provide open views towards the proposed alignment, including landscapes typical of LCT F: Rural Settlement (F7: Forest Hill).

Key visual sensitivities

- High sensitivity of receptors, including nearby residents of Forest Hill and visitors to the town (which includes travellers using the Cobb and Co scenic drive staging post at Forest Hill), as well as travellers driving along Forest Hill Fernvale Road, Railway Street, Glenore Grove Road and Gordon Street
- The presence of existing infrastructure (power poles, powerlines, rail lines and a controlled level crossing) reduces the overall sensitivity of this view
- This viewpoint is considered to have a 'high' sensitivity overall to the change proposed, due to the number and type of viewers in close proximity to the alignment (local residents and tourists visiting Forest Hill).

Visual evaluation

Photomontage view from Viewpoint 7 (without noise barriers)

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Viewpoint 7: Gordon Street looking north-west towards level crossing

Photomontage view from Viewpoint 7 (with 5 m noise barriers, concrete only—Option 1)

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Photomontage view from Viewpoint 7 (with 5 m noise barriers, top edge treatment and soft finishing—Option 2)

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Photomontage view from Viewpoint 7 (with 5 m noise barriers, soft finishing and barrier segments offset—Option 3)

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Construction

Magnitude of change assessment

- Construction works for the realignment of Gordon Street, Glenore Grove Road, and the relocation of the controlled level crossing will have a temporary impact on nearby residents and commercial buildings
- At this distance, views towards construction works from surrounding properties and Gordon Street will be close and will create a noticeable change in the visual character of the landscape
- This represents a 'low' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 7 during construction is considered to be 'low'.

Viewpoint 7: Gordon Street looking north-west towards level crossing

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 40 m to the north-east of this viewpoint
- The existing residential properties will not be directly affected by the Project
- The skyline is already affected by the presence of powerlines, power poles and existing rail infrastructure
- The permanent infrastructure is anticipated to be noticeable, due to:
  - The provision of a new single-track dual-gauge railway to the north of the existing rail line
  - New level crossing will be visible but is a replacement of the existing controlled level crossing infrastructure
  - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character
- At this distance, the alignment will be noticeable. However, it will not change the fundamental visual character of the landscape, as it will be introducing new rail infrastructure into the West Moreton System rail corridor. This represents a Moderate magnitude of change
- Options for noise attenuation are currently being explored, including an option that includes the provision of noise barriers within the vicinity of this location (to the east of the level crossing along Railway Street and Gordon Street). If noise barriers were installed in this location, the magnitude of change would be increased and considered to be up to 'high'.

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be evident due to the open views of the railway track from this viewpoint and surrounding residential properties. Close views to the alignment will be possible for travellers along Forest Hill Fernvale Road, Railway Street, Glenore Grove Road and Gordon Street, as well as patrons of the Lockyer Hotel and people visiting Anzac Park, part of the Cobb and Co tourist drive. This view will be experienced by a relatively high number of residents and visitors to Forest Hill; however, it is noted that the existing rail line currently facilitates freight train movements, albeit single stacked. Therefore, the magnitude of change is considered to be 'low'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 7 during operation is considered to be 'high'
- If noise barriers are installed in this location, the effect of the Project during operation would be increased and would be considered to be 'major'.

Viewpoint 8

TABLE 10.25: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 8

Viewpoint 8: Laidley Plainlands Road looking north towards bridge crossing

Visual baseline assessment

Existing view from Viewpoint 8

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°36'59.96"S 152°23'51.61"E
- Elevation: 108 m
- Northerly view towards intersection of Laidley Plainlands Road and Old Laidley Forest Hill Road. The Laidley Cultural Centre and Bichel Cricket Oval are immediately to the north of the existing residential property shown in the left-hand side of the view
- Proposed alignment is approximately 70 m to the north of this viewpoint
- Represents typical views of travellers along Laidley Plainlands Road and nearby residents on the northern outskirts of Laidley
- Northerly views from this viewpoint provide views towards the proposed alignment, realignment of Old Laidley Forest Hill Road, proposed rail-over-road bridge as well as including landscapes typical of LCT F: Rural Settlement (F9: Laidley), LCT C: Irrigated Croplands (C27: Laidley) and LCT D: Dry Croplands and Pastures (D15: Laidley).

Key visual sensitivities

- Moderate number of receptors, including travellers along Laidley Plainlands Road (AADT around 5,632 per day, of which up to 6.10 per cent are heavy vehicles) and a small number of existing residential properties (existing properties shown within this view are within the temporary construction disturbance footprint therefore likely to be resumed). This viewpoint is near the entrance to Valley Vista estate
- This viewpoint is considered to have a 'moderate' sensitivity overall to the change proposed, due to the proximity of this viewpoint to the Laidley Cultural Centre, proximity to emerging residential areas of Valley Vista Estate and Cunningham Park, as well as the moderate number of travellers on Laidley Plainlands Road with a lack of specific interest in the view experiencing transient views
- This view is also representative of driver views experienced from Old Laidley Forest Hill Road.

Visual evaluation

Photomontage view from Viewpoint 8

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Viewpoint 8: Laidley Plainlands Road looking north towards bridge crossing

Construction

Magnitude of change assessment

- The proposed alignment and associated earthworks will introduce considerable construction works into the view. This change will be exacerbated by the proximity of the Laidley Cultural Centre, cricket oval and nearby residences within Valley Vista Estate and Cunningham Park estate to the works in this location
- The proposed location of a laydown immediately north of this viewpoint would cause a reduction in visual amenity from this viewpoint, however this would be temporary
- Earthworks associated with the proposed alignment will require large volumes of material to be brought in for the construction of proposed embankments (heights up to approximately 8.6 m within this view)
- Clearance of vegetation will be typically limited to existing vegetation within private residential properties due to the relatively open rural nature of this view
- The key impacts will relate to the presence of construction plant and disturbance due to the construction of the alignment and embankments
- While construction works will be clearly evident from this vantage point, the impact of these is temporary, which represents a considerable change and 'moderate' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 8 during construction is considered to be 'moderate'.

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 70 m to the north of this viewpoint. The skyline is already affected by the presence of infrastructure (streetlights, power poles and powerlines)
- The magnitude of change on this receptor is anticipated to be dominant, therefore 'high', due to:
  - Introduction of new rail infrastructure within what is currently a relatively intact rural setting, including major earthworks and a rail-over-road bridge over Laidley Plainlands Road
  - Resumption of existing residential properties shown within the view
  - Realignment of Old Laidley Forest Hill Road
- Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character
- At this distance, the alignment, bridge infrastructure and embankments (up to around 8.6 m high) will be highly evident and will change the visual character of the landscape, as it will be introducing new rail infrastructure into what is currently a relatively intact rural setting. This represents a 'high' magnitude of change.

Magnitude of change assessment - train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be experienced by a moderate number of travellers along Laidley Plainlands Road and Old Laidley Forest Hill Road. Views to the train will also be experienced by nearby residents of Valley Vista Estate and Cunningham park estate. Therefore, the magnitude of impact is considered to be 'high'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 8 during operation is considered to be 'high'.

Viewpoint 9

TABLE 10.26: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 9

Viewpoint 9: Patrick Street Underpass looking north-west

Visual baseline assessment

Existing view from Viewpoint 9

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°37'11.28"S 152°24'11.79"E
- Elevation: 102 m
- North-westerly view towards residential properties within Valley Vista estate and the alignment from Hardy Drive
- Proposed alignment is approximately 80 m to the north-east of this viewpoint, while the proposed rail-over-road bridge over Francis Road is approximately 115 m to the north of this viewpoint
- Represents typical views of residents and visitors of the Valley Vista Estate. Is also representative of typical views from the nearby Cunningham Park residential estate
- Elevated areas visible in the background of the view are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay and also acknowledged in the Scenic Amenity of the Lockyer study; however, this particular viewpoint is not located in the overlay area
- North-westerly views from this viewpoint provide views towards the proposed alignment, as well as including landscapes typical of LCT F: Rural Settlement (F9: Laidley), LCT D: Dry Croplands and Pastures (D15: Laidley) and LCT E: Vegetated Grazing (E10: Laidley North).

Key visual sensitivities

- Relatively high number of receptors, including numerous residential properties and visitors of Valley Vista estate
- Existing residential area set within a strongly rural context
- This viewpoint is considered to have a 'moderate' sensitivity overall to the change proposed, due to the relatively high number of nearby residential viewers with a specific interest in this view and the proximity of this viewpoint to proposed alignment.

Visual evaluation

Photomontage view from Viewpoint 9

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Viewpoint 9: Patrick Street Underpass looking north-west

Construction

Magnitude of change assessment

- The proposed alignment and associated earthworks will introduce considerable construction works into the view. This change will be exacerbated by proximity of residences with Valley Vista estate to the works in this location
- The proposed location of a laydown immediately north of this viewpoint would cause a reduction in visual amenity from this viewpoint, however this would be temporary
- Earthworks associated with the proposed alignment will require large volumes of material to be brought in
- The key impacts will relate to the presence of construction plant and disturbance due to the construction of the alignment and embankments
- Construction works will be clearly evident from this vantage point, and although the impact of these is temporary, this would be a dominant and therefore 'high' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 9 during construction is considered to be 'high'.

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 80 m to the north of this viewpoint. The skyline is already affected by the presence of streetlights.
- The magnitude of change on this receptor is anticipated to be dominant, therefore 'high', due to:
  - Introduction of new rail infrastructure within what is currently a relatively intact rural setting, including major earthworks
  - Provision of a road-over-rail bridge over Francis Road, a key access road within the residential development
  - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character
  - Concept options for noise attenuation are currently being explored within the vicinity of this location.
- At this distance, the alignment and embankments (up to around 8.7 m high within this view) will be highly evident and will change the visual character of the landscape, as it will be introducing new rail infrastructure into what is currently a relatively intact rural setting for the estate. This represents a 'high' magnitude of change.

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be experienced by a large number of residents at close range. Therefore, the magnitude of impact is considered to be 'high'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 9 during operation is considered to be 'high'.

Viewpoint 10

TABLE 10.27: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 10

Viewpoint 10: Hardy Drive looking north-east down Rampton Street over new subdivision

Visual baseline assessment

Existing view from Viewpoint 10

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°37'15.12" S 152°24'10.685" E
- Elevation: 103 m
- North-easterly view towards residential properties within Valley Vista estate and the alignment from Hardy Drive
- Proposed alignment is approximately 220 m to the north of this viewpoint
- Represents typical views of residents and visitors of the Valley Vista and Cunningham Park residential estates
- Elevated areas visible in the background of the view are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay and also acknowledged in the Scenic Amenity of the Lockyer study; however, this particular viewpoint is not located in the overlay area
- North-easterly views from this viewpoint provide views towards the proposed alignment, as well as including landscapes typical of LCT F: Rural Settlement (F9: Laidley), LCT D: Dry Croplands and Pastures (D16: Forest Hill) and LCT E: Vegetated Grazing (E10: Laidley North).

Key visual sensitivities

- Relatively high number of receptors, including numerous residential properties and visitors of Valley Vista estate
- Existing residential area set within a strongly rural context
- This viewpoint is considered to have a 'moderate' sensitivity to the change proposed, overall, due to the relatively high number of nearby residential viewers with a specific interest in this view and the proximity of this viewpoint to the proposed alignment.

Visual evaluation

Please note that no visualisation has been provided for this viewpoint. Visualisations have been selected on the basis of those illustrating key infrastructure elements likely to be of interest to the community and/or the most sensitive viewpoints, such as from regionally significant scenic lookouts.

Construction

Magnitude of change assessment

- The proposed alignment and associated earthworks will introduce considerable construction works into the view. This change will be exacerbated by proximity of residences with Valley Vista estate to the works in this location
- The proposed location of a laydown immediately north of this viewpoint would cause a reduction in visual amenity from this viewpoint, however this would be temporary
- Earthworks associated with the proposed alignment will require large volumes of material to be delivered
- The key impacts will relate to the presence of construction plant and disturbance due to the construction of the alignment and embankments
- While construction works will be clearly evident from this vantage point, the impact of these is temporary, which represents a dominant change and 'moderate' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 10 during construction is considered to be 'moderate'.

Viewpoint 10: Hardy Drive looking north-east down Rampton Street over new subdivision

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 220 m to the north of this viewpoint. The skyline is already affected by the presence of streetlights.
- The magnitude of change on this receptor is anticipated to be dominant, therefore high, due to:
  - Introduction of new rail infrastructure within what is currently a relatively intact rural setting, including major earthworks
  - Grade separation of Francis Road, a key access road within the residential development
  - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character
- At this distance, the alignment and embankments (up to around 11.2 m high) will be highly evident and will change the visual character of the landscape, as it will be introducing new rail infrastructure into what is currently a relatively intact rural setting for the estate. This represents a 'high' magnitude of change.

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be experienced by a large number of residents at close range. Therefore, the magnitude of impact is considered to be 'high'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 10 during operation is considered to be 'high'.

Viewpoint 11

TABLE 10.28: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 11

Viewpoint 11: Branell Homestead Luxury Cabins on Paroz Road, looking west

Visual baseline assessment

Existing view from Viewpoint 11a

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Existing view from Viewpoint 11b

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°37'45.239" S 152°25'40.494" E
- Elevation: 212.0 m
- Westerly view towards Branell Homestead and the town of Laidley, with distant views to the Great Dividing Range
- Proposed alignment is approximately 1.2 km to the west of this viewpoint
- Represents publicly accessible views typical of nearby rural residents, those staying at Branell Homestead and visitors and tourists travelling along Paroz Road
- Elevated and vegetated parts of this view are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay and also acknowledged in the Scenic Amenity of the Lockyer study; and this particular viewpoint is located in the overlay area
- Westerly views from this elevated point provide panoramic views towards the proposed alignment, as well as including landscapes typical of the LCT E: Vegetated Grazing (E10: Laidley North), LCT H: Forested Uplands (H10: Little Liverpool) and LCT D: Dry Croplands and Pastures (D15: Laidley) with LCT F: Rural Settlement (F9: Laidley) in the distance.

Viewpoint 11: Branell Homestead Luxury Cabins on Paroz Road, looking west

Key visual sensitivities

- Receptors include visitors staying at Branell Homestead who are likely to be interested in the views as well as relatively low number of receptors travelling down Paroz Road
- This view comprises a strong character due to the views to the distant mountains beyond and forested and rural character in the foreground; however, the scenic amenity value is reduced by views to the residential area of Laidley beyond and cabins in the foreground
- This viewpoint is considered to have a 'moderate' sensitivity overall to the change proposed, due to the sensitivity of viewers but noting relatively few receptors are able to experience sustained views.

