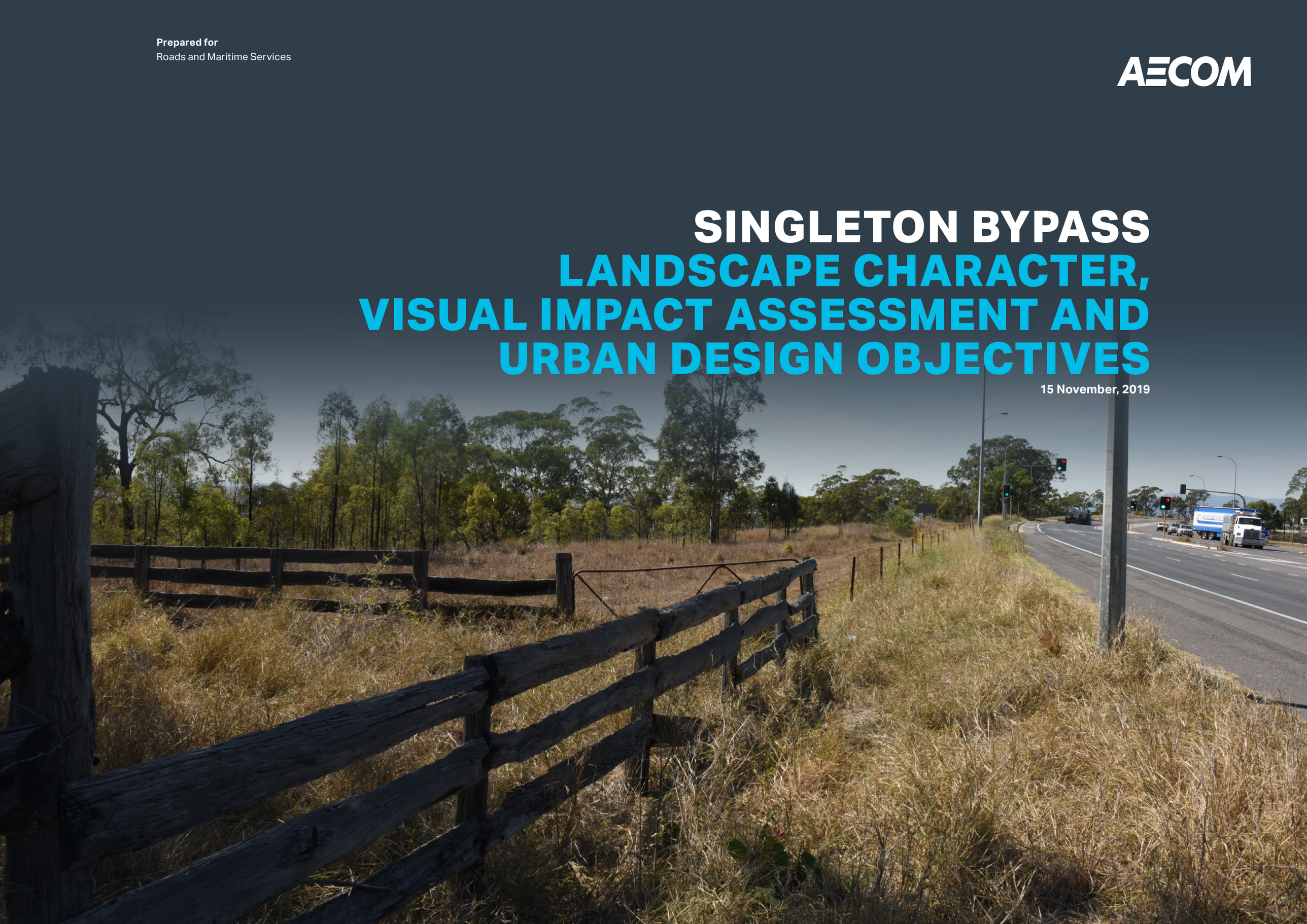
Prepared for
Roads and Maritime Services

AECOM

SINGLETON BYPASS
LANDSCAPE CHARACTER, VISUAL IMPACT ASSESSMENT AND URBAN DESIGN OBJECTIVES

15 November, 2019



Quality information

Document name	Ref	Prepared for	Prepared by	Date	Reviewed by
LCVIA and Urban Design Objectives Report	60558931_DOC_ENV_003_A_LCVIA & Urban Design Objectives	Roads and Maritime Service	Michael White	27/02/18	Mark Blanche
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Revision history

Issue	Issue date	Details	Name	Position
A	27.02.18	20% draft report for client review and feedback	Michael White	Principal Landscape Architect
B	08.06.18	20% concept design report for client review and feedback	Michael White	Principal Landscape Architect
C	04.10.19	80% concept design report for internal review	Mark Blanche	Associate Director - Design + Planning
D	25.10.19	80% concept design report issue	Frank Ciancio	Associate Director - Design + Planning
E	08.11.19	Final concept design report issue for client review and feedback	Frank Ciancio	Associate Director - Design + Planning
F	15.11.19	Final concept design report issue	Frank Ciancio	Associate Director - Design + Planning

CONTENTS

EXECUTIVE SUMMARY

AECOM Australia Pty Ltd (AECOM) was engaged by New South Wales (NSW) Roads and Maritime Services (Roads and Maritime) to prepare a Landscape Character, Visual Impact Assessment and Urban Design Objectives report to inform the Review of Environmental Factors (REF) being prepared for the Singleton Bypass Proposal. The project crosses the Hunter River and associated agricultural floodplain, skirting the historic old town of Singleton, and will be about nine kilometres in length. The project incorporates the only major river crossing of the New England Highway along its 900 kilometre length.

A summary of the report findings is shown over.

Effects on landscape character

LANDSCAPE CHARACTER ZONE	SENSITIVITY	MAGNITUDE	LANDSCAPE CHARACTER IMPACT
LCZ 1 – ENCLOSED RURAL LANDSCAPE	LOW	MODERATE	MODERATE TO LOW
LCZ 2 – OPEN RURAL LANDSCAPE	MODERATE	HIGH	HIGH - MODERATE
LCZ 3 – INDUSTRIAL	LOW	NEGLIGIBLE	NEGLIGIBLE
LCZ 4 – LARGE LOT RESIDENTIAL	MODERATE	NEGLIGIBLE	NEGLIGIBLE
LCZ 5 – NEW RESIDENTIAL SUBURBS	MODERATE	NEGLIGIBLE	NEGLIGIBLE
LCZ 6 – AGRICULTURAL FLOODPLAIN	HIGH	MODERATE	HIGH - MODERATE
LCZ 7 – SINGLETON OLD TOWN	HIGH	MODERATE	HIGH - MODERATE

Effects on views and visual amenity

VISUAL RECEPTOR LOCATION	SENSITIVITY	MAGNITUDE	VISUAL IMPACT
VR 1 – NEW ENGLAND HIGHWAY - SOUTH	LOW	MODERATE	MODERATE TO LOW
VR 2 – ELLEN AVENUE	HIGH	MODERATE	HIGH - MODERATE
VR 3 – ARMY CAMP ROAD	MODERATE	MODERATE	MODERATE
VR 4 – NEW ENGLAND HIGHWAY - NORTH	LOW	LOW	LOW
VR 5 – NEW ENGLAND HIGHWAY - BUNNINGS	LOW	LOW	LOW
VR 6 – MAISON DIEU ROAD	LOW	LOW	LOW
VR 7 – MITCHELL AVENUE	HIGH	HIGH	HIGH

Overall, the proposal can be seen to have good alignment and design qualities with regard to urban design and landscape character and visual impacts, including:

- the lightly stepping character of the bridge crossing over much of the agricultural floodplain;
- the climb across McDougalls Hill which is substantially lost to view through the use of cuttings; and
- the retention / supplementary planting of a substantial re-growth bushland remnant at its northern extent which comprises a Critically Endangered Ecological Community.

The key adverse findings of the report relate to three landscape character zones and two visual receptor locations that were assessed as being subject to considerable impacts arising from the project. With regard to landscape character zones, the key impacts comprise:

- The use of embankments within the agricultural floodplain (2.3 kilometres total length compared with a 1.7 kilometres length of bridging over the floodplain), and subsequent adverse effects on the historic connection between this and the southern edge of Singleton old town;
- The proximity of the bridge over the floodplain to the old town historic settlement of Glenridding west of the Main Northern Railway line, including loss of two homes and subsequent separation of outlying residences from the main settlement; and
- The placement of three large embankments associated with the Putty Road connection, which pass through a long established market gardening area on a bank of the Hunter River, and sit uncomfortably within a narrow neck of land between the Hunter River and the Main Northern Railway line.

With regard to views, the key impacts occur from:

- The southern edge of Singleton old town, resulting in permanent loss of extensive views across the floodplain to the distant backdrop of the Greater Blue Mountains World Heritage Area
- Parts of Singleton Heights, including medium-term loss of substantial tree cover on the skyline
- The high sensitivity, and large number of residential receptors subject to close views of the project with high levels of detail, and potential for moderate to potentially high duration of viewing.

Mitigation measures have been provided for consideration, the adoption of which would reduce some of the above described impacts. Additionally, visual amenity arising from the project is assessed conservatively at 12-18 months post-construction, and as such landscape and visual amenity outcomes can be expected to improve over time in this regard, primarily to areas north of the Hunter River.

1 INTRODUCTION

1.1 Project Overview

The New England Highway (the Highway) is part of the National Land Transport Network and is a major freight and commuter route. It currently passes through Singleton and forms the main road access through the town and to the central business district (CBD) with more than 28,000 vehicles a day travelling through Singleton. The highway corridor is important both locally and regionally, with the Highway forming the inland routes from Sydney to Brisbane. As a result of extensive studies of various options it was deemed that a new bypass would be the best solution to facilitate the expected increased traffic volumes attributed to population growth, future land developments within Singleton, and increase in regional freight movement along the highway.

The bypass would extend for about 8 kilometres between Rix's Creek Lane to the north and Newington Lane in the south. It would cross the Hunter River and travel through the surrounding suburbs of Singleton including Gowrie, Singleton Heights, Glenridding, Whittingham and Darlington. A dominant feature of the proposal is a 1.7 kilometre bridge crossing over Hunter Valley floodplains and the Main Northern Railway line. The bypass would also travel through a series of cuttings and elevated positions as it rises up an escarpment before linking with the current the Highway corridor.

Ultimately the bypass would improve traffic flow along the highway and through Singleton CBD and surrounds, reduce travel times and enhance overall safety for motorists along the highway and residents of Singleton through reduced traffic volumes in town.

1.2 The Proposal

The proposal is a new bypass road that would improve journey time and reliability on the Highway through Singleton, along with reducing freight traffic from the town centre. The bypass would include;

- about 8 kilometres of the bypass of Singleton with a single lane in each direction
- connection with the New England Highway at the southern end of the proposal, including a southbound entry ramp and northbound exit ramp only (the southern connection)
- a 1.7 kilometre long bridge over the Main North Railway line, Doughboy Hollow and Hunter River floodplain, Army Camp Road and Putty Road (bridge over the floodplain)
- connection to Putty Road including a northbound entry ramp and southbound exit ramp (the Putty Road connection)
- a 40 metre bridge over the entry ramp at the Putty Road connection
- a 100 metre bridge over Rose Point floodway
- a 205 metre bridge over the Hunter River
- a 40 metre bridge over the New England Highway west of the existing Main North Railway line overbridge (known as Gowrie Gates)
- connection with the New England Highway at Gowrie Gates consisting of a southbound entry ramp and northbound exit ramp. The northbound exit ramp would connect to the New England Highway via a new roundabout intersection at Maison Dieu Road
- a 1.7 kilometre northbound climbing lane between Gowrie Gates and the northern connection.

1.3 Project Objectives

The objectives of the proposal are;

- improve travel reliability on the New England Highway through Singleton, particularly for road freight supporting the Upper Hunter and the North West New England region
- improve the amenity of Singleton by removing freight traffic
- improve road safety for through and local traffic in Singleton
- support future traffic growth along the New England Highway associated with planned land use in the Upper Hunter area
- provide access for oversize over mass vehicles along the New England Highway.

The proposal is also considered consistent with the objectives of multiple Australian and State government strategic documents including the Australian Infrastructure Plan (Infrstructure Australia, 2016) and the Future Transport Strategy 2056 (Infrastructure NSW, 2018).

1.4 Purpose of the LCVIA and Urban Design Study

The purpose of the report is to ensure landscape character and visual impacts are considered during the road design as an integrated engineering and urban design outcome. Successful outcomes would see that the proposal, in accordance with *Beyond the Pavement - Urban design policy procedures and design principles* (Roads and Maritime Services, 2014):

- fits sensitively into the built and natural environments through which it passes and contributes positively to the character and function of the area.
- contributes to the safety, accessibility and connectivity of people within the region and communities
- mitigates to the best of its ability any negative impacts that may be imposed on the community and the natural environment.
- considers the outcomes of the landscape character and visual impact assessment so they are iteratively fed into the concept design development process.

1.5 Project Approach

The study follows a process of consideration of numerous aspects in order to develop a suite of urban design principles that can be achieved in the final design outcome. Its an iterative process where issues, opportunities, constraints and mitigation measures related to the landscape character and visual assessment are incorporated into the engineering and urban design concept.

The landscape and visual impact assessment (LCVIA) has been undertaken in accordance with the Roads and Maritime (RMS) *Environmental Impacts Assessment Practice Note – Guideline for Landscape Character and Visual Impact Assessment EIA-N04* (2018) .

In accordance with these guidelines, key steps in the landscape character and visual impact assessment include:

1. **Contextual Analysis** - An analysis of the regional and local context in which the road passes through. It considers the findings of the New England Highway Urban Design Framework which locates Singleton in the sub-region of the 'Upper Hunter Country' based on key landscape characteristics. It also includes an analysis of the landscape character with the identification of specific landscape character zones.
2. **Urban Design Vision, Objectives and Strategy** - The development of urban design principles that align with the overall vision for the Highway outlined in the RMS New England Highway Urban Design Framework. The principles would be delivered through a set of clear and achievable objectives that would guide the urban concept design.
3. **Urban Design Concept** – The preparation of an illustrative urban design concept that reflects the urban design strategy.
4. **Landscape Character Impact Assessment** - An evaluation of the existing landscape character within the proposal area to inform the early stages of the urban design process, and to assess the anticipated landscape effects as a result of the final design outcome.
5. **Identify Representative Viewpoints** - Mapping the extent of visibility of the proposal to identify sensitive receivers from publicly accessible areas, as well as a selection of representative viewpoints.
6. **Visual Impact Assessment** - An evaluation of the existing views and visual amenity along the proposed bypass alignment to identify and assess possible impacts placed on the community by the proposed works.
7. **Mitigation** – A list of mitigation measures to reduce adverse impacts that the proposal may impose within the study area.

1.6 Landscape Character Assessment

A Landscape Character Zone (LCZ) is best described as an area, or component of a landscape area, that is relatively homogeneous in character, sharing broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement patterns and aesthetic attributes.

Assessment of landscape character impact deals with the effect of change on the landscape, the aesthetic and - the distinctive character of a particular LCZ. The two primary factors used to determine the extent of impact within a particular LCZ include;

- **Sensitivity** - Susceptibility of the landscape to a specific type of change.
- **Magnitude** - A combination of the scale, extent and duration of a change.

1.6.1 Sensitivity

The sensitivity of a landscape is based upon the extent to which it can accept change of a particular type and scale without adverse impacts upon its character or value. Sensitivity is based on;

- Inherent landscape value, e.g. its condition, perceptual qualities and cultural importance
- Likely congruency of the proposed change, e.g. the extent to which the proposal may 'fit' or be 'absorbed' into the landscape.

1.6.2 Magnitude

The magnitude of change depends on factors such as the extent of:

- Loss, change or addition of any feature or element.
- The duration over which the landscape effects would be felt, e.g. short, medium or long term.
- Change to the landscape itself or one nearby that affects its character
- The quality and extent of the concept design solution.

These individual criteria listed above are combined to achieve a landscape sensitivity and magnitude rating using a qualitative ratings guide and matrix table as shown in *Table 1*.

1.6.3 Overall rating of landscape character effects

Once the sensitivity of the landscape to change and the magnitude of the landscape effect is determined, a rating matrix is used to determine an overall rating of landscape effects based on *Table 1* below.

Table 1: Overall significance of landscape character effects

SENSITIVITY	MAGNITUDE OF EFFECT				
		High	**Moderate**	**Low**	**Negligible**
	High	High	High - Moderate	Moderate	Negligible
	Moderate	High - Moderate	Moderate	Moderate - Low	Negligible
	Low	Moderate	Moderate - Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

1.7 Visual Impact Assessment

Assessment of visual impacts (VIA) deals with the effects of changes to the landscapes perceived by individuals or groups of people, resulting from change or loss of existing elements of the visual landscape and/or introduction of new elements to relevant users of the proposal. As per the landscape character assessment the two primary factors used to determine the extent of impact are '**sensitivity**' and '**magnitude**'.

1.7.1 Sensitivity

The sensitivity of visual receptors and existing views to the proposed change is dependent on:

- Location and context of the receptor location.
- Expectations and activity of the receptor.
- Type and number of receptors.
- Quality of the existing view.
- Temporal duration of the view.

The most sensitive visual receptors may include:

- Users participating in outdoor passive recreational activities.
- Communities where development results in changes in the landscape setting or valued views enjoyed by the community.
- An area of high frequency and range of users.
- Residents with views affected by the project from their homes and living spaces.

1.7.2 Magnitude

The magnitude of change on a view would depend on factors such as:

- Extent of visibility of the change as per the visual envelope.
- The scale, size and character of the project.
- Degree of obstruction of existing features.
- Degree of contrast with the existing view.
- The quality of the design outcome.
- Angle of the existing view.
- Distance of view from the project.

1.7.3 Overall rating of visual effects

These individual criteria listed above are combined to achieve a visual sensitivity and magnitude rating using the same qualitative ratings guide and matrix table applied to the landscape character impact assessment as shown in *Table 1*. It is to be noted that the VIA is based on the landscape outcomes at 12-18 months after completion, therefore conservative ratings have been applied and the VIA ratings would generally be expected to improve over time.

1.7.4 Visual Envelope

The likely visibility of the final proposal from surrounding areas (visual catchment) has been broadly mapped to create a visual envelope. This provides a measure of the extent of receptors with visibility of the proposal in the surrounding environment. The visual envelope has been derived from a desktop review of aerial photography, GIS mapping of topography, review of concept design as a visualisation in Google Earth 3D terrain model and site inspections.

2 CONTEXTUAL ANALYSIS

2.1 Regional Scale

2.1.1 Catchment Context

The Hunter River drains the largest coastal catchment in New South Wales, covering some 22,000 square kilometres (refer *Figure 1*). Regionally, the Hunter Valley:

- supports a range of agricultural activities including wineries, dairying, vegetables, fodder, beef and horse breeding.
- contains the Greater Blue Mountains World Heritage areas of Wollemi and Yengo National Parks, in addition to Goulburn River National Park to the south, and Mount Royal and Barrington Tops National Parks to the north.
- contains over 20 of the world's largest coal mines and three power stations, including Australia's largest electricity generator (EPA, 2017).

As can be seen in *Figure 1*, Singleton is located well down into the lower half of the catchment, i.e. broadly three quarters of the catchment (about 16,500 square kilometres) is upstream of the Singleton township.

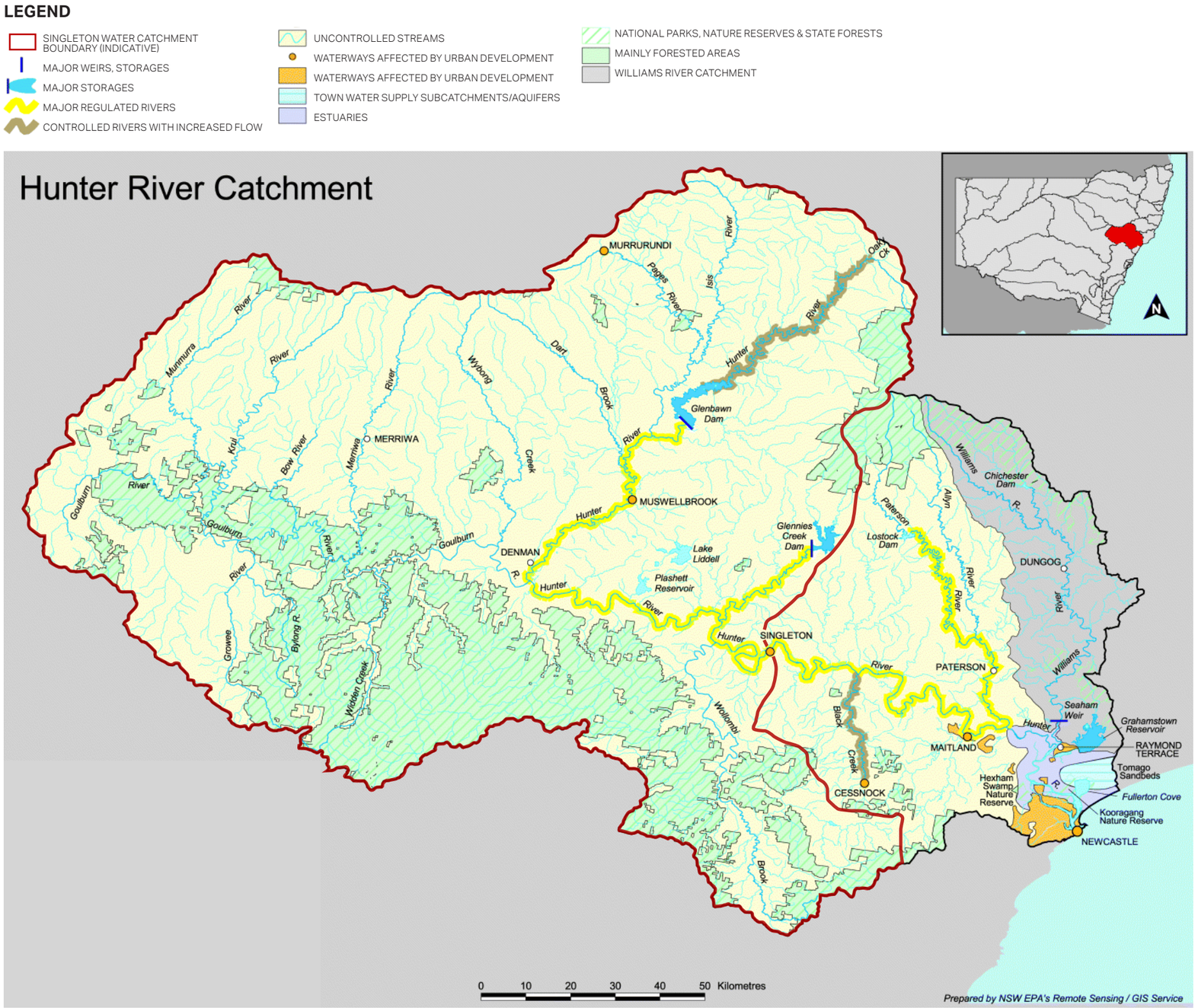


Figure 1: Hunter River Catchment Map (Source: NSW EPA, modified by AECOM)

2.1.2 Regional Context

The crossing of the Hunter River at Singleton comprises the only location where the New England Highway crosses a major river over its 900 kilometre length.

The proposal is located in the Singleton local government area (LGA) in the Hunter Valley, 75 kilometres inland from Newcastle, 47 kilometres south-east of Muswellbrook and 200 kilometres north from Sydney, on the New England Highway (the Highway) (refer *Figure 2*). The Singleton LGA is situated in the heart of the coalfields, agricultural land and the popular Hunter Valley Wine Country. Wollemi and Yengo World Heritage National Parks are located about 15 kilometres south-west of the town, and Mount Royal and Barrington Tops National Parks about 35 kilometres to the north. The LGA covers a wide variety of landforms ranging from the dominant, forested features of The Great Dividing Range, through to the alluvial floodplains of the Hunter Valley.

The surrounding National Parks and State Forests provide some spectacular scenery and backdrops to the low-lying agricultural lands. Small intimate villages such as Jerry's Plains, Bulga, Milbrodale, Broke and Fordwich are scattered throughout the LGA at the foothills of the National Parks and State Forests, and rely on Singleton township as a service centre.

Singleton was established in the 1820s, with the Main North Railway line reaching the town in 1863. The town retains many historic buildings, including the original court house built in 1841, various large churches and many traditional Australian pubs. The countryside surrounding Singleton contains an unusual number of fine old mansions, reflecting the aristocratic nature of land grants when the area was settled (Wikipedia). Refer *Figure 3* to *Figure 8*.

The Hunter River flows through Singleton reaching the sea at Newcastle (refer *Figure 2*).

The climatic characteristics of the region are westerly winds and high pressure systems that alternate with cold fronts during winter. South-easterly and north-easterly winds dominate during summer with occasional sea breezes providing a slight cooling effect. The broader region of Singleton is well known for its climatic extremes with major floods, droughts and bushfire events over the years having had an impact on the LGA.

Singleton sits within the Wanaruah Aboriginal Land Council boundary which is rich with Aboriginal culture with culturally significant sites scattered throughout the region. Such sites include Baiame Cave, Appletree Flat Aboriginal Area, Wollombi Brook Conservation Area, Lizard Rock, Bulga Bora and Mount Yengo.

Figure 2: Regional Newcastle context map (Source: Google Earth, modified by AECOM)

Figure 3: Wollemi National Park World Heritage Area

Figure 4: St Patrick's Catholic Church, Queen Street, Singleton

Figure 5: Wine growing south of Singleton

Figure 6: Agricultural floodplain

Figure 7: The heritage listed Newton Street Bridge in Singleton

Figure 8: View looking north-east over Liddell Thermal Coal Mine. Mount Royal National Park in far background

2.2 Landscape Setting

2.2.1 Landcover

Figure 9 shows the landscape setting of the Proposal. Key elements of the landscape comprise:

- The fertile, agricultural Hunter River floodplain which runs from west to east across the page, and is identified by the diversely chequered forms of both irrigated and non-irrigated paddocks, presenting with a diverse array of greens, browns and khaki.
- Singleton Township to the centre of the figure comprising:
  - the original old town, within the floodplain south of the Hunter River,
  - more recent residential suburbs of Singleton Heights and Hunterview to the north, and Gowrie to the west of the old town, and
  - an industrial estate to the north-west within the suburb of Maison Dieu.
- Large, light grey areas of open cut coal mines located from the south-west through to the north of Singleton.
- Large patches of regrowth and remnant endemic forest communities on gently rolling and often more elevated areas.
- Open pasture land, primarily subject to grazing.
- More tightly winding, capillary-like lines of watercourses flowing north and south down tributary valleys into the Hunter River, with their lower reaches also often containing small areas of agricultural floodplain near their confluence with the River.

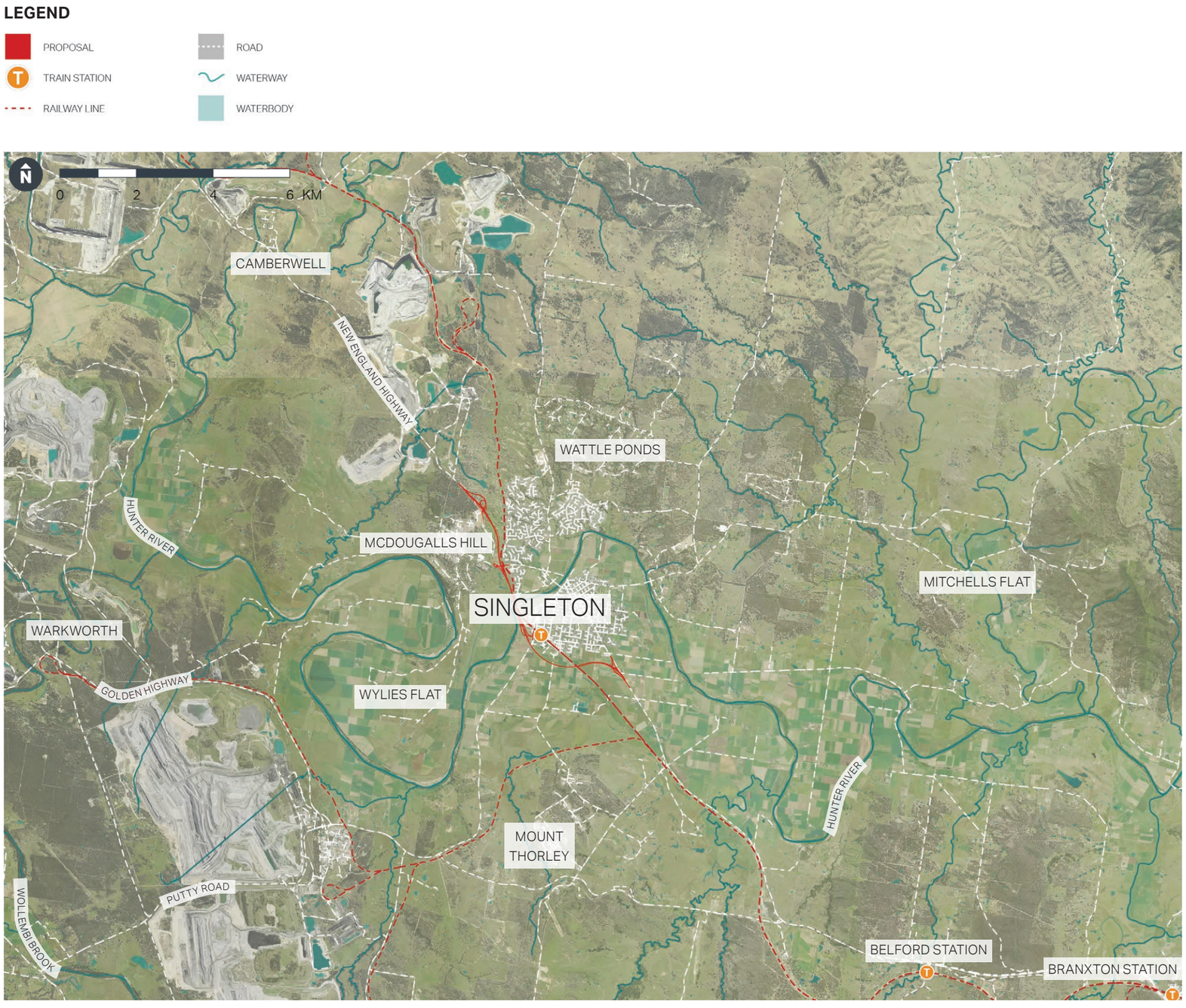


Figure 9: Proposal landscape setting, 1:125,000 at A3 (Source: AECOM)

2.2.2 Geology

Figure 10 shows the local geology within the landscape setting of the Proposal. An immediate correlation can be seen between the above described chequered green, brown and khaki forms of both irrigated and non-irrigated paddocks on the Hunter River floodplain (refer *Figure 9*), and the unnamed unit of gravel, sand, silt and clay which comprises the floodplain. As also can be seen, that part of the floodplain within which the old town of Singleton lies is significantly wider than those areas upstream and downstream, comprising a length of about 20 kilometres (between Wylies Flat and Mitchells Flat), and a width of 5-6 kilometres (refer *Figure 10*). The Hunter River describes a series of wide meanders through this area, pushing alternatively between the northern and southern banks of the floodplain, with a corresponding increase in the meander length and width through this area, as compared with the areas upstream and downstream. This change possibly reflects the softer nature of the underlying rock in this area, compared with the Singleton Coal Measures both upstream and downstream of this area.