Visual evaluation

No visualisation has been produced for Viewpoint 11a.

Photomontage view from Viewpoint 11b

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Construction

Magnitude of change assessment

- The major construction activities close to this vantage point are the formation of the proposed cuts located north of Railway Street; however, these are anticipated to be screened due to the intervening forested landform
- Other construction activities would comprise selective vegetation clearance and earthworks to construct embankments and the Paroz Road rail bridge in the north (right-hand side of the view)
- The construction laydown area between Paroz Road and Luck Road will also be visible from this vantage point
- While construction works will be evident from this vantage point, the impact of these is temporary, which represents a noticeable change and 'low' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 11 during construction is considered to be 'low'.

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 1.2 km to the west of this viewpoint. The magnitude of change on this receptor is anticipated to be, at greatest, considerable, due to:
  - Limited vegetation-clearing is required for the construction of the proposed alignment
  - Provision of a new single-track dual-gauge railway to the north of the existing rail line through this section
  - Introduction of the Paroz Road rail bridge that will be approximately 7.3 m high and adjoining embankments up to around 8 m high. These will introduce rail infrastructure into the rural landscape as viewed from this vantage point
  - Standard rural fencing is proposed, extending between the corridor and private land adjoining the railway that will be in keeping with the existing rural character
- At this distance, from this elevated vantage point, the alignment will be evident and will have a considerable impact on the character of the landscape as it will be introducing major cuts and embankments into this view. This represents a 'moderate' magnitude of change.

Viewpoint 11: Branell Homestead Luxury Cabins on Paroz Road, looking west

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be visible in the east of the view, crossing the Paroz Road rail bridge, due to the elevated views of the railway track from this viewpoint and cabins. This view will be experienced by a relatively low number of receptors and the impact will be occasional. Therefore, the magnitude of change is considered to be 'low'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 11 during operation is considered to be 'moderate'.

Viewpoint 12

TABLE 10.29: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 12

Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west

Visual baseline assessment

Existing view from Viewpoint 12

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°38'23.369" S 152°24'56.13" E
- Elevation: 132.0 m
- Northerly view towards Little Liverpool Range and the existing West Moreton System rail corridor
- Proposed alignment is approximately 380 m to the north-east of this viewpoint
- Elevated, vegetated areas visible in the background are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay (and acknowledged in the Scenic Amenity of the Lockyer study); however, this particular viewpoint is not located in the overlay area
- Represents typical and accessible views of nearby rural residents and of those travelling along Douglas McInnes Drive
- Views towards the proposed alignment from LCT G: Rural Living (G14: Laidley), including landscapes typical of LCT D: Dry Croplands and Pastures (D15: Laidley) and LCT H: Forested Uplands (H10: Little Liverpool)
- This viewpoint is selected to represent a range of views obtained from nearby properties, including residents and visitors of the nearby McInnes Field at Laidley residential estate.

Key visual sensitivities

- Receptors include residents and visitors of nearby rural residential properties and properties within McInnes Field residential estate
- Although this view comprises a strong forested and rural character, the presence of the existing rural residential properties and the existing rail line detracts from the rural qualities and sense of remoteness
- This viewpoint is considered to have a 'Moderate' sensitivity to the change proposed, overall, due to the relatively large number of potential viewers (e.g. local rural residents and residents of McInnes Field residential estate) but presence of existing rail infrastructure.

Visual evaluation

Photomontage view from Viewpoint 12

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west

Construction

Magnitude of change assessment

- The proposed alignment and associated earthworks will introduce considerable construction works into the view. This change will be exacerbated by proximity of residences to the works in this location
- This location is within close proximity to a laydown area that will be utilised for the construction of the western tunnel portal, bridge construction and is identified as a potential concrete batching plant site
- Views from this location will also provide close views to the western tunnel portal access track, therefore construction traffic will be evident
- Tunnel works and spoil haulage will occur 7 days a week, 24 hours a day
- This would cause a reduction in visual amenity from this viewpoint, however this would be temporary
- Earthworks associated with the proposed alignment will require large volumes of material and vegetation to be removed
- The key impacts will relate to the presence of construction plant and disturbance due to the construction of the alignment and associated cuts and embankments
- While construction works will be clearly evident from this vantage point, the impact of these is largely temporary which represents a considerable change and 'high' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 12 during construction is considered to be 'high'.

Operation

Magnitude of change assessment - permanent infrastructure

- The nearest section of the alignment is approximately 380 m to the north-east of this viewpoint. The magnitude of change on this receptor is anticipated to be up to dominant due to:
  - Provision of a new single-track dual-gauge railway to the north of the existing rail line
  - At operational stage, the view will be affected by the removal of vegetation associated with cuts, which will result in a loss of continuous cover in the foothills of the Little Liverpool Range. This will also reduce the density of screening vegetation
  - From this and other views in the locality (including private views that cannot be accessed for the purposes of this assessment), views will be obtained to the deep rock cuts (up to around 20 m deep) and embankments of up to around 8 m
- Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character
- At this distance, the alignment will be a highly evident feature of the landscape and, despite the presence of the existing rail that is largely at grade, will have a dominant impact on the character of the landscape. As it will be introducing major cuts and embankments this represents a 'high' magnitude of change.

Magnitude of change assessment - train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be highly evident due to the open views of the railway track from this viewpoint and surrounding residential properties. This view will be experienced by a relatively high number of residents; however, it is noted that the existing rail line currently facilitates freight train movements, albeit single stacked. Therefore, the magnitude of change is considered to be 'low'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 12 during operation is considered to be 'high'.

Viewpoint 13

TABLE 10.30: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 13

Viewpoint 13: Kessling Drive, looking south-west towards western tunnel portal

Visual baseline assessment

Existing view from Viewpoint 13

Refer to Appendix H: Landscape and Visual Amenity Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°38'34.764" S 152°25'39.57" E
- Elevation: 182.0 m
- Southerly view towards private property
- Proposed alignment is approximately 135 m to the south-west of this viewpoint
- Southerly views from this viewpoint on the edge of LCT G: Rural Living (G15: Cunninghams Crest) towards the proposed alignment, western tunnel portal and ventilation building within LCT H: Forested Uplands (H10: Little Liverpool)
- Represents accessible views of residents of 208-212 Kessling Drive
- Vegetated areas visible in view are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay and also acknowledged in the Scenic Amenity of the Lockyer study; and this viewpoint is located in the overlay area
- Views are contained due to dense remnant vegetation.

Key visual sensitivities

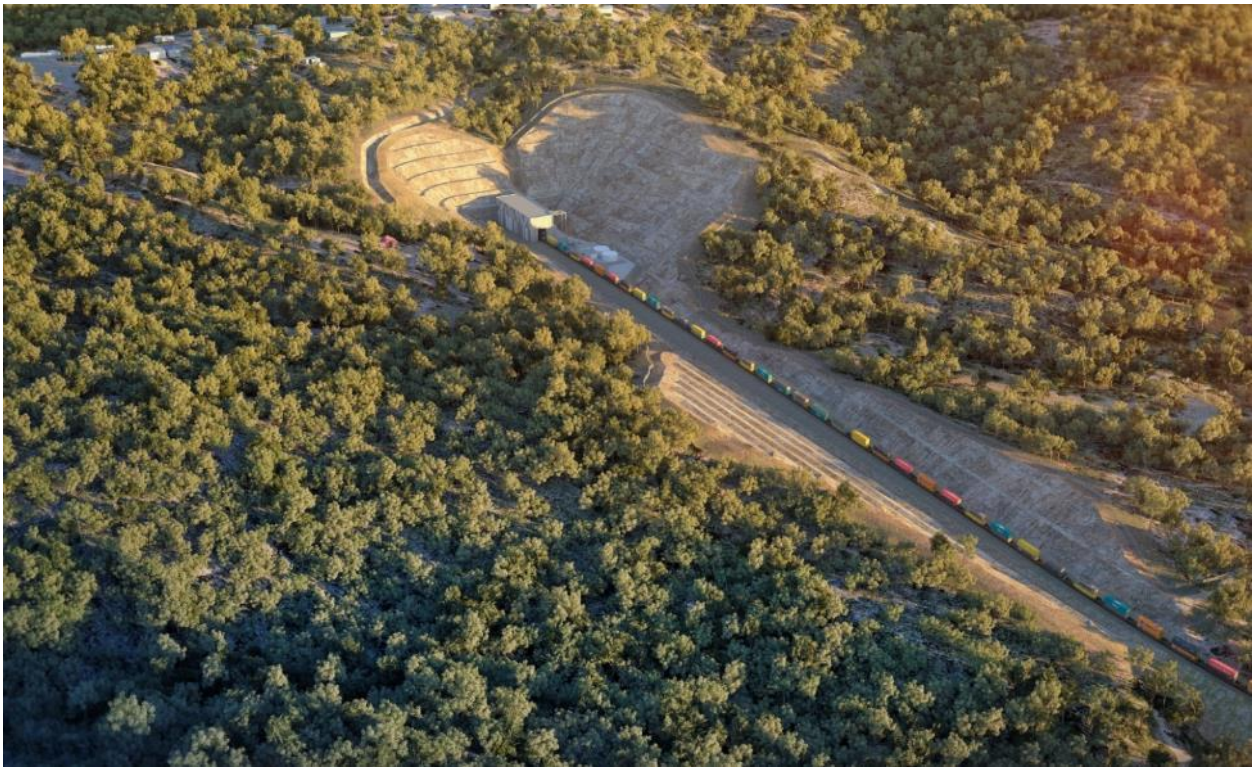
- Few receptors, namely residents and visitors of 208-212 Kessling Drive. As this is a cul-de-sac, there will be no drivers using this road as a through route.
- This view comprises a strong forested and rural character
- This viewpoint is considered to have a 'low' sensitivity overall to the change proposed, due to the very low number of viewers (e.g. very small number of local rural residents).

Visual evaluation

Please note that no visualisation has been provided for this viewpoint. Visualisations have been selected on the basis of those illustrating key infrastructure elements likely to be of interest to the community and/or the most sensitive viewpoints, such as from regionally significant scenic lookouts.

However, a bird's-eye perspective visualisation (Viewpoint 13b) has been produced to illustrate the impact of the Project, in particular the western tunnel portal on Kessling Drive, Range Crescent and the Little Liverpool Range generally.

Viewpoint 13: Kessling Drive, looking south-west towards western tunnel portal



Bird's-eye perspective view (Viewpoint 13b) from the vicinity of Viewpoint 13

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Construction

Magnitude of change assessment

- The proposed alignment and associated earthworks will introduce new rail infrastructure into the existing rural landscape, creating a dominant change in the landscape character of this viewpoint during construction
- Due to the distance from the alignment, the most evident construction impact will be the extensive clearance of vegetation for the construction of the deep cut on the approach to the tunnel portal, which will reduce the density of screening vegetation, increasing the visibility of the alignment as well as exposing rock faces.
- This represents a 'High' magnitude of change.

Significance of effect (construction)

- The significance of the effect of the Project on Viewpoint 13 during construction is considered to be 'low'.

Operation

Magnitude of change assessment - permanent infrastructure

- The viewpoint is on the edge of the temporary construction disturbance footprint, around 130 m from the alignment and 200 m from the Little Liverpool Range tunnel portal. The magnitude of change on this receptor during operation is anticipated to be dominant, therefore 'high', due to:
  - The provision of new rail infrastructure including steep deep cuts, ventilation building and tunnel portal
  - Additionally, the consequence of vegetation-clearing during bulk earthworks will be that views to the alignment will be more open
  - At this distance, the alignment will have a dominant effect that will change the fundamental visual character of the landscape from a natural and rural landscape to a landscape characterised by the presence of railway infrastructure.
- These factors represent a 'high' magnitude of change.

Magnitude of change assessment - train

- Movement of double-stacked freight trains up to 1,800 m long with a height of 6.5 m will only be experienced occasionally but at close distance, albeit in cut. Therefore, the magnitude of change is considered to be 'moderate'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 13 during operation is considered to be 'moderate'.

Viewpoint 14

TABLE 10.31: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 14

Viewpoint 14: Cunningham's Crest Lookout, looking south-west towards Laidley

Visual baseline assessment

Existing view from Viewpoint 14

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°38'23.369" S 152°24'56.13" E
- Elevation: 289.0 m
- South-westerly view towards the Lockyer Valley, showing acreage properties of Range Crescent in the foreground
- Proposed alignment is approximately 960 m to the south-west of this viewpoint
- Represents typical and accessible views of visitors and tourists visiting Cunningham's Crest Lookout, a scenic viewpoint with picnic facilities, artwork and information signage on local heritage
- South-westerly views from this elevated scenic viewpoint provide elevated panoramic views towards the proposed alignment, Little Liverpool Range tunnel western portal and ventilation building, Lockyer Valley including landscapes typical of LCT G: Rural Living (G15: Cunninghams Crest) and LCT H: Forested Uplands (H10: Little Liverpool)
- Elevated and vegetated areas visible in the view are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay and also acknowledged in the Scenic Amenity of the Lockyer study, and this viewpoint is located in the overlay area
- Distant views to the Great Dividing Range.

Key visual sensitivities

- Moderate number of visitors to Cunningham Crest Lookout who have a high level of interest in this environment and views obtained from the lookout
- Although this view comprises a strong forested and rural character; the presence of the existing rural residential properties detracts from the rural and natural qualities and sense of remoteness
- Lookout has views over the regional scenic amenity area as defined in *ShapingSEQ*
- This viewpoint is considered to have a 'moderate' sensitivity overall to the change proposed, due to the medium number but 'high' sensitivity of viewers (e.g. tourists visiting Cunningham Crest Lookout in the regionally significant scenic amenity area).

Visual evaluation

Please note that no visualisation has been provided for this viewpoint. Visualisations have been selected on the basis of those illustrating key infrastructure elements likely to be of interest to the community and/or the most sensitive viewpoints, such as from regionally significant scenic lookouts.

Viewpoint 14: Cunningham's Crest Lookout, looking south-west towards Laidley

Construction

Magnitude of change assessment

- The proposed alignment, laydown areas and associated earthworks will introduce new rail infrastructure into the existing rural landscape, resulting in considerable changes in the landscape character of this viewpoint
- Due to the distance from the alignment, the most evident construction impact will be the clearance of vegetation for the construction of the proposed alignment and laydown areas
- This represents a 'moderate' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 14 during construction is considered to be 'moderate'.