What can be taken from the above with regard to landscape setting, is that the floodplain setting of Singleton is substantially distinctive in both its area and river form from that of the narrower floodplains upstream and downstream of it, affording an extensive and fertile agricultural floodplain. This is diagonally bisected by the Highway over a distance of about 10 kilometres, and as above, comprises the only example of a major river crossing on the Highway. As such, from the perspective of the road user, this floodplain landscape comprises a unique, picturesque and highly contrasting feature of the Highway.

Table 2: Geological lithology of Singleton

UNIT NAME	LITHOLOGY
Mulbring Siltstone	Siltstone and sandstone.
Muree Sandstone	Sandstone and conglomerate
Branxton Formation	Mudstone, sandstone and conglomerate
Singleton Coal Measures	Sandstone, shale, mudstone, conglomerate and coal seams
Wallaringa Formation	Conglomerate, acid tuffs, lithic red siltstones. Includes correlatives
Gilmore Group	Intermediate to acid crystal and vitric tuff and lavas, conglomerate, sandstone
Mt Johnstone Formation	Conglomerate, lithic sandstone, shale, occasional thin coal
Narrabeen Group	Sandstone, conglomerate, red and green claystone, shale

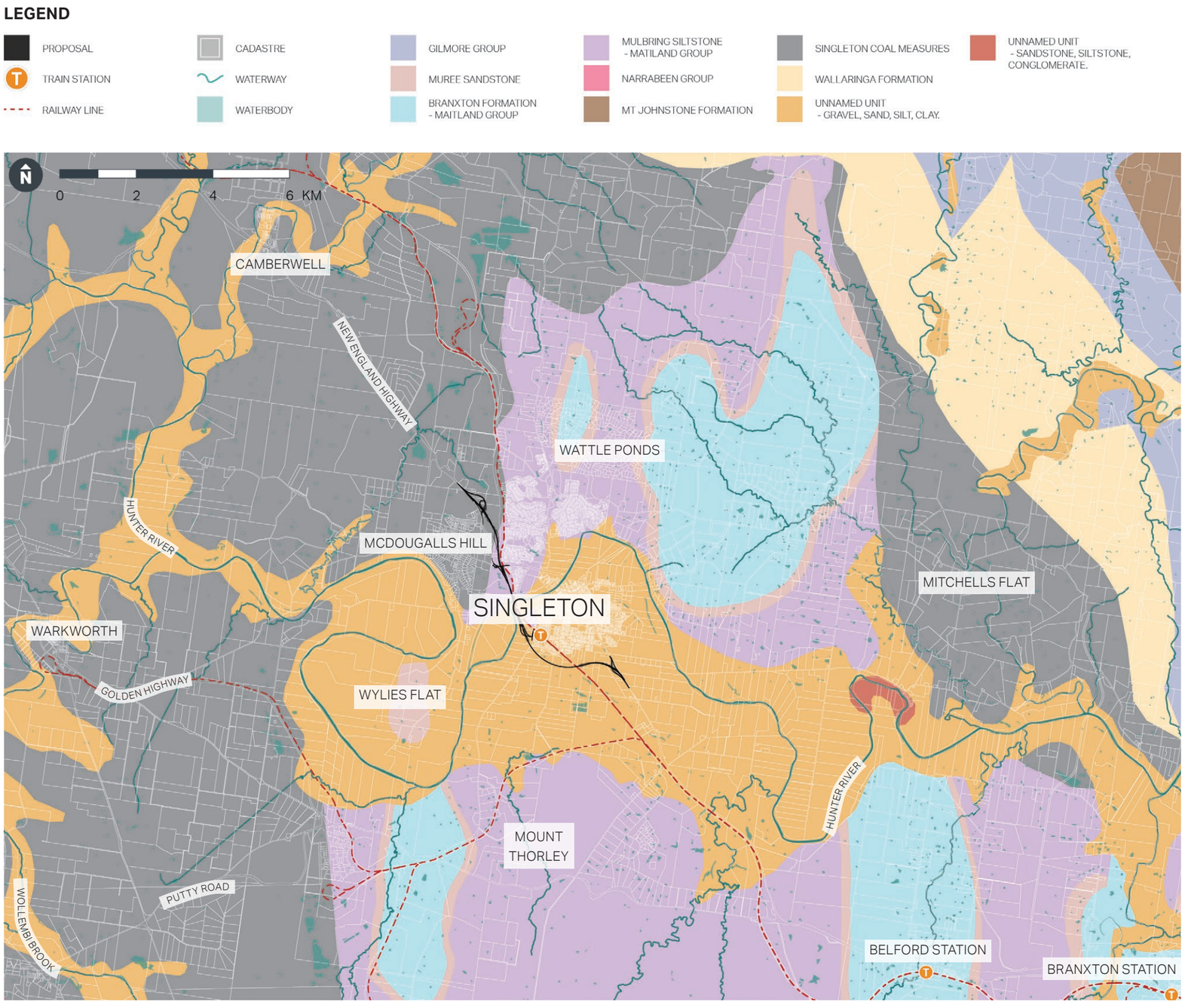


Figure 10: Geological Map, 1:125,000 at A3 (Source: AECOM)

2.2.3 Local Context

The early settlement of Singleton was built along the banks of the Hunter River in flood-prone land. The old town centre is focussed around the busy 'high' streets of John Street and the Highway where there is a large number of retail and commercial businesses housed in heritage buildings of varying architectural styles. The Hunter River divides the town, with the floodplain encompassing the area of original settlement which is a constraint to development and traffic movement along the Highway. More recent development comprising mostly low density residential and an industrial estate is located on non-flood prone land to the north.

Early European history is evident in the architecture of buildings within the old part of Singleton. It can also be seen in agricultural landscapes with remnant fences, stockyards, in the middle and far distance, large historic manor homes and rest houses can be seen across the floodplain.

Within the town of Singleton, the Main North Railway line intersects the road network in two locations via bridges. It crosses over the Highway to the north of the CBD and crosses under John Street immediately adjacent to Singleton Railway Station in the CBD.

Through this region the proposed bypass would travel along flat to undulating stretches of landscape with open pastoral views, rolling plains and forested hills in the distance. The proposed bypass would also cross the Hunter River on the town centre outskirts which is significant in the fact that it is the only major river crossing on this section of The Highway. Refer *Figure 11* and *Figure 12*.

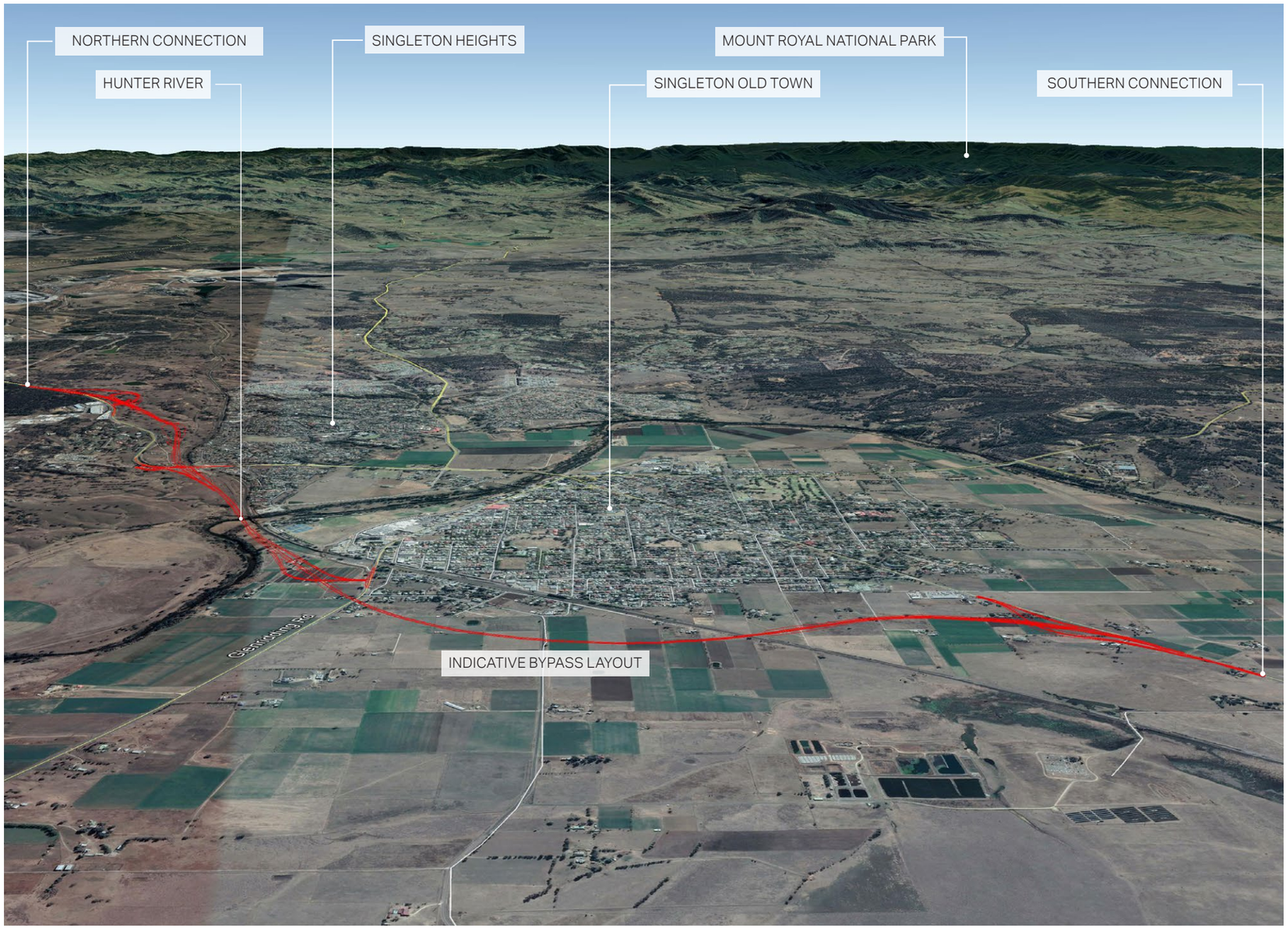


Figure 11: Singleton local map - View looking North (Source: AECOM)

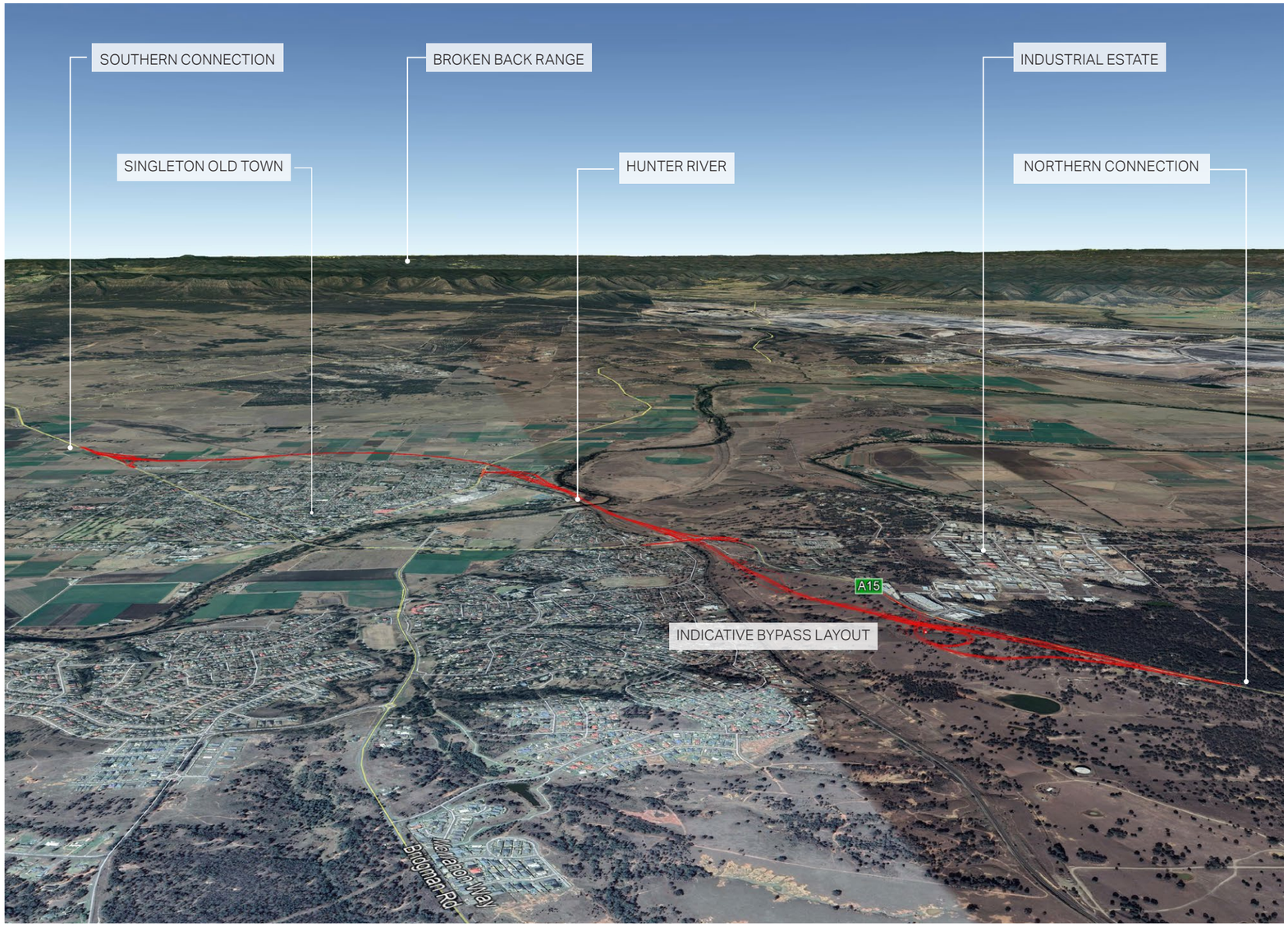


Figure 12: Singleton local map - View looking South (Source: AECOM)

2.2.4 Topography

As can be seen in *Figure 13*, most of the water from this catchment runs through the town of Singleton, i.e. between the old town which is set island-like upon a low, flood prone rise within the floodplain, and the more recent residential suburbs of Singleton Heights, Hunterview and rural residential development at Gowrie, all located on higher foothills to the north and west of the old town.

Levels proximate to the Proposal range from about 30 metres AHD on the floodplain to about 120 metres AHD at McDougalls Hill.

The erosive, earth-shaping power of the Hunter River can be seen by the way it is cutting into McDougalls Hill north and east of Long Point, and the narrow point of land between Long Point and Singleton (refer *Figure 13*).

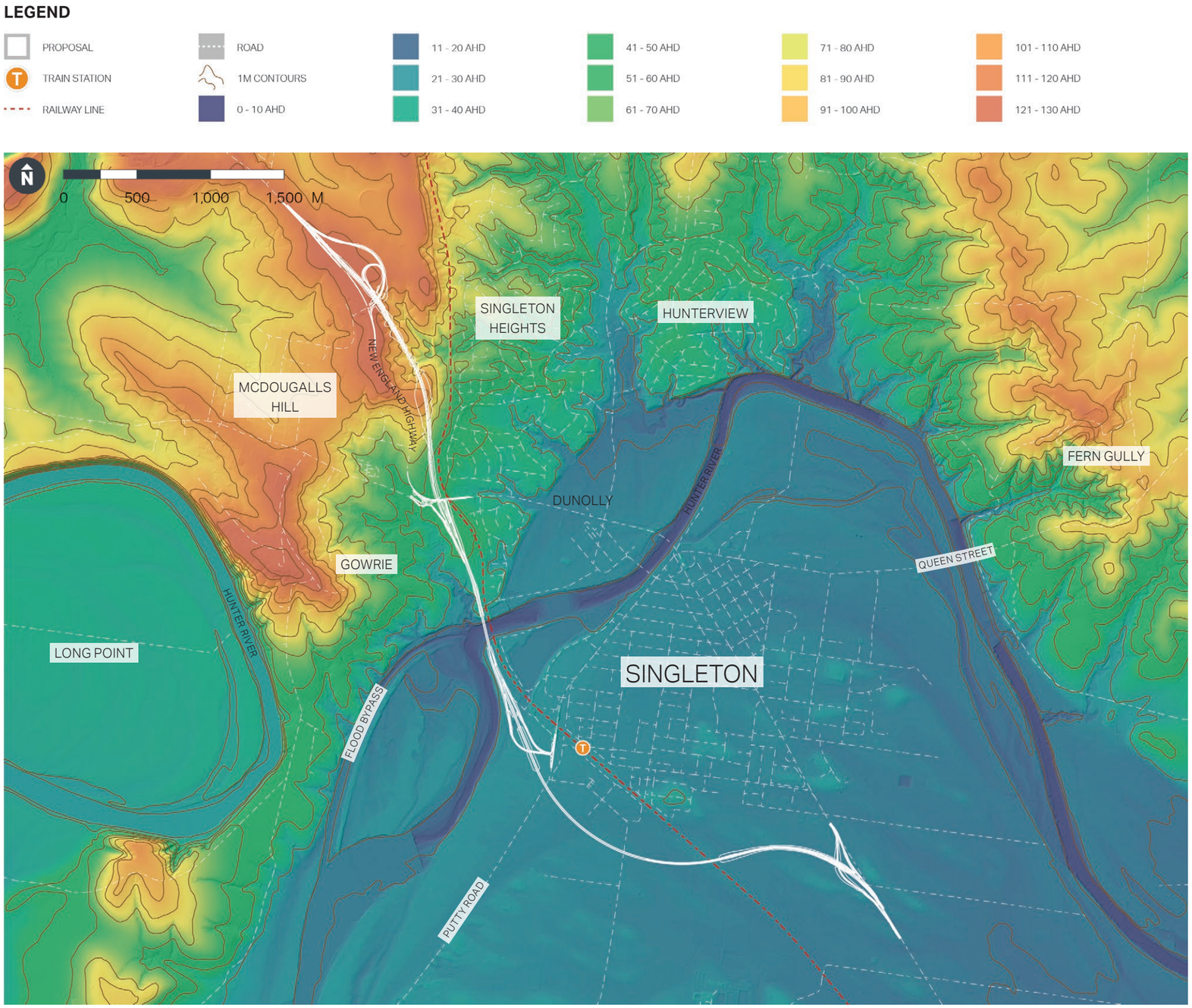


Figure 13: Topographical Map, 1:35,000 at A3 (Source: AECOM)

2.2.5 Drainage

As can be seen from *Figure 15*, localised depositional areas have built up on the floodplain, as seen at Long Point, and beneath the old town of Singleton and adjacent settlement of Dunolly. All of these areas have been subject to flooding, and continue to be flood prone.

In 1955 the Hunter Valley suffered its worst recorded flood when heavy rain began falling in the Upper Hunter Valley. Days of torrential rain saw the Hunter River peak at 14.57m. The flood peak remained steady for 36 hours wreaking havoc on Singleton, surrounding districts and downstream in Maitland. Refer *Figure 14*.

Singleton also suffered further recent serious flooding in 2007 and 2015.

Figure 14: View looking east along Campbell Street to the New England Highway (the main street of the old town) in the 1955 flood. (Source: Singleton News)

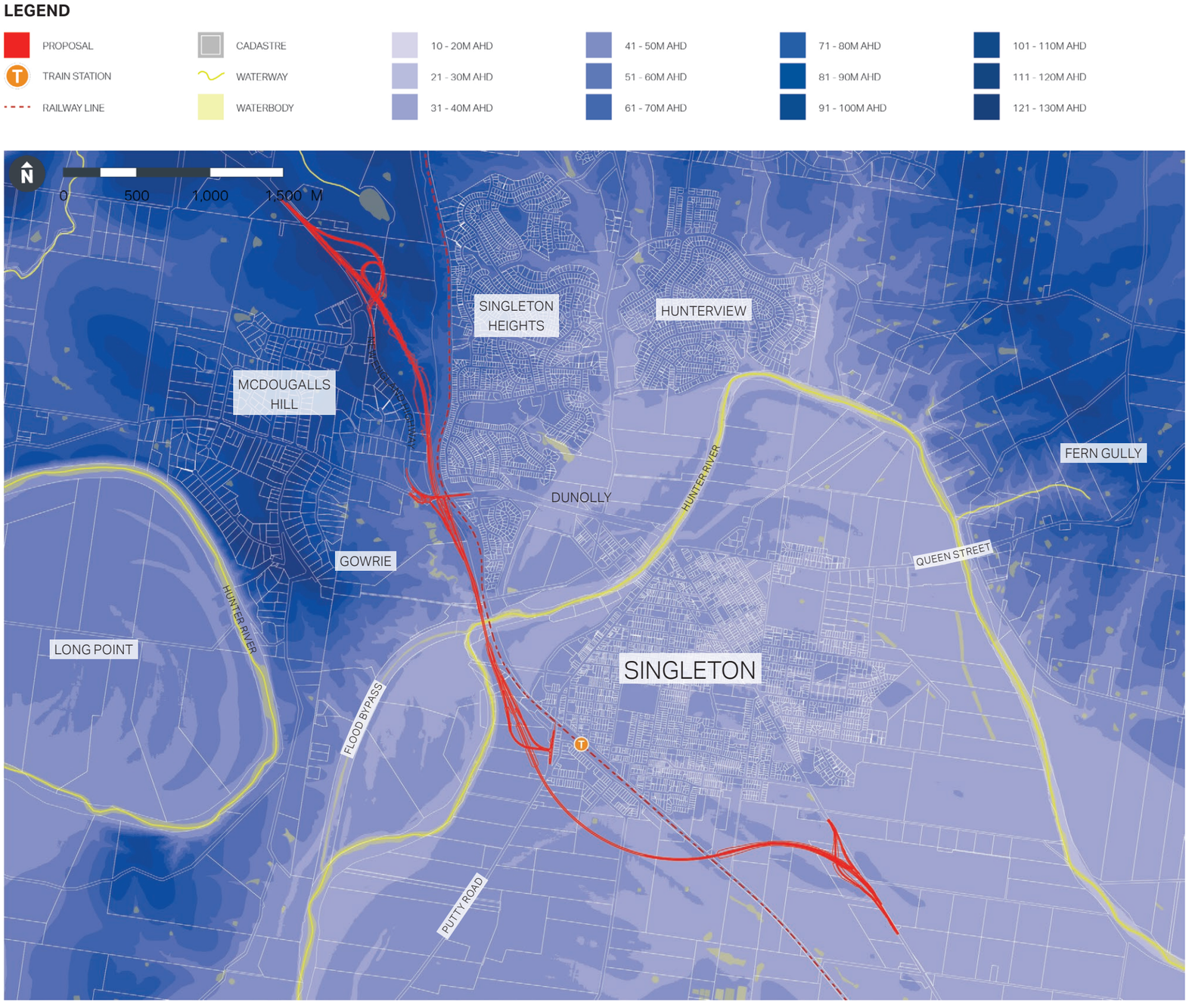


Figure 15: Drainage Map, 1:35,000 at A3 (Source: AECOM)

2.2.6 Land Use Zoning

As can be seen from *Figure 16*, the predominant land uses within the locality comprise:

- primary production (RU1), e.g. cattle, crops, market gardens,
- general residential (R1) within the old town (south of the Hunter River), and more recent elevated suburbs to the north (with provision for future housing in Gowrie west of the old town),
- environmental living (E4) west of Gowrie,
- the McDougalls Hill Industrial Estate (B5), adjoined along its southern boundary surrounding the southern half of an industrial area,
- commercial and business uses located along the northern edge of the old town (B4 and B3),
- open space generally confined to the main drainage lines and the floodplain (RE1), and
- a large conserved bushland remnant at the northern end of the Proposal (E2).

Key infrastructure elements comprise the Main North Railway line, and the existing Highway which runs straight, through the old town to the Hunter River crossing, veers west across the remainder of the floodplain before climbing north to the top of McDougalls Hill, which broadly corresponds with the main entry to the McDougalls Hill Industrial Estate.

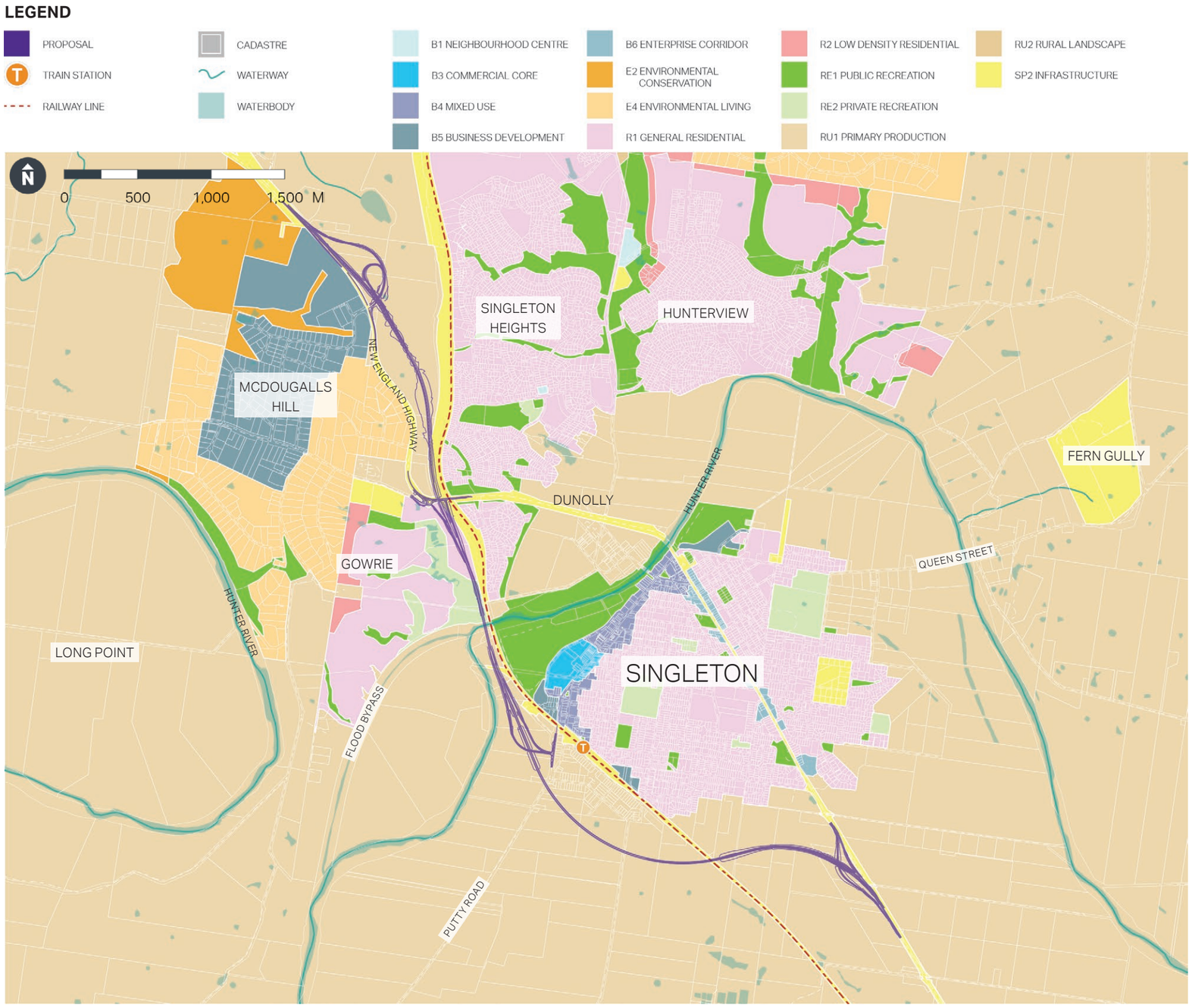


Figure 16: Singleton LEP, 1:35,000 at A3 (Source: AECOM)

2.2.7 Agricultural Qualities

As can be seen from *Figure 18*, the most fertile parts of the floodplain are clearly distinguishable, defined as 'suitable for regular cultivation', and characterised by the patchwork cover of flood-prone irrigated and non-irrigated fields comprising crops and market gardens (refer *Figure 17*), with all other types basically 'dryland', and 'suitable for grazing with occasional cultivation' or 'no cultivation'. The proposed bypass would straddle this feature over a distance of about 5.5 kilometres, of which about 4.0 kilometres would be either on embankment or bridge set well above the floodplain.

Figure 17: View looking south-west across the floodplain from Putty Road (Source: AECOM)

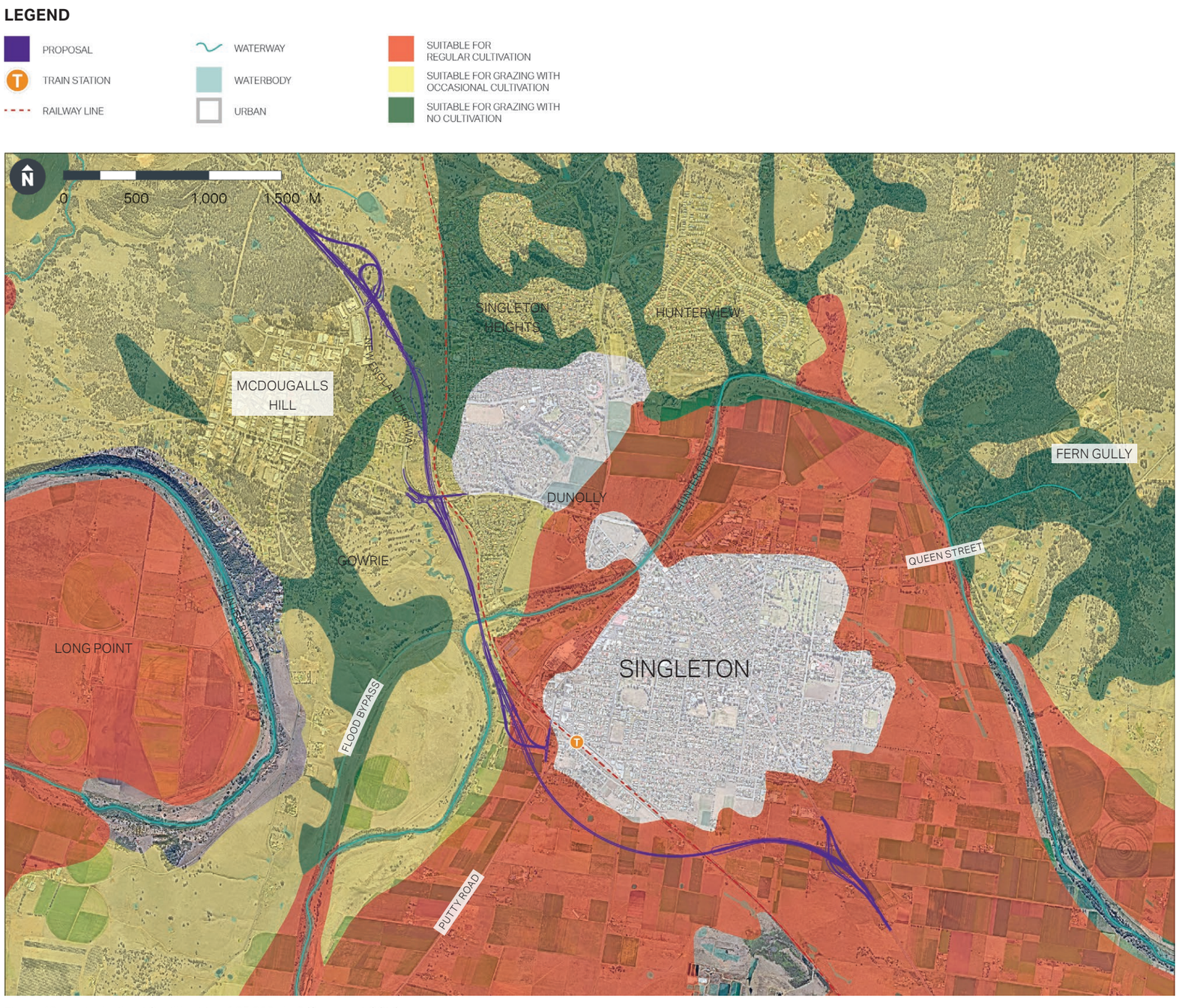


Figure 18: Agricultural Qualities Map, 1:35,000 at A3 (Source: AECOM)

2.2.8 Vegetation

Large areas of floodplain that have been cleared for agricultural purposes. The historic vegetation on the Hunter River floodplain was likely characterised by open forests dominated by a canopy of Forest Red Gum (*Eucalyptus tereticornis*), an open shrub layer and grassy ground cover.