Operation

Magnitude of change assessment - permanent infrastructure

- The nearest section of the alignment and the western Little Liverpool Range tunnel portal and ventilation building are approximately 960 m to the south-west of this viewpoint. The skyline is already affected by the presence of powerlines, power poles and mobile towers. The magnitude of change on this receptor is anticipated to be considerable, due to:
  - The provision of new rail infrastructure, tunnel portal and ventilation building, which will cause a considerable change in the vegetated landscape character
  - Vegetation clearing during bulk earthworks and for the construction of the proposed alignment, laydown areas and tunnel portal will be noticeable due to how dense vegetation is in this location
- These factors represent a 'moderate' magnitude of change.

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be typically screened by dense foreground vegetation. Therefore, the magnitude of impact is considered to be 'negligible'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 14 during operation is considered to be 'moderate'.

Viewpoint 15

TABLE 10.32: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 15

Viewpoint 15: Laidley Rosewood Road near properties 113–117, looking east

Visual baseline assessment

Existing view from Viewpoint 15

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°39'31.788" S 152°26'33.39" E
- Elevation: 131.0 m
- Easterly views towards Laidley Rosewood Road and private rural properties access road
- Proposed alignment is approximately 175 m to the north-east of this viewpoint
- Represents typical and accessible views of nearby rural residents and of those travelling along Laidley Rosewood Road towards Grandchester, Ipswich and Brisbane
- Elevated areas associated with the Little Liverpool Range in close proximity to this viewpoint are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay and also acknowledged in the Scenic Amenity of the Lockyer study; however, this particular viewpoint is not located in the overlay area
- Easterly views from this viewpoint at the edge of LCT H: Forested uplands provide open views towards landscapes typical of LCT D: Dry croplands and pastures (D19: Grandchester) and the proposed Rosewood Laidley Road Rail Bridge. Views to the north are somewhat screened by existing vegetation.

Key visual sensitivities

- Receptors include isolated rural residents, workers and travellers experiencing transient views at speed along Rosewood Laidley Road (AADT around 2,591 per day, of which up to 11.24 per cent are heavy vehicles), albeit noting that the Cobb and Co tourist route passes along this section of road
- Overall, this viewpoint is considered to have a 'low' sensitivity to the change proposed, due to the relatively low interest of viewers (i.e. small numbers of nearby rural residents and travellers passing at some speed along Rosewood Laidley Road).

Visual evaluation

Please note that no visualisation has been provided for this viewpoint. Visualisations have been selected on the basis of those illustrating key infrastructure elements likely to be of interest to the community and/or the most sensitive viewpoints, such as from regionally significant scenic lookouts.

Viewpoint 15: Laidley Rosewood Road near properties 113–117, looking east

Construction

Magnitude of change assessment

- The proposed alignment, realignment of Rosewood Laidley Road and Doonans Road and associated earthworks will introduce considerable construction works into the view. This change will be exacerbated by proximity of the isolated rural residences to the works in this location
- The proposed location of a laydown area (including site offices and fuel storage) 400 m to the east of this viewpoint would cause a temporary reduction in visual amenity from this viewpoint
- Substantial vegetation clearing for the construction of the proposed alignment, service and access roads and realignment of Rosewood Laidley Road will reduce the density of screening vegetation, increasing the visibility of the alignment from Rosewood Laidley Road and surrounding rural properties
- Earthworks associated with the proposed alignment and realignment of Rosewood Laidley Road and Doonans Road will require the movement of large volumes of material
- While construction work and plant will be clearly evident from this vantage point, the impact of these is temporary, which represents a considerable and therefore 'moderate' magnitude of change.

Significance of effect (construction) 6

- The effect of the Project on Viewpoint 15 during construction is considered to be 'low'.

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 170 m to the north-east of this viewpoint. The magnitude of change on this receptor is anticipated to be dominant due to:
  - The provision of new rail infrastructure within what is currently a relatively intact rural setting, including the Rosewood Laidley Road Rail Bridge (8.3 m clearance over road), realignment of Rosewood Laidley Road and Doonans Road and major earthworks
  - Vegetation clearing for the construction of the proposed alignment, service and access roads and realignment of Rosewood Laidley Road and Doonans Road will reduce the density of screening vegetation
  - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed that will be in keeping with the existing rural character
- At this distance, the alignment and new Rosewood Laidley Road Rail Bridge will be highly evident and will change the visual character of the landscape, as it will be introducing new rail and road infrastructure into what is currently a relatively intact and vegetated rural setting. This represents a 'high' magnitude of change.

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be experienced by a small number of rural residents and by those travelling on Rosewood Laidley Road. While experienced by a moderate number of motorists, these views are of a transient nature. Therefore, the magnitude of change is considered to be 'moderate'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 15 during operation is considered to be 'moderate'.

Viewpoint 16

WTABLE 10.33: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 16

Viewpoint 16: Grandchester State School looking north toward alignment and old railway station

Visual baseline assessment

Existing view from Viewpoint 16a

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°39'55.482" S 152°27'54.966" E
- Elevation: 90.0 m
- Northerly view towards Grandchester, Western Creek and the Little Liverpool Range from School Road
- Proposed alignment is approximately 175 m to the north-east of this viewpoint
- Represents typical and accessible views of residents of Grandchester and people driving down School Road
- Elevated and vegetated areas associated with Little Liverpool Range, visible in the background of the view are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay and also acknowledged in the Scenic Amenity of the Lockyer study; however, this particular viewpoint is not located in the overlay area
- Northerly views from this viewpoint provide open views towards the proposed alignment, LCT B: Vegetated Watercourses—Creeks (B9: Western Creek) Western Creek as well as including landscapes typical of LCT D: Dry Croplands and Pastures (D20: Calvert).

Key visual sensitivities

- Receptors include residents of Grandchester, workers and students of Grandchester State School as well as people visiting School Road Reserve (including people waiting to pick up school children) and travellers along School Road
- The presence of existing infrastructure (power poles and powerlines) reduces the overall sensitivity of this view
- This viewpoint is considered to have a 'moderate' sensitivity overall to the change proposed, due to the relatively small number and types of viewers (e.g. travellers on School Road and visitors to School Road Reserve).

Visual evaluation

Please note that no visualisation has been provided for this viewpoint. Visualisations have been selected on the basis of those illustrating key infrastructure elements likely to be of interest to the community and/or the most sensitive viewpoints, such as from regionally significant scenic lookouts.

However, a bird's-eye perspective visualisation has been produced to illustrate the impact of the Project on Grandchester more generally.

Viewpoint 16: Grandchester State School looking north toward alignment and old railway station

Aerial visualisation from Viewpoint 16b

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Construction

Magnitude of change assessment

- The construction of the alignment and embankments will introduce new rail infrastructure into and significantly modify the existing landscape, creating a noticeable change in the landscape character of this viewpoint
- Due to the open nature of agricultural land the alignment passes through in this location, vegetation clearing for the construction of the proposed alignment is considered to have 'negligible' impact upon screening vegetation
- This temporary impact represents a 'low' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 16 during construction is considered to be 'low'.

Operation

Magnitude of change assessment — permanent infrastructure

- The nearest section of the alignment is approximately 175 m to the north-east of this viewpoint. Despite the close proximity, the magnitude of change on this receptor is anticipated to be considerable due to:
  - Provision of new rail infrastructure within what is currently a relatively intact rural setting, including earthworks
  - Standard rural fencing is proposed and will be in keeping with the existing rural character
  - Infrastructure at this location will be on a low embankment up to around 1 m high, so will blend with the existing rural view to some extent. While there is currently no rail infrastructure in this particular view, other parts of Grandchester already have rail infrastructure present, so rail infrastructure is part of the existing visual character of the wider area
- At this distance, the alignment will be clearly evident, and will change the fundamental visual character of the landscape, as it will be introducing new rail infrastructure into what is currently a relatively intact rural setting. This represents a 'moderate' magnitude of change.

Viewpoint 16: Grandchester State School looking north toward alignment and old railway station

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be experienced by nearby residents of Grandchester, people visiting School Road Reserve, visitors, students and staff of Grandchester State School and by those travelling on School Road. These views are of transient nature; however, and therefore the magnitude of impact is considered to be 'moderate'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 16 during operation is considered to be 'moderate'.

Viewpoint 17

TABLE 10.34: LIKELY VISUAL EFFECT OF THE PROJECT ON VIEWPOINT 17

Viewpoint 17: End of Calvert School Road, looking west near properties 917–923

Visual baseline assessment

Existing view from Viewpoint 17

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Location and description

- GPS Location: 27°39'50.892" S 152°31'20.028" E
- Elevation: 60.0 m
- Westerly view towards properties of Calvert and the existing West Moreton System rail corridor
- Proposed alignment is approximately 15 m to the north of this viewpoint
- Represents typical accessible views of residents, visitors, and workers in Calvert
- Elevated and vegetated areas associated with Little Liverpool Range, visible in the background of the view are considered to have high scenic amenity and are included on the Regional Significant Scenic Amenity overlay and also acknowledged in the Scenic Amenity of the Lockyer study; however, this particular viewpoint is not located in the overlay area
- Westerly views from this viewpoint provide open views from LCT F: Rural Settlement (F10: Calvert) across LCT D: Dry Croplands and Pastures towards the existing rail line and proposed alignment, and distant views to LCT H: Forested Uplands (H10: Little Liverpool Range).

Key visual sensitivities

- Moderate sensitivity of receptors, particularly relatively low number of residents of Calvert who are, however, located in very close proximity to the alignment
- The presence of existing infrastructure (existing railway tracks) reduces the overall sensitivity of this view
- This viewpoint is considered to have a 'moderate' sensitivity overall to the change proposed, due to the relatively low number of nearby residential viewers with a specific interest in this view and the close proximity of this viewpoint to the alignment.

Visual evaluation

Photomontage view from Viewpoint 17 (75o field of view)

Refer to Appendix H: Landscape and Visual Impact Assessment Technical Report for appropriately scaled image

Viewpoint 17: End of Calvert School Road, looking west near properties 917–923

Construction

Magnitude of change assessment

- The construction of the proposed alignment within the West Moreton System rail corridor will create a noticeable change in the landscape character of this viewpoint
- The lack of existing vegetation provides open views from nearby residential properties to the proposed alignment
- The presence of construction plant constructing the alignment will temporarily change the character of the landscape, creating a noticeable change in the landscape character of this viewpoint
- This represents a 'low' magnitude of change.

Significance of effect (construction)

- The effect of the Project on Viewpoint 17 during construction is considered to be 'low'.

Operation

Magnitude of change assessment—permanent infrastructure

- The nearest section of the alignment is approximately 15 m to the north of this viewpoint. The view is already affected by the presence of existing rail infrastructure. The magnitude of change on this receptor is anticipated to be noticeable due to:
  - The provision of a new single-track dual-gauge railway to the south of the existing rail line with associated localised culverts. The rail line will be largely at grade so will be similar in appearance to the existing rail line.
  - Due to the sparse nature of existing vegetation within the rail corridor, the effect of vegetation clearing for the construction of the proposed alignment is considered to be 'negligible'
  - Fencing will extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character
- At this distance, the alignment will be noticeable; however, it will not change the fundamental visual character of the landscape, as it will be introducing new rail infrastructure into the West Moreton System rail corridor. This represents a 'low' magnitude of change.

Magnitude of change assessment—train

- Movement of double-stacked freight trains up to 1,800 m long with a height of up to 6.5 m will be highly evident due to the open views of the railway track from this viewpoint. Close views to the alignment will be possible for nearby residents of Calvert. While experienced by close residential properties, these views are of a transient nature. The existing rail line currently facilitates freight train movements, albeit single stacked. Therefore, the magnitude of change is considered to be 'low'.

Significance of effect (operation)

- The effect of the Project on Viewpoint 17 during operation is considered to be 'low'.

10.7.4 Lighting impact

This section considers the impact of Project lighting.

As described in Section 10.7, construction lighting will only be associated with security lighting to site offices, fuel storage areas and bridge laydown areas as well as some night-time construction works associated with bridge construction, tunnelling activities, rail possessions and other approved out-of-hours work.

In terms of operational lighting, proposed permanent lighting for the Project is associated with safety lighting at the following active level crossings:

- Connors Road, Helidon
- Jamiesons Road, Gatton
- Dodt Road, Forest Hill
- Glenore Grove Road, Forest Hill
- Grandchester Mount Mort Road, Grandchester
- Neumann Road, Calvert
- Calvert Station Road, Calvert.

There would also be minimal internal lighting within the tunnel, with only low-level and emergency lighting expected, and transient lighting associated with train headlights.

On this basis, most of the assessed viewpoints would not receive any lighting impacts. Therefore, only the following viewpoints have been assessed, which are reported in Table 10.35 to Table 10.48:

- Viewpoint 1 (construction only)
- Viewpoint 3 (construction only)
- Viewpoint 4 (construction only)
- Viewpoint 5 (construction only)
- Viewpoint 6 (operation and construction)
- Viewpoint 7 (operation only)
- Viewpoint 8 (operation and construction)
- Viewpoint 9 (operation and construction)
- Viewpoint 10 (construction only)
- Viewpoint 11 (construction only)
- Viewpoint 12 (construction and operation)
- Viewpoint 13 (operation and construction)
- Viewpoint 15 (construction only)
- Viewpoint 16 (operation only).

Viewpoint 1

TABLE 10.35: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 1

Viewpoint 1: Airforce Road near 45 and 47 Airforce Road, looking north-west

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Low' as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting, including nearby isolated rural residents.
Magnitude of change assessment (construction)	▸ This location is within close proximity to a bridge construction laydown area. Therefore, during construction it is anticipated that night-time works will be undertaken. Additionally, the laydown area proposed would be lit with security lighting ▸ Works outside of standard hours to construct bridges is likely, therefore more intense lighting is probable during this period ▸ Airforce Road is not lit with permanent street lighting in this location; however, existing road and rail traffic introduces transient light. Therefore, the current light levels are assumed to be 'predominantly dark' and it is assumed that, with careful planning of light spill (i.e. the selection of luminaries that direct light downwards below the horizontal to avoid lateral glare and the potential installation of additional shielding to further control light spill), the levels would be up to 'predominantly lit' representing a noticeable 'low' magnitude of change.
Significance of effect (construction)	▸ Negligible
Magnitude of change assessment (operation)	▸ No permanent lighting near this viewpoint
Level of effect (operation)	▸ No Impact

Viewpoint 3

TABLE 10.36: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 3

Viewpoint 3: Warrego Highway looking east

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Moderate' as described for daytime assessment. However, somewhat fewer receptors are anticipated in this location at night as compared to the daytime view. Although travellers will still be passing along the Warrego Highway at night, their interest in the transient views obtained is expected to be low even compared to daytime interest.
Magnitude of change assessment (construction)	▸ This location is adjacent to a major bridge construction laydown area. Therefore, during construction it is anticipated that night-time works will be undertaken. Additionally, the laydown area proposed would be lit with security lighting ▸ Works outside of standard hours to construct bridges is likely, therefore more intense lighting is probable during this period ▸ The Warrego Highway is not lit with permanent street lighting in this location; however, existing traffic on the highway introduces transient light. Therefore, the current light levels are assumed to be 'predominantly dark' and it is assumed that, with careful planning of light spill (i.e. the selection of luminaries that direct light downwards below the horizontal to avoid lateral glare and the potential installation of additional shielding to further control light spill), the levels would be up to 'predominantly lit' representing a noticeable 'low' magnitude of change.
Significance of effect (construction)	▸ Low
Magnitude of change assessment (operation)	▸ No permanent lighting near this viewpoint
Level of effect (operation)	▸ No Impact

Viewpoint 4

TABLE 10.37: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 4

Viewpoint 4: Beavan Street looking south-west towards existing Lockyer Creek rail bridge	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Moderate' as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting, including nearby residents and travellers on local roads.
Magnitude of change assessment (construction)	▸ This location is within close proximity to two laydown areas, including a bridge construction laydown area that is situated on the northern side of Gatton Station (predominately screened by existing vegetation and residential properties). Therefore, during construction it is anticipated that night-time works will be undertaken. Additionally, the laydown area proposed would be lit with security lighting ▸ Works outside of standard hours to construct bridges is likely, therefore more intense lighting is probable during this period ▸ The current light levels on the edge of the town are assumed to be 'predominantly dark' and it is assumed that the levels would be up to 'predominately lit' representing a noticeable 'moderate' magnitude of change.
Significance of effect (construction)	▸ Moderate
Magnitude of change assessment (operation)	▸ No permanent lighting near this viewpoint
Level of Effect (operation)	▸ No Impact

Viewpoint 5

TABLE 10.38: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 5

Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'High' as described for daytime assessment. There will still be receptors in this area after dark, for example visiting restaurants and bars in the Gatton CBD including the adjacent RSL.
Magnitude of change assessment (construction)	▸ This location is within close proximity to two laydown areas. An additional bridge construction laydown area is situated at a further distance from this viewpoint on the northern side of Gatton Station. Therefore, during construction it is anticipated that night-time works will be undertaken. Additionally, the proposed bridge construction laydown area within this view would be lit with security lighting ▸ Works outside of standard hours to construct bridges is likely, therefore more intense lighting is probable during this period ▸ The current light levels are assumed to be 'predominantly lit' and it is assumed that the levels would be up to 'brightly lit' representing a noticeable 'low' magnitude of change.
Significance of effect (construction)	▸ Moderate
Magnitude of change assessment (operation)	▸ No permanent lighting near this viewpoint
Level of Effect (operation)	▸ No Impact

Viewpoint 6

TABLE 10.39: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 5

Viewpoint 6: Spencer Street looking north-east near Gatton Showgrounds

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Moderate' as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting, including nearby residents, and travellers on Eastern Drive/Spencer Street and local roads.
Magnitude of change assessment (construction)	▸ This location is within close proximity to a bridge construction laydown area. Therefore, during construction it is anticipated that night-time works will be undertaken. Additionally, the laydown area proposed would be lit with security lighting ▸ Works outside of standard hours to construct bridges is likely, therefore more intense lighting is probable during this period ▸ The current light levels are assumed to be 'predominantly lit' and it is assumed that the levels would be up to 'brightly lit' representing a noticeable 'low' magnitude of change.
Significance of effect (construction)	▸ Moderate
Magnitude of change assessment (operation)	▸ Existing street lighting along Eastern Drive will be reinstated ▸ At this stage of the Project, it is anticipated that replacement lighting will be of a similar level to the existing lighting; however, this will need to be assessed during the detailed design phase to ensure lighting is compliant with relevant DTMR standards. ▸ It is anticipated that a 'predominately lit' landscape would remain as a 'predominately lit' landscape representing no noticeable change considered to have a 'negligible' magnitude of change.
Level of Effect (operation)	▸ Negligible

Viewpoint 7

TABLE 10.40: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 7

Viewpoint 7: Gordon Street looking north-west towards level crossing

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Moderate', due to fewer receptors in this location at night. There will still be receptors in this location at night who will be interested in the view and presence of lighting—including residents of Gordon Street and nearby streets and travellers on local roads
Magnitude of change assessment (construction)	▸ No temporary construction lighting near this viewpoint
Significance of effect (construction)	▸ No impact
Magnitude of change assessment (operation)	▸ The active level crossing proposed at Glenore Grove Road would be controlled by automatic warning systems including flashing lights and would be visible to residents along Gordon Street and nearby streets, as well as those travelling on local roads ▸ However, there is an existing active level crossing approximately 120 m to the west of the proposed active level crossing location ▸ Existing street lighting along Eastern Drive will be reinstated ▸ It is anticipated that replacement lighting will be of a similar level to existing ▸ It is anticipated that a 'predominantly dark' landscape would remain as a 'predominantly dark' landscape representing no noticeable change considered to have a 'negligible' magnitude of change.
Level of effect (operation)	▸ Negligible

Viewpoint 8

TABLE 10.41: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 8

Viewpoint 8: Laidley Plainlands Road looking north towards bridge crossing

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Moderate' as described for daytime assessment. However, somewhat fewer receptors are anticipated in this location at night as compared to the daytime view. Although travellers will still be passing along the Laidley Plainlands Road at night, their interest in the transient views obtained at night is expected to be low even compared to daytime interest.
Magnitude of change assessment (construction)	▸ This location is within close proximity to a bridge construction laydown area. Therefore, during construction it is anticipated that night-time works will be undertaken. Additionally, the proposed laydown area within this view would be lit with security lighting ▸ Works outside of standard hours to construct bridges is likely, therefore more intense lighting is probable during this period ▸ The current light levels are assumed to be 'predominantly dark' and it is assumed that with careful planning of light spill (i.e. the selection of luminaries that direct light downwards below the horizontal to avoid lateral glare and the potential installation of additional shielding to further control light spill), the levels would be up to 'predominantly lit' representing a noticeable 'low' magnitude of change.
Significance of effect (construction)	▸ Low
Magnitude of change assessment (operation)	▸ Existing street lighting along Laidley Plainlands Road will be reinstated ▸ At this stage of the Project, it is anticipated that replacement lighting will be of a similar level to the existing lighting. However, this will need to be assessed at detail design phase to ensure lighting is compliant with relevant DTMR standards ▸ It is anticipated that a 'predominantly dark' landscape would remain as a 'predominantly dark' landscape representing no noticeable change considered to have a 'negligible' magnitude of change.
Level of effect (operation)	▸ Negligible

Viewpoint 9

TABLE 10.42: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 9

Viewpoint 9: Patrick Street Underpass looking north-west

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Moderate' as described for daytime assessment. There will be residential receptors in this location at night—who will be interested in the view including the impact of any lighting.
Magnitude of change assessment (construction)	▸ This location is within close proximity to a main construction compound/hub, including fuel storage and a bridge construction site. Therefore, during construction it is anticipated that night-time works will be undertaken. Additionally, the proposed laydown area within this view would be lit with security lighting ▸ Works outside of standard hours to construct bridges is likely, therefore more intense lighting is probable during this period ▸ The current light levels are assumed to be 'predominantly dark' and it is assumed that with careful planning of light spill (i.e. the selection of luminaries that direct light downwards below the horizontal to avoid lateral glare and the potential installation of additional shielding to further control light spill), the levels would be up to 'predominantly lit' representing a noticeable 'low' magnitude of change.
Significance of effect (construction)	▸ Low
Magnitude of change assessment (operation)	▸ It is anticipated that safety lighting will be required at Francis Road Rail Bridge ▸ The current light levels are assumed to be 'predominantly dark' and it is assumed that the levels would be up to 'predominately lit' representing a noticeable 'low' magnitude of change.
Level of effect (operation)	▸ Low

Viewpoint 10

TABLE 10.43: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 10

Viewpoint 10: Hardy Drive looking north-east down Rampton Street over new subdivision

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Moderate' as described for daytime assessment. There will be residential receptors in this location at night who will be interested in the view including the impact of any lighting.
Magnitude of change assessment (construction)	▸ During construction it is not anticipated that works will be undertaken at night in this location. However, a main construction compound/hub, including fuel storage and bridge construction site is situated approximately 250 m to the north of this viewpoint. This laydown area would be lit with security lighting, which is anticipated to be visible from this viewpoint ▸ The current light levels are assumed to be 'predominantly dark' and it is assumed that, with careful planning, the levels would remain up to 'predominantly dark' representing a 'negligible' (temporary) magnitude of change.
Significance of effect (construction)	▸ Low
Magnitude of change assessment (operation)	▸ No permanent lighting near this viewpoint.
Level of Effect (operation)	▸ No Impact

Viewpoint 11

TABLE 10.44: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 11

Viewpoint 11: Branell Homestead Luxury Cabins on Paroz Road, looking west

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Moderate' as described for daytime assessment. There will be tourists staying overnight in cabins as well as other local residents and travellers on local roads in this location at night.
Magnitude of change assessment (construction)	▸ During construction it is not anticipated that works will be undertaken at night in this location. However, distant view to the bridge construction laydown area proposed along Paroz Road would be possible. This laydown area would be lit with security lighting ▸ Works outside of standard hours to construct bridges is likely, therefore more intense lighting is probable during this period ▸ While this viewpoint is located around 1.4 km from any light source the impact of lighting this compound has been considered with respect to the residential receptors located on Luck Road adjacent to the laydown area ▸ The current light levels are assumed to be 'intrinsically dark' and it is assumed that, with careful planning, the levels would remain 'intrinsically dark' representing a 'negligible' magnitude of change.
Significance of effect (construction)	▸ Low
Magnitude of change assessment (operation)	▸ No permanent lighting near this viewpoint.
Level of effect (operation)	▸ No impact

Viewpoint 12

TABLE 10.45: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 12

Viewpoint 12: McInnes Drive near existing rail line

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Moderate' as described for daytime assessment. There will be residential receptors in this location at night – the residents of rural residential properties on McInnes Drive (and other roads in this part of Laidley) are the key night-time viewers.
Magnitude of change assessment (construction)	▸ This location is within close proximity to a laydown area that will be utilised for the construction of the western tunnel portal, bridge construction and is identified as a potential concrete batch plant. Therefore, during construction it is anticipated that night-time works will be undertaken. Additionally, the proposed laydown area within this view would be lit with security lighting ▸ Views from this location will also provide close views to the western tunnel portal access track, therefore construction traffic will introduce additional transient light ▸ Tunnel works and spoil haulage will occur 7 days a week, 24 hours a day, therefore this viewpoint is likely to experience more considerable construction lighting impacts due to its proximity to the western tunnel access track ▸ The current light levels on the edge of the town are assumed to be 'predominantly dark' and it is assumed that the levels would be up to 'predominately lit' representing a noticeable 'moderate' magnitude of change.
Significance of effect (construction)	▸ Low
Magnitude of change assessment (operation)	▸ No permanent lighting near this viewpoint.
Level of effect (operation)	▸ No impact

Viewpoint 13

TABLE 10.46: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 13

Viewpoint 13: Kessling Drive, looking south-west towards western tunnel portal

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Low' as described for daytime assessment. There are few residential properties in this area.
Magnitude of change assessment (construction)	▸ This location is within close proximity to the western tunnel portal. Therefore, during construction it is anticipated that night-time works will be undertaken ▸ Tunnel works and spoil haulage will occur 7 days a week, 24 hours a day, therefore this viewpoint is likely to experience considerable construction lighting impacts due to its proximity to the western tunnel portal ▸ Construction traffic will introduce additional transient light ▸ The current light levels are assumed to be 'intrinsically dark' and it is assumed that the levels would be up to 'predominately lit' representing a noticeable 'low' magnitude of change.
Significance of effect (construction)	▸ Negligible
Magnitude of change assessment (operation)	▸ The tunnel portal would be lit with low level security lighting ▸ It is anticipated that an 'intrinsically dark' landscape would become, at greatest, as a 'predominantly dark' landscape representing a noticeable 'low' level of change.
Level of effect (operation)	▸ Negligible

Viewpoint 15

TABLE 10.47: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 15

Viewpoint 15: Laidley Rosewood Road near properties 113–117, looking east

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Low' as described for daytime assessment. There will be few receptors in this location at night – the residents of rural properties located off Rosewood Laidley Road will be the key potential night-time viewers concerned with lighting amenity with less interest from passing traffic experience transient views along the road.
Magnitude of change assessment (construction)	▸ This location is within close proximity to a laydown area, including bridge construction site, fuel storage, road realignment site and site offices. Therefore, during construction it is anticipated that night-time works will be undertaken. Additionally, the laydown area proposed would be lit with security lighting ▸ Works outside of standard hours to construct bridges is likely, therefore more intense lighting is probable during this period ▸ The current light levels are assumed to be 'intrinsically dark' and it is assumed that, with careful planning, the levels would be at greatest 'predominantly dark' representing a noticeable 'low' magnitude of change.
Significance of effect (construction)	▸ Negligible
Magnitude of change assessment (operation)	▸ No permanent lighting near this viewpoint.
Level of effect (operation)	▸ No impact

Viewpoint 16

TABLE 10.48: LIKELY VISUAL EFFECT OF THE PROJECT LIGHTING ON VIEWPOINT 16

Viewpoint 16: Grandchester State School toward alignment and old station

Lighting assessment	
Visual evaluation	
Sensitivity assessment	▸ 'Moderate' as described for daytime assessment. There will be few receptors in this specific location at night as the school will not be in use. However, there are several rural residential properties nearby (including on Grandchester Mount Mort Road) who are likely to be concerned about night-time lighting.
Magnitude of change assessment (construction)	▸ No temporary construction lighting near this viewpoint.
Significance of effect (construction)	▸ No impact
Magnitude of change assessment (operation)	▸ The new active crossing proposed on Grandchester Mount Mort Road would be controlled by automatic warning systems, including flashing lights, and would be visible to people travelling along Grandchester Mount Mort Road as well as the local rural residents in this area ▸ This would, at worst, change an 'intrinsically dark' landscape into a 'predominantly dark' landscape, representing a noticeable change considered to have a 'low' magnitude of change.
Level of effect (operation)	▸ Low

10.8 Mitigation measures

10.8.1 Mitigation

The initial mitigation measures included in the Project design and identifies proposed mitigation measures to manage predicted environmental impacts in the pre-construction, construction and operational phases of the Project are outlined in this section.