The Hunter Lowland Redgum Forest EEC is a good match for what likely covered much of the floodplain and a list of characteristic species is provided in the determination (noting that not all the species in the list are suitable/ available for planting).

River Red Gum (*Eucalyptus camaldulensis*) in the Hunter Catchment is an endangered population under the NSW BC Act, and would have dominated the river banks and still occurs in a few locations. Any plantings should use propagation materials of local provenance [pers comm: Tom Schmidt – Ecologist – Eco Logical Australia].

The following threatened ecological populations and communities are present within the study area shown in *Figure 19*:

One endangered population, outside of the development footprint, comprising river red gum (*Eucalyptus camaldulensis*) in the Hunter Catchment endangered population, as listed under the *Biodiversity Conservation Act 2016* (BC Act)

- Two threatened ecological communities (TEC) as listed under the BC Act were recorded within the study area, comprising *Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions EEC* (BC Act) *and Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions* EEC (BC Act)
- One TEC as listed under the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) was recorded in the study area, comprising *Central Hunter Valley Eucalypt Forest and Woodland CEEC* (EPBC Act)
- Two TECs are predicted to occur in the study area based on regional vegetation mapping, comprising the *Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregion EEC* (BC Act) and *Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions* EEC.

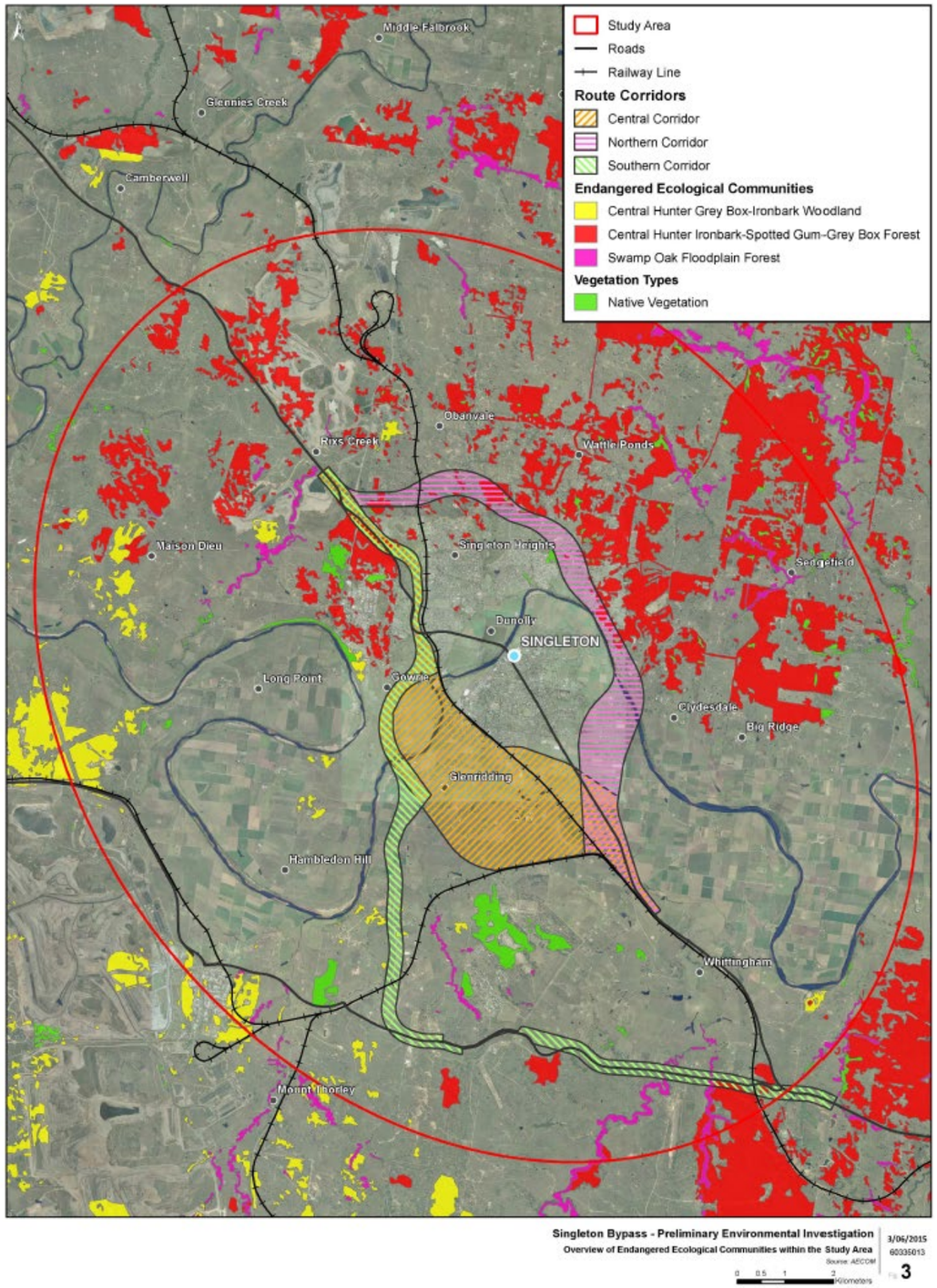


Figure 19: Threatened Ecological Communities within potential route corridors, reproduced from route options identification report (Roads and Maritime 2015a).

2.2.9 Aboriginal Heritage

Archaeological field investigations undertaken for the proposal have identified numerous Aboriginal archaeological sites across the study area, indicating a widespread Aboriginal presence in the past (refer *Figure 20*). However, in keeping with local and regional archaeological datasets, the results of archaeological survey and test excavation works within the study area point to an occupational emphasis on higher order watercourses. The Hunter River, in particular, appears to have been a focal feature for Aboriginal peoples occupying the study area and greater Singleton area more broadly, with the river and its associated economic resources likely facilitating sustained and/or repeated occupation over thousands of years. Test excavations across the river's elevated left bank terrace have revealed the presence of high subsurface artefact densities consistent with intensive occupation of this landform element. In addition to serving as a reliable source of drinking water, the Hunter River would have provided a range of other resources including gravels for flaked and edge-ground stone tool manufacture, animal foods (ie, freshwater fish, eels, mussels and crustaceans) and edible plants. High terraces bordering the river, such as that within study area, would have represented prime locations for nuclear family or community base camps.

Dating of artefacts suggests that the findings are suggestive of Aboriginal occupation of the area from about 4,000 years prior to European contact. At the same time, the identification of flaked glass artefacts within the study area attests to post-contact Aboriginal occupation and complements local evidence of this phenomenon.

Aboriginal Knowledge Holders consulted for the proposal's cultural values assessment have indicated that the study area lies within a broader cultural landscape that holds significant traditional, historical and contemporary cultural values to the Aboriginal community of the region. Within this broader cultural landscape there are a range of specific locations and pathways that are known to the contemporary Aboriginal community. Cultural Site A: Gathering Place (Railway Bridge Camps), located in the central portion of the study area, is one such location, as are nearby sites Cultural Site B: Cultural Line of Sight and Cultural Site C: Camping Place. Notably, historical reference materials indicate that land within and surrounding Cultural Site A, which has been identified by Aboriginal Knowledge Holders as being of high cultural significance to the local Aboriginal community, comprised part of noted Singleton identity Reverend James S. White's Gowrie estate. Reverend White's association with the study area is of particular significance given the central role that he played in the post-contact history of Aboriginal people occupying the greater Singleton distict. White was an ardent advocate for the district's surviving Aboriginal population and was responsible for the establishment of the St Clair Mission in 1893.

Of the 25 Aboriginal archaeological sites located within the study area, an assessment of the scientific significance of identified sites has found that majority are of low scientific significance. Identified sites of low scientific significance within the study area consist principally of open artefact sites (i.e. isolated artefacts and artefact scatters) in disturbed contexts, with a single potential scarred tree and a single area of Potential Archaeological Deposit (PAD) also recorded. The remaning two sites have been assessed as being of moderate scientific significance.

INSET A

Figure removed due to cultural sensitivity

Figure 20: Aboriginal Heritage Map, 1:35,000 at A3 (Source: AECOM) - Removed due to cultural sensitivity

2.2.10 European Heritage

Figure 22 shows an excerpt from the 1933 Parish Map of Whittingham, illustrating the extent of the Singleton township at that time. The Main North Railway line (bordering the southern edge of the town), and the Highway (running straight through the town) can be seen running diagonally across the page. The old town is effectively contained south of the Hunter River, and as can be seen in *Figure 15*, was perched on locally higher areas of flood deposition within the floodplain.

Figure 21 shows information derived from Singleton Council's European heritage map (Singleton LEP, 2013). As can be seen, heritage listings are primarily focussed around the old town, in addition to several larger landholdings to the south of it.

Figure 21: European Heritage Map, 1:35,000 at A3 (Source: AECOM)

Figure 22: 1933 Parish Map Whittingham (excerpt) showing the early township of Singleton

2.3 Landscape Character Zones

Seven Landscape Character Zones (LCZ) have been identified within the study area:

LCZ 1 Enclosed Rural Landscape

LCZ 2 Open Rural Landscape

LCZ 3 Industrial

LCZ 4 Large Lot Residential

LCZ 5 New Residential Suburbs

LCZ 6 Agricultural Floodplain

LCZ 7 Singleton Old Town

Figure 23 maps the above relative to the Proposal.

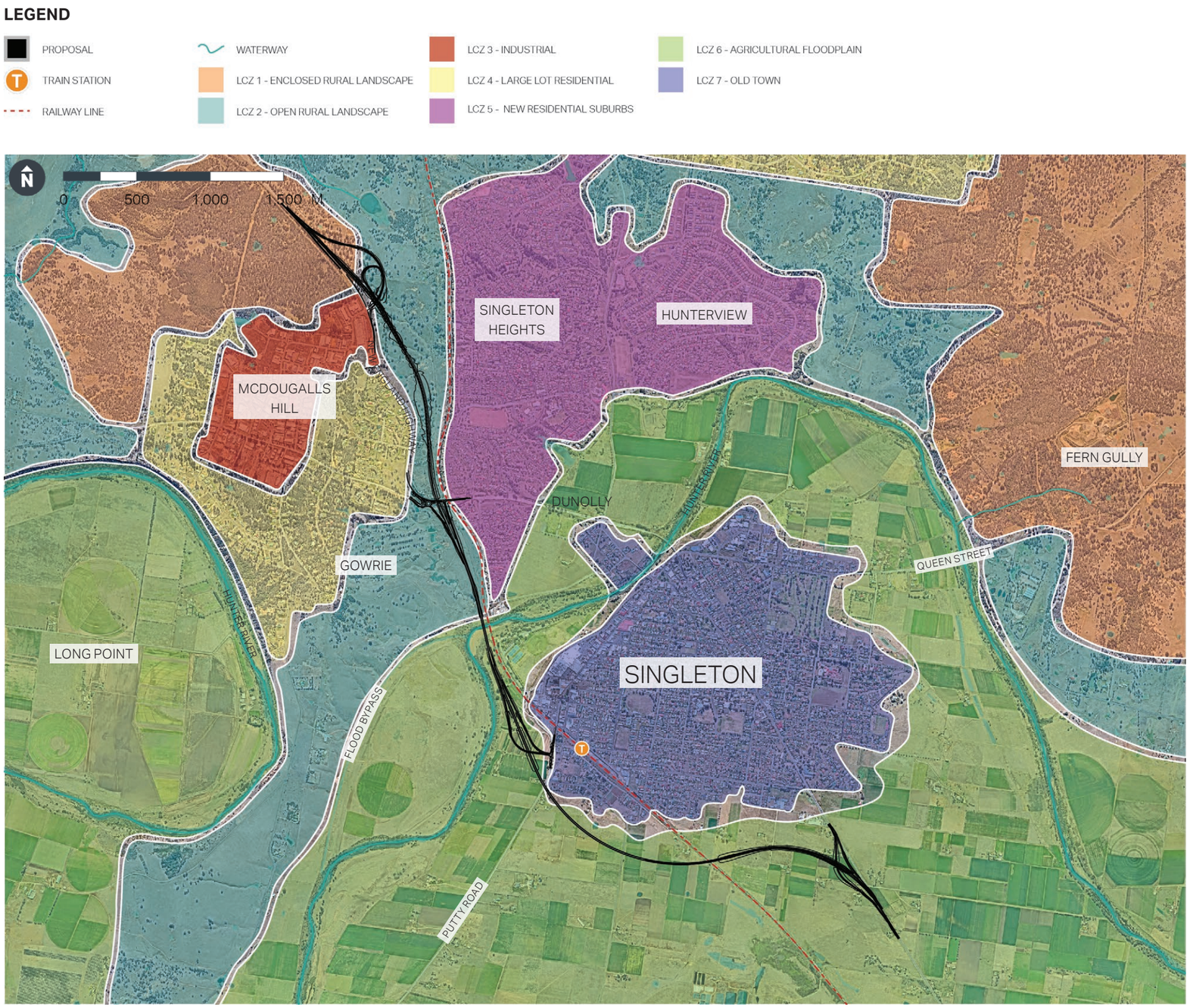


Figure 23: Landscape Character Zones Map, 1:35,000 at A3 (Source: AECOM)

2.3.1 LCZ 1: Enclosed Rural Landscape

Heavily vegetated remnant bushland of Ironbark-Spotted Gum-Grey Box Forest through which the Highway passes, creating a sense of an enclosed landscape with tall vertical scale.

Component	Description
Land Use	E2 Environmental Conservation to western side, and RU1 Primary Production to the eastern side of the Highway
Topography	Undulating foothills country
Vegetation	Heavily forested regrowth Ironbark-Spotted Gum-Grey Box vegetation community
Built Form	Road infrastructure
Spatial Form	Sense of enclosure, particularly on the western side of the Highway

Figure 24: View looking south along New England Highway about 300 metres north of entry to McDougalls Hill Industrial Estate

Figure 25: View looking north along New England Highway about 300 metres north of entry to McDougalls Hill Industrial Estate

2.3.2 LCZ 2: Open Rural Landscape

A predominantly open rural setting with remnant and regrowth tree stands scattered throughout an undulating to rolling landform of pasture land. The character ranges from areas virtually devoid of trees (refer *Figure 23*, the spit of elevated land between Long Point and Singleton old town), to areas that have moderate stands of trees but still sufficiently open such that they frame views across the broader landscape rather than comprise the view . Natural regeneration is occurring over parts of this LCZ. If left for a sufficient time, these areas would naturally return to a forest cover of endemic trees, albeit, at least in the short to medium term, with a limited native understorey.

Component	Description
Land Use	Primary Production
Topography	Undulating foothills country
Vegetation	Cleared understorey with scattered Ironbark-Spotted Gum-Grey Box trees with greater density along the roadside edge.
Built Form	Road infrastructure and occasional rural dwellings with associated sheds and farming infrastructure, accessed by long gravel driveways and stock fences.
Spatial Form	Partially enclosed in the northern section to expansive and open in the middle and southern areas.

Figure 26: View looking south from Maison Dieu Road across open rural landscape

Figure 27: View looking east from New England Highway across open rural landscape in the foreground to forested mountains on the horizon

2.3.3 LCZ 3: Industrial

Typical industrial zone character including large factory-style bulky buildings, wide streets and devoid of structured landscape works or significant street tree planting. The entry to the industrial zone is signified by the existing Magpie Street intersection with a recently built Bunnings and car sales yard typical of the architectural quality. The remaining parts of the industrial estate vary in quality of built form. The majority of the industrial park is hidden from view from the existing the Highway due to topography and intervening development.

Other than for three large developments fronting onto the Highway, the LCZ is surrounded by well-wooded large lot residential development along its western, southern and eastern edges (LCZ 4), and a substantial patch of conserved bushland along its northern edge (LCZ 1). This provides some measure of visual containment within LCZ 3, although generally only readily apparent when approaching the edges of the development.

Component	Description
Land Use	Business Development / Conservation
Topography	Gently sloping, with much of the LCZ contained with a small valley-form draining west(refer *Figure 13*).
Vegetation	Sparse introduced landscape works associated with private development, with wooded edges as above described.
Built Form	Large bulky buildings / factories.
Spatial Form	Linear, structured and mostly enclosed due to scale of buildings, topography and adjoining well-wooded development and conserved bushland.

Figure 28: View looking south to McDougalls Hill Industrial Estate car dealership fronting the New England Highway

Figure 29: View of Magpie Street entry to McDougalls Hill Industrial Estate near the high point, with the Greater Blue Mountains World Heritage Area seen on the horizon

2.3.4 LCZ 4: Large Lot Residential

Small acreage lots varying from mostly cleared, to heavily-wooded with remnant Spotted Gum and Ironbark trees creating a rural / bushland residential setting. The rural setting is highlighted with a number of properties aligning front boundaries with rural style post, rail and wire fencing. Streets have a rural profile with open drains, degraded road edges and wide grass verges. The area is predominantly screened from view from the existing the Highway due to vegetation and topography.

Component	Description
Land Use	Environmental Living
Topography	Gently to moderately sloping, predominantly draining east and west (refer *Figure 13*) from a north to south running ridgeline.
Vegetation	Mix of remnant native trees, gardens and open, manicured lawns.
Built Form	Detached dwellings and large sheds.
Spatial Form	Mostly enclosed due to vegetation and topography with some elevated areas having a sense of openness with views to distant forested ranges.

Figure 30: Representative view of large lot rural residential within Maison Dieu

Figure 31: Representative view of large lot rural residential within Maison Dieu

2.3.5 LCZ 5: New Residential Suburbs

This zone is called Singleton Heights and is one of the newer suburbs of Singleton. It's layout is fairly consistent with the new urbanism movement for greenfield development which is diverse in use, has a connected public open space network and is scaled to accommodate pedestrians and vehicles. It comprises predominantly low to medium density residential development with standard amenities such as schools, parks, sporting facilities and local shops set within a curving street pattern influenced by the landform. The streetscape is characterised by front yard gardens of varying styles and plant species.

Component	Description
Land Use	General Residential, Public Recreation
Topography	A highly modified landform influenced by gently undulating hills and flat areas.
Vegetation	Predominantly introduced gardens, manicured grass and parkland trees.
Built Form	Detached residential dwellings and commercial buildings.
Spatial Form	Although enclosed by built form and narrow streets, wide house setbacks, open front yards, parks and occasional views from elevated areas creates a sense of openness and context to the greater Singleton LGA.

Figure 32: Residential street view in the more recent suburb of Singleton Heights, north of the old town (Source: Google Street View)

Figure 33: Residential street view in Singleton Heights (Source: Google Street View)

2.3.6 LCZ 6: Agricultural Floodplain

The predominant features of this zone comprise the winding Hunter River with sections of tree-lined embankments and the patchwork patterns of the agricultural alluvial floodplain. The valley floor of irrigated crops and market gardens is a stark colour contrast of the often dry brown grasslands of the rolling hills and the grey hues of urban development. The rich dark colours of the distant ranges create a backdrop to the valley floor. Houses are sporadically placed on elevated positions just above flood levels. The rural setting is further emphasised by rural roads, gravel driveways and agricultural fences. A large sports complex bordered by the river and the CBD takes advantage of the flat land.

Component	Description
Land Use	Primary Production, Public Recreation
Topography	Flat
Vegetation	Swamp Oak Forest community aligning the Hunter River edge. Agricultural crops in floodplain
Built Form	Farmhouses and associated buildings.
Spatial Form	Wide open expanses with extensive views.

Figure 34: View looking south along Army Camp Road, seen against a backdrop of National Parks on the far horizon.

2.3.7 LCZ 7: Singleton Old Town

The Singleton town centre is broadly encompassed by the Main North Rail Line, Hunter River and the Highway. It comprises a vibrant 'high street' commercial and retail strip with recent streetscape upgrades to John Street. The existing the Highway corridor is narrow with historic buildings aligning the road at minimal setbacks to the streets. Formal parks and botanic gardens reminiscent of a Victorian era are centrally located amongst a strong grid pattern of narrow roads aligned with rows of houses. The combination urban patterns, dominant tree species and architectural styles of historic buildings are reminders of early European settlement. The town centre is in the valley floor and has seen severe floods throughout its history.

Component	Description
Land Use	Commercial, Mixed Use, Business Development, General Residential, Private Recreation, Public Recreation
Topography	Flat
Vegetation	Mix of introduced and native tree planting in streets and parks. Front gardens contribute to the urban landscape character.
Built Form	Multi storey commercial, retail, road infrastructure, public buildings and residential dwellings
Spatial Form	Linear patterns and moderately enclosed due to built form and extensive tree planting in the streets and parks. Some views to the surroundings floodplains and distant ranges are attained along the streets.

Figure 36: The Percy Hotel on George Street in Singleton Old Town (Source: Google Images)

Figure 35: View looking from south from a residential area across the floodplain (Source: Google Street View)

3 URBAN DESIGN VISION, OBJECTIVES AND PRINCIPLES

3.1 Introduction

It is important to establish design criteria for all elements of the project's design, not only to minimise the potential for a poor urban design outcome, but also as a measure of the project's success as a piece of transport infrastructure in a regional environment. Given this, it is even more critical to establish early in the design process the project vision, objectives and principles to ensure it responds to the landscape context and is integrated with the surrounding rural environment.

The '*New England Highway Urban Design Framework - Urban Design Vision, Objectives and Design Principles of the New England Highway*' (Roads and Maritime, 2016), hereafter 'The Framework', outlines a consistent urban design approach for future upgrade to the road. As its title suggests, 'the Framework' defines the vision for the New England Highway (the Highway), along with the guiding urban design objectives and principles. '*Beyond the Pavement - Urban design policy, procedures and design principles*' (Roads and Maritime, 2014), which 'the Framework' is based on, further reinforces the urban design process to achieve an integrated built outcome.

To define the urban design aspirations of the project, the urban design vision and objectives are described in the following pages. The project vision has been adapted to reflect the unique context of the Singleton township. The project objectives have also been taken from 'The Framework' and modified to suit the project. The design principles have been developed from '*Beyond the Pavement - Urban design policy, procedures and design principles*' (Roads and Maritime, 2014) to guide the design process and to ensure a coordinated design response.

3.2 Vision

'The Framework' outlines a clear vision *'that seeks to retain and enhance the distinct character of the New England Highway and its sub-regions'*. A series of urban design objectives, responsive to the context of the landscape and place, provides a degree of legibility along the road and a travel experience that embraces the unique characteristics of the region.

The vision for the Singleton bypass is;

To provide a safe travel experience that acknowledges the unique sense of place within the broader Upper Hunter landscape and delivers a road design outcome sensitive to its setting.

3.3 Objectives

The following objectives are closely aligned to those outlined in 'The Framework' but tailored specifically to this project. The application of these objectives would ensure a 'whole of corridor' design proposal that is integrated with the surrounding context.

3.3.1 Objective 1: Respond to the landform

Embrace the undulating hills and gullies that rise above the Hunter River agricultural floodplains. Responses to include;

- Form a road that curves and gently undulates as it passes through cuttings and fill embankments.
- Provide a straight horizontal plane within the floodplain lands. Minimise depth of structure and vertical elements as far as possible.
- Adopt variable embankment slopes to reflect the undulating hills and provide a degree of 'natural' irregularity within the road corridor.
- Minimise physical footprint by maintaining as narrow as possible corridor where appropriate.
- Provide slope treatments that reflects the vegetation and landform in which it traverses with landscape works or visually recessive treatments.

3.3.2 Objective 2: Contribute to the urban structure

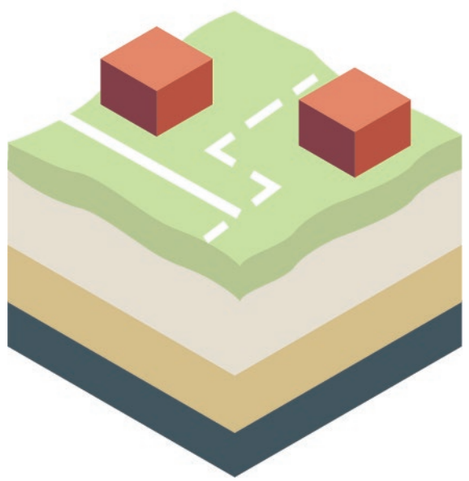
Acknowledge the connection the proposal has to Singleton township physically and visually by incorporating the following;

- Consider both transport and community needs in the planning and design with a focus on safety, operational efficiency and amenity.
- Celebrate the sense of place by protecting and enhancing historic items or features within the landscape that are characteristic to the region.
- Avoid adverse visual impacts by screening views or incorporating urban design treatments that improves the visual quality of the proposal.
- Consider future development adjoining the proposal and ensure the road corridor design considers access and views
- Provide a welcoming 'gateway' to Singleton.

3.3.3 Objective 3: Maximise the travel experience

Utilise the unique characteristics of the region to provide an enjoyable travel experience by emphasising the following;

- Enhance and frame views from the road.
- Provide references to the heritage of the place.
- Provide visual features and 'wayfinding' elements particularly at the connections.



3.3.4 Objective 4: Respond to landscape patterns

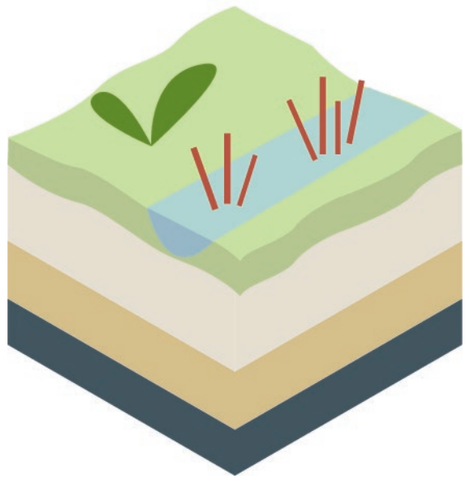
The patchwork tapestry of colour and shapes in the agricultural floodplains is a striking feature, particularly viewed from the escarpment country. So too are the vegetated ridge lines and hills in which the road travels through. Responses to include;

- Integrate adjacent vegetation communities and patterns in the landscape and design a complementary roadside landscape.
- Maintain and enhance natural systems connections and habitat corridors.
- Minimise the removal of native vegetation and consider road design options to reduce impacts on existing vegetation.
- Provide distinctive trees and landscape works at key points such as town entries and connections.

3.3.5 Objective 5: Design for minimal lifecycle costs

A measure of sustainability is in the ongoing lifecycle costs and achieving this includes;

- Incorporating robust materials that are readily available and can be replaced safely and easily.
- Designing a low maintenance, long-living and self-sustaining landscape.
- Incorporating materials and design a strategy that deters vandalism.
- Consider and implement where possible Ecologically sustainable Development (ESD) and Water Sensitive Urban Design (WSUD) principles throughout the design.



3.3.6 Objective 6: Coordinate a simple and consistent design language along the road corridor.

The proposal would include bridges, walls, barriers, landscape works and standard roadside furniture and infrastructure. A coordinated response would include;

- Integrate physically and visually the urban design treatments with the existing landscape character and context along the Highway. The proposed works shall reflect the existing plant communities of the floodplain and wood hill environment to achieve a road corridor that blends with the overall landscape, while highlighting points of interest for road users.
- Locating fencing, walls and barriers, and incorporating landscape measures to minimise visual impact.
- Continue the suite of overhead bridges that exist on the Hunter Expressway to the south of the proposal, in accordance with The Framework.
- Ensure walls and fences have clean horizontal lines that follow the alignment of the road corridor to avoid stepping.
- Continue the landscape theme within the medians and roadside edges established along the Hunter Expressway.

3.4 Principles

Below is an outline of the urban design principles for specific elements of the proposal. The design principles shall be reflected in the finished roadscape:

3.4.1 Early Works

- Investigate the opportunity to collect seed as early as possible and at the optimum time of year to ensure a viable seed bank of a variety of species is available at the time of planting for native seeded areas.
- Investigate the opportunity to implement an early plant procurement contract to ensure the species and quantity of plants required for the project is available.
- Native vegetation removed should be chipped, stockpiled and used as mulch in nominated landscape areas and/or composted to be re-used as a soil amelioration additive.
- Site topsoil stripped for re-use should be treated for weeds and stockpiled appropriately, and protected from further weed infestation.

3.4.2 General Planting Principles

- Where the road is to traverse through remnant vegetation such as the northern escarpment, planting would consist of species endemic to the area (i.e. like for like).
- Planting would reflect future land use of areas adjoining the road corridor to mitigate visual impacts.
- Planting in medians and verges shall not compromise road safety standards for clearances, setback, sight lines, maintenance and operations.
- Planting shall be in accordance with the planting theme established along The Hunter Expressway.
- Species selection would be of low maintenance, hardy to the local conditions and be of habitat value; promoting good sustainable practice.
- Opportunities should be explored to enable direct seeding and planting to be undertaken in the optimum time of year to minimise the reliance on temporary irrigation and improve chances of good establishment.
- As per the Framework, '*establish a strong vegetated landscape character* (s.6.2)'

3.4.3 Views

The roadway is part of a longer travel experience and the way the road trip is perceived would have an impact on the quality of the travel experience. The visual quality along the route should be considered from two perspectives;

1. Views from the roadway, including immediate, close views and distant views to the vegetated ranges and floodplains.

2. Views from areas adjoining the roadway corridor (existing and future development).

These differing viewpoints would have a direct bearing on how the other urban design elements are assessed and detailed. In terms of works within the road corridor, a number of principles should be adopted:

- Views should be accentuated on elevated portions of the road by planting low species and tall trees kept to a minimum.
- Dense planting should be considered for visual screening where proposed development adjoins the road corridor.
- Feature treatments to large abutment walls should consider the view point from the car and skew of the road.
- Visual links to the distinctive vegetation associated with the Hunter River and agricultural floodplains should be retained.
- Where noise walls are required along the bridges they should be transparent to maximise views for the motorists.

3.4.4 Cycle / Pedestrian

- Provide cross-corridor cycle and pedestrian connections to ensure they are safe and legible.
- Ensure proposed cycle and pedestrian connections to existing street, pedestrian and cycle path networks are direct to encourage patronage.

3.4.5 Road Engineering Elements

- Road furniture elements (e.g. guard rails, fencing, signage, lighting, etc.) should be consistent in design to maintain continuity and avoid visual clutter. The furniture should be integrally designed and coordinated with the road design.
- 'Soft' engineering treatments should be incorporated into the stormwater design where possible to protect the water quality of the Hunter River, floodplains and enhance the landscape opportunities.
- Where the height difference is less than 2.5 metre fill batters should be maximum 3 in 1 gradient ensure the viability of the plants during establishment. Where batters are steeper than 3 in 1, dense planting of fast establishing species would be required for stabilisation. Temporary erosion control measures should be considered for all batters at 3 in 1 or steeper.
- Cut batter gradients would be dependent on the geology of the area and should consider benching to reduce the possibility of erosion. Where cuttings occur in rock it should be left exposed; where it is into clay or soft soils the batters should use temporary erosion control measures and be landscaped to provide stability and visual continuity.