10.8.2 Initial mitigation measures

The mitigation measures presented in Table 10.49 have been incorporated into the Project design. These design measures have been identified through collaborative development of the design and consideration of environmental constraints and issues, including proximity to sensitive receptors. These design measures are relevant to both construction and operational phases of the Project.

TABLE 10.49: INITIAL MITIGATION MEASURES THROUGH DESIGN RESPONSES

Aspect	Summary of management measure
Landscape and visual issues	▸ The horizontal alignment of the Project has avoided direct impacts on nationally or regionally protected landscape areas such as the Lockyer National Park and Gatton National Park ▸ The Project has minimised direct impacts on areas noted as being of regional landscape significance, as defined by the regional scenic amenity methodology (*ShapingSEQ*), to the greatest extent possible; including avoiding impacts on the mountain ranges of the Great Dividing Range, Marburg Range, Main Paradise Range, and elevated areas around Beins Mountain, and the northern extent of the Mistake Mountains range. While the Little Liverpool Range is affected, the design affects the minimum area of this zone as is possible, is largely in tunnel and traverses an area already affected by existing rail infrastructure ▸ Much of the Project is located along or close to the existing West Moreton System rail corridor and has been aligned to be co-located with existing road infrastructure where possible. The disturbance footprint defined in Project design has aimed to minimise vegetation clearing extents to that required to construct and operate the works ▸ The alignment has sought to reduce the extent of impact on watercourses ▸ The extent of cut-and-fill, including the height of structures and embankments, has been kept to the minimum consistent with required engineering design and requirements for cross-corridor connectivity for people and vehicles ▸ The alignment has been kept away from settlements to the greatest extent possible, including Helidon, Grantham, Placid Hills and Laidley North. Where the alignment passes near settlements it has been designed to either follow the edge of the settlement to minimise impacts on viewers (e.g. through Laidley) or to follow the West Moreton System rail corridor to the greatest extent possible (e.g. through Gatton, Forest Hill, Grandchester and Calvert).

10.8.3 Proposed mitigation measures

To manage and mitigate project impacts, a number of mitigation measures and design objectives are proposed for future stages of design and delivery. A further reduction in significance from the initial significance rating for foreseeable Project impacts will be achieved. The proposed mitigation measures respond to Project-specific issues and opportunities, address legislative requirements, accepted government plans, policy and practice.

Table 10.50 presents these proposed mitigation measures in accordance with the Project phase during which they would be implemented, as follows:

- Detailed design
- Pre-construction
- Construction
- Operation.

These mitigation measures include Project-wide considerations as well as location- or issue-specific measures in response to impacts identified in the LVIA.

TABLE 10.50: LANDSCAPE AND VISUAL AMENITY MITIGATION MEASURES

Delivery phase	Aspect	Proposed mitigation measures

Detailed design	Landscape and visual values	**Landscape and visual impacts due to vegetation removal**
		▸ Clearing extents of visually significant vegetation will be further limited, where feasible, to that required to safely construct, operate and maintain the Project. Locations include the forested areas:
		  ▸ Within Little Liverpool Range Forested Uplands (LCA H10) (approximately Ch 60.4 km to Ch 64.4 km)
		  ▸ Associated with Lockyer National Park Forested Uplands (LCA H5) (approximately Ch 27.3 km to Ch 35.4 km).
		▸ Develop a Reinstatement and Rehabilitation Plan for areas within the disturbance footprint that do not form part of the permanent works (e.g. construction compounds, laydown areas, temporary access tracks). The Plan will include and clearly specify:
		  ▸ Location of areas subject to rehabilitation and/or reinstatement/stabilisation, in accordance with the landscape and rehabilitation design developed during detailed design
		  ▸ Objectives and timeframes for rehabilitation and/or reinstatement/ stabilisation works (including the biodiversity, vegetation establishment and erosion and sediment control outcomes to be achieved)
		  ▸ Where appropriate, the plan will describe how the objectives align with relevant recovery plans, threat abatement plans, conservation advices or policy guidance for target species in areas identified for rehabilitation
		  ▸ Details of the actions and responsibilities to progressively rehabilitate, regenerate, and/or revegetate areas, consistent with the agreed objectives
		  ▸ Native flora species endemic to the Lockyer Valley and Ipswich regions or other suitable species appropriate to the landscape context and nursery/seed stock sources
		  ▸ Procedures, timeframes, measurable performance objectives and responsibilities for monitoring the success of rehabilitation and/or reinstatement/stabilisation areas
		  ▸ Corrective actions if the outcomes of rehabilitation and/or reinstatement/stabilisation are not achieved.
		▸ A Landscape and Rehabilitation Management Plan will be developed to define post-construction maintenance requirements, monitoring requirements and completion criteria for areas defined in the landscape design and/or identified in the Reinstatement and Rehabilitation Plan.

	Landscape and visual impacts on watercourses	▸ Develop the detailed design to further minimise impacts to waterways, riparian vegetation and in-stream flora and habitats. Locations include Lockyer Creek (LCA B1); Sandy Creek (LCA B5); Laidley Creek (LCA B8); and Western Creek (LCA B9) i.e. associated with the corridors of Sandy Creek, Lockyer Creek, an upper tributary of Laidley Creek, Laidley Creek, Lagoon Creek and Western Creek. ▸ Aim to avoid, then minimise, the extent of waterway diversions.
	Visual impact of rail infrastructure	▸ Infrastructure (such as structures, embankments/cuttings, tunnel portals, tunnel control centre and bridges) will be designed following an integrated design process with regard to landscape character and views as identified in the EIS seeking to: ▸ **Legacy:** Create consistent design treatments along the Inland Rail alignment to enhance the overall recognition and legacy of the Project. ▸ **Bridges:** Consider appropriate bridge design principles at key viewpoints, including:

Delivery phase	Aspect	Proposed mitigation measures
Detailed design (continued)	Visual impact of rail infrastructure (continued)	▸ Airforce Road Bridge and road realignment works associated with Air Force Road and Warrigal Road (near Viewpoint 1), Helidon (approximately Ch 26.80 km to Ch 27.5 km): Consider sensitive landscape design input to the bridge structure and embankments associated with road realignments, including buffer planting adjacent the embankments, to assist in sympathetically integrating the new embankments and bridge into the landscape and minimise the impact on views from nearby isolated rural residential properties and drivers accessing Lockyer National park via the realigned Seventeen Mile Road. This includes the replacement of existing roadside vegetation impacted by the construction of the Project that provides a visual buffer to the existing rail line. ▸ Warrego Highway Rail Bridge (near Viewpoint 3), Grantham (approximately Ch 34.0 km to Ch 34.2 km): Consider urban design input into bridge structure to minimise the impact on views from the Warrego Highway, part of the Warrego Way and Adventure Way Tourist Drive ▸ Philps Road Rail Bridge, Grantham (approximately Ch 36.7 km to Ch 36.9 km): Consider urban design input into bridge structure to minimise the impact on views from Philps Road and the Warrego Highway, part of the Warrego Way and Adventure Way Tourist Drive ▸ Lockyer Creek Rail Bridge and Lockyer Creek QR Rail Bridge (near Viewpoint 4), Gatton (approximately Ch 43.1 km to Ch 43.3 km): Consider urban design input into bridge structure to minimise the impact on views from nearby residential properties, local roads and views from William Kemp Park ▸ Gatton Station Pedestrian Bridge (near Viewpoint 5), Gatton (approximately Ch 43.5 km): Consider urban design inputs into the new pedestrian bridge structure, including associated stairs, throw screens and lifts to assist in sympathetically integrating the new rail bridge into its setting (i.e. respecting the existing visual character of the Gatton Station) ▸ Eastern Drive Bridge Northbound and Southbound (near Viewpoint 6), Gatton (approximately Ch 43.9 km to Ch 44.6 km): Consider urban design inputs into bridge structures and embankments associated with road realignments to minimise the impact on views from Eastern Drive, nearby residential properties, local roads and views from Gatton Caravan Park and Gatton Jubilee Golf Club ▸ Laidley Plainlands Road (near Viewpoint 8), Laidley North (approximately Ch 57.2 km to Ch 57.4 km): Consider urban design inputs into bridge structure and embankments associated with road realignments to minimise the impact on views from Laidley Plainlands Road, nearby residents of Valley Vista estate, local roads and views from Laidley Cultural Centre and the Bichel Cricket Oval ▸ Francis Road Rail Bridge (near Viewpoint 10), Laidley North (approximately Ch 57.9 km to Ch 58.0 km): Consider urban design inputs into bridge structure to minimise the impact on views from nearby residents of Valley Vista Estate ▸ Luck Road Rail Bridge, Laidley (approximately Ch 58.8 km to Ch 58.9 km): Consider sensitive urban design inputs into bridge structure to minimise the impact on views from nearby rural residential properties and distant views from Paroz Road and Branell Homestead ▸ Paroz Road Rail Bridge (near Viewpoint 11), Laidley (approximately Ch 59.3 km to Ch 59.5 km): Consider urban design inputs into bridge structure to minimise the impact on views from Paroz Road, nearby rural residential properties (including Branell Homestead and luxury cabins). Paroz Road provides access to Cunningham Crest Lookout which is a marketed tourist viewpoint ▸ Rosewood Laidley Road Rail Bridge (near Viewpoint 15) (approximately Ch 64.2 km to Ch 64.5 km): Consider urban design input into bridge structure to minimise the impact on views from the Rosewood Laidley Road, part of the Cobb and Co Tourist Drive and views from nearby isolated rural residents.

Delivery phase	Aspect	Proposed mitigation measures
Detailed design (continued)	Visual impact of rail infrastructure (continued)	▸ **Embankments:** At locations where embankments are near roads and/or adjoin bridge structures, the design will minimise the extent to which landform (embankments) restricts views or affects views from nearby residences to the greatest extent possible, including through sensitive stabilisation, revegetation or, where appropriate, screen planting. Consider the following opportunities: ▸ Warrego Highway embankments adjacent bridge structure (near Viewpoint 3), Grantham (approximately Ch 33.7 km to Ch 34.5 km): Landscape design input to the embankments in this area including buffer planting adjacent to the embankment to assist in sympathetically integrating the new embankment and bridge into the landscape and minimise the impact on views from the Warrego Highway, part of the Warrego Way and Adventure Way Tourist Drive. ▸ Embankments to the south of the Warrego Highway, Grantham (approximately Ch 35.1 km to Ch 37.0 km): Landscape design input to the embankments in this area including tree planting to assist in sympathetically integrating the new embankment into the landscape to minimise the impact on views from the Warrego Highway, part of the Warrego Way and Adventure Way Tourist Drive and views from nearby elevated residential properties within Grantham ▸ Valley Vista Estate (near Viewpoint 10), Laidley East (approximately Ch 57.3 km to Ch 58.5 km): Landscape design input to the embankments in this area including tree planting to assist in sympathetically integrating the new embankment into the estate landscape and minimise the impact on residents' views from the streets in Valley Vista Estate surrounding this structure ▸ Paroz Road embankment and bridge (near Viewpoint 11), Laidley (approximately Ch 58.5 km to Ch 59.8 km): Landscape design input to the embankment including buffer planting adjacent to the embankment where it crosses Paroz Road to assist in sympathetically integrating the new embankment and bridge into the landscape and minimise the impact on views to the Project from Branell Homestead Luxury Cabins and residents' views from the streets in Valley Vista Estate surrounding this structure ▸ Railway Street (near Viewpoint 12), Laidley East (approximately Ch 60.5 km to Ch 61.2 km): Landscape design input to the embankments in this area including tree planting to assist in sympathetically integrating the new embankment into the landscape and minimising the impact on residents' views from the streets surrounding this area including Douglas McInnes Drive ▸ Embankments adjacent to the Rosewood Laidley Road Rail Bridge structure (near Viewpoint 15), Grandchester (approximately Ch 64.0 km to 65.3 km): Landscape design input to the embankments in this area including buffer planting adjacent to the embankment to assist in sympathetically integrating the new embankment and bridge into the landscape and minimising the impact on views from the Warrego Highway, part of the Cobb and Co Tourist Drive ▸ Embankments in the vicinity of Grandchester-Mt Mort Road and School Road (near Viewpoint 16), Grandchester (approximately Ch 65.8 km to 67.6 km): Landscape design input to the embankments in this area including tree planting to assist in sympathetically integrating the new embankment into the landscape and minimising the impact on views from nearby residential properties, Grandchester State School, School Road Reserve and nearby roads such as Grandchester-Mt Mort Road and School Road.

Delivery phase	Aspect	Proposed mitigation measures
Detailed design (continued)	Visual impact of rail infrastructure (continued)	▸ **Cuttings:** Where practicable, minimise the extent of cut batters and undertake design treatment of these to blend them into their landscape setting (for example considering potential for revegetation, rock pitching etc.). Locations to consider include: ▸ Railway Street (near Viewpoint 12) (approximately Ch 59.8 km to Ch 60.5 km), Laidley East: Landscape design input to the embankment and cuts in this area, including extensive tree planting to the greatest extent possible along the realigned Railway Street and in wider corridor to assist in integrating the new landforms into the landscape and minimising the impact on resident's views from the streets surrounding this area including Douglas McInnes Drive. ▸ **Tunnels:** Consider cuts on the approach to tunnels as described above and consider the detailed design of tunnel portals. Consider the following opportunity: ▸ Landscape and urban design input to Little Liverpool Range tunnel approach (within LCT H: Forested Uplands and visible in Viewpoints 13 and 14): opportunity for review of treatment of cut batters and surrounding landscape to minimise impacts on landscape (approximately Ch 61.2 km to Ch 62.8 km) ▸ **Concept noise barriers:** Minimise the use of noise barriers to the greatest extent possible. Where these are or may be required in the future, particularly in towns and urban areas, the Project will ensure they are designed sympathetically to their surroundings and consider CPTED and graffiti issues, where appropriate, considering the inclusion of community artwork and urban design. This strategy will be applied to any concept noise barriers required within Gatton (approximately Ch 43.5 km to Ch 44.8 km), or Forest Hill (approximately Ch 51.7 km to Ch 52.7 km), or Valley Vista Estate at Laidley (approximately Ch 57.0 km to Ch 58.2 km).
	Landscape design treatments	▸ Develop a Project landscape design with landscaping treatments determined referencing the key landscape characteristics and elements identified in the EIS with emphasis on sensitive design that is appropriate to the setting as described below. The Project landscape design will also define appropriate treatments for areas subject to the Reinstatement and Rehabilitation Plan (or equivalent) and comply with the ARTC *Engineering (Track & Civil) Code of Practice Section 17 Right of Way Requirements* (ARTC, 2013b). ▸ **Rural and natural landscapes:** The landscape design shall respect and enhance the rural landscapes. Considerations include: ▸ Design of the landscape earthworks and planting to screen and integrate the railway and associated structures and features, wherever practicable and appropriate to the character and maintenance of desired views. This includes further opportunity for design of targeted planting of buffer/shelterbelts adjacent to major earthworks within the rail corridor to the extent consistent with safety. For example, planting strips could be introduced adjacent to significant embankments to reduce visual impact and assist in integrating the landform into the existing landscape setting, which already includes similar shelterbelts beside roads and riparian vegetation along watercourses, as described above, and in the following locations: – Near Paroz Road in Laidley to screen potential views from adjacent properties and in recognition that Paroz Road is used to access Cunninghams Crest Lookout – Adjacent Laidley Plainlands Road in Laidley, to screen the alignment and bridge abutments. ▸ The landscape design will seek to enhance the features and qualities that give the landscape its characteristics, ensuring the design responds to the natural patterns of the rural or natural landscape ▸ Where appropriate, consult with local stakeholders and landowners during design (and construction) to understand the landscape context and the qualities of existing landscapes

Delivery phase	Aspect	Proposed mitigation measures
Detailed design (continued)	Landscape design treatments (continued)	▸ **Ecologically sensitive areas:** Design to provide opportunities for ecological gain to benefit biodiversity. This includes: ▸ Development of diverse planting and seed mixes to maximise and connect habitat types for ecological gain ▸ Enhancement of landscape corridors and ecological links across the landscape by, where possible, joining or re-joining fragmented areas of habitat ▸ Landscape design and planting to incorporate ecological requirements to benefit the characteristic and visual amenity of local landscapes, including revegetation with locally indigenous species. ▸ **Townships:** Seek to create landscape settings that enhance or complement the local context for the social, environmental and economic benefit of local communities. This includes: ▸ All components in an urban context to consider the appearance and careful integration of new structures, fencing and noise barriers ▸ Undertake local community collaboration in the land management and restoration of footpath and cycle route connections; maintaining and, where possible, improving connectivity to provide access to open spaces including recreation areas ▸ Provide enhanced planting and habitat creation to benefit the local community and support health and wellbeing, for example streetscape strategies within the vicinity of the Project alignment and street tree planting within Gatton, Forest Hill and Calvert, and measures to enhance the setting of the Laidley Cultural Centre: – Gatton Railway Station (near Viewpoint 5) (approximately Ch 43.3 km to Ch 43.5 km): Landscape and urban design input to the setting of the Gatton Railway Station including the replacement of two ground palms (thought to be Phoenix canariensis) if they are removed by the realignment works; urban design input into the new pedestrian overpass that will replace the existing heritage wooden structure, landscape connectivity legibility enhancements through station from CBD to Littleton Park on Hickey Street and general streetscape enhancements and rehabilitation adjacent to the rail corridor – Eastern Drive/Western Drive (near Viewpoint 6), Gatton (approximately Ch 43.9 km to Ch 44.6 km): Consider undertaking rehabilitation associated with the Eastern Drive Road Bridges to create a positive gateway legacy on the approach to Gatton from the A2/eastern approach e.g. through street tree planting, reinstatement of existing pocket park, rehabilitation and artwork – Shared user path (near Viewpoint 6), Gatton (approximately Ch 43.7 km to Ch 51.1km): Opportunity to provide shade tree planting along the proposed new path to improve amenity – Laidley Cultural Centre: Undertake design of screen planting and oval landscaping adjacent to the alignment where it deviates adjacent to Old Laidley Forest Hill Road and Laidley Plainlands Road (between approximately Ch 56.8 km to Ch 57.3 km) – Gordon Street/Glenore Grove Road (near Viewpoint 7), Forest Hill (approximately Ch 52.3 km to Ch 52.7 km): Streetscape design to enhance the legacy of Inland Rail associated with the level crossing realignment including provision of new street trees and enhancing the approach to the Cobb and Co Staging Post – Grandchester/Mount Mort Road (near Viewpoint 16), Grandchester (approximately Ch 65.8 km to Ch 66.1 km): Leverage rehabilitation to create a positive gateway legacy on the approach to Grandchester e.g. through street tree planting and vegetation rehabilitation

Delivery phase	Aspect	Proposed mitigation measures
		– Hiddenvale Road, Calvert (approximately Ch 71.2 km to Ch 71.3 km): Leverage rehabilitation associated with the laydown area and level crossing to create a positive gateway legacy on the approach to Calvert e.g. through enhancement of existing pocket park adjacent to LCTB9: Western Creek Vegetated Watercourse in this area. ▸ **Heritage landscapes:** Through detailed design: ▸ Seek to further limit direct impacts or impacts to the setting of identified items of Aboriginal, historic or natural heritage significance including non-Indigenous heritage places (comprising local heritage places and other areas of interest as identified in EIS Chapter 18: Cultural heritage) and Indigenous heritage places (to be identified through Cultural Heritage Management Plans (CHMPs)). Consider the development of interpretation strategy and wayfinding to assist in the interpretation of visual elements of heritage significance, such as old rail lines, bridges, buildings or other items of visual value.
	Visual impacts of lighting	▸ During detailed design, review assessment of the potential for operational light impacts to residents and identify if/where attenuation measures are required.
Pre-construction	Landscape and visual values	**Visual impacts of lighting** ▸ Implement the relevant aspects of the Reinstatement and Rehabilitation Plan and progressively deliver to minimise disturbance to landscape and visual amenity values during and post the pre-construction period ▸ Where feasible and practicable, construction areas including compounds, stockpiles, fuel storage, laydown areas and staff parking to be located outside the tree protection zone as defined in AS4970-2009 *Protection of trees on development sites* (Standards Australia, 2009b).
Construction and commissioning	Landscape and visual values	▸ Establish vegetation protection zones and Project-clearing extents prior to commencement of works to avoid impacts on adjoining vegetation and habitats as far as reasonably practicable.
	Visual impacts of construction activities	▸ Avoid or minimise locating construction compounds within proximity to existing sensitive receptors to provide as much separation as possible ▸ Minimise height of all stockpiles to the greatest extent possible to reduce their visual impact; as well as maintain soil viability and avoid heat sterilisation of seed bank ▸ Cover stockpiles with temporary vegetative cover (such as mulch, grass seeding/hydro-mulch, soil binder) ▸ Temporary treatments (such as hoardings and shade-cloth screens) to site compound fencing will be considered to assist in reducing visual impacts of temporary infrastructure and sun glare within proximity of sensitive receptors. This may include art-based treatments to assist with screening the works from the public and using information boards (or similar) to inform the public about the construction works.
	Lighting impacts of construction activities	▸ Implement attenuation measures in discussion with potentially affected landholders.
	Reinstatement/ rehabilitation	▸ Implement the landscape design, and the Reinstatement and Rehabilitation Plan and the relevant requirements of the Landscape and Rehabilitation Management Plan, until performance criteria are satisfactorily achieved.
Operation	Reinstatement/ rehabilitation	▸ Implement the Landscape and Rehabilitation Management Plan until performance criteria are satisfactorily achieved.
	Visual impact of disturbed areas	▸ As required, implement the relevant requirements of the Reinstatement and Rehabilitation Plan, until performance criteria are satisfactorily achieved and incorporate any specific ongoing management requirements into the Inland Rail Operation and Maintenance Management Plan.

10.9 Impact assessment

10.9.1 Summary of landscape impacts

Eight LCTs with associated LCAs were identified through the landscape assessment process. A summary of the overall likely landscape impact anticipated during the construction and operation of the Project for each LCT is presented in Table 10.51.

TABLE 10.51: SUMMARY LANDSCAPE ASSESSMENT (CONSTRUCTION AND OPERATION)

		Initial mitigation		With additional mitigation	
Landscape character type	Landscape sensitivity	Magnitude of change	Potential landscape effect	Magnitude of change	Potential landscape effect
LCT A: Vegetated Watercourses— Rivers	No impact	No impact	No impact	No impact	No impact
LCT B: Vegetated Watercourses— Creeks and Channels	Low	Moderate	Low	Moderate	Low
LCT C: Irrigated Croplands	Low	Low	Negligible	Low	Negligible
LCT D: Dry Croplands and Pastures	Low	High	Moderate	High	Moderate
LCT E: Vegetated Grazing	Low	Moderate	Low	Moderate	Low
LCT F: Rural Settlement	Moderate	Moderate	Moderate	Moderate	Moderate
LCT G: Rural Living	Moderate	Moderate	Moderate	Low	Low
LCT H: Forested Uplands	High	Moderate	High	Moderate	High

This summary shows that the Project is considered likely to result in impacts of up to 'high' significance on the landscape character and amenity of LCT H: Forested Uplands, during construction and operation. This principally relates to the impacts associated with clearance of vegetation and the construction of extensive cuts and embankments through regional landscape of significance in H10: Little Liverpool Range and H5: Teviot Range.

Potential impacts will be managed through the implementation of the mitigation measures described in Section 10.8.

10.9.2 Summary of visual impacts

Based on digital mapping and the field survey, 17 representative viewpoints were selected for detailed assessment. A summary of the baseline analysis and overall likely visual impact anticipated during the construction of the Project (as described in Section 10.7.3) is summarised for each viewpoint in Table 10.52.

TABLE 10.52: SUMMARY OF VISUAL ASSESSMENT (CONSTRUCTION)

		Initial mitigation		With additional mitigation	
Viewpoint name	Viewpoint sensitivity	Magnitude of change	Potential visual effect	Magnitude of change	Potential visual effect
Viewpoint 1: Airforce Road near 45 and 47 Airforce Road, looking north-west	Low	Moderate	Low	Moderate	Low
Viewpoint 2: Seventeen Mile Road looking north	Low	Moderate	Low	Moderate	Low
Viewpoint 3: Warrego Highway looking east	Moderate	Moderate	Moderate	Moderate	Moderate
Viewpoint 4: Beavan Street looking south-west towards existing Lockyer Creek rail bridge	Moderate	Moderate	Moderate	Moderate	Moderate
Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing	High	Low	Moderate	Low	Moderate

		Initial mitigation		With additional mitigation	
Viewpoint name	Viewpoint sensitivity	Magnitude of change	Potential visual effect	Magnitude of change	Potential visual effect
Viewpoint 6: Spencer Street looking north-east near Gatton Showgrounds	Moderate	Moderate	Moderate	Moderate	Moderate
Viewpoint 7: Gordon Street looking north-west towards level crossing	Moderate	Low	Low	Low	Low
Viewpoint 8: Laidley Plainlands Road looking north towards bridge crossing	Moderate	Moderate	Moderate	Moderate	Moderate
Viewpoint 9: Patrick Street underpass looking north-west	Moderate	High	High	High	High
Viewpoint 10: Hardy Drive looking north-east down Rampton Street over new subdivision	Moderate	Moderate	Moderate	Moderate	Moderate
Viewpoint 11: Branell Homestead Luxury Cabins on Paroz Road, looking west	Moderate	Low	Low	Low	Low
Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west	Moderate	High	High	High	High
Viewpoint 13: Kessling Drive, looking south-west towards western tunnel portal	Low	High	Low	High	Low
Viewpoint 14: Cunningham's Crest Lookout, looking south-west towards Laidley	Moderate	Moderate	Moderate	Moderate	Moderate
Viewpoint 15: Laidley Rosewood Road near properties 113-117, looking east	Low	Moderate	Low	Moderate	Low
Viewpoint 16: Grandchester State School looking north toward alignment and old railway station	Moderate	Low	Low	Low	Low
Viewpoint 17: End of Calvert School Road, looking west near properties 917-923	Moderate	Low	Low	Low	Low

This summary shows that construction impacts of up to a 'high' potential visual effect are anticipated for Viewpoint 9: Patrick Street underpass looking north-west and Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west. Site-specific mitigation measures and management practices have been recommended in Section 10.8.

A summary of the overall likely visual impact on the same representative viewpoints during the operation of the Project is summarised in Table 10.53.

TABLE 10.53: SUMMARY VISUAL ASSESSMENT (OPERATION)

Viewpoint name	Viewpoint sensitivity	Magnitude of change	Potential visual effect
Viewpoint 1: Airforce Road near 45 and 47 Airforce Road, looking north-west	Low	High	Moderate[1]
		Moderate	Low[2]
Viewpoint 2: Seventeen Mile Road looking north	Low	High	Moderate[1 and 2]
Viewpoint 3: Warrego Highway looking east	Moderate	High	High[1]
		Moderate	Moderate[2]
Viewpoint 4: Beavan Street looking south-west towards existing Lockyer Creek rail bridge	Moderate	Moderate	Moderate[1 and 2]
Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing	High	Low (current design)	Moderate[1 and 2]
		High (provision of noise barriers)	Major[1]
		Moderate (provision of noise barriers)	High[2]

Viewpoint name	Viewpoint sensitivity	Magnitude of change	Potential visual effect
Viewpoint 6: Spencer Street looking north-east near Gatton Showgrounds	Moderate	Moderate	Moderate[1]
		Low	Low[2]
Viewpoint 7: Gordon Street looking north-west towards level crossing	High	Moderate (current design)	High[1 and 2]
		Low (current design)	Moderate[1]
		High (provision of noise barriers)	Major[1]
		Moderate (provision of noise barriers)	High[2]
Viewpoint 8: Laidley Plainlands Road looking north towards bridge crossing	Moderate	High	High[1]
		Moderate	Moderate[2]
Viewpoint 9: Patrick Street underpass looking north-west	Moderate	High	High[1 and 2]
Viewpoint 10: Hardy Drive looking north-east down Rampton Street over new subdivision	Moderate	High	High[1 and 2]
Viewpoint 11: Branell Homestead Luxury Cabins on Paroz Road, looking west	Moderate	Moderate	Moderate[1]
		Low	Low[2]
Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west	Moderate	High	High[1]
		Moderate	Moderate[2]
Viewpoint 13: Kessling Drive, looking south-west towards western tunnel portal	Low	High	Moderate[1 and 2]
Viewpoint 14: Cunningham's Crest Lookout, looking southwest towards Laidley	Moderate	Moderate	Moderate[1 and 2]
Viewpoint 15: Laidley Rosewood Road near properties 113-117, looking east	Low	High	Moderate[1]
		Moderate	Low[2]
Viewpoint 16: Grandchester State School looking north toward alignment and old railway station	Moderate	Moderate	Moderate[1 and 2]
Viewpoint 17: End of Calvert School Road, looking west near properties 917-923	Moderate	Low	Low[1 and 2]

Table notes:
1. Initial mitigation only
2. Assessment including additional mitigation measures

This summary shows that the Project has the potential to result in impacts of 'high' significance on six representative views, relating to impacts on Viewpoint 3: Warrego Highway looking east, Viewpoint 7: Gordon Street looking north-west towards level crossing, Viewpoint 8: Laidley Plainlands Road looking north towards bridge crossing, Viewpoint 9: Patrick Street underpass looking north-west, Viewpoint 10: Hardy Drive looking north-east down Rampton Street over new subdivision and Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west.