3.4.6 Bridges

- The design of the bridges should adopt 'context sensitive design' principles to ensure the scale and aesthetics of the bridges are complimentary to the surrounds.
- Overbridges and the bridge over the Hunter River should belong to the same design family and considered as part of a suite of unified elements.
- The design of the overbridges at the southern and northern connections of the bypass should strongly reflect the existing bridges along the Hunter Expressway, in particular the banded walled abutment design, in accordance with The Framework.
- All other overbridges along the bypass should consist of spill through abutments to maximise views, in accordance with The Framework.
- The bridge elements such as piers, abutments, retaining walls, parapet and barriers need to be designed in an integrated way to ensure the proportions are to scale and the bridge reads as one harmonious structure.
- The design of the bridges including the materials and finishes should consider the 'life-cost' and ongoing maintenance requirements.
- The bridge traversing the floodplain should appear to sit in the landscape rather than dominate. The height above ground level should remain constant and horizontal for the full length to reflect the horizontal nature of the landscape.
- Bridge elements should be designed and arranged to reduce visual clutter and maintain clean lines.
- The bridge design should adhere to the RMS Bridge Aesthetics Design Guidelines

3.4.7 Place

- Retain and accentuate views of the landscape where possible to highlight the landscape context in which the corridor traverses.
- Maximise the distant views of the vegetated ranges, Singleton township and agricultural lands as visual clues of the road destination.
- Retain and enhance existing remnant vegetation where possible.
- Where possible, expose the rock face in cuttings to enable an appreciation of the underlying geology of the area.


J L HORSEMAN BRIDGE

4 URBAN DESIGN CONCEPT

4.1 Introduction

The existing New England Highway (the Highway) currently passes through the township of Singleton. It forms the main road access through the town and to the historic central business district (CBD). The proposed bypass would traverse the floodplain and ranges to the south and west of the town, providing views to surrounding agricultural and pasture lands, enclosed wooded sloping terrain and the township of Singleton. These elements are brought together in the urban design to create an integrated 'whole of corridor' response.

The proposed urban design intent for the project is based on the vision, objectives and principles established in Chapter 3 of this report. The objectives and principles are closely aligned to The Framework which outlines the broader urban design strategy for the entire New England Highway. The findings from the contextual analysis have been applied to inform the urban design concept.

To ensure a fully coordinated, 'whole-of-corridor' and context-related road design, the urban design team worked closely with the project team to develop the design for the bridges, abutments, throw screens, noise walls, retaining walls, cut batters and fill embankments. Key design elements from the Hunter Expressway were expressed in the proposed works to provide consistency, continuity and a cohesive design response. The Framework and the Roads and Maritime design guidelines were referenced to develop and refine the urban design concept.

4.2 Design Concept

The urban design concept (refer *Figure 37* to *Figure 43*) has been developed in accordance with The Framework and the Roads and Maritime design guidelines.

A summary of the landscape contextual elements critical to the urban design outcome include:

- the agricultural Hunter River floodplain
- the Singleton Township
- the elevated hilltop ranges towards the coal fields.

The urban design response was to integrate the project works within the surrounding landscape context and Singleton township, while also providing an engaging experience for road users. To confirm, the urban design objectives as described in *Section 3* of this report, are:

Objective 1: Respond to the landform

Objective 2: Contribute to the urban structure

Objective 3: Maximise the travel experience

Objective 4: Respond to landscape patterns

Objective 5: Design for minimal lifecycle costs

Objective 6: Coordinate a simple and consistent design language along the road corridor

4.2.1 Landscape concept

The proposed landscape concept responds to the existing surrounding landscape context through which the road travels through, with planting that is able to withstand inundation through the floodplain and the wood hill tops of the surrounding ranges and coalfields. The southern and northern connections provide opportunities to highlight these main entries into the Singleton Township with ornamental tree planting creating a legible wayfinding element from the road corridor.

The proposed landscape treatments seek to maintain and reinforce the character and vegetation communities of the existing environment along the road corridor, rather than impose a uniform vegetation treatment. In this way the road would blend with the overall landscape, reducing the degree of contrast and at the same time create a variety of experiences for the road users as they pass through landscape areas with varying characters.

The landscape concept and its components are described in further detail in this Section (*4.3 Landscape Design Response*) of the design report.

4.2.2 Urban design considerations

Given the change in topography and floodplain through which the road passes requires a number of significant structures along the corridor route that require urban design consideration. These structures include:

- Bridge through the floodplain, along with minor supporting bridge structures
- Road bridge over the Hunter River
- Road bridge over the existing the Highway at Gowrie Gates
- Bridges associated the southern and northern connections into the Singleton Township
- Noise walls along the corridor that interface with the Singleton Township
- Integrated retaining wall and headlight screen at the southern connection.

The design of these structures should belong to the same design family and should be considered as part of a suite of unified elements along the bypass.

4.3 Landscape Design Response

The landscape design is an integral part of the project and is essential to maintain and enhance the character of the surrounding landscape, establish a legible character along the road corridor, enhance connectivity between areas of vegetation and provide an enjoyable road user experience.

Guiding principles are the key to establishing an effective landscape strategy for the road corridor. These principles have been established in order to guide the development of the landscape for the road corridor.

The landscape principles are as follows:

- Develop a landscape design with consistent character and elements that is fully integrated with the surrounding environment and reduces the visual impact of the road and associated structures.
- Generally plant indigenous species, except for nominated points of interest.
- Use planting to reveal or reinforce desirable views or screen undesirable views.
- Planting height, density and frangibility are dependent on distance from the road edge, topography, and adjoining land use.
- Create a landscape that is self-reliant and can be managed and maintained economically.

4.4 Landscape Treatment

The landscape treatments proposed for this concept design are based on an assessment of the existing landscape character and the nature of the proposed bypass construction. The landscape treatment aims to integrate the road with the surrounding land form, the woodland, riparian and rural environments through sympathetic earthworks and planting, while enhancing local biodiversity through regeneration and planting of vegetation which replicates existing communities, enhances connectivity and their distribution along the corridor.

The landscape design concept generally reflects the distinctive qualities of the landscape zones and existing vegetation communities. The local environment through which the road corridor passes would contribute significantly to the aesthetic qualities of the road. The existing vegetation of Ironbark-Spotted Gum-Grey Box Forest community, combine with the rural pasture land and the riparian vegetation along the Hunter River crossing create a diverse and visually attractive landscape which provide variety and interest for users. The highway and landscape treatments are designed to take advantage of the scenic qualities of the area while minimising the impact of the road.

The intent is to incorporate the opportunities and challenges of the various cut batters and fill embankments to create a landscape which maintains and complements the visual amenity and reduces the impact of the road. Along the steep cut batters and fill embankments adjacent to the woodland area, it is proposed to have a simple landscape treatment with trees, large shrubs, grasses and native groundcovers which reflect the existing vegetation. Along the floodplain area, pasture grass and scattered trees are proposed offering views from the road to the surrounding landscape.

The majority of the landscape treatments would consist of revegetation to verge areas on cut batters and fill embankments to re-establish the vegetation characteristics of the adjoining areas while maintaining the required safety clearances from the carriageway. Top and bottom of batters would be rounded off to visually integrate the earthworks into the landscape setting.

The revegetation of cuttings and fill embankments would consist of a cover crop seed mix made up of annual grass cover crop together with indigenous shrub and ground cover species of the surrounding vegetation community.

In areas with 4 in 1 slope, over-planting with tubestock would be undertaken to establish a more rapid coverage to rehabilitate the area and create a more immediate attractive visual effect. These plantings would comprise forestry tube stock of indigenous tree and shrub species. However, there would be no tree planting to the face or benches of steep cuttings and fill embankments (due to maintenance difficulties). Tree planting would be carried out on the top of cuttings and bottom of fill embankments instead.

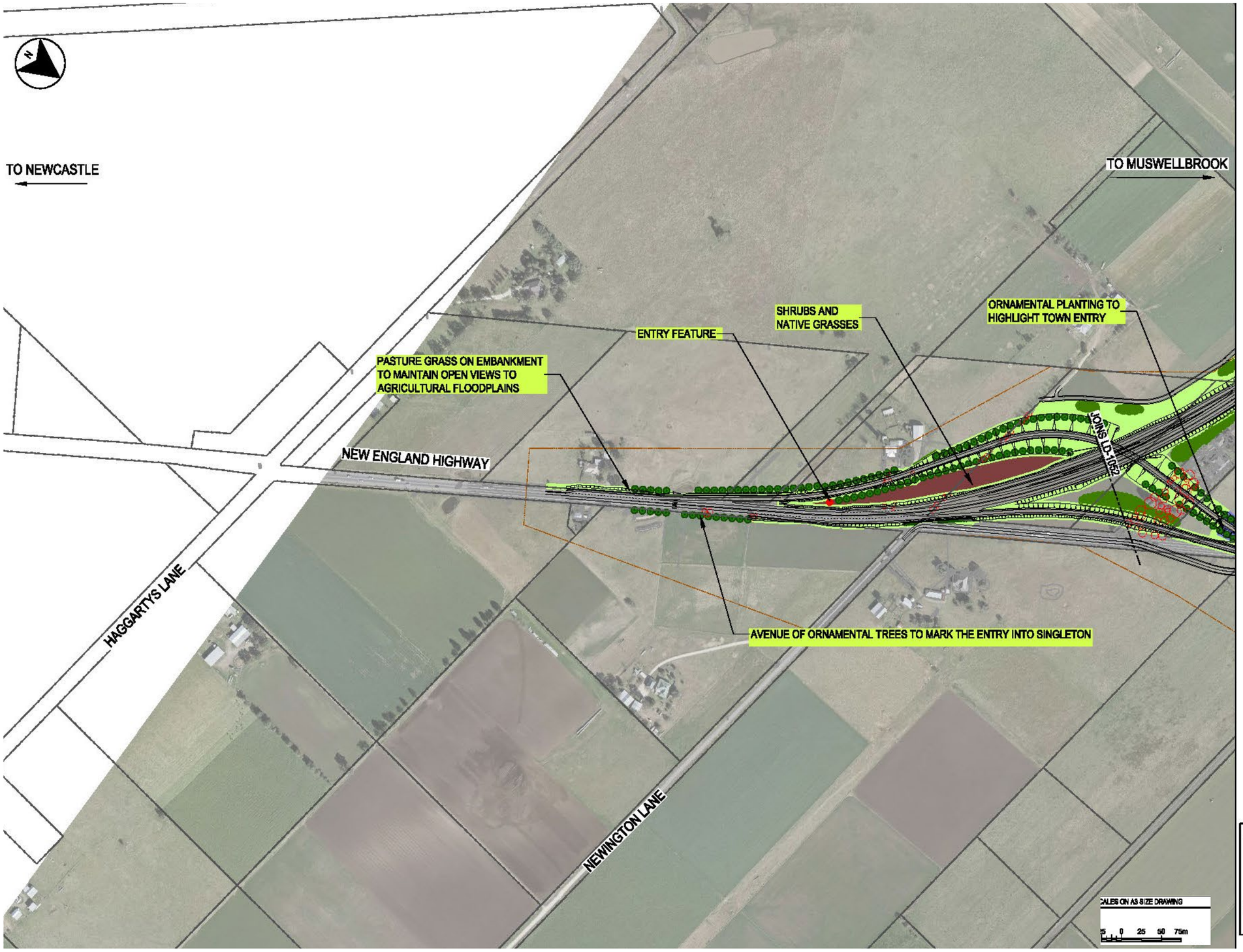
The treatment of verge in pastoral areas is intended to retain rural character by recreating open grassland with groups of indigenous tree planting at irregular intervals.

The median treatments would consist of hydroseeding and overplanting of shrub tubestock in specific locations such as cuttings, long bends (headlight glare) and at the connections. Tree planting and the retention of existing trees would be carried out where appropriate. Treatments would match the pattern of treatments along the outer edges of the corridor.

The ‘Gateway’ planting treatment is proposed with an avenue of ornamental tree (*Grevillea robusta,* or similar distinct species) approaching the exit ramp of the southern connection overbridge. This species was selected in consultation, and recommended by, Singleton Shire Council because of its suitability to the local environmental area and climatic conditions. The ‘Gateway’ experience is reinforced with accent planting (*Doryanthes*) and colourful shrubs (*Callistemon*, *Hardenbergia*, and *Leptospermum* species) along the embankment leading into the existing Highway to highlight town entry into Singleton.

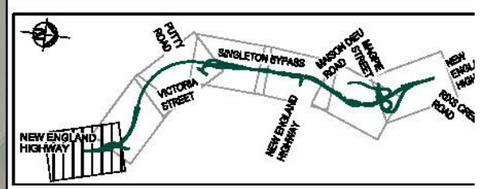
The treatment of areas adjacent to bridges is designed to reduce the extent to which the bridge and its associated abutments are visible from both the road carriageway and adjoining areas. The planting of massed trees adjacent to the verges approaching the bridges would assist in visually integrating the structure into the surrounding landscape. Embankments would be revegetaed with indigenous shrub and ground cover species, with endemic tree species planted to ensure they do not encroach within safe clearzones. New trees adjacent to noise barriers would be kept a minimum of 1.5 metres clear of the noise wall to allow for maintenance.

The implementation of a comprehensive landscape strategy based on endemic vegetation species, and implemented in accordance with *RMS Specification 178 - Vegetation* and *RMS Specification 179 - Planting*, would assist in ensuring that biological diversity in the local area and region is maintained and enhanced.



LEGEND

- PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED
- PROPOSED ORNAMENTAL TREES
- ENTRY FEATURE
- ORNAMENTAL PLANTING
- PASTURE GRASSLAND SEED MIX
- SHRUBS & NATIVE GRASS SEED MIX
- RIPARIAN SEED MIX
- STABILISE BATTER WITH ROCK, RIPARIAN SEED MIX AND TOPSOIL
- DENSE NATIVE SCREEN PLANTING
- NATIVE TREE PLANTING
- RIVERINE TREE PLANTING
- WOODLAND TREE PLANTING
- NOISE WALL (REFER BRIDGES DRAWINGS FOR DETAILS)
- PROPOSED BASIN (PERMANENT)
- OPERATIONAL BASIN (TEMPORARY)



KEY PLAN

Figure 37: Landscape Concept Plan

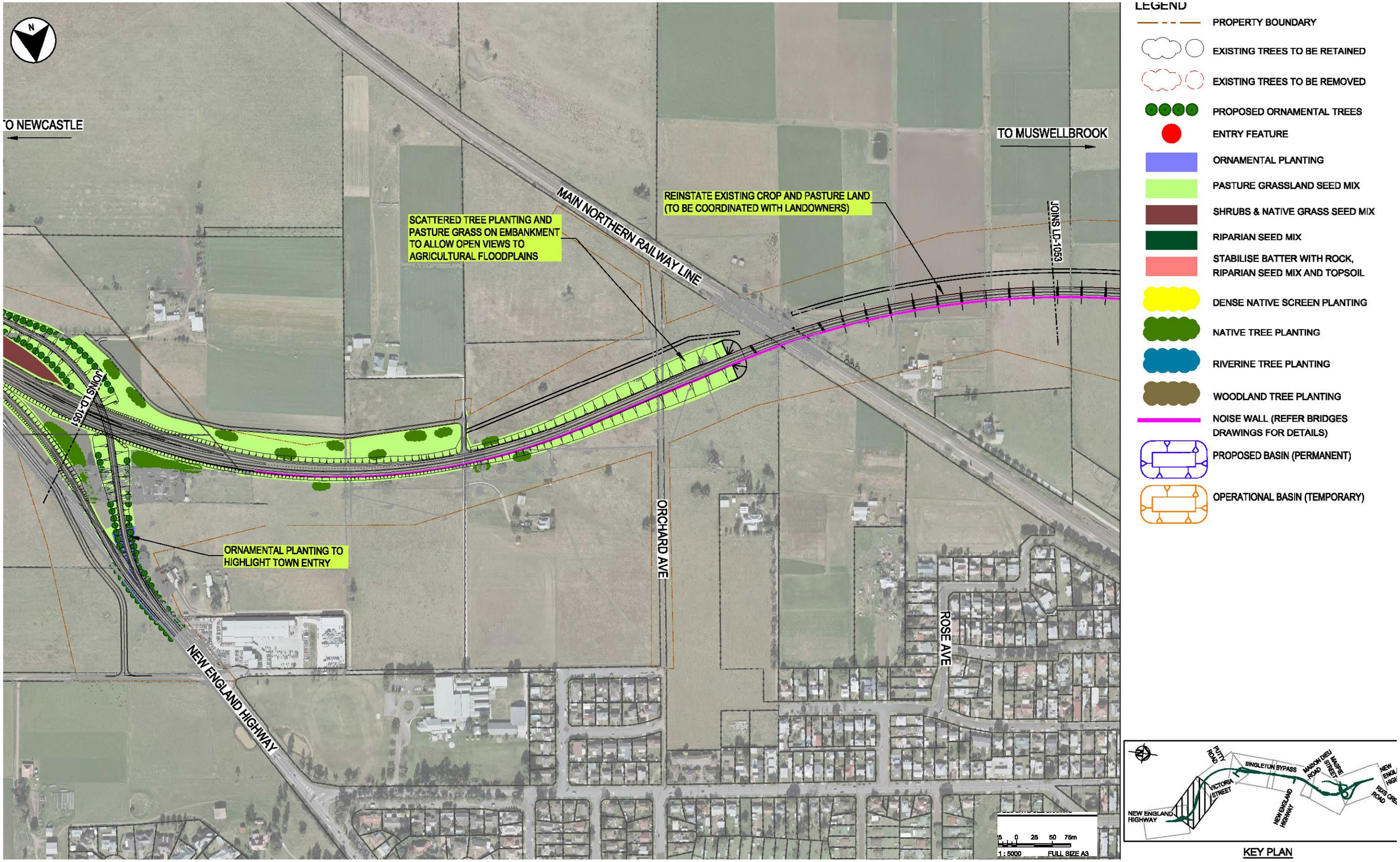
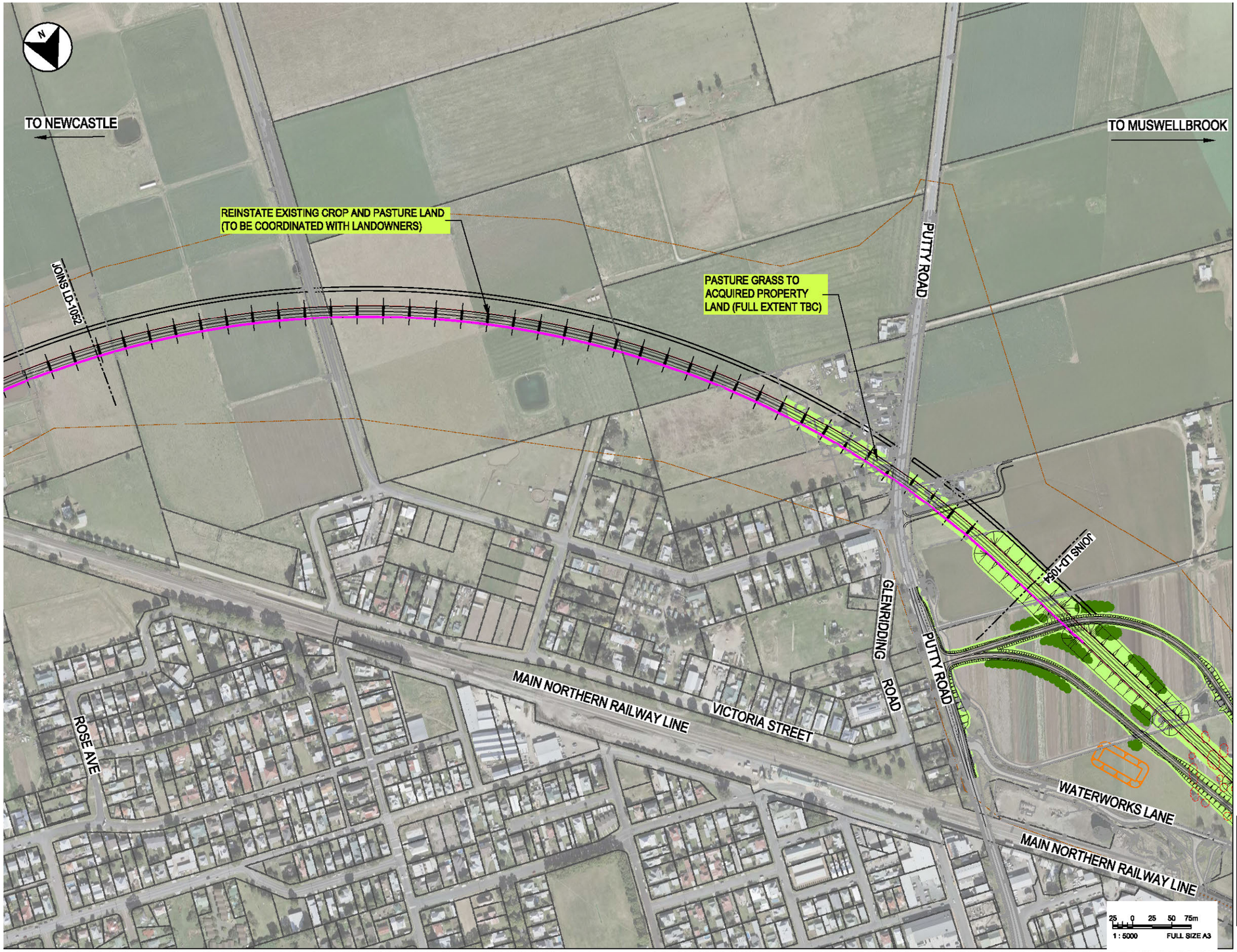


Figure 38: Landscape Concept Plan



LEGEND

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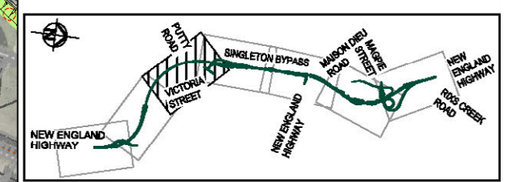

KEY PLAN
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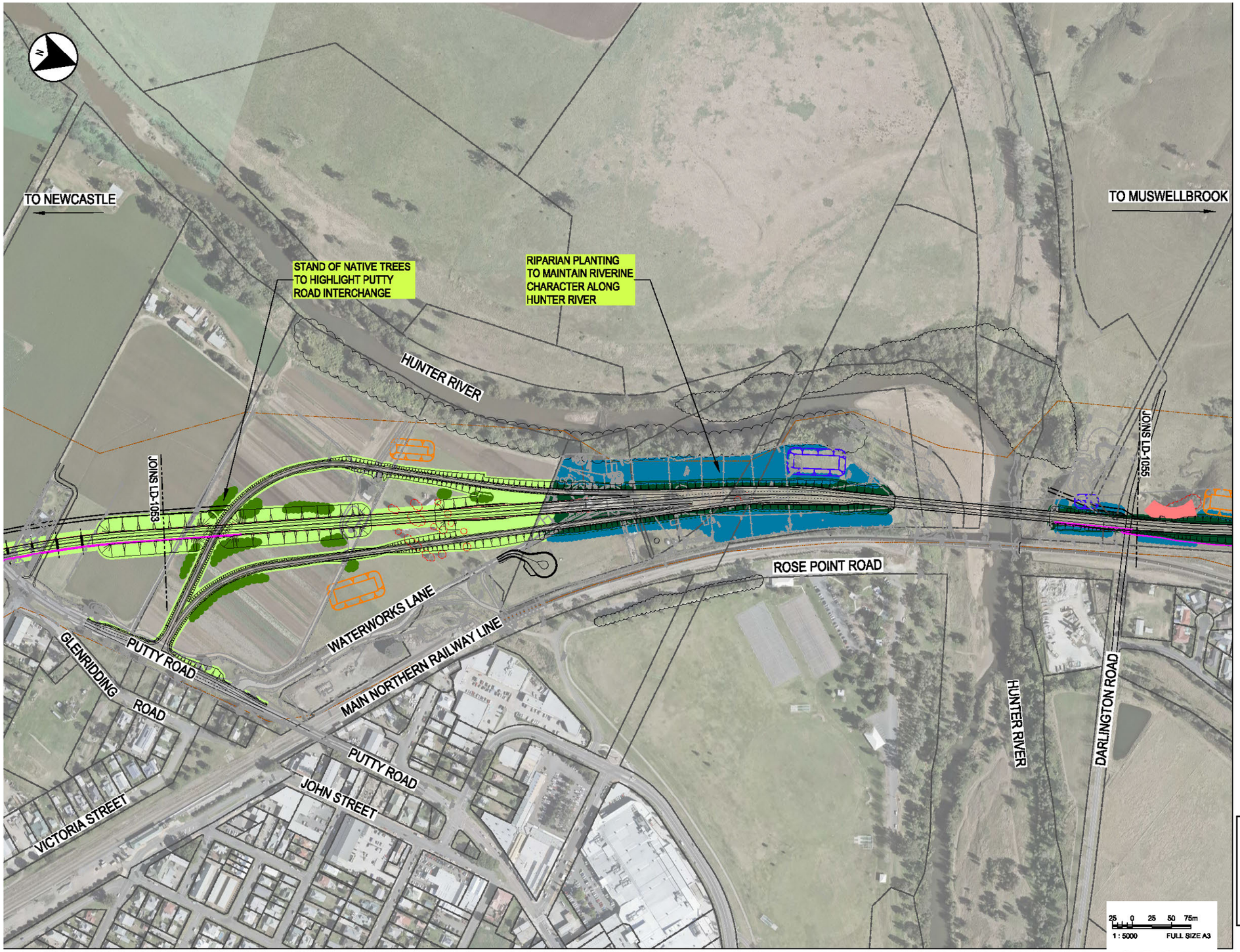
Figure 39: Landscape Concept Plan



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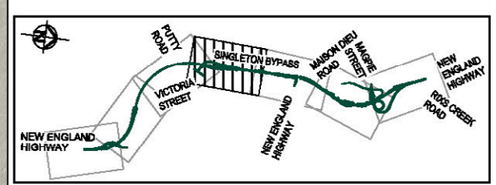

KEY PLAN
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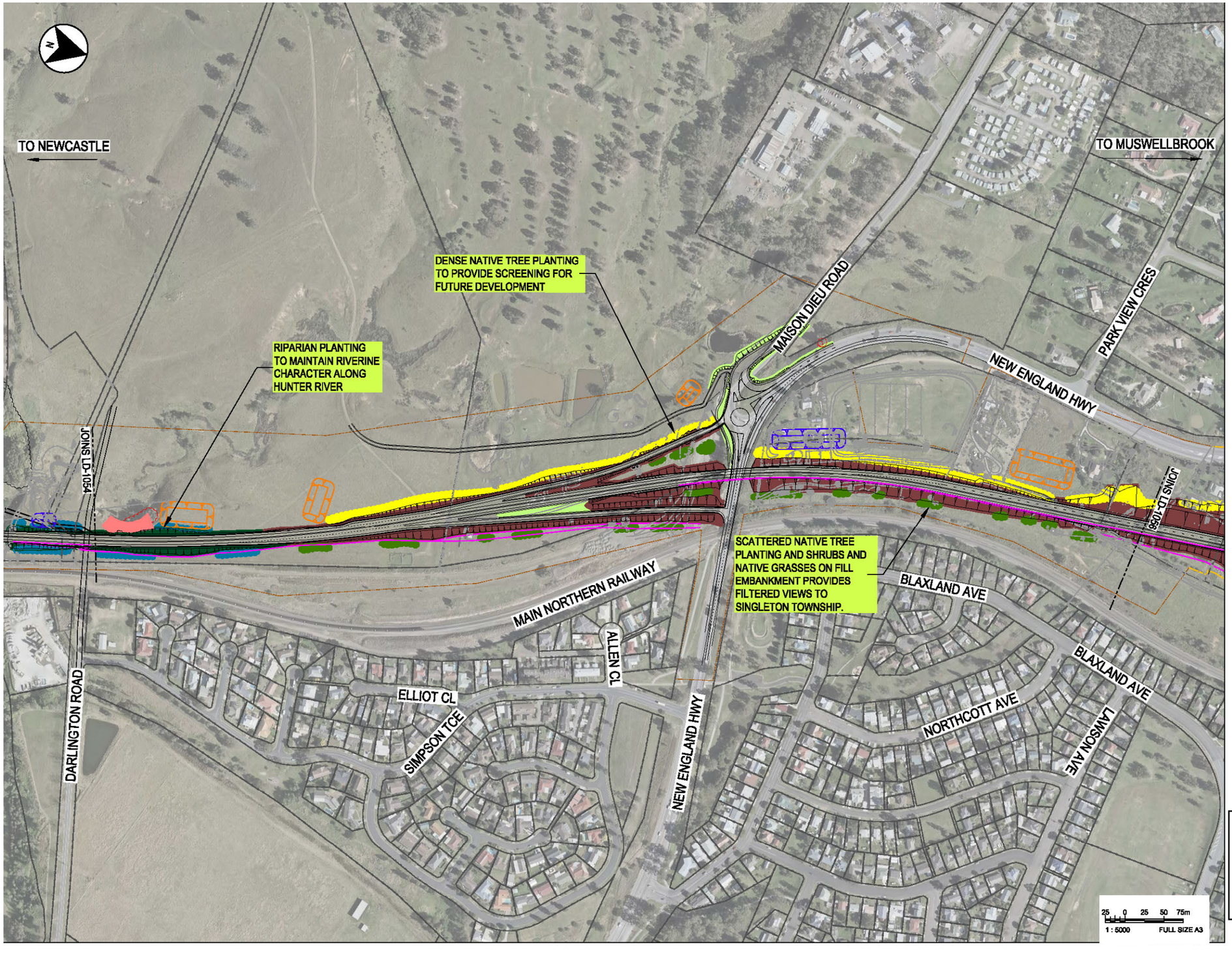
Figure 40: Landscape Concept Plan



LEGEND

- PROPERTY BOUNDARY
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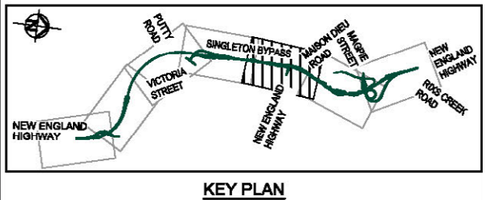
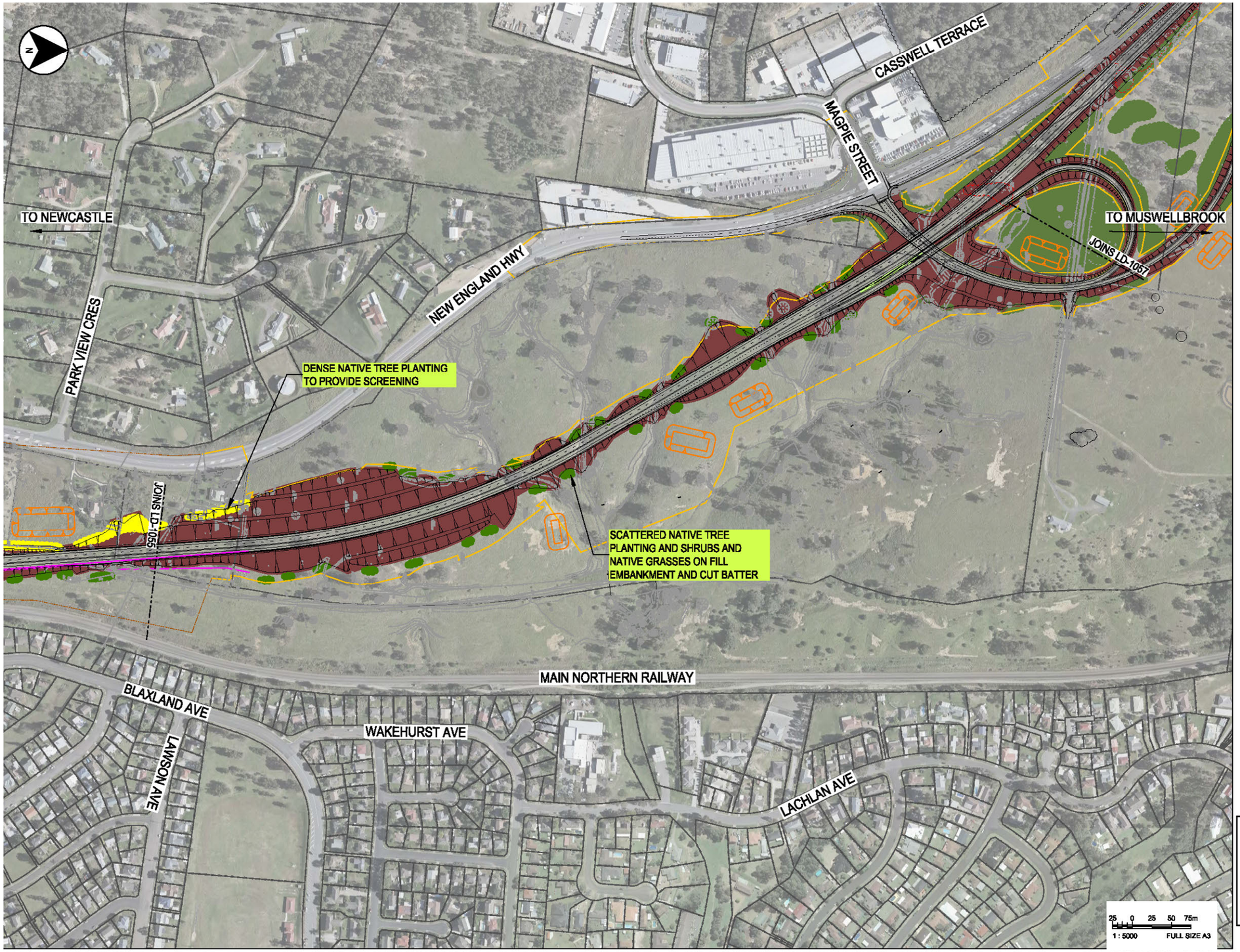
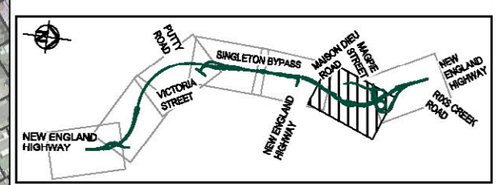


KEY PLAN
N.T.S.

Figure 41: Landscape Concept Plan





KEY PLAN
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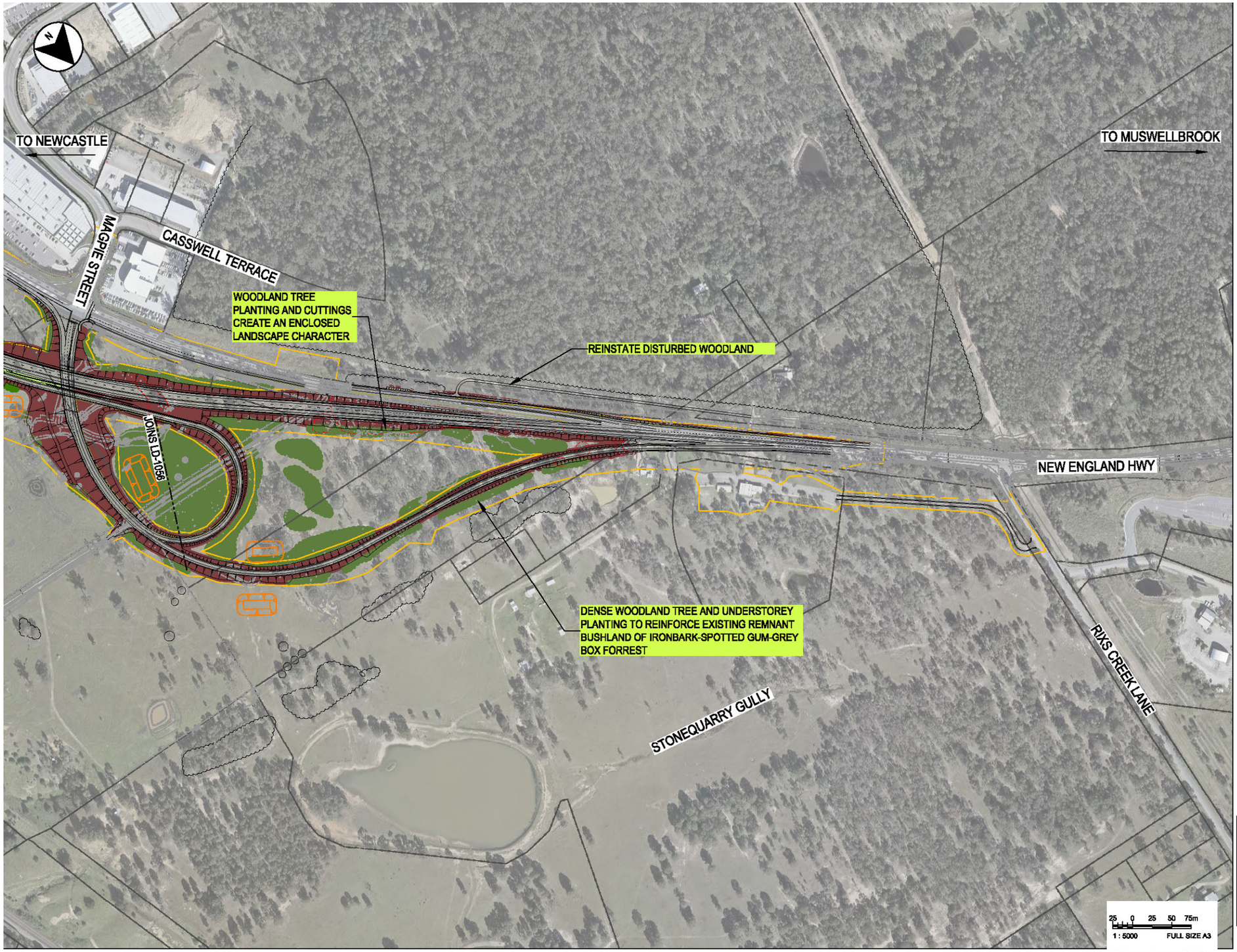
Figure 42: Landscape Concept Plan



LEGEND

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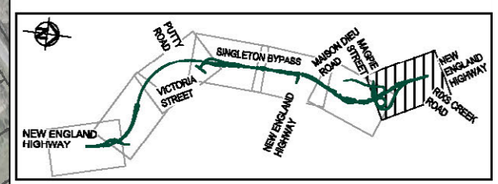
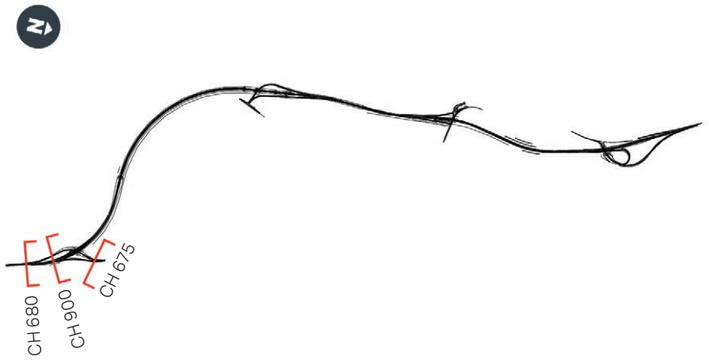


KEY PLAN
N.T.S.

Figure 43: Landscape Concept Plan

4.5 Landscape Cross Sections



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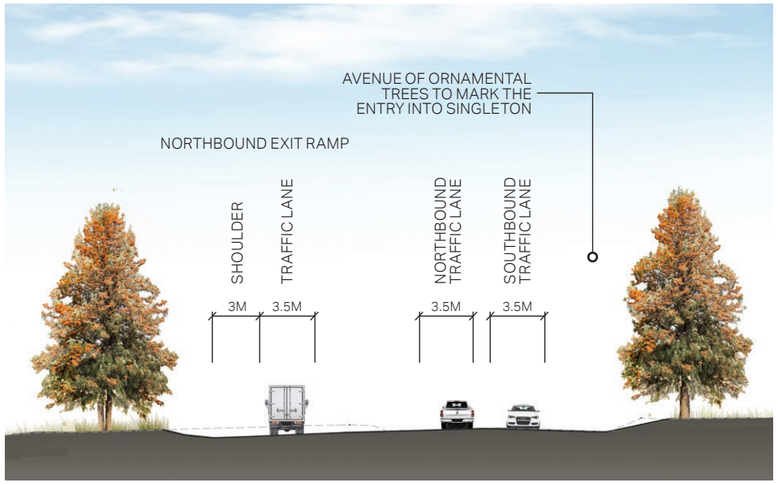


Figure 44: Cross Section - Ch. 680

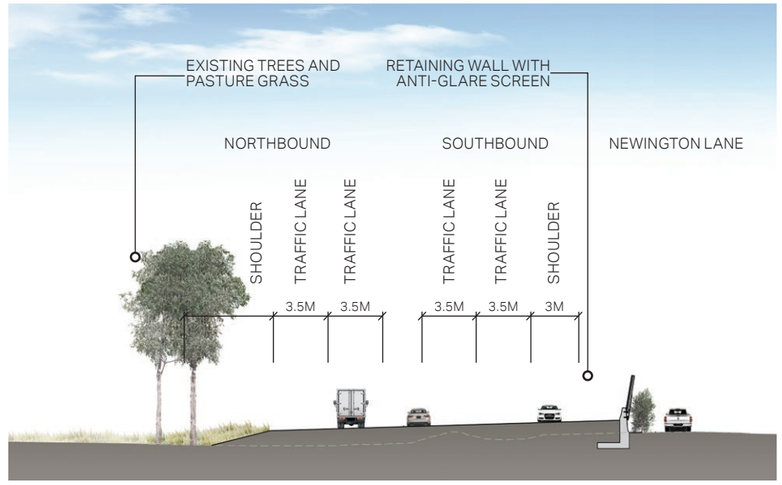


Figure 45: Cross Section - Ch. 900

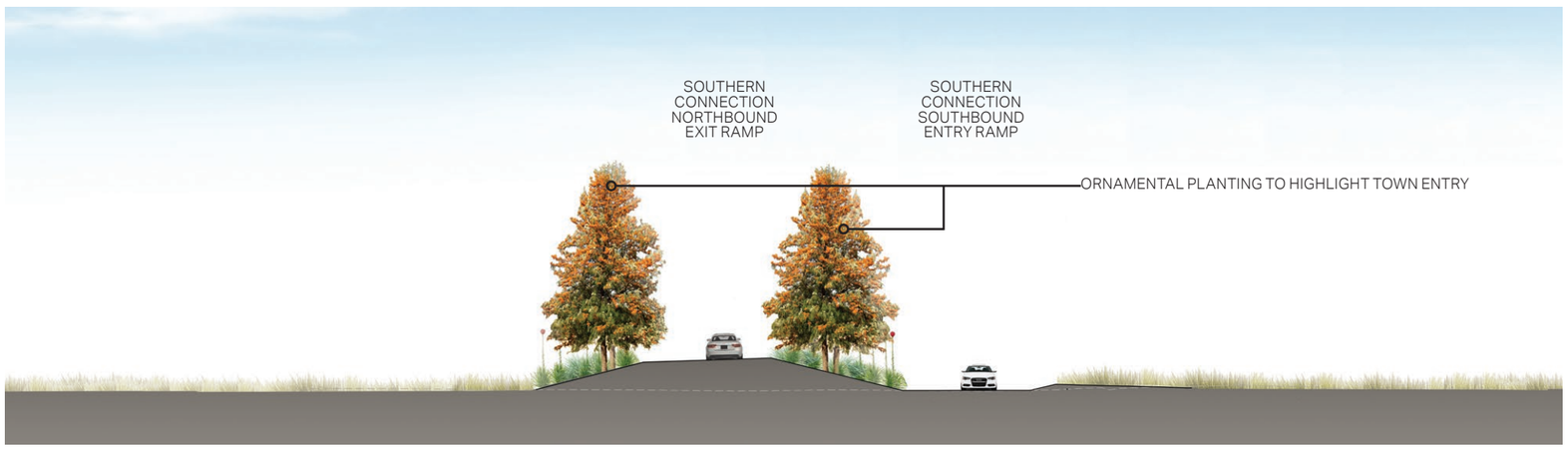
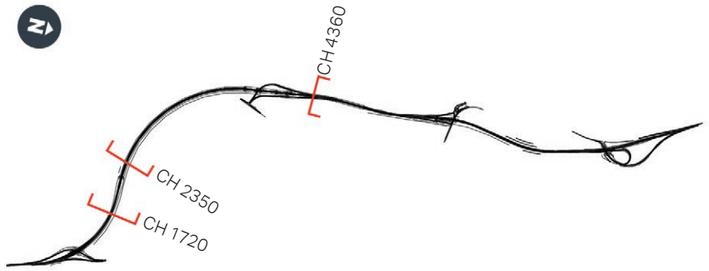


Figure 46: Cross Section - Ch. 675



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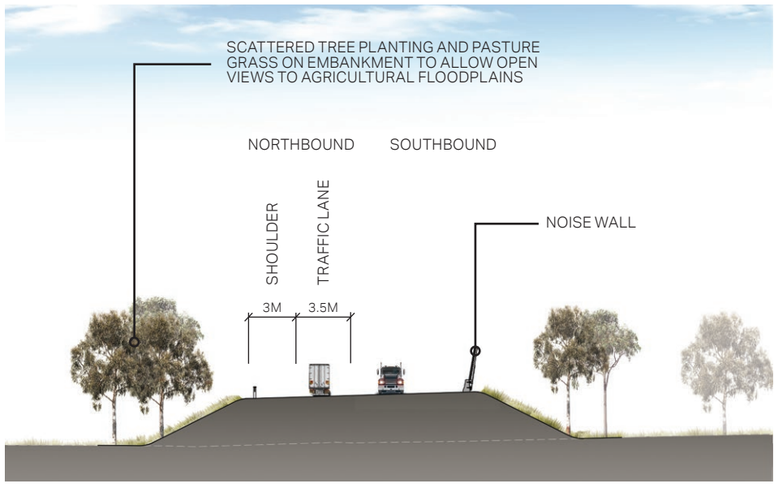


Figure 47: Cross Section - Ch. 1720

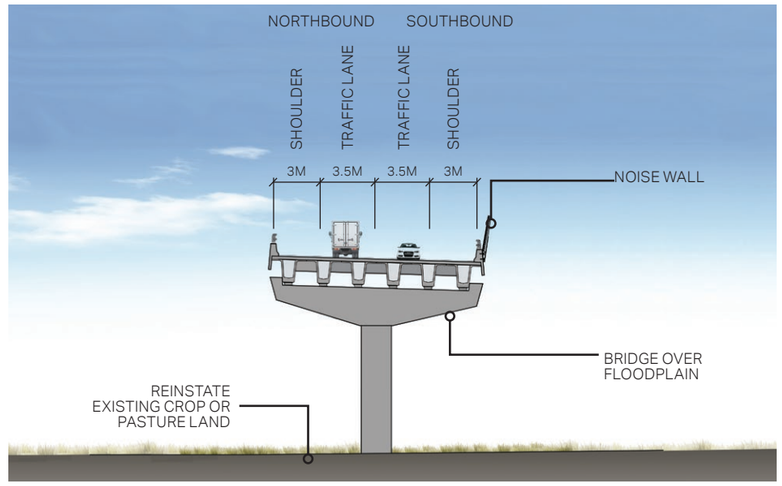


Figure 48: Cross Section - Ch. 2350

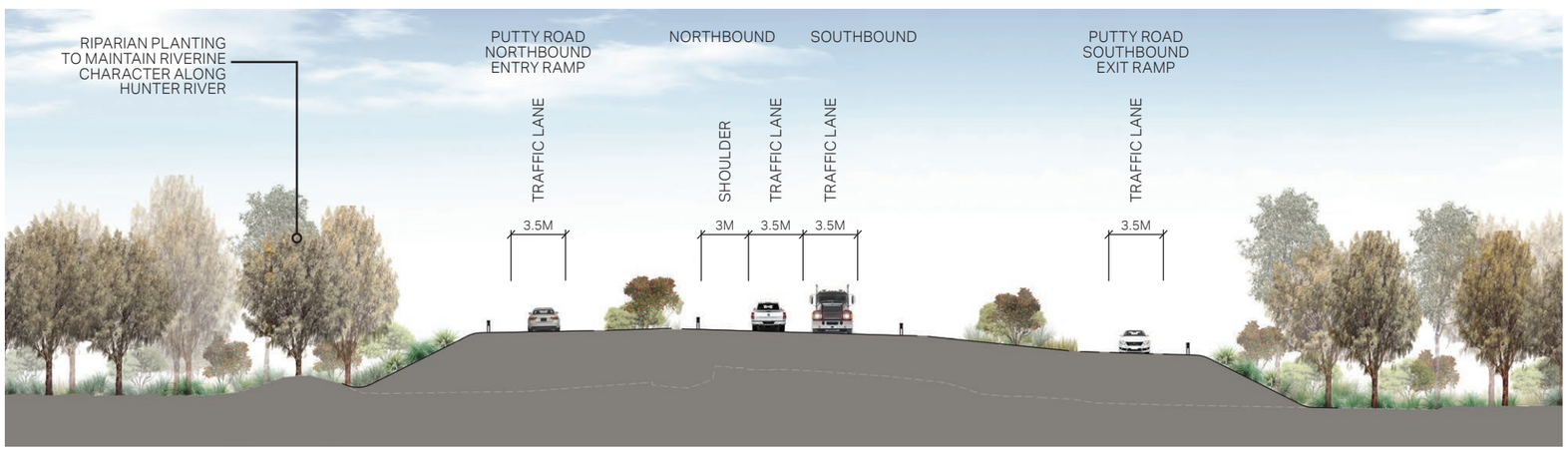
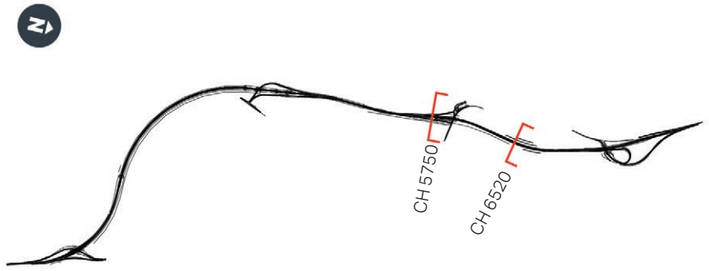


Figure 49: Cross Section - Ch. 4360



Key Plan (NTS)

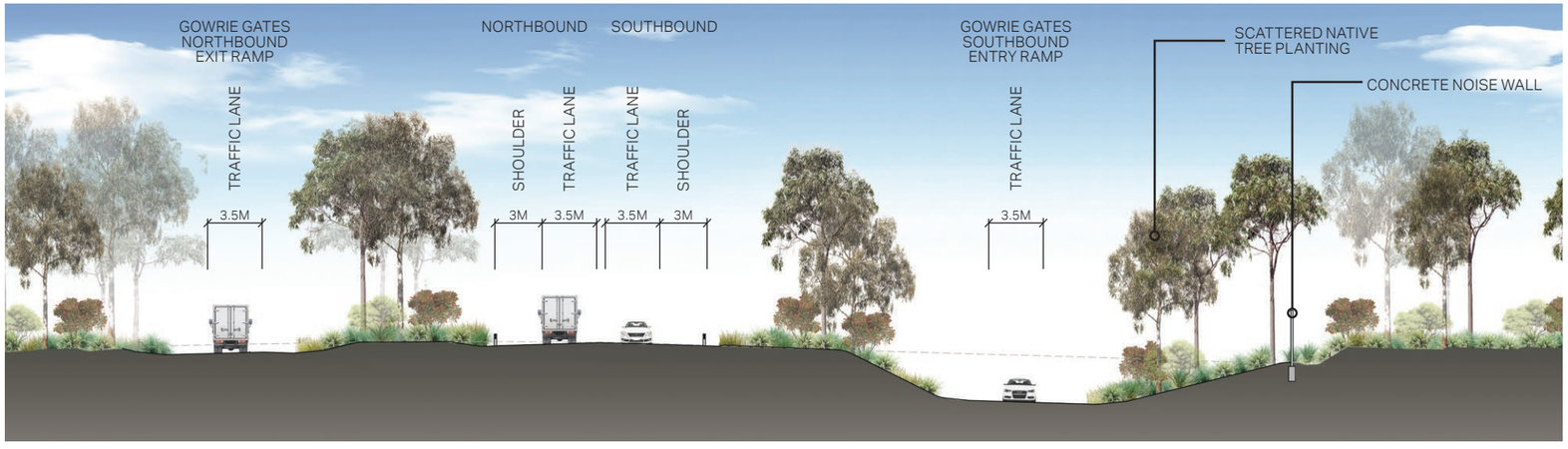


Figure 50: Cross Section - Ch. 5750

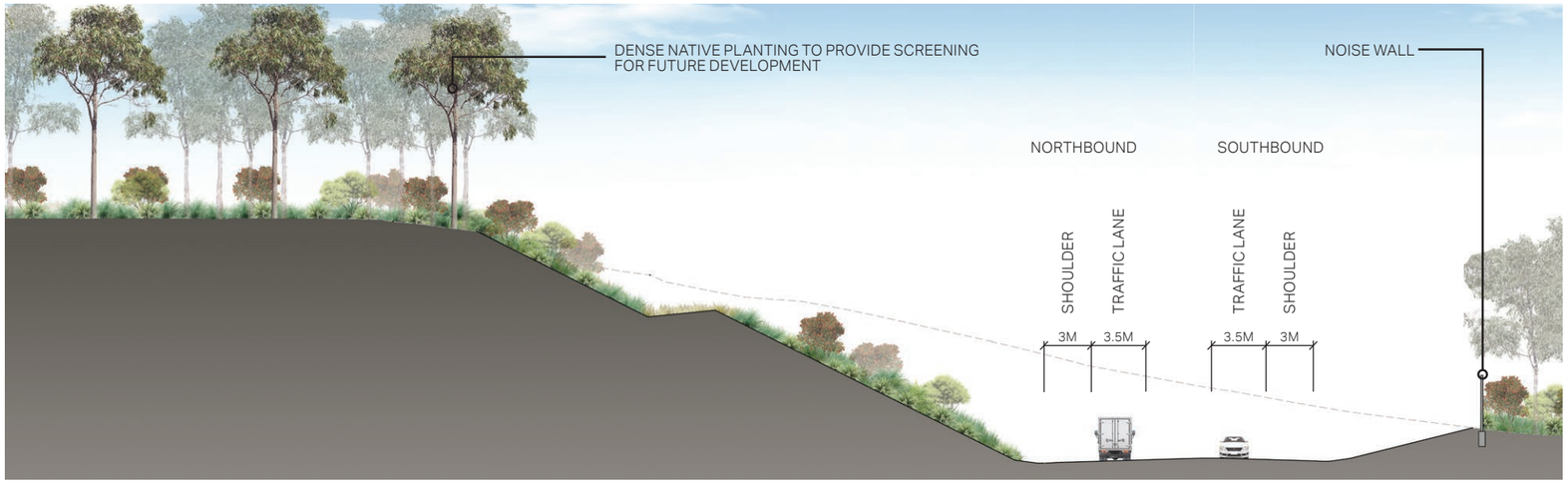
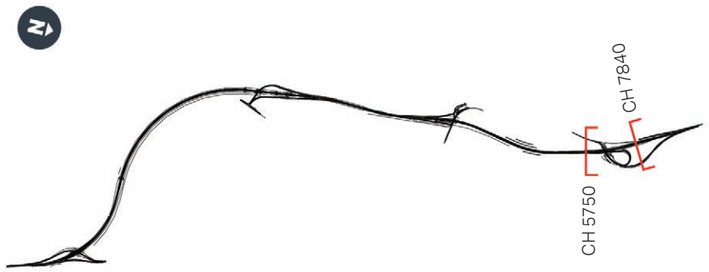


Figure 51: Cross Section - Ch. 6520



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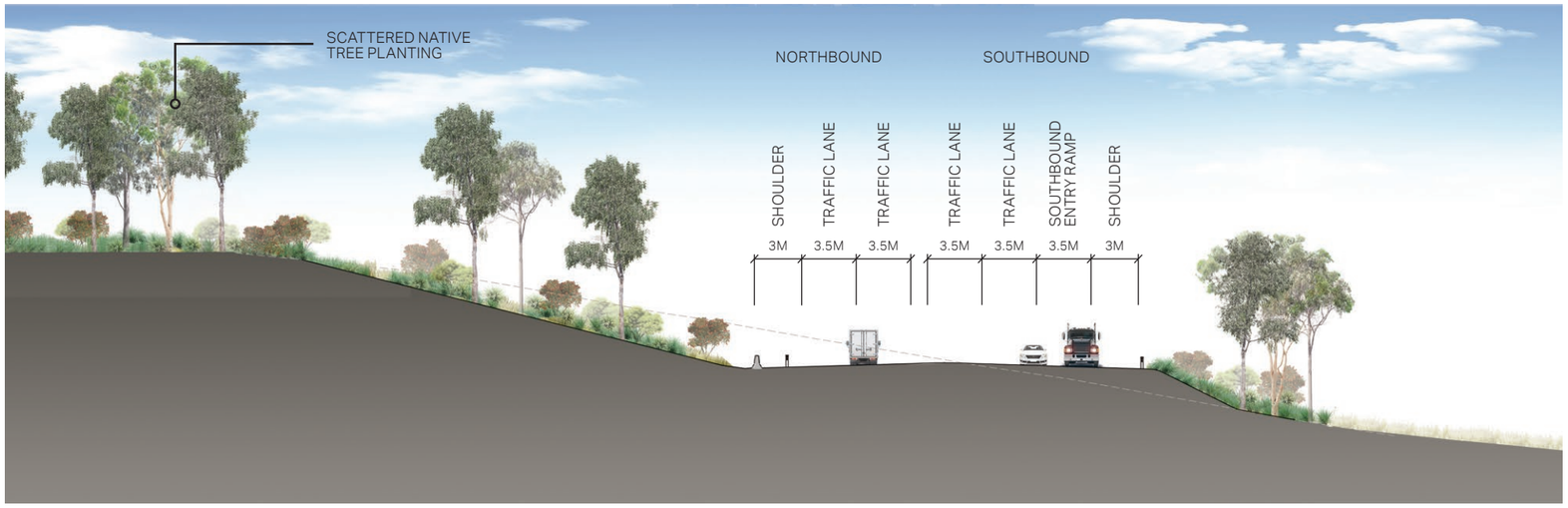


Figure 52: Cross Section - Ch. 7320

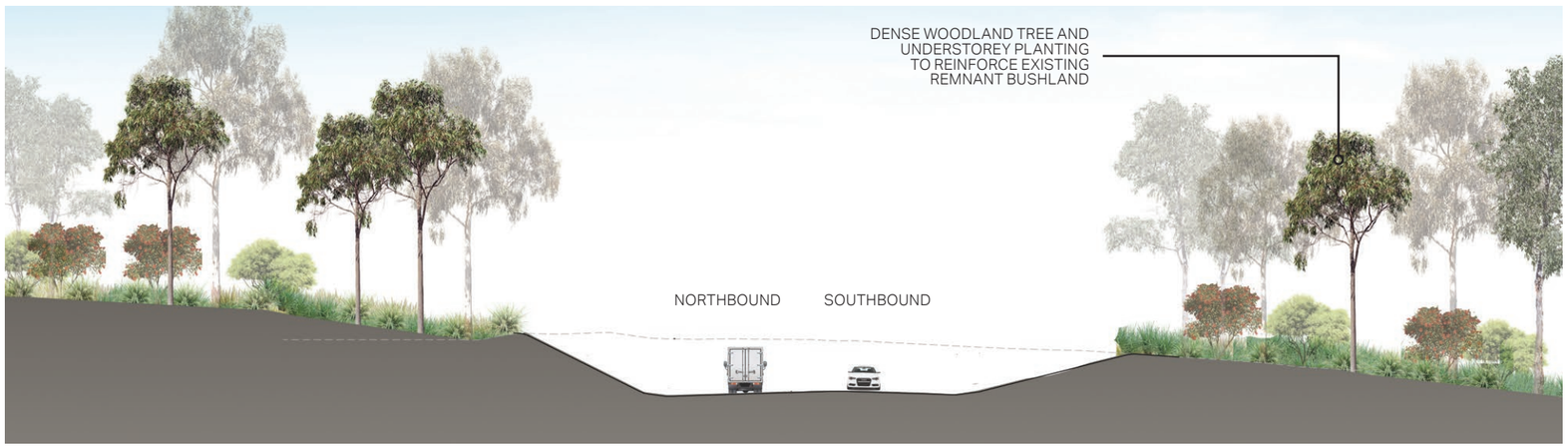


Figure 53: Cross Section - Ch. 7840

4.6 Indicative Species List

Species	Common name	Ornamental Planting	Dense Native Screen Planting	Scattered Native Tree Planting	Riverine / Riparian Planting	Woodland Planting
Trees						
Allocasuarina leuhmannii	Bull-oak				●	●
Angophora floribunda	Rough-barked Apple		●	●	●	
Casuarina cunninghamiana	River She-oak				●	
Casuarina glauca	Swamp Oak				●	
Corymbia maculata	Spotted Gum		●	●		●
Eucalyptus camaldulensis	River Red Gum				●	
Eucalyptus crebra	Narrow-leaved Ironbark				●	●
Eucalyptus fibrosa	Red Ironbark			●		●
Eucalyptus melliodora	Yellow Box			●	●	
Eucalyptus moluccana	Grey Box			●		●
Eucalyptus tereticornis	Forest Red Gum		●	●	●	●
Grevillea robusta	Silky Oak	●				●

Species	Common name	Ornamental Planting	Dense Native Screen Planting	Scattered Native Tree Planting	Riverine / Riparian Planting	Woodland Planting
Shrubs						
Acacia ambligona	Fan Wattle		●			●
Acacia falcata	Sickle Wattle		●			●
Breynia oblongifolia	Coffee Bush		●			●
Daviesia ulicifolia	Gorse Bitter Pea		●			●
Doryanthes excelsa	Gymea Lily	●				
Einadia hastata	Berry Saltbush				●	
Einadia polygonoides	Knotted Goosefoot					●
Enchylaena tomentosa	Ruby Saltbush					●
Eremophila debilis	Winter Apple					●
Myoporum montanum	Waterbush		●			●
Olearia elliptica	Sticky Daisy Bush		●			●
Ozothamnus diosmifolius	Rice Flower		●			●

Species	Common name	Ornamental Planting	Dense Native Screen Planting	Scattered Native Tree Planting	Riverine / Riparian Planting	Woodland Planting
Ground covers / native grasses						
Aristida spp.	Wire Grass			●	●	
Chloris truncata	Windmill Grass					●
Cynodon dactylon	Couch Grass			●	●	●
Cyperus gracilis	Slender Fat-sedge		●		●	●
Dianella caerulea	Blue Flax-lily	●	●			●
Dichondra repens	Kidney Weed				●	●
Glycine tabanica	Variable Glycine				●	●
Hardenbergia violacea	Purple Coral Pea	●	●			●
Lomandra filiformis	Wattle Mat-rush	●	●			●
Lomandra multiflora	Club Rush	●	●			●
MIcrolaena stipoides	Weeping Rice Grass		●		●	
Panicum spp.	Panic Grasses		●			●
Themeda triandra	Kangaroo Grass		●			●

Trees

Angophora floribunda (**Rough-barked Apple)**

Casuarina glauca (**Swamp Oak)**

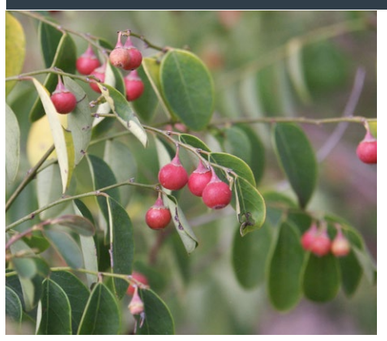
Corymbia maculata **(Spotted Gum)**

Eucalyptus crebra (**Narrow-leaved Ironbark)**

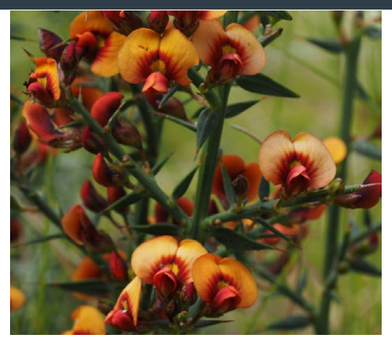
Eucalyptus tereticornis (**Forest Red Gum)**

Grevillea robusta (**Silky Oak)**

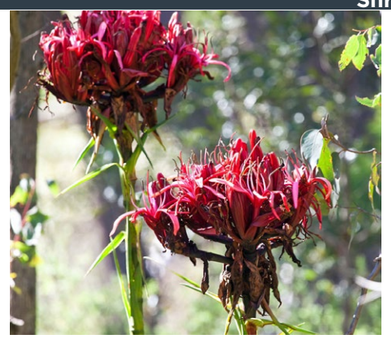
Shrubs



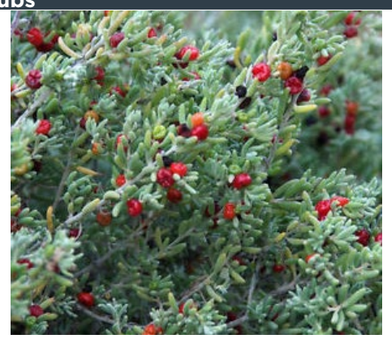
Breynia oblongifolia (**Coffee Bush)**



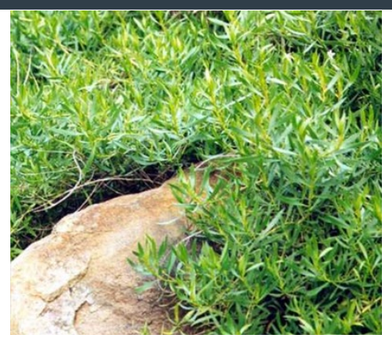
Daviesia ulicifolia (**Gorse Bitter Pea)**



Doryanthes excelsa (**Gymea Lily)**



Einadia hastata (**Berry Saltbush)**



Myoporum montanum (**Waterbush)**

Ozothamnus diosmifolius (**Rice Flower)**

Ground covers / native grasses

Aristida spp. (**Wire Grass)**

Cynodon dactylon (**Couch Grass)**

Cyperus gracilis (**Slender Fat-sedge)**

Dianella caerulea (**Blue Flax-lily)**

Hardenbergia violacea (**Purple Coral Pea)**

Lomandra filiformis (**Wattle Mat-rush)**

4.7 Urban Design Concept

To deliver a whole-of-corridor approach, a multi-disciplinary design team must develop a shared design vision for the Singleton bypass project, from design through to procurement, implementation, operation and maintenance.

The adoption of consistent and appropriate design themes for common components such as bridges, abutments, retaining walls, noise walls and concrete finishes should result in a particular visual character and consistent finish.

An urban design concept has been developed in accordance with New England Highway Urban Design Framework (RMS, October 2016).

The integrated urban design outcome delivers:

- A distinctive, expressive and safe driving experience.
- A design that has minimum impacts upon the natural land form as much as possible.
- Standard elements that follow a common design approach, adapted to each context.
- A simple, unified, whole-of-corridor' design of the road corridor and its elements which would minimise maintenance and associated whole-of-life costs.

Figure 54: Images of Hunter Expressway roadside elements to be replicated

Figure 55: Bridge abutment and noise wall details along the Hunter Expressway

4.8 Urban Design Components

An integrated design approach has been adopted for the project in order to ensure that the best possible outcomes are achieved. This integration is achieved through multidisciplinary teams and urban design team regularly collaborating to resolve design issues. This approach has enabled urban design solutions to be developed that feeds outcomes and values into the overall design for the Singleton bypass project.

The urban design response follows on from the urban design principles and objectives developed and aims to identify specific direction for the project.

The following description of urban design components expands on the following topics:

- Bridges
- Noise Walls
- Anti-Throw Screens
- Anti-Glare Screens

Bridges and other structures, over and above their functional requirements, should be designed and used as a visual marker or aid to travel orientation.

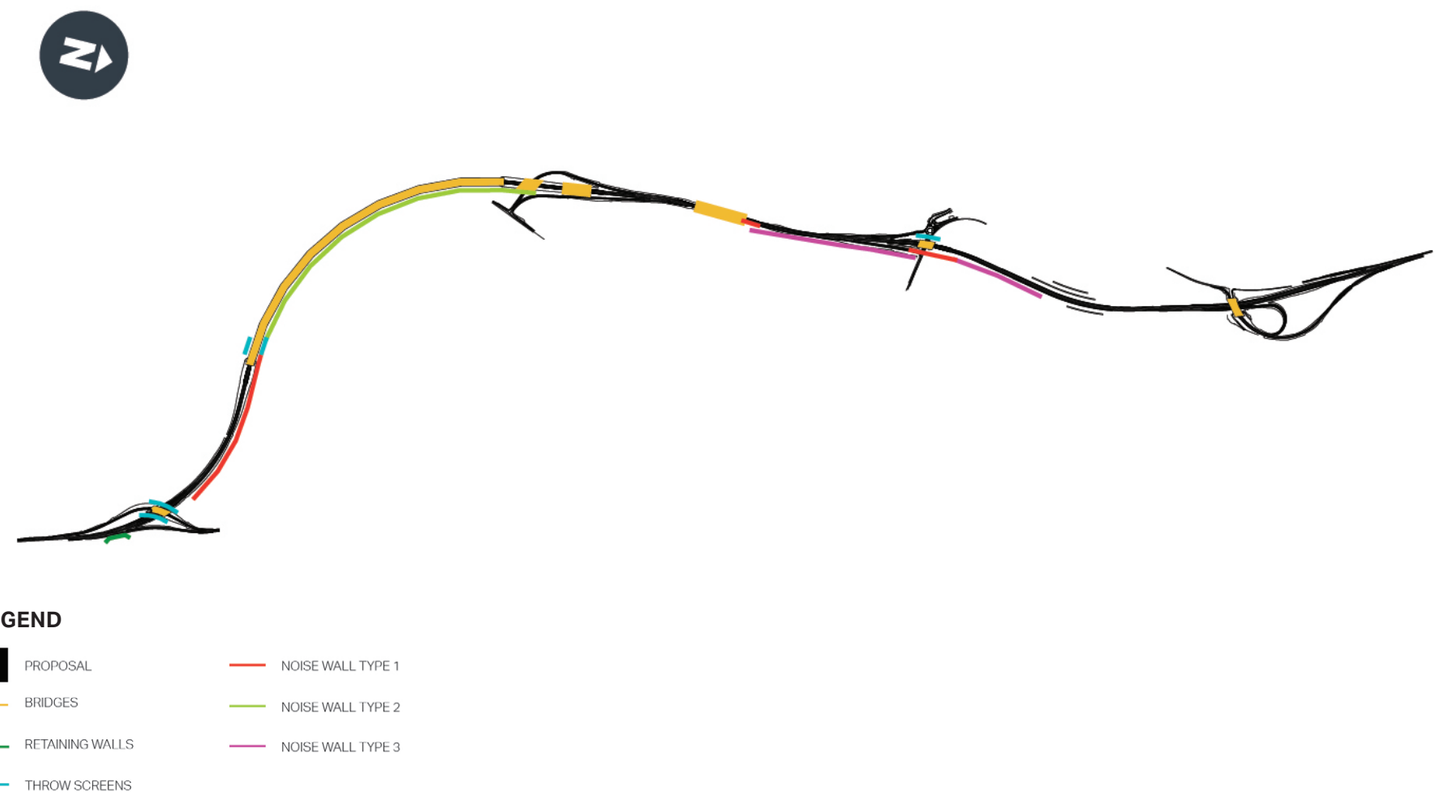


Figure 56: Key Map of Urban Design Component Locations

4.9 Bridges

Singleton bypass includes seven new bridges to support the bypass. Urban design input has been integrated into the bridge structural design process in order to ensure that the requirements of the following have been achieved:

- New England Highway Urban Design Framework (RMS, October 2016).

Additionally, urban design for the bridges has been undertaken in accordance with the key Roads and Maritime design policies and guidelines:

- Beyond the Pavement – urban design policy procedures and design principles (2014)
- Bridge Aesthetics – design guideline to improve the appearance of bridges in NSW (2012)

Bridges should belong to the same design family and should be considered as part of a suite of unified elements along the whole highway.

The overarching urban design approach to the bridge design has been:

- To design the visual expression of the bridges to be simple, streamlined and elegant in order to allow the surrounding landscape character to predominate
- To develop a consistent language to typical bridge elements in order to visually unify the bridges along the project
- To be consistent with the urban design of bridges in the adjoining sections of the Highway.

Urban design coordination has been undertaken across all project sections to ensure a consistent approach to the design and detailing for all bridges across the project.

The designed response outlined in the following elevations and sections apply consistently for all bridges along the bypass corridor. This approach includes the following design criteria:

- The outer face of the bridge deck parapets should be smooth single planes slanted outward to the bottom. Finish to be plain concrete (grey) to reference those constructed along the Hunter Expressway.
- Traffic barriers to be precast concrete with a twin steel railing.
- The southern and northern connection bridges to continue the coal banding on the bridge abutments from the Hunter Expressway as markers to the Singleton township.

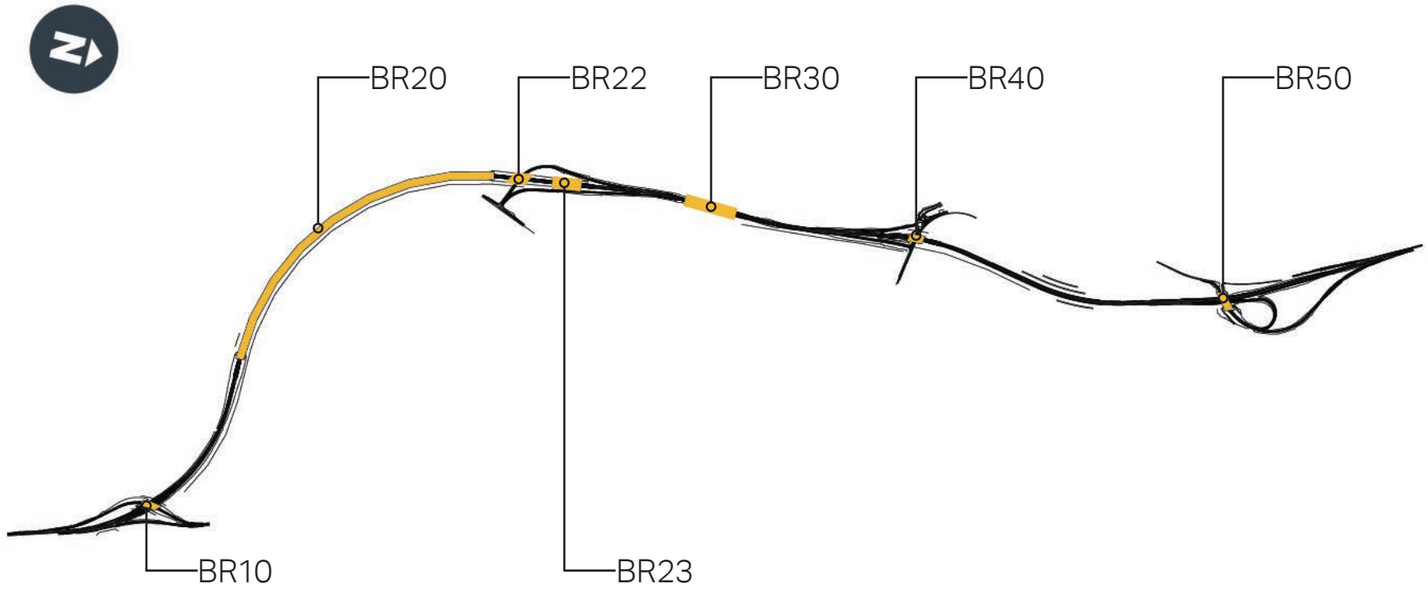


Figure 57: Key Map of Bridge Locations

BR010

This is a single lane bridge carrying the southern connection northbound exit ramp over the bypass. The bridge has been designed to cater for both the single and duplicated dual carriageway bypass. The bridge has medium performance barrier with twin steel rails (RMS type MAO) and has anti-throw screens on both sides of the bridge. Safety anti-throw screens would comprise of galvanised steel support posts and transparent panel screens mounted to the rear of the traffic barriers. Abutments are comprised of a 1500 millimetre deep headstock with integrated wingwalls, cheek walls, and curtain wall.

The bridge is located to the south of Singleton and on the eastern side of the rail corridor. It carries the southern northbound exit ramp over the bypass to facilitate a free-flowing connection.

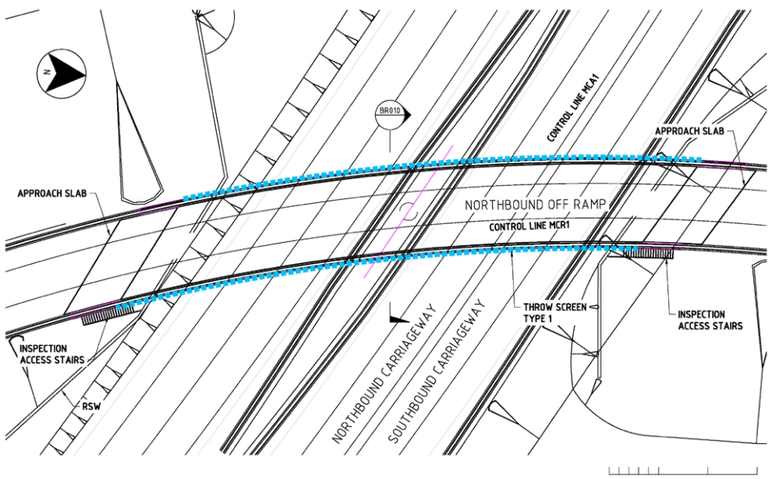


Figure 58: BR010 Plan View

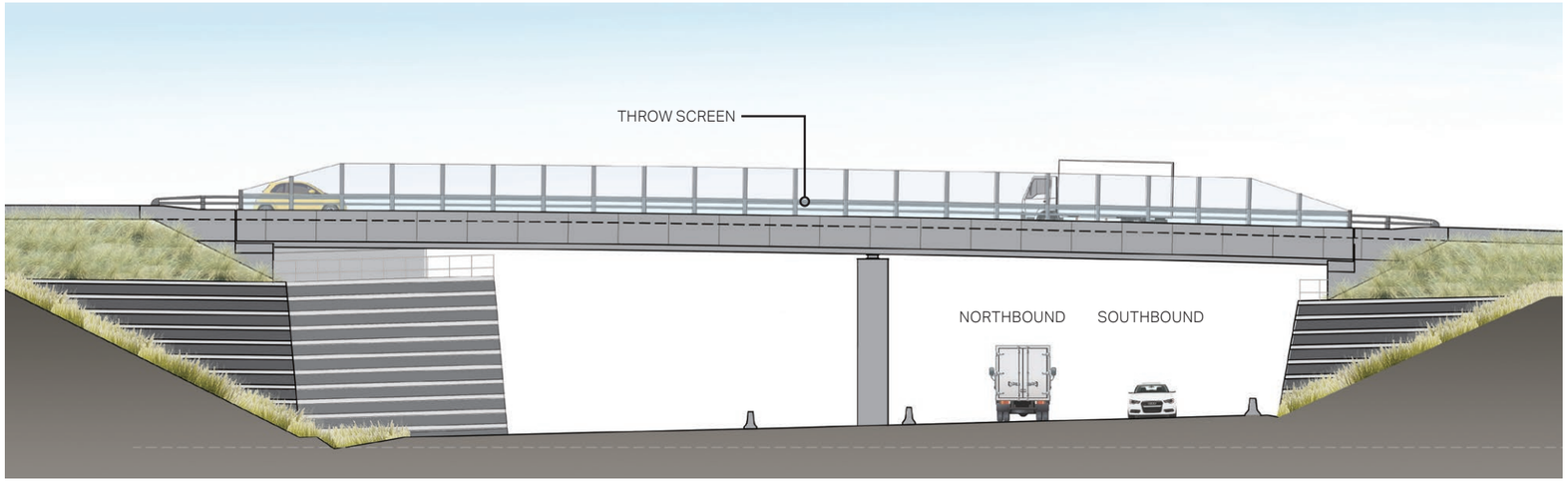


Figure 59: BR01 North Facing Elevation

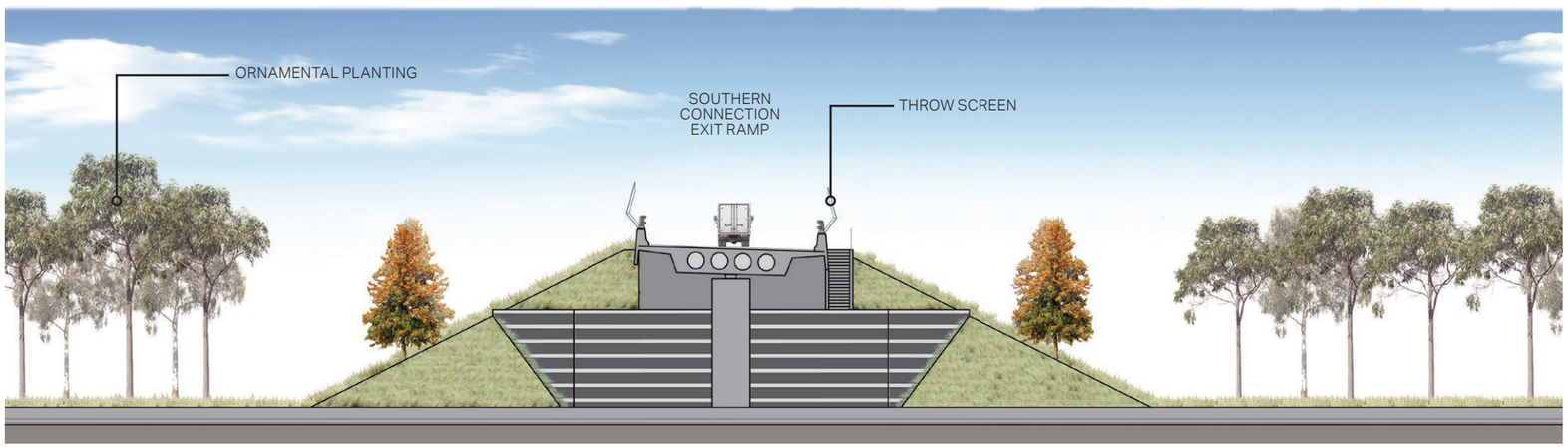


Figure 60: BR01 Section (Refer to *Figure 58* for location)

BR020

This is a 1.7 kilometre long bridge carrying the bypass over the Singleton floodplain. The bridge passes over farmland, the Main North Railway line, Army Camp Road, and Putty Road. The bridge is comprised of 51 spans to provide sufficient waterway area.

Barriers would be half height reinforced concrete with a galvanised twin steel rail, conforming the Roads and Maritime standard MAO detail.

Safety anti-throw screens are not required on this structure, determined in accordance with the risk assessment methodology provided in Roads and Maritime BTD 2012/01. However, they have been provided for the region of the bridge crossing the rail corridor in accordance with ARTC requirements.

In addition, acoustic screening is required on the east side of this structure. This would comprise coloured acrylic transparent panels that reflect the floodplain colours. The colours would aim to reduce the visual prominence of the moving traffic on the bridge when seen from the old town.

Further design investigation is to be undertaken during detailed design to remove the headstock upstands to the sides of the girders. This would reduce the visual bulk of the girders and create a more integrated appearance.

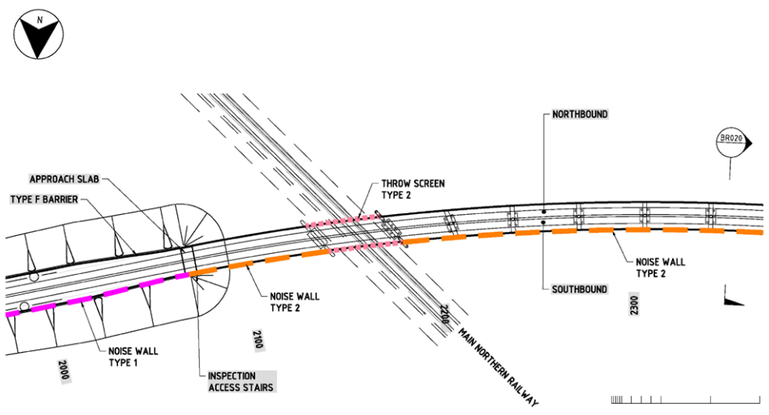


Figure 61: BR020 Plan View

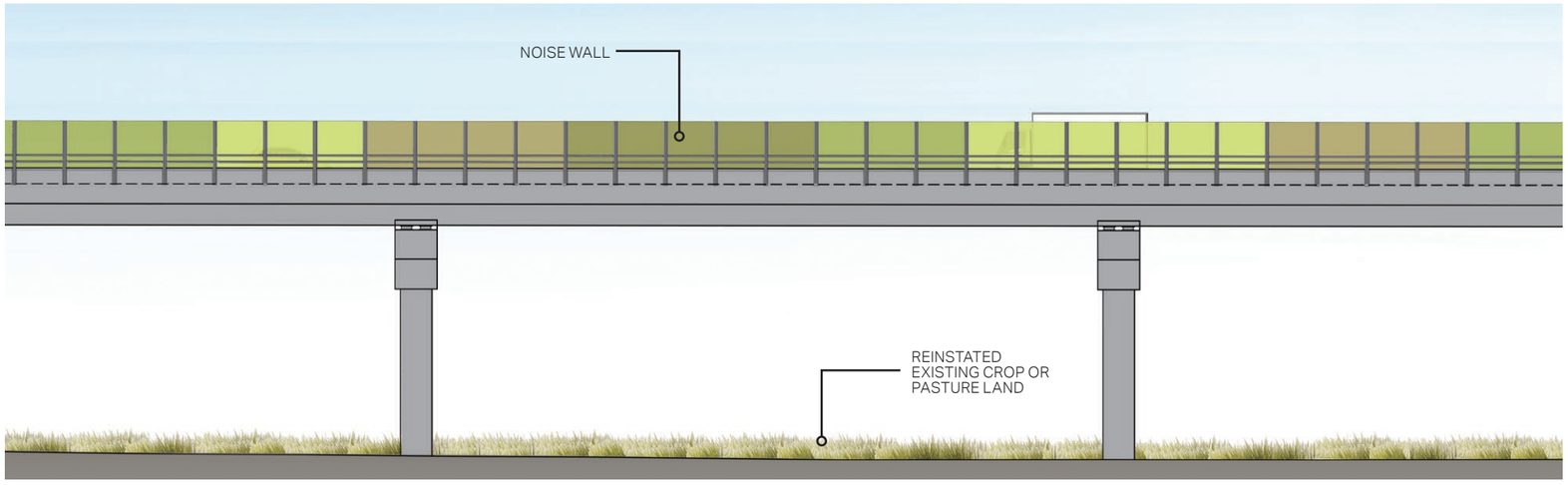


Figure 62: BR021 North Facing Elevation

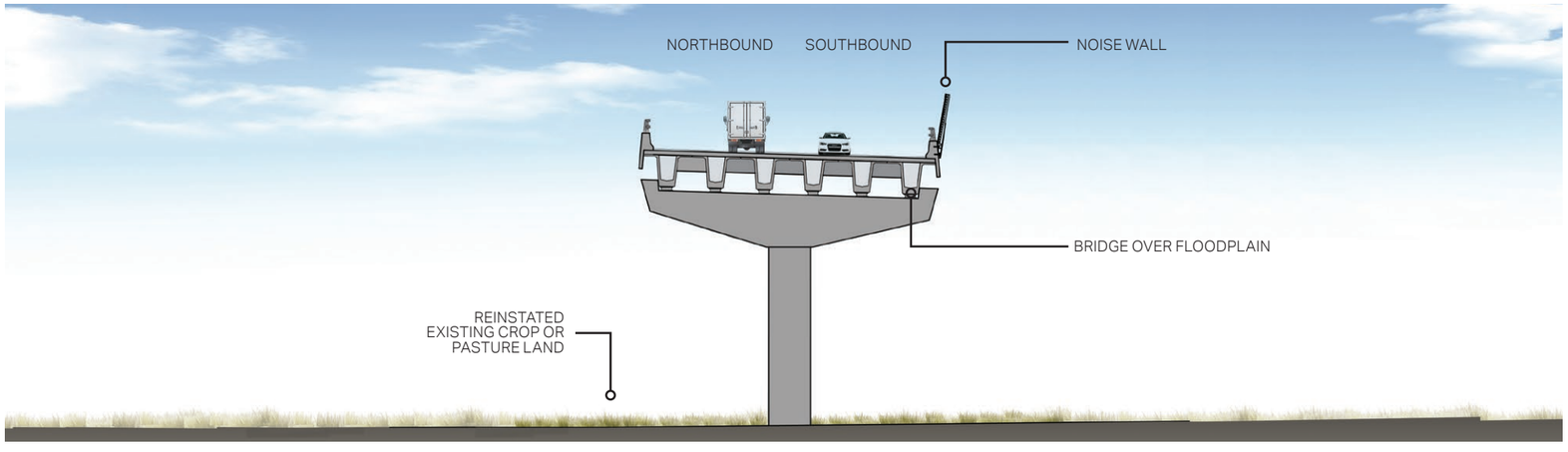


Figure 63: BR021 Section (Refer to *Figure 61* for location)

BR022

The bridge over the entry ramp at Putty Road connection is located to the north of Putty Road and west of the rail line. It carries the bypass over the proposed northbound entry ramp originating from Putty Road.

Barriers would be half height reinforced concrete with a galvanised twin steel rail, conforming the Roads and Maritime standard MAO detail.

Safety anti-throw screens are not required on this structure, determined in accordance with the risk assessment methodology provided in Roads and Maritime BTD 2012/01.

In addition, acoustic screening is required on the eastern side of this structure. This would comprise coloured acrylic transparent panels that reflect the floodplain colours.

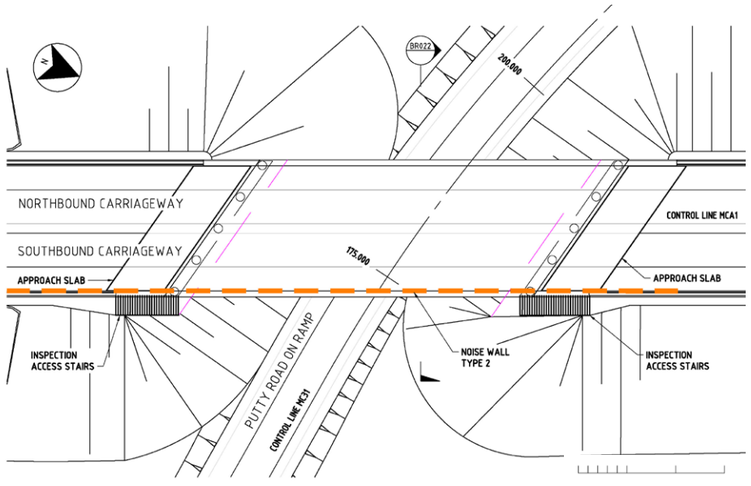


Figure 64: BR022 Plan View

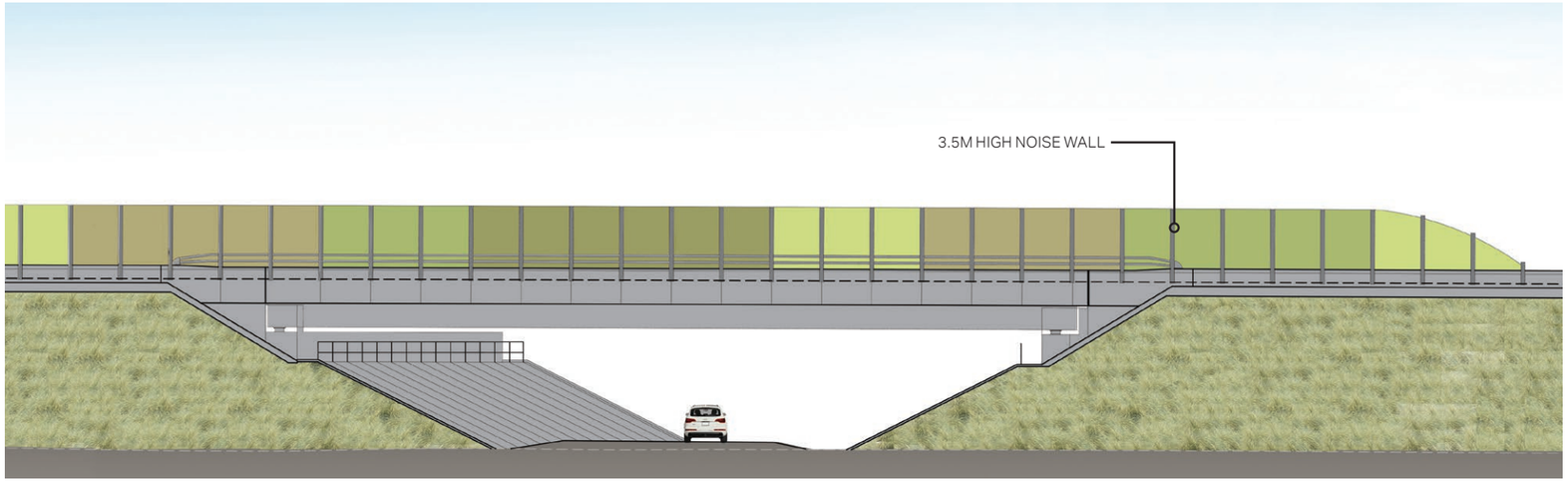


Figure 65: BR022 North Facing Elevation

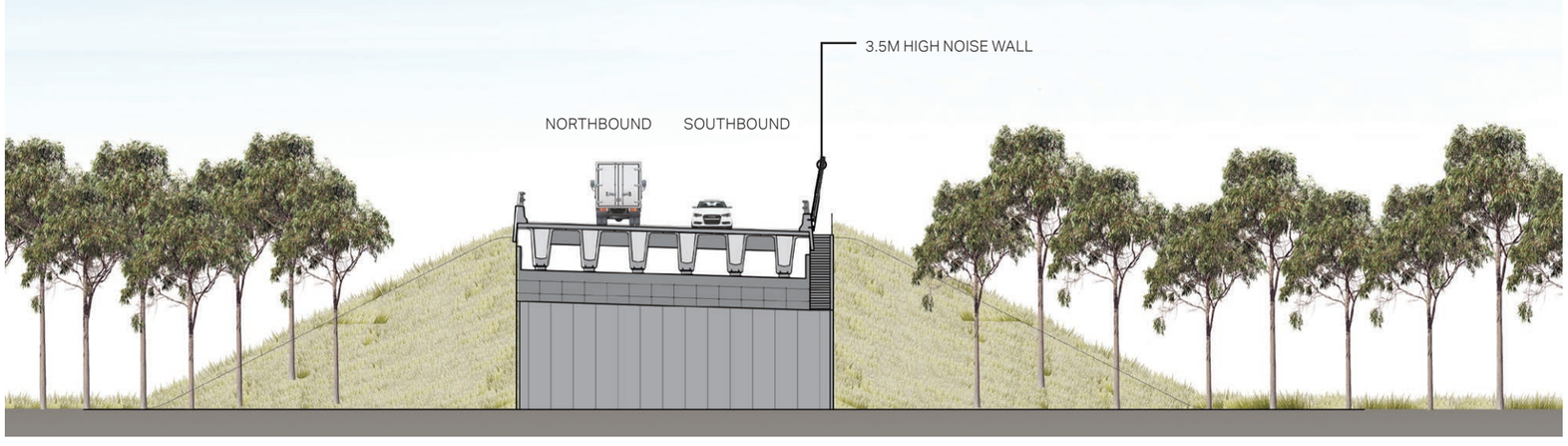


Figure 66: BR022 Section (Refer to *Figure 64* for location)

BR023

The bridge over Rose Point floodway is located between the existing rail line and Hunter River. It provides an opening in the bypass embankment to permit floodwaters to pass along the Rose Point Floodway.

Barriers would be half height reinforced concrete with a galvanised twin steel rail, conforming the Roads and Maritime standard MAO detail.

Safety screens are not required on this structure, determined in accordance with the risk assessment methodology provided in Roads and Maritime BTD 2012/01.

Acoustic screening is not required on this structure.

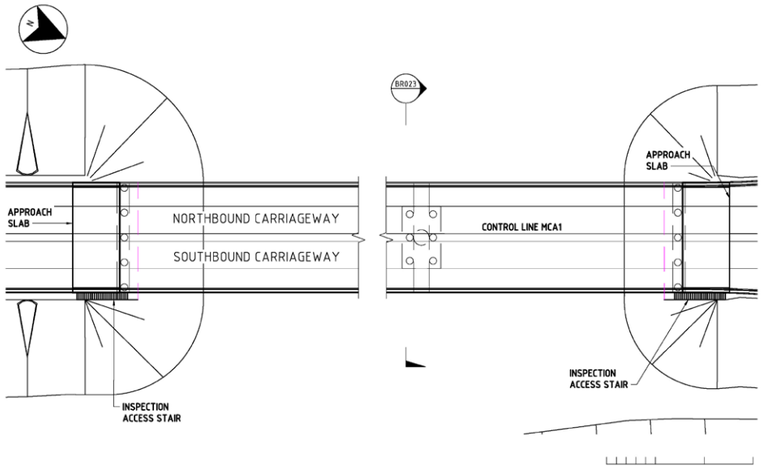


Figure 67: BR023 Plan View

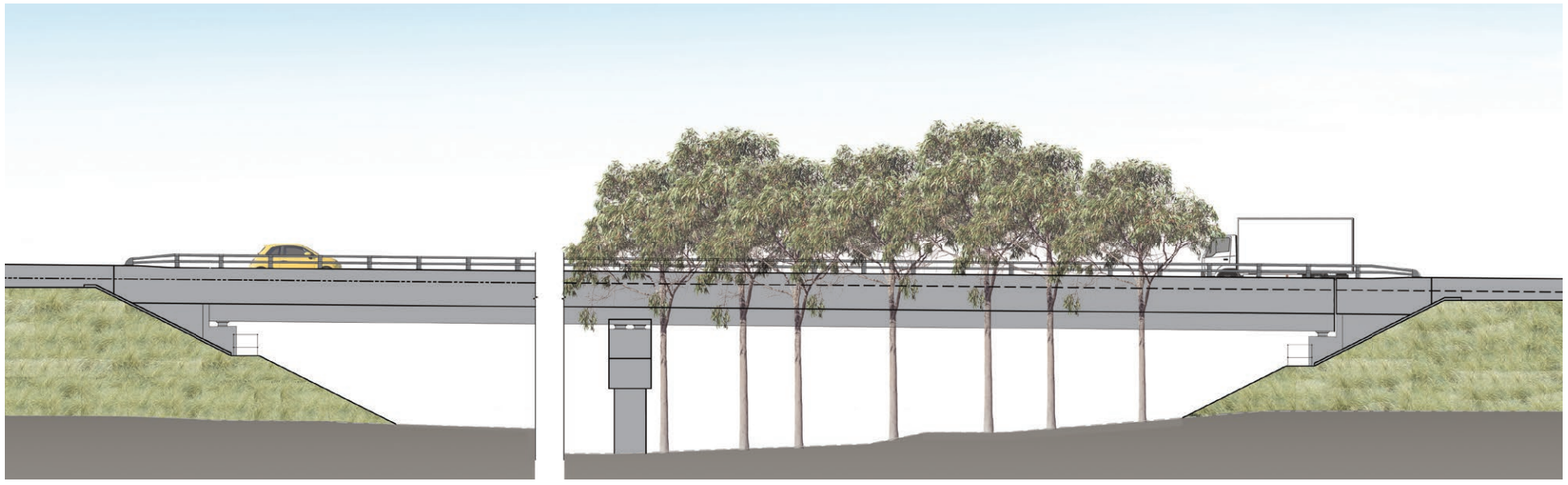


Figure 68: BR023 North Facing Elevation

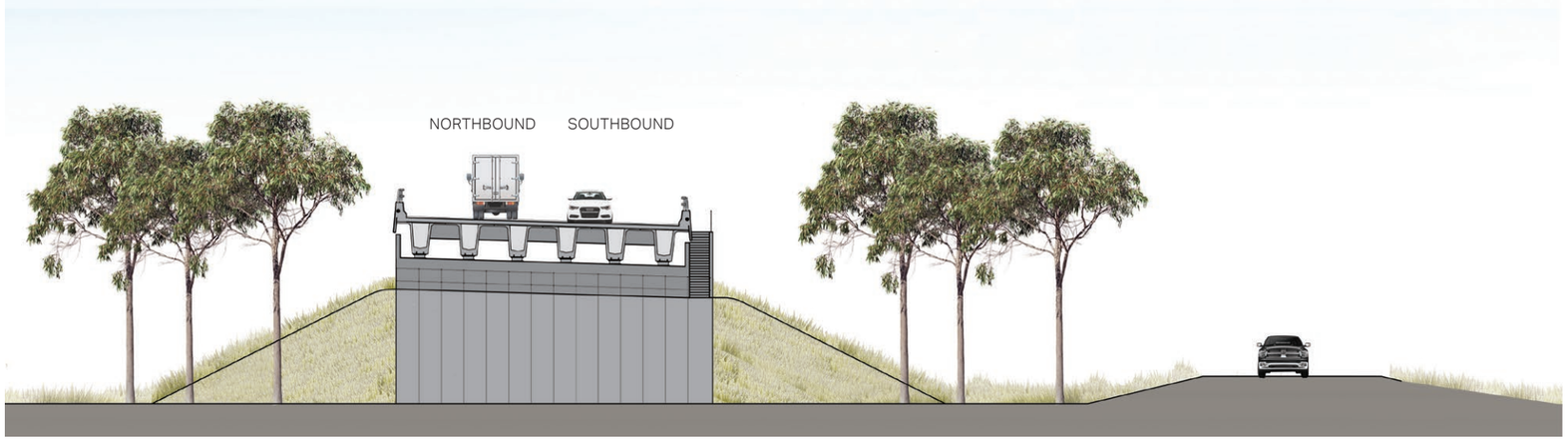


Figure 69: BR023 Section (Refer to *Figure 67* for location)

BR030

The bridge over Hunter River is located to the immediate west of the current Hunter River rail bridge. The bridge includes one pier within the river channel. It carries the bypass main alignment over the Hunter River channel and provides sufficient opening to permit the passage of flood waters.

Barriers would be half height reinforced concrete with a galvanised twin steel rail, conforming the Roads and Maritime standard MAO detail.

Safety screens are not required on this structure, determined in accordance with the risk assessment methodology provided in Roads and Maritime BTD 2012/01.

Acoustic screening is not required on this structure.

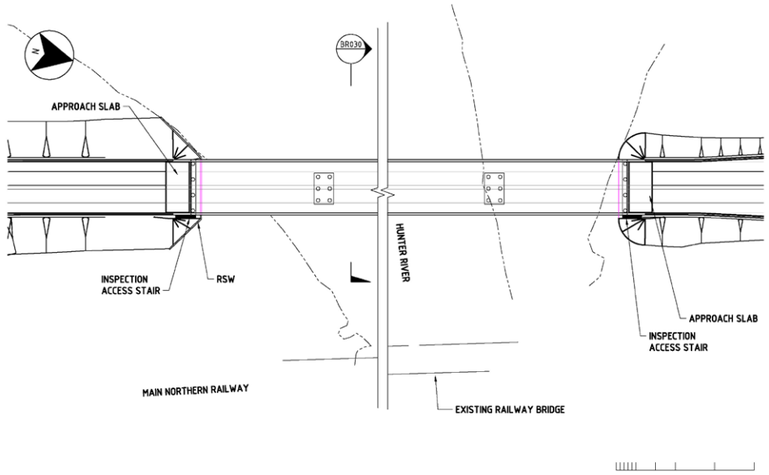


Figure 70: BR030 Plan View

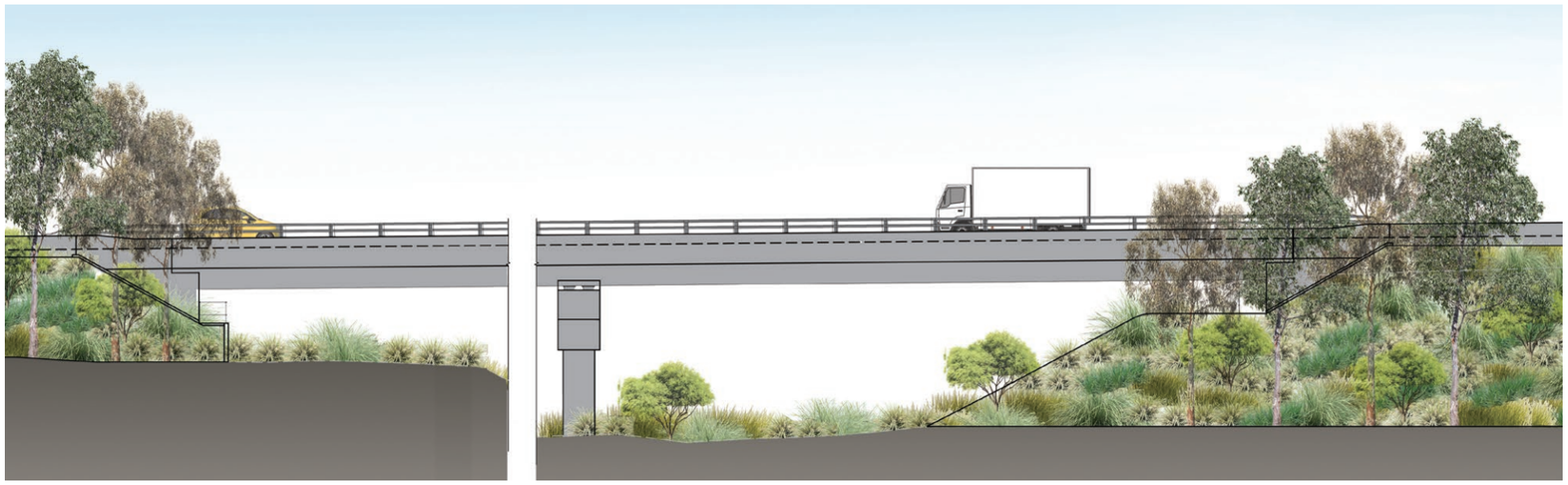


Figure 71: BR030 North Facing Elevation

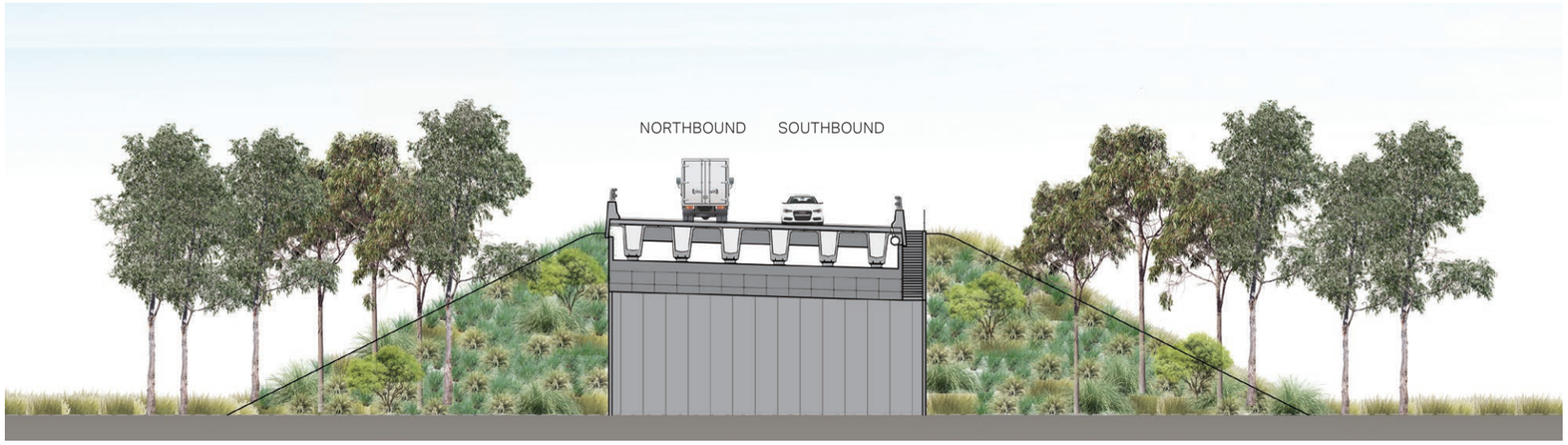


Figure 72: BR030 Section (Refer to *Figure 70* for location)

BR040

The bridge over the Highway at Gowrie Gates is located to immediate west of the current rail bridge over the Highway. It carries the bypass over the current the Highway.

The bridge is arranged as a single span structure providing clearance for the existing highway arrangement and a realigned shared path.

Barriers would be half height reinforced concrete with a galvanised twin steel rail, conforming the Roads and Maritime standard MAO detail.

Safety anti-throw screens are required on this structure, determined in accordance with the risk assessment methodology provided in Roads and Maritime BTD 2012/01. Safety screens would comprise of galvanised steel support posts and transparent panels mounted to the rear of the traffic barriers.

In addition, acoustic screening is required on the eastern side of this structure. This would comprise coloured acrylic transparent panels that reflect the floodplain colours.

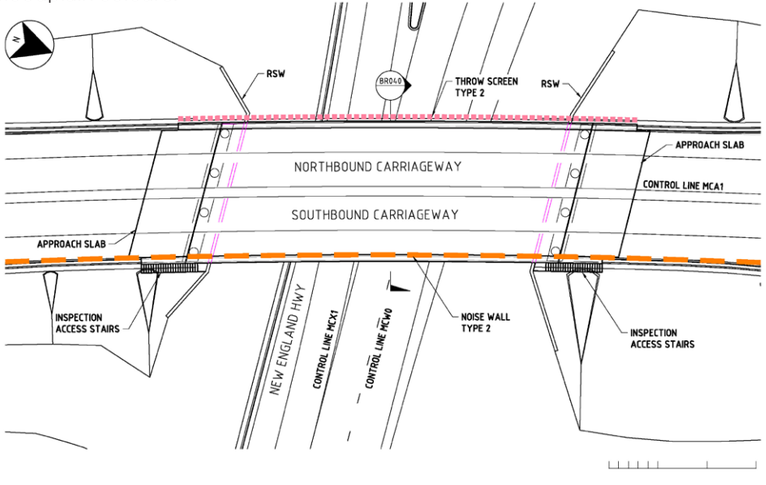


Figure 73: BR040 Plan View

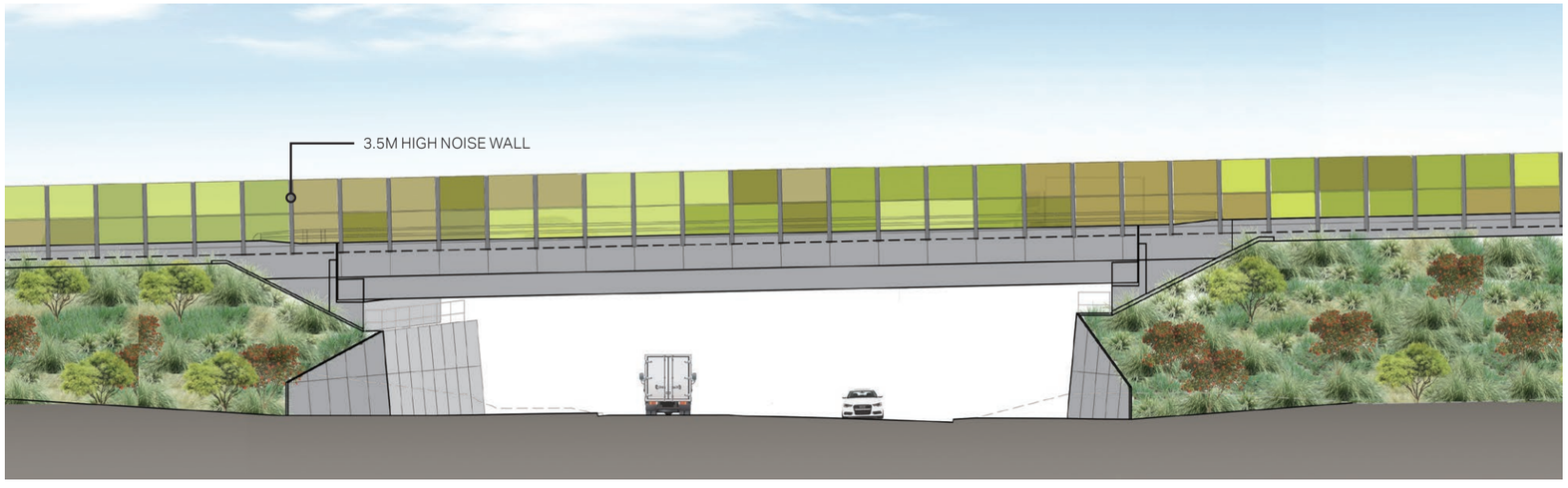


Figure 74: BR040 North Facing Elevation

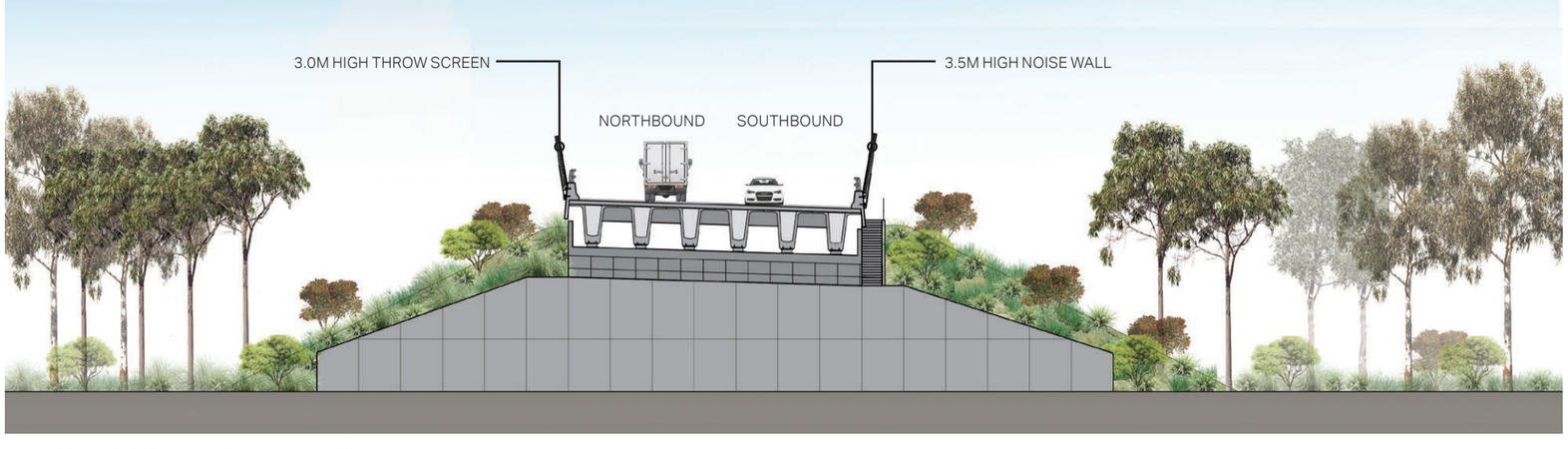


Figure 75: BR040 Section (Refer to *Figure 73* for location)

BR050

The bridge over bypass at northern connection is located to east of the existing the Highway and McDougalls Hill Industrial Estate. It carries the northern connection southbound exit and entry ramps over the bypass main alignment to facilitate a free-flowing arrangement.

Barriers would be half height reinforced concrete with a galvanised twin steel rail, conforming the Roads and Maritime standard MAO detail.

Safety anti-throw screens are not required on this structure, determined in accordance with the risk assessment methodology provided in Roads and Maritime BTD 2012/01.

Acoustic screening is not required on this structure.

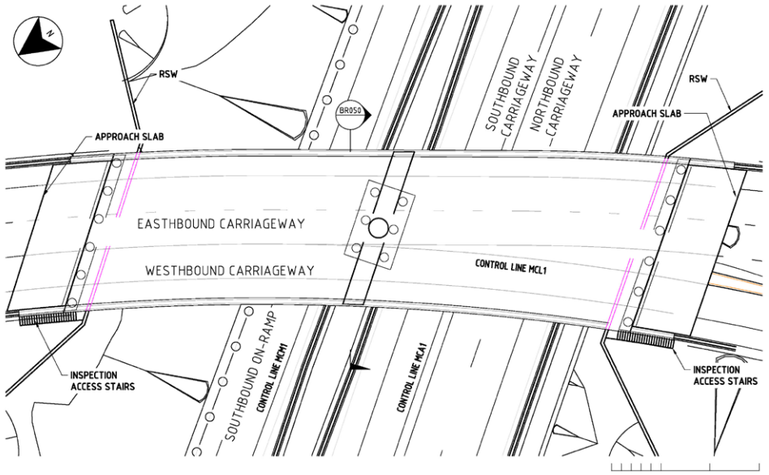


Figure 76: BR050 Plan View

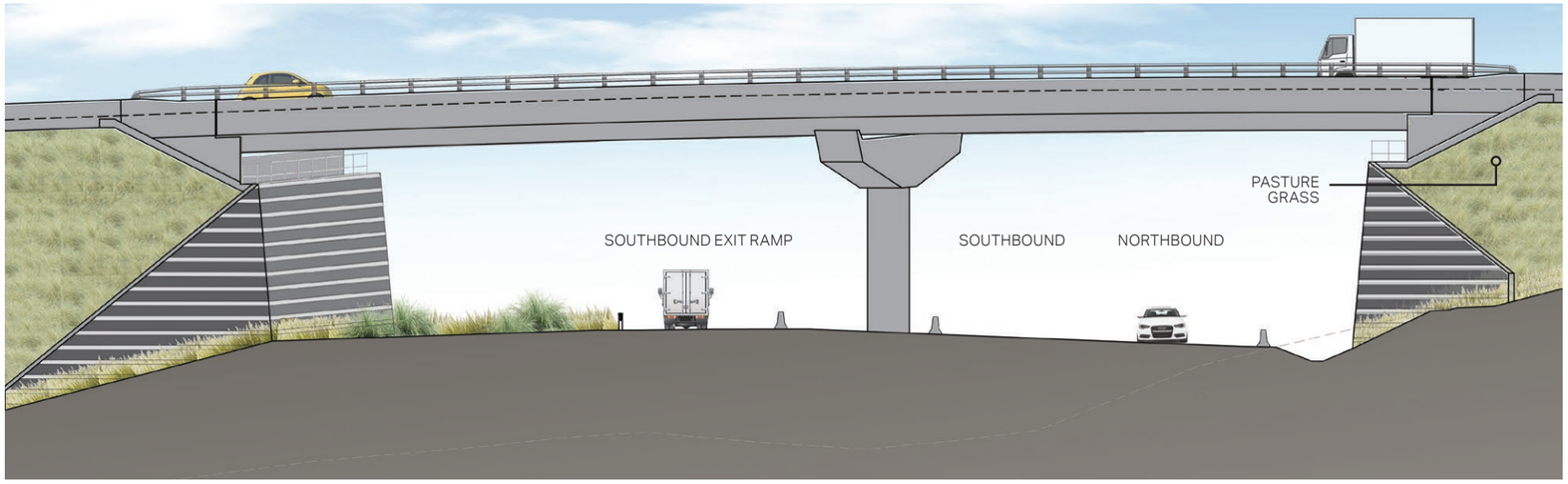


Figure 77: BR050 South Facing Elevation

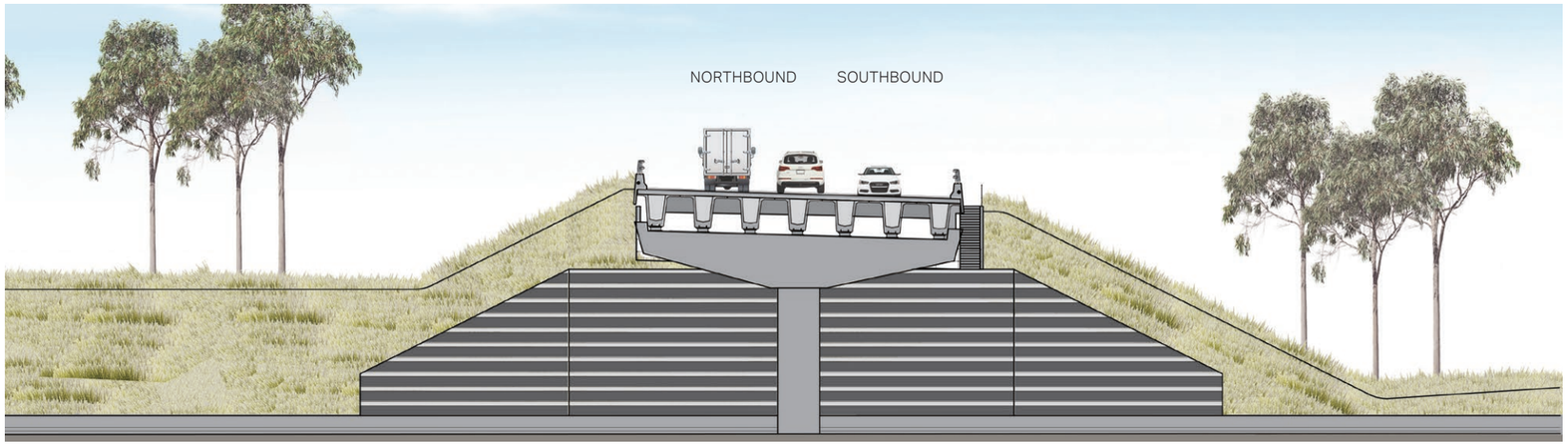


Figure 78: BR050 Section (Refer to *Figure 76* for location)

4.10 Noise Walls

A noise barrier assessment has been undertaken in accordance with Road Noise Policy for road traffic noise barriers close to the proposal. The noise assessment has resulted in the recommendation of six noise barriers. Barriers one to three are located south of Singleton and Glenridding, with barriers four and five located to the west of Darlington and barrier six to the west of Singleton Heights. The barriers range in height from 3 to 3.5 metres. Full study of noise barrier location can be found in the Noise and Vibration Technical Report (Singleton bypass – Concept Design and Environmental Assessment, AECOM, 2019).

As a highly visible element, noise walls play an important role in the experience along the corridor and connecting them to the surrounding context.

The following urban design principle and guidelines have been developed in accordance with RMS' Noise Wall Design Guideline (RMS, 2016) and New England Highway Urban Design Framework (RMS, October 2016).

Principle

- Provide a simple, consistent, coordinated and neat composition of road elements along the length of the road corridor.

Guidelines

- Noise wall panels should be comprised of robust, vandal-resistant materials and be resilient to damage by adjacent planting. Material and system selection to consider sustainability objectives.
- Any noise walls are to be designed as part of a hierarchy of walls that includes retaining walls, abutments and parapet walls, such that elements appear to be visually coordinated.
- Use of transparent panels to provide views and reduce the visual bulk on bridges or walls.
- Where noise walls are visible with limited screening opportunities, utilise patterns and colours that reference the adjacent landform and natural context.
- The apparent scale and visual impact of noise walls located on top of batter is to be reduced with careful planting, even when space is limited.
- Noise walls should have a smooth top edge parallel with the adjacent ground line as possible. All vertical posts should be of consistent height and set out. Where appropriate the post set-out should match that of the vertical joints in supporting structures below. For example, when noise walls are mounted above concrete barrier, the two elements should be visually integrated.
- When used in combination with other structures (e.g concrete crash barriers and bridge parapets), all joints, fixings and panels must be carefully coordinated as an integrated, three-dimensional design.
- Angling walls outwards to reduce the dominance of the wall, mitigating the 'boxed in' effect and enhance natural cleaning from rain.
- Consider tapering the end of walls to avoid an abrupt termination and to better integrate with adjacent structures or landforms (e.g. connect the wall end with the structure or tie the barrier into the landscape).

The noise wall types are outlined in further details over the following pages.

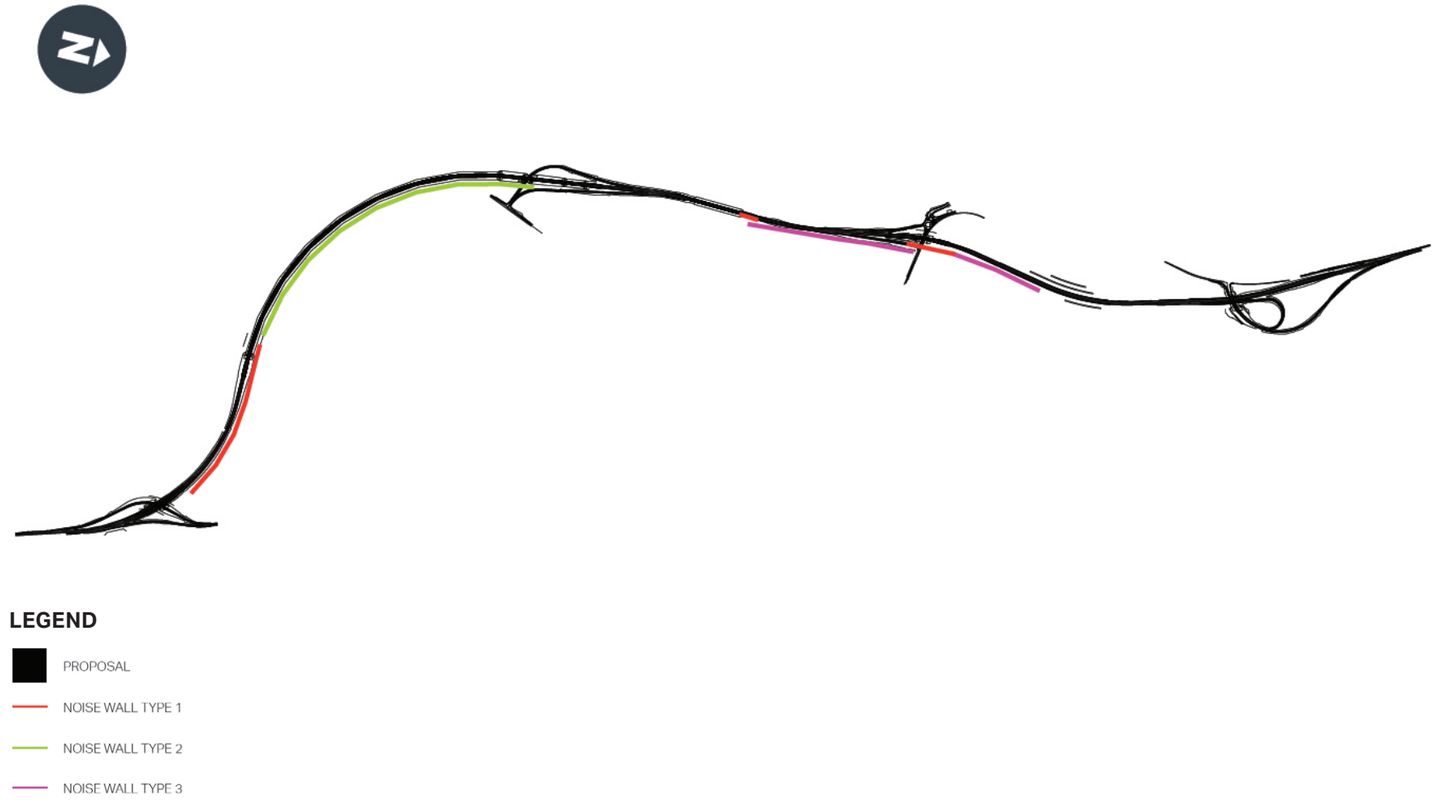


Figure 79: Key Map of Noise Wall Locations

Noise Wall Type 1

Noise Wall Type 1 consists of angled transparent panels fixed on the top the concrete crash barrier (with type F face) located on the edge of the southbound lane between chainages 1385 and 2100. A noise wall height of 3 metres was considered viable in this location. A 3.5 metres high Noise Wall Type 1 is located between chainages 4975 and 5075, between chainages 5830 and 5880, and between chainages 5935 and 6400. Coloured acrylic transparent panels that reflect the floodplain colours are proposed at the terminations of all Type 1 noise walls along the corridor. The coloured acrylic panels transition to a single acrylic colour through the centre section of the noise wall to provide an unimpeded view of the floodplain landscape. The colours would also aim to reduce the visual prominence of the moving traffic on the bridge when seen from the old town. The indicative colour palette is illustrated in *Figure 81*.

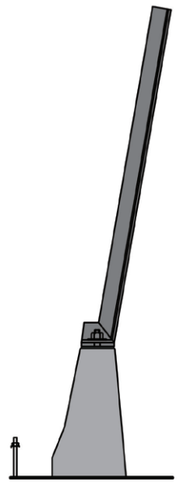


Figure 80: Detailed Profile of Noise Wall Type 1

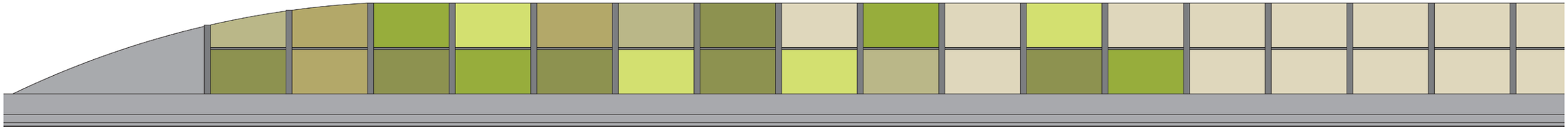


Figure 81: Indicative Elevation and Detailed Profile of Noise Wall Type 1

Noise Wall Type 2

Noise Wall Type 2 consists of angled transparent panels fixed on the back of the bridge parapet with twin railings. The noise wall, 3.0 metres in height, is located on the southbound side between chainages 2100 and 2975. The noise wall height increases to 3.5 metres from chainages 2975 to 3930 and between chainages 5880 and 5935. Coloured acrylic transparent panels that reflect the floodplain colours are proposed at the terminations of all Type 2 noise walls along the corridor. The coloured acrylic panels transition to a single acrylic colour through the centre section of the noise wall to provide an unimpeded view of the floodplain landscape. The colours would aim to reduce the visual prominence of the moving traffic on the bridge when seen from the old town. The indicative colour palette is illustrated in *Figure 83*.

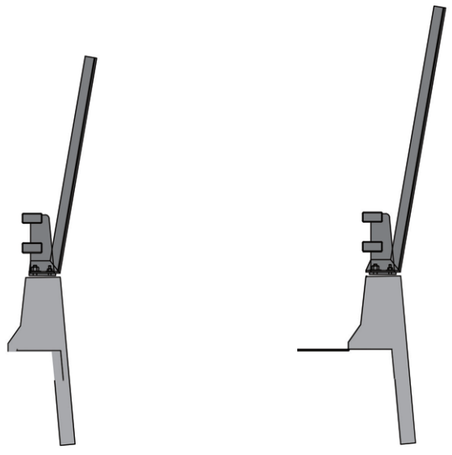


Figure 82: Detailed Profiles of Noise Wall Type 2

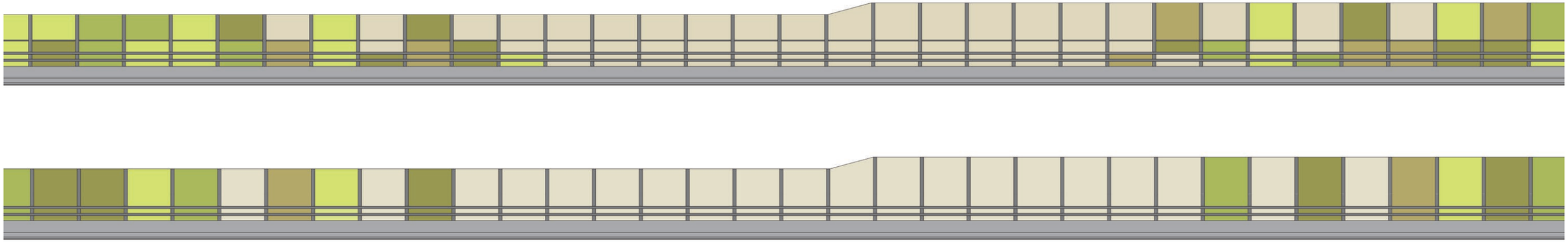


Figure 83: Indicative Elevation and Detailed Profile of Noise Wall Type 2

Noise Wall Type 3

Noise Wall Type 3 consists of vertical precast concrete panels located on top of the cut batters. The noise wall, 3.5 metres in height, is located on the southbound side between chainages 5060 and 5865 and between chainages 6380 and 6565. The proposed detailing and form of the noise walls would reflect the existing noise walls along the Hunter Expressway, particular in shape and arrangement (i.e. overlapping), to provide consistency along the road corridor. The noise wall panels themselves should also be simple with minimal relief pattern to the roadside face to allow for applied colour. The proposed colours would reflect the woodland colours, providing a backdrop to the planting on the cut batter. The concrete panels softened by planting in front and with trees behind is illustrated in *Figure 85*.

Figure 84: Typical noise wall arrangement from Hunter Expressway to be considered for Noise Wall Type 3

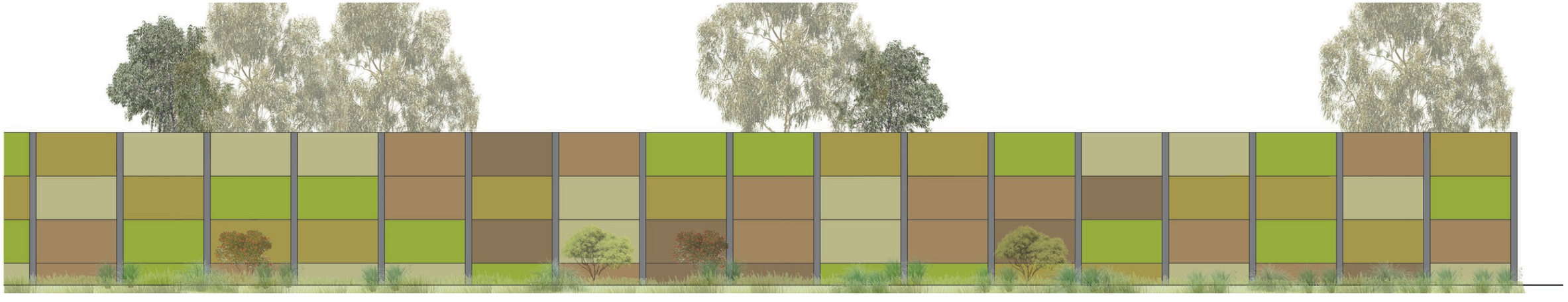


Figure 85: Indicative Elevation and Detailed Profile of Noise Wall Type 3

4.11 Anti-Throw Screens

Principle

- Integrate anti-throw screens into the road corridor and urban or landscape setting, as part of a coordinated whole-of-corridor design.

Guidelines

- Screens should be fully integrated with other bridge and abutment elements.
- This modular screen panels should be integrated with the bridge parapet design and should be an integral part of the bridge design.
- There should be a neat, elegant transition of the bridge barrier safety screen (e.g. tapered end).
- The anti-throw screen should extend to the end of the bridge span.

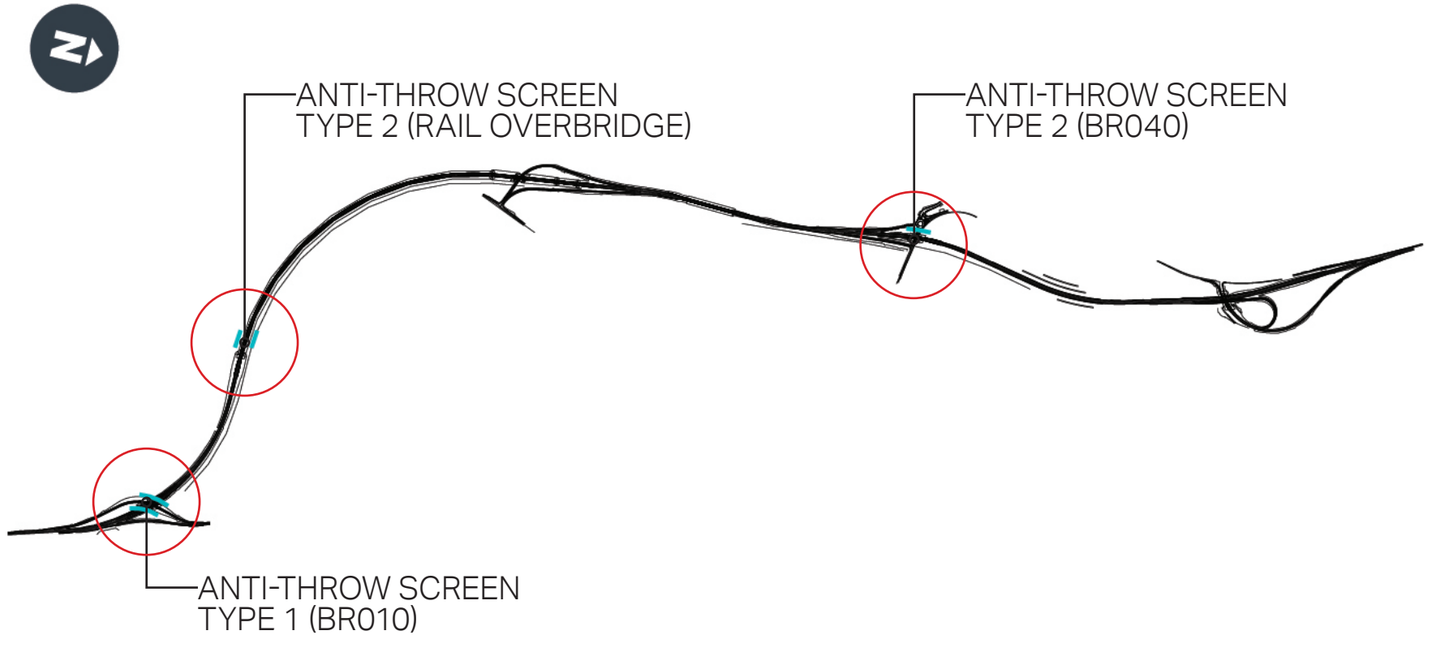


Figure 86: Key Map of Anti-Throw Screen Locations

Throw Screen Type 1

Clear acrylic transparent panels (20 millimetres thick) with embedded bird protection stripes.

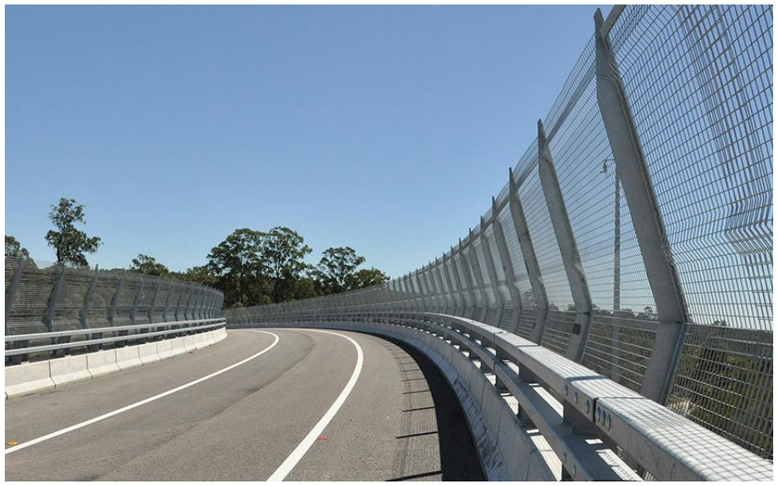


Figure 87: Example image of Throw Screen Type 1

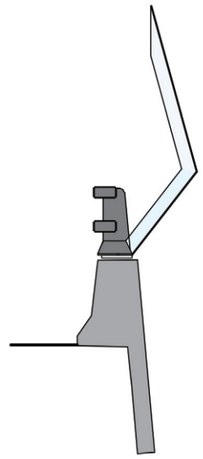


Figure 88: Detailed Profile of Throw Screen Type 1

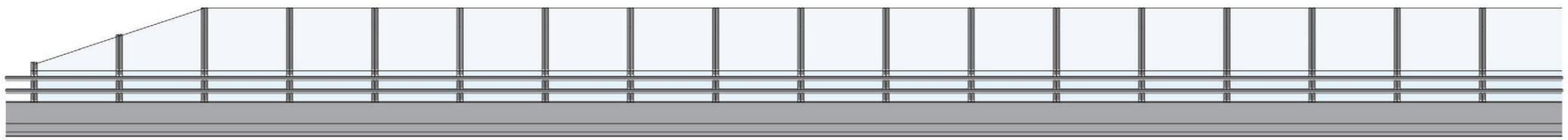


Figure 89: Indicative Elevation and Detailed Profile of Throw Screen Type 1

Throw Screen Type 2

Coloured acrylic transparent panels (20millimetres thick). Refer to *Figure 92* for indicative colour patterns.

Figure 90: Example image of Throw Screen Type 2 - Penshurst Road Overbridge, M5 East (Sydney)

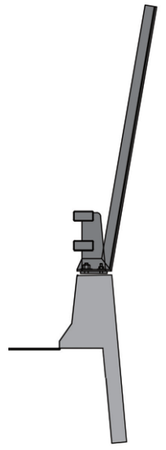


Figure 91: Detailed Profile of Throw Screen Type 2

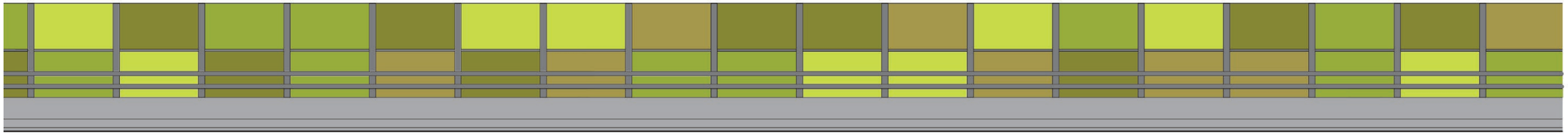
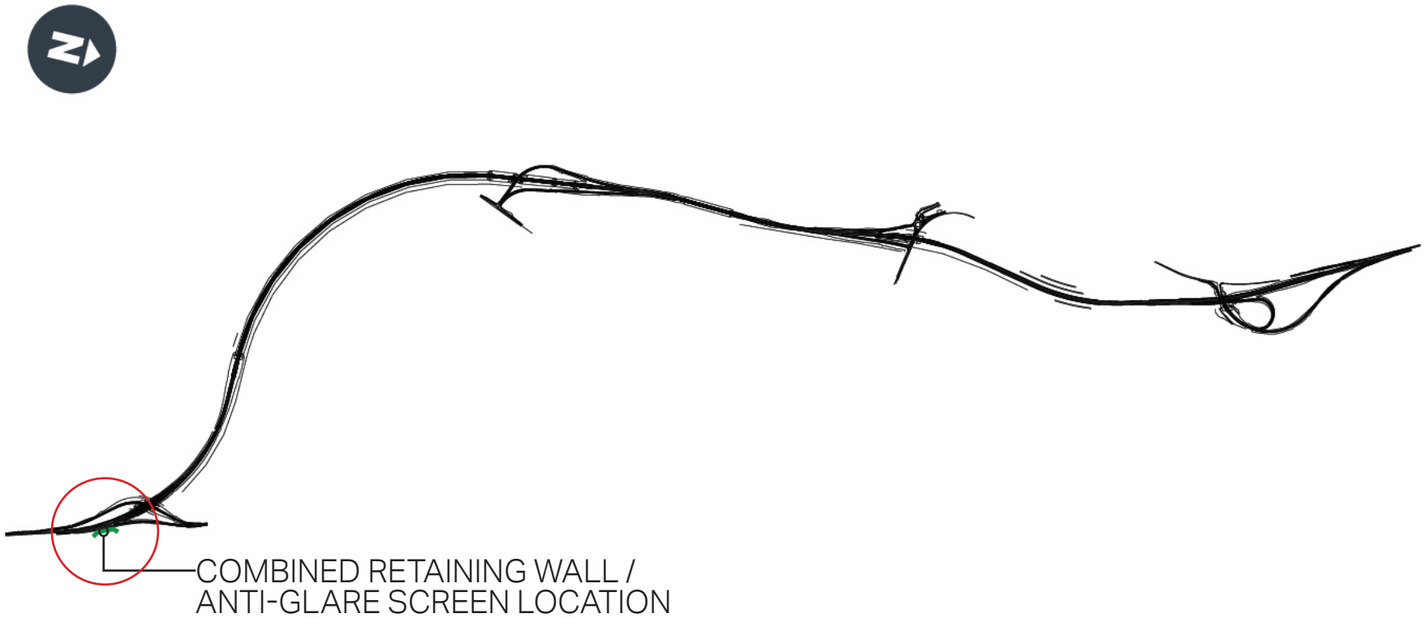


Figure 92: Indicative Elevation and Detailed Profile of Throw Screen Type 2

4.12 Anti-glare Screen

Guidelines

- Consider providing design continuity in form with the Hunter Expressway north to Muswellbrook.
- Integrate screens into the design of bridges and barriers.
- Ensure screens have a smooth top edge (no stepping), following the horizontal alignment of the carriageway.
- Minimise the perceived height of screen through laying back the vertical face.
- Headlight screens should be a dark recessive colour. Consider utilising a mesh that allows views from one direction but blocks headlights in the other.



4.13 Retaining Wall

Guidelines

- Minimise the visibility of walls by providing landscape screening in front of walls
- Panel surface design should discourage graffiti and consider methods for removal.

L - shaped walls are used where the wall can be integrated with adjacent pavements and roadside barriers to both retain and assist in meeting roadside barrier crash performance requirements.

L-Shaped concrete retaining walls are reinforced in situ concrete walls with a class 2 finish to all exposed faces. Edges would include a 25millimetre chamfer.

These walls are included on the southern connection.

Figure 93: Example image of Retaining Wall with Anti-glare Screen on top

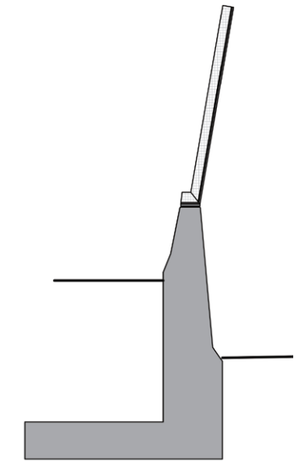


Figure 94: Detailed Profile of Retaining Wall with Anti-glare Screen on top

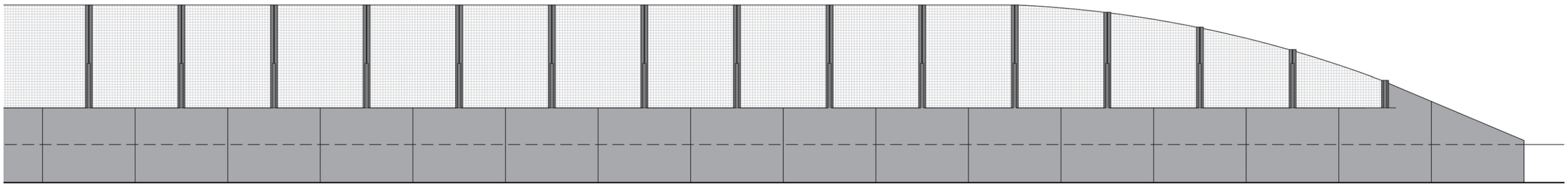


Figure 95: Indicative Elevation and Detailed Profile of Retaining Wall with Anti-glare Screen on top

4.14 Concrete Barriers

Two types of concrete barriers have been adopted for the project:

- Medium performance barriers with twin rails for all bridges to meet safety standards
- Regular performance solid concrete barriers with Type F face for all barriers along the road edge

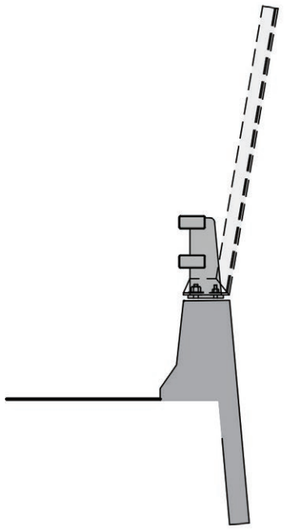


Figure 96: Detailed Profile of Medium Performance Concrete Barrier With Twin Rails

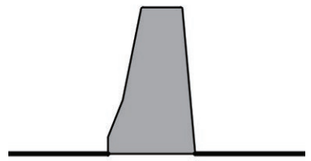


Figure 97: Detailed Profile of Regular Performance Solid Concrete Type F Barrier

Figure 98: Indicative Elevation and Detailed Profile of Medium Performance Concrete Barrier With Twin Rails

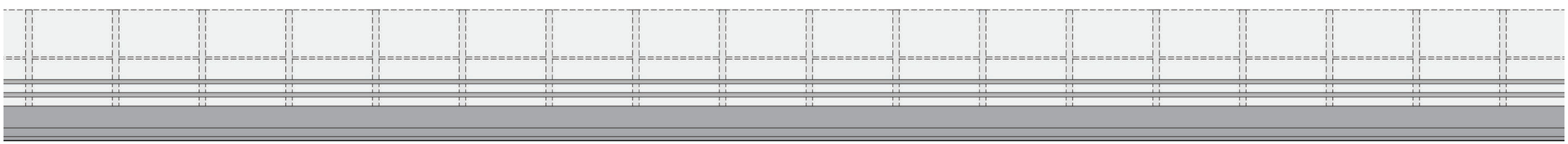


Figure 99: Indicative Elevation and Detailed Profile of Regular Performance Solid Concrete Type F Barrier

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5 LANDSCAPE CHARACTER IMPACT ASSESSMENT

5.1 LCZ 1 - Enclosed Rural Landscape

Description of works:

The northern end of the proposal would pass through LCZ 1 over a length of about 1.5 kilometres, retaining most of a regrowth Ironbark-Spotted Gum-Grey Box Forest abutting the northbound lane (refer s.2.3.1). However, it would remove much of the forest cover along the eastern edge of the highway through cut batters, the southbound Singleton exit, the Magpie Street connection and associated embankments for the proposal crossing point and widening of the existing highway. The distance between the forested edges of the existing highway would increase from about 20 metres wide to 40 metres wide at the bypass take-off point from the existing highway. Refer *Figure 43*.

A long, sweeping southbound exit ramp would be set on a constructed, rising embankment, over a distance of about one kilometre. This would attain a final height of about 20 metres to facilitate a bridge crossing of the proposed bypass to the existing New England Highway (the Highway), entering an upgraded intersection with Magpie Street and the main entry to the McDougalls Hill Industrial Estate. The bridge crossing would also facilitate access via a 'teardrop' loop from the Highway and Magpie Street connection to southbound bypass traffic. The proposed bypass would continue south through a cutting up to about 5 metres deep to the southern extent of the LCZ, located about 200 metres north of the upgraded Magpie Street intersection.

Both the main bypass and the entry and exit ramps for the new bypass would isolate large open areas within them. These would be subject to substantial cover of retained bushland and a forest planting of trees and understorey species characteristic of that existing, both along the edges of the works, and to areas within the connection. Batters would predominantly be planted to native shrubs and groundcovers characteristic of the endemic forest. Refer *Figure 43*.

Sensitivity: Low

The landscape value of the LCZ is moderate given that:

- it comprises a regenerating forest landscape landscape type: *Central Hunter Valley Eucalypt Forest and Woodland CEEC* (EPBC Act*), and *Central Hunter Ironbark - Spotted Gum - Grey Box Forest EEC* (BC Act**), (Note: much of these two communities overlap). Most of this area is zoned E2 - Environmental Conservation (refer *Figure 16*).
- the regenerating forest has a visually distinctive closed-forest form that is unusual within the context of the broader open and semi-open landscapes encountered along the rest of the proposal.

The likely congruency of the proposal with the LCZ, i.e. the extent to which it may 'fit' or be 'absorbed' into the setting of LCZ 1 is high, given that:

- the sense of enclosure of the Highway would be affected, with the distance between the east and west forest edges of the carriageway increasing from about 20 metres wide to 40 metres wide at the southbound exit ramp to Singleton - this includes a 500 metre edge alongside the southbound lane where only shrub and ground layer planting would be possible between the existing highway and the bypass.
- the extent and nature of the proposed restoration planting would be experienced as being set within a landscape that was consistent in its current character, comprising a dominant, defining feature of the LCZ.

* Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)

** Biodiversity Conservation Act 2016 (NSW)

Magnitude: Moderate

The proposal results in the:

- loss of existing forest cover
- addition of both the bypass and southbound exit ramp carriageways, with associated cuttings up to about 5 metres deep, mounding up to about 5 metres high, and widening with lane adjustments to the existing highway
- two-to three-fold addition of forest cover within the project corridor and arising from the proposal.

The landscape effects of the proposal are medium term, say 10-15 years, after which it would be expected to appear similar to the pre-existing part of the LCZ.

The landscape would change:

- from one containing a distinctive sense of enclosure and 'naturalness' with a two-lane road passing through it, and in which the forest is the dominant element within the landscape
- to that of a new roadway and exit ramp where the extent, quality and dominance of the forest landscape is maintained.

The quality of the concept design is high in that it:

- responds to the distinctive nature of the LCZ, including sense of enclosure and naturalness, and the use of forest restoration measures that provide a foundation for improved long-term conservation and ecological patch outcomes
- once the plant community is established, maintenance levels can be expected to decrease to levels well-below those typically required for interchange landscapes
- The extent of the concept design has been iteratively reduced in size during the proposal design development phase, to that of a relatively 'tight' and small footprint within the landscape. This has resulted in a reduction of land required for acquisition, associated project cost, and disruption for the local community

Landscape Character Impact: Moderate to Low

The rating is primarily influenced by:

- Conservation value and unusual visually distinctive closed-forest form within the context of the proposal
- The likely congruency of the proposal with the LCZ
- The quality of the concept design is high in that it responds to the distinctive nature of the LCZ, and the use of forest restoration measures that provide for improved long-term maintenance and conservation outcomes.

Table 3: Landscape character assessment - LCZ 1: Enclosed Rural Landscape

Landscape Character Impact Assessment	
Sensitivity	Low
Magnitude of Change	Moderate
Impact	Moderate to Low

5.2 LCZ 2 – Open Rural Landscape

Description of works:

The northbound exit ramp and bridge as described in LCZ 1 extends into this LCZ. The intersection of Magpie Street would be upgraded to a four-way intersection where a bridge over the bypass would be provided. This would direct traffic from / onto both the Highway and the McDougalls Hill Industrial Estate. The exit ramp would climb an earth embankment up to a height of about 20 metres, at which point it would provide an extensive view across the landscape.

Travelling south, the bypass would descend along a continuous series of cuttings through the side slopes of McDougalls Hill, over a distance of about 1.5 kilometres, before transitioning to embankment sufficient to again cross the existing highway, then travelling through gentle cut to the Hunter River. One major cutting would be in the order of up to 30 metres high and 500 metres long. Cuttings would be subject to a cover of native shrubs and grasses only. The top edges of the cuttings would generally be subject to sporadic stands of trees, consistent with the hillside landscape, with increased planting where it came within proximity of residential areas (broadly west of Alroy Park). Dense native screen planting would be applied along the western edge of the cuttings where they adjoined rural residences, and land zoned R2 Low Density Residential within Gowrie (refer *Figure 16*).

Sensitivity: Moderate

- The landscape value of the LCZ tends towards low given its generally open, steeply sloping nature, and eroded side slopes and watercourses
- The likely congruency of the proposal with the LCZ is low given the extent of both cuttings and raised embankments that it would be subject to, and the inability to provide similar stands of trees as found across much of the LCZ , to the proposed extensive cutting and elevated embankment batters
- Notwithstanding the above, the hillside presents as a natural landscape feature and backdrop / visual foil to the adjoining LCZ 5 – New Residential Suburbs, with potential for this effect to be diminished by the proposal

Magnitude: High

- The proposal would result in the large northern connection landform, some 1.7 kilometres of substantial cuttings, and 800 metres of raised embankment across both the eastern side slopes of McDougalls Hill and associated watercourses
- The duration of the change would be long term
- The quality of the design is limited by the extent of steep batters and embankments