An additional two representative viewpoints (Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing and Viewpoint 7: Gordon Street looking north-west towards level crossing) have the potential for the significance of impact during operation to increase from moderate and high respectively to 'major', should noise barriers be included at the detail design phase.

These impacts will be managed through the implementation of the mitigation measures described in Section 10.8.

10.9.3 Summary of lighting impacts

As there is limited Project lighting proposed, many of the viewpoints are not anticipated to be affected by night lighting. A summary of the baseline analysis and overall likely visual impact anticipated during the operation of the Project is provided for each viewpoint (as described above) is presented in Table 10.54.

TABLE 10.54: SUMMARY OF LIGHTING ASSESSMENT (CONSTRUCTION AND OPERATION)

		Initial mitigation		With additional mitigation	
Viewpoint name	**Viewpoint sensitivity**	**Magnitude of change**	**Potential visual effect**	**Magnitude of change**	**Potential visual effect**
Viewpoint 1: Airforce Road near 45 and 47 Airforce Road, looking north-west	Low	Low (construction only)	Negligible (construction only)	Low (construction only)	Negligible (construction only)
Viewpoint 2: Seventeen Mile Road looking north	Low	No impact	No impact	No impact	No impact
Viewpoint 3: Warrego Highway looking east	Moderate	Low (construction only)	Low (construction only)	Low (construction only)	Low (construction only)
Viewpoint 4: Beavan Street looking south-west towards existing Lockyer Creek rail bridge	Moderate	Moderate (construction only)	Moderate (construction only)	Moderate (construction only)	Moderate (construction only)
Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing	High	Low (construction only)	Moderate (construction only)	Low (construction only)	Moderate (construction only)
Viewpoint 6: Spencer Street looking north-east near Gatton Showgrounds	Moderate	Low (construction)	Moderate (construction)	Low (construction)	Moderate (construction)
		Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)
Viewpoint 7: Gordon Street looking north-west towards level crossing	Moderate	Negligible (operation only)	Negligible (operation only)	Negligible (operation only)	Negligible (operation only)
Viewpoint 8: Laidley Plainlands Road looking north towards bridge crossing	Moderate	Low (construction)	Low (construction)	Low (construction)	Low (construction)
		Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)
Viewpoint 9: Patrick Street underpass looking north-west	Moderate	Low (construction and operation)	Low (construction and operation)	Low (construction and operation)	Low (construction and operation)
Viewpoint 10: Hardy Drive looking north-east down Rampton Street over new subdivision	Moderate	Negligible (construction only)	Low (construction only)	Negligible (construction only)	Low (construction only)
Viewpoint 11: Branell Homestead Luxury Cabins on Paroz Road, looking west	Moderate	Negligible (construction only)	Low (construction only)	Negligible (construction only)	Low (construction only)
Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west	Moderate	Moderate (construction only)	Low (construction only)	Moderate (construction only)	Low (construction only)
Viewpoint 13: Kessling Drive, looking south-west towards western tunnel portal	Low	Low (construction and operation)	Negligible (construction and operation)	Low (construction and operation)	Negligible (construction and operation)
Viewpoint 14: Cunningham's Crest Lookout, looking south-west towards Laidley	Moderate	No impact	No impact	No impact	No impact
Viewpoint 15: Laidley Rosewood Road near properties 113–117, looking east	Low	Low (construction only)	Negligible (construction only)	Low (construction only)	Negligible (construction only)
Viewpoint 16: Grandchester State School looking north toward alignment and old railway station	Moderate	Low (operation only)	Low (operation only)	Low (operation only)	Low (operation only)
Viewpoint 17: End of Calvert School Road, looking west near properties 917–923	Moderate	Low (operation only)	Low (operation only)	Low (operation only)	Low (operation only)

The most significant lighting effect during construction is up to 'moderate' (Viewpoint 4: Beavan Street looking south-west towards existing Lockyer Creek rail bridge, Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing and Viewpoint 6: Spencer Street looking north-east near Gatton Showgrounds). The most significant effect for operation is 'low'.

In summary, the qualitative desktop lighting assessment concludes that the proposed alignment and associated infrastructure is unlikely to create any significant obtrusive lighting into the external environment during typical night-time scenarios. Measures to manage these impacts are described in Section 10.8.

10.9.4 Residual impact assessment

Potential impacts to landscape and visual amenity associated with the Project in the construction and operation phases are outlined in Section 10.7. These impacts have been subjected to a significance assessment as per the methodology described in Section 10.5.

The initial impact assessment is undertaken on the basis that the design measures (or initial mitigation) detailed in Table 10.49 have been incorporated into the Project design.

Proposed mitigation measures, described in Table 10.50**,** were then applied as appropriate to the phase of the Project to reduce the level of potential impact.

The residual risk level of the potential impacts was then reassessed after the proposed mitigation measures were applied. The initial significance levels were compared to the residual significance levels to assess the effectiveness of the proposed mitigation measures.

The Project is assessed to have the residual impacts on landscape and visual values shown in Table 10.55.

TABLE 10.55: RESIDUAL IMPACT ASSESSMENT SUMMARY

				Initial significance[1]		Residual significance[2]	
Aspect	**Phase**	**Landscape character type/viewpoint**	**Sensitivity**	**Magnitude**	**Significance**	**Magnitude**	**Significance**
Landscape impacts	Construction/ operation	LCT A: Vegetated Watercourses—Rivers	No impact	No impact	No impact	No impact	No impact
		LCT B: Vegetated Watercourses—Creeks and Channels	Low	Moderate	Low	Moderate	Low
		LCT C: Irrigated Croplands	Low	Low	Negligible	Low	Negligible
		LCT D: Dry Croplands and Pastures	Low	High	Moderate	High	Moderate
		LCT E: Vegetated Grazing	Low	Moderate	Low	Moderate	Low
		LCT F: Rural Settlement	Moderate	Moderate	Moderate	Moderate	Moderate
		LCT G: Rural Living	Moderate	Moderate	Moderate	Low	Low
		LCT H: Forested Uplands	High	Moderate	High	Moderate	High
Visual impacts	Construction	Viewpoint 1: Airforce Road near 45 and 47 Airforce Road, looking north-west	Low	Moderate	Low	Moderate	Low
		Viewpoint 2: Seventeen Mile Road looking north	Low	Moderate	Low	Moderate	Low
		Viewpoint 3: Warrego Highway looking east	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 4: Beavan Street looking south-west towards existing Lockyer Creek rail bridge	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing	High	Low	Moderate	Low	Moderate
		Viewpoint 6: Spencer Street looking north-east near Gatton Showgrounds	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 7: Gordon Street looking north-west towards level crossing	Moderate	Low	Low	Low	Low
		Viewpoint 8: Laidley Plainlands Road looking north towards bridge crossing	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 9: Patrick Street underpass looking north-west	Moderate	High	High	High	High
		Viewpoint 10: Hardy Drive looking north-east down Rampton Street over new subdivision	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 11: Branell Homestead Luxury Cabins on Paroz Road, looking west	Moderate	Low	Low	Low	Low
		Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west	Moderate	High	High	High	High

Aspect	Phase	Landscape character type/viewpoint	Sensitivity	Initial significance[1]		Residual significance[2]	
				Magnitude	Significance	Magnitude	Significance
Visual impacts (continued)	Construction (continued)	Viewpoint 13: Kessling Drive, looking south-west towards western tunnel portal	Low	High	Low	High	Low
		Viewpoint 14: Cunningham's Crest Lookout, looking south-west towards Laidley	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 15: Laidley Rosewood Road near properties 113–117, looking east	Low	Moderate	Low	Moderate	Low
		Viewpoint 16: Grandchester State School looking north toward alignment and old railway station	Moderate	Low	Low	Low	Low
		Viewpoint 17: End of Calvert School Road, looking west near properties 917-923	Moderate	Low	Low	Low	Low
Visual impacts	Operation	Viewpoint 1: Airforce Road near 45 and 47 Airforce Road, looking north-west	Low	High	Moderate	Moderate	Low
		Viewpoint 2: Seventeen Mile Road looking north	Low	High	Moderate	High	Moderate
		Viewpoint 3: Warrego Highway looking east	Moderate	High	High	Moderate	Moderate
		Viewpoint 4: Beavan Street looking south-west towards existing Lockyer Creek rail bridge	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing	High	Low (current design)	Moderate	Low (current design)	Moderate
				High (provision of noise barriers)	Major	Moderate (provision of noise barriers)	High
		Viewpoint 6: Spencer Street looking north-east near Gatton Showgrounds	Moderate	Moderate	Moderate	Low	Low
		Viewpoint 7: Gordon Street looking north-west towards level crossing	High	Moderate (current design)	High	Low (current design)	Moderate
				High (provision of noise barriers)	Major	Moderate (provision of noise barriers)	High
		Viewpoint 8: Laidley Plainlands Road looking north towards bridge crossing	Moderate	High	High	Moderate	Moderate
		Viewpoint 9: Patrick Street underpass looking north-west	Moderate	High	High	High	High

Aspect	Phase	Landscape character type/viewpoint	Sensitivity	Initial significance[1]		Residual significance[2]	
				Magnitude	Significance	Magnitude	Significance
Visual impacts (continued)	Operation (continued)	Viewpoint 10: Hardy Drive looking north-east down Rampton Street over new subdivision	Moderate	High	High	High	High
		Viewpoint 11: Branell Homestead Luxury Cabins on Paroz Road, looking west	Moderate	Moderate	Moderate	Low	Low
		Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west	Moderate	High	High	Moderate	Moderate
		Viewpoint 13: Kessling Drive, looking south-west towards western tunnel portal	Low	High	Moderate	High	Moderate
		Viewpoint 14: Cunningham's Crest Lookout, looking south-west towards Laidley	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 15: Laidley Rosewood Road near properties 113–117, looking east	Low	High	Moderate	Moderate	Low
		Viewpoint 16: Grandchester State School looking north toward alignment and old railway station	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 17: End of Calvert School Road, looking west near properties 917–923	Moderate	Low	Low	Low	Low
Lighting impacts	Construction/ operation	Viewpoint 1: Airforce Road near 45 and 47 Airforce Road, looking north-west	Low	Low (construction only)	Negligible (construction only)	Low (construction only)	Negligible (construction only)
		Viewpoint 2: Seventeen Mile Road looking north	Low	No impact	No impact	No impact	No impact
		Viewpoint 3: Warrego Highway looking east	Moderate	Low (construction only)	Low (construction only)	Low (construction only)	Low (construction only)
		Viewpoint 4: Beavan Street looking south-west towards existing Lockyer Creek rail bridge	Moderate	Moderate (construction only)	Moderate (construction only)	Moderate (construction only)	Moderate (construction only)
		Viewpoint 5: Gatton RSL car park looking north-west towards existing Railway Station and pedestrian crossing	High	Low (construction only)	Moderate (construction only)	Low (construction only)	Moderate (construction only)
		Viewpoint 6: Spencer Street looking north-east near Gatton Showgrounds	Moderate	Low (construction)	Moderate (construction)	Low (construction)	Moderate (construction)
				Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)

Aspect	Phase	Landscape character type/viewpoint	Sensitivity	Initial significance[1]		Residual significance[2]	
				Magnitude	Significance	Magnitude	Significance
Lighting impacts (continued)	Construction/ operation (continued)	Viewpoint 7: Gordon Street looking north-west towards level crossing	Moderate	Negligible (operation only)	Negligible (operation only)	Negligible (operation only)	Negligible (operation only)
		Viewpoint 8: Laidley Plainlands Road looking north towards bridge crossing	Moderate	Low (construction)	Low (construction)	Low (construction)	Low (construction)
				Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)
		Viewpoint 9: Patrick Street underpass looking north-west	Moderate	Low (construction and operation)	Low (construction and operation)	Low (construction and operation)	Low (construction and operation)
		Viewpoint 10: Hardy Drive looking north-east down Rampton Street over new subdivision	Moderate	Negligible (construction only)	Low (construction only)	Negligible (construction only)	Low (construction only)
		Viewpoint 11: Branell Homestead Luxury Cabins on Paroz Road, looking west	Moderate	Negligible (construction only)	Low (construction only)	Negligible (construction only)	Low (construction only)
		Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west	Moderate	Moderate (construction only)	Low (construction only)	Moderate (construction only)	Low (construction only)
		Viewpoint 13: Kessling Drive, looking south-west towards western tunnel portal	Low	Low (construction and operation)	Negligible (construction and operation)	Low (construction and operation)	Negligible (construction and operation)
		Viewpoint 14: Cunningham's Crest Lookout, looking south-west towards Laidley	Moderate	No impact	No impact	No impact	No impact
		Viewpoint 15: Laidley Rosewood Road near properties 113–117, looking east	Low	Low (construction only)	Negligible (construction only)	Low (construction only)	Negligible (construction only)
		Viewpoint 16: Grandchester State School looking north toward alignment and old railway station	Moderate	Low (operation only)	Low (operation only)	Low (operation only)	Low (operation only)
		Viewpoint 17: End of Calvert School Road, looking west near properties 917–923	Moderate	Low (operation only)	Low (operation only)	Low (operation only)	Low (operation only)

Table notes:

1. Includes implementation of initial mitigation specified in Table 10.49.
2. Includes implementation of additional mitigation and controls as identified in Table 10.50.

10.10 Cumulative impacts

Cumulative impacts to the landscape and visual amenity of the Project will largely be the product of:

- Temporal construction impacts—presence of construction traffic, workforce and machinery operating on adjoining projects at the same time
- Spatial operational impacts—the residual impact of the visibility of infrastructure of identified projects to sensitive receptors and also as a result of the introduction of additional visual receptors (including residential receptors) into an area and with potential to view the Project.

A provisional review has been conducted to streamline the assessment process to eliminate, or scope out, projects that are anticipated to generate negligible landscape and visual impacts. Due to the potential for sequential impacts, for example, when driving through the landscape, a wider Area of Interest (AOI) than the LVIA study area was considered, extending 50 km (approximately 30 mins drive or more). Beyond this distance, it is considered that there would be no reasonable expectation of cumulative impact being registered by a viewer.

A number of projects were identified and considered for the project cumulative assessment but were discounted on the basis of location (i.e. outside the AOI) or lack of available information. Projects not included within the LVIA cumulative impact assessment on this basis include:

- Ebenezer Regional Industrial Area
- Willowbank Raceway Upgrade
- Bus and Passenger Rail Connection to Brisbane
- Brisbane Valley Highway Interchange.

Based on this assessment, the potential projects considered to have potential cumulative landscape and visual impacts are shown in Table 10.56.

TABLE 10.56: PROJECTS INCLUDED IN THE LANDSCAPE AND VISUAL IMPACT ASSESSMENT CUMULATIVE IMPACT ASSESSMENT

Project and proponent	Location	Description	Project status	Construction dates and jobs	Operation years and jobs	Selection criteria	Relationship to the proposal
G2H (ARTC)	Rail alignment from Gowrie to Helidon	26 km single-track, dual-gauge freight railway as part of the Inland Rail	Draft EIS being prepared by ARTCI'	2021–2026 Jobs: Peak of 596 FTE, average of 264 FTE	>50 years Jobs: ~20	b) & c)	Potential overlap of construction with H2C and G2H Operational impacts associated with the road network from the operation of the Inland Rail
C2K (ARTC)	Rail alignment from Calvert to Kagaru	53 km single-track, dual-gauge freight railway as part of the Inland Rail	Draft EIS being prepared by ARTC	2021–2026 Jobs: Peak of 620 FTE, average of 271 FTE	>50 years Jobs: ~20	b) & c)	Potential overlap of construction with H2C and C2K Operational impacts associated with the road network from the operation of the Inland Rail
Bromelton State Development Area (SDA) (Queensland Government)	Bromelton, Qld	Delivery of critical infrastructure within the Bromelton SDA will support future development and economic growth. This includes a trunk water main and the Beaudesert Town Centre Bypass. This infrastructure provides opportunities to build on the momentum of current development activities by major landowners in the SDA.	Approved by Governor in Council, December 2017	2016–2031	>50 years Jobs: TBA	c) & d)	Ongoing development approximately 55 km at the Bromelton SDA could require deconfliction of construction resources. There may also be an increase of heavy vehicles using the surrounding highways during both construction and operation, resulting in road network impacts
Ipswich Motorway Upgrade Rocklea to Darra (remaining sections) (Department of Transport and Main Roads)	Western Brisbane, Qld	Addressing congestion and extensive delays in the Ipswich Motorway corridor by a range of road upgrades along 7km of Ipswich Motorway between Rocklea and Darra.	Project listed on Queensland Infrastructure Initiative List— EIS not yet initiated	2016/17 to 2020–2021 Jobs: TBA	TBA Jobs: TBA	c)	Construction periods may overlap, resulting in conflict in demand for construction resources and additional traffic on arterial roads

Project and proponent	Location	Description	Project status	Construction dates and jobs	Operation years and jobs	Selection criteria	Relationship to the proposal
RAAF Base Amberley future works (Department of Defence)	RAAF Base Amberley	White paper dedicated future upgrades to RAAF Base Amberley at a cost of $1 billion	N/A	2016–2022 Jobs: 7,000	>50 years Jobs: TBA	c)	Ongoing development at RAAF Base Amberley may see increase in road traffic with heavy vehicles and further increase as the H2C construction occurs
GWIZ (Lockyer Valley Regional Council)	3 km north-west of Gatton	Industrial development including a transport and logistics hub on the Warrego Highway	N/A	2019–2024 Jobs: 13.5 FTE	>50 years Jobs: Approximately 37	c)	May increase road traffic and increase need for rail resources during both construction and operation
InterLinkSQ (InterLinkSQ)	13 km west of Toowoomba	200 ha of new transport, logistics and business hubs. Located on the narrow-gauge regional rail network and interstate network. Located at the junction of the Gore, Warrego and New England Highways.	N/A	2017–2037	>50 years Jobs: 1,500	c)	Ongoing development may constrain potential construction resources. There may also be an increase in heavy vehicles using the surrounding highways.

Table notes:
B = billion, TBA = to be advised, FTE = full time equivalents, N/A = not applicable
Selection criteria based on the criteria outlined in Chapter 22: Cumulative impacts
b) Have been declared a 'coordinated project' by the Coordinator-General under the SDPWO Act and an EIS is currently being prepared or is complete, or an IAS is available on the Department of State Development, Tourism and Innovation (now Department of State Development, Infrastructure, Local Government and Planning) Queensland Government) website.
c) May use resources located within the region (including materials, groundwater, road networks or workforces) that are the same as those to be used by the ARTC Inland Rail Project.
d) Could potentially compound residual impacts that the ATRC Inland Rail Project may have on environmental or social values

10.10.1 Temporary (construction) impact

In terms of temporal (construction) impact, it appears likely that the following projects may have some overlap in construction periods:

- G2H section of Inland Rail
- C2K section of Inland Rail
- Ipswich Motorway upgrade Rocklea to Darra
- Gatton West industrial zone
- Bromelton SDA
- InterLinkSQ
- RAAF Base Amberley upgrade.

The overlapping construction periods of these projects have the potential to result in the perception of relatively high amounts of construction activity and views of the movement of heavy vehicles and plant within the AOI.

The section of the road network likely to be most affected by this cumulative activity is the Warrego Highway within the LVIA study area and the areas at the easternmost and westernmost section of the alignment. The western area will be affected simultaneously by the construction of the Project and the G2H Project. The eastern area will potentially (depending on specific project phasing) be affected simultaneously by the C2K Project, RAAF Base Amberley upgrade and, further afield, the Bromelton SDA. As large vehicles on the highway would not be unexpected from a visual perspective and the construction impacts are temporary, the consequence of this cumulative impact during construction in the LVIA study area is considered to be 'low'.

10.10.2 Spatial (operational) impacts

In terms of spatial (operational) impacts of other linear transport infrastructure projects, the G2H and C2K projects immediately adjoin the Project. Some receptors will experience views of both G2H/H2C or H2C/C2K, but the Project will, in practice, be viewed as part of the same integrated project (Inland Rail). The Ipswich Motorway upgrade is over 40 km from the H2C alignment, so no cumulative impacts are anticipated.

With regards to the other land development projects, InterLinkSQ is closest to the G2H Project, being located around 25 km west of H2C from which it is separated by landform associated with Toowoomba and the Great Dividing Range. Consequently, there would be no combined or successive impacts and the potential for sequential impacts is highly limited. Similarly, RAAF Base Amberley is over 15 km from the H2C alignment so there would be no combined or successive impacts and the potential for meaningful sequential impacts is limited.

The Bromelton SDA is a large-scale major land development project that will affect many hectares of land with associated landscape and visual impacts. This Project will also potentially introduce additional visual receptors (residents and workers) into the wider landscape of the LVIA study area. It directly adjoins the eastern end of the C2K alignment. This development will result in a noticeable intensification of built development and extension into the rural and natural landscape character west of Greater Brisbane, particularly in terms of sequential impacts gained while travelling around the region. However, combined or successive impacts of H2C are unlikely.

The GWIZ is considered to have the greatest potential for cumulative impacts when considered with the H2C alignment. The area north of Placid Hills, North Gatton, is currently highly natural and rural in character and the clearance of vegetation and intensification of built and transportation infrastructure development throughout this zone would result in a considerable change to the landscape character and visual amenity that is likely to be perceived by users of the Warrego Highway as well as some residents living in the acreage properties of Placid Hills.

In the context of these projects, the cumulative landscape and visual impact of the Project alignment, which occupies a narrow, linear corridor, is considered to be generally very modest. The significance of the contribution of the Project to cumulative impact is considered to be 'low' for both landscape and visual values for most of the projects identified, with the exception of the GWIZ that would have up to 'medium' cumulative impacts. Mitigation to address this impact will generally be as described for the standalone H2C (and C2K/G2H) Project. However, specific mitigation is likely to be required associated with the Project alignment through Placid Hills to minimise potential cumulative impacts of the GWIZ and the Project on views from acreage properties.

Due to the low level of lighting proposed at the Project, there are not anticipated to be any significant cumulative lighting impacts associated with these projects.

Overall, the cumulative LVIA in the region is likely to be up to 'low'. This is summarised in Table 10.57

TABLE 10.57: PROJECT INCLUSION CRITERIA—CUMULATIVE IMPACT ASSESSMENT

Residual cumulative landscape and visual impact	Consequence
Construction impacts associated with views of increase in construction traffic and construction areas	Low
Operation impacts associated with views of combined, successive and sequential views of adjoining projects	(up to) Medium
Impacts of night lighting	Nil

10.11 Conclusions

The landscape between Helidon and Calvert is a populated working agricultural landscape characterised by generally flat irrigated and non-irrigated croplands and undulating pastures. The landscape is interspersed by a network of vegetated watercourses associated with Lockyer Creek and the Bremer River and set against a backdrop of forested ranges. Historically, a freight railway has existed along much of the proposed alignment and there is a legacy of modern and heritage rail infrastructure throughout the visual study area.

The Project would introduce 47 km of rail into the landscape, of which nearly half (approximately 24 km) is proposed to be along or adjacent to the West Moreton System rail corridor.

The key landscape and visual impacts of the Project relate to the removal of vegetation, along with the provision of new infrastructure elements including embankments, deep cuts, tunnels, and new road and rail bridges. Further visual impacts of the Project may include the effect of more frequent train movements through the region.

To assess the visual impact of the construction and operation of the Project, eight LCTs have been identified within the LVIA study area that are assessed to have up to 'high' sensitivity to impacts due to their distinctive character, local or regional significance, or are protected because of their scenic qualities. Significant impacts on these LCTs of up to 'high' significance have been identified for a single character area—LCT H: Forested Uplands—which comprises the regionally-significant Teviot and Little Liverpool Ranges scenic amenity areas that are identified in *ShapingSEQ* (DILGP, 2017a).

Throughout the LVIA study area there are high numbers of visual receptors, including residents in the various population centres close to the alignment, such as Murphys Creek (664 people); Withcott (1,000 people); Helidon Spa (538 people); Grantham (634 people); Gatton (7,101 people); Forest Hill (968 people); Laidley (3,808 people); Ma Ma Creek (394 people); Grandchester (444 people); and Calvert (310 people) as well as numerous rural living areas and the UQ Gatton Campus. Additionally, views can be obtained from roads throughout the area, including the Warrego Highway and tourist drives (including part of the Cobb and Co. trail).

Visual impacts are often contained by the presence of vegetation and landform. However, there are localised elevated areas affording views over a wider area, including one scenic lookout close to the alignment—Cunninghams Crest.

Seventeen representative viewpoints have been assessed to represent impacts on these views. These viewpoints were assessed to determine the impact of the Project on:

- Views and vistas
- Streetscapes, key sites and buildings
- Heritage items including Aboriginal places and environmental heritage
- Local community.

Select viewpoint assessments included artist impressions and perspective drawings of the Project to illustrate how the Project has responded to the visual impact through urban design and landscaping. While visualisations have not been prepared for all viewpoints, visualisations have been selected on the basis of those illustrating key infrastructure elements likely to be of interest to the community and/or the most sensitive viewpoints, such as from regionally significant scenic lookouts.

The most significant effect during construction is up to 'high' (Viewpoint 9: Patrick Street underpass looking north-west and Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west). These viewpoints may experience impacts from construction activities including significant embankment works and vegetation clearing. These impacts are temporary in nature and will not contribute to long-term impacts.

Based on these assessments, six significant visual impacts of up to 'high' significance were identified for the operational phase of the Project. Key areas comprise the impact of the Warrego Highway rail bridge on Viewpoint 3: Warrego Highway looking east; the impact of the large embankment close to residential properties at Viewpoint 10: Hardy Drive looking down Rampton Street in the new subdivision to the north of Laidley; and the impact of embankments and deep cuts at the foothills of the Little Liverpool Range at Viewpoint 12: Douglas McInnes Drive near existing rail line, looking north-west, also in Laidley.

Cumulative impacts, particularly the effects in combination with the adjoining G2H and C2K Inland Rail projects and the GWIZ have been considered but it was concluded that the consequence of these cumulative impacts is 'low' during construction and up to 'medium' during operation.

The requirement for specific mitigation to manage landscape and visual impacts, beyond ARTC's standard mitigation measures, is constrained by practical and operational issues. Specific mitigation opportunities have been identified and include measures to manage flora and fauna effects, riparian vegetation and aquatic habitats, rehabilitation, landscaping, heritage, property, landform, light pollution, and waterways.

The management strategies associated with these opportunities are mostly controlled by effective design and construction strategies as well as adequate reinstatement and conservation plans. While these may not change the presented residual impact rating, they will result in an enhanced outcome for the Project on affected landscape and visual receptors.

Measures are proposed to minimise visual impacts of lighting during the construction and operation of the Project, which include localised strategies such as light-blocking curtains for surrounding residents when construction lighting is present and limiting operational lighting to only essential areas.

Opportunities to enhance the legacy of the Project on landscape and visual values have also been identified for consideration in the detail design phase. These opportunities include design, construction and landscape-management strategies that will further mitigate visual impacts near Viewpoint 9, Viewpoint 7, Viewpoint 2, Viewpoint 4, Viewpoint 8, LCT H: Forested Uplands, the Laidley Cultural Centre, and laydown areas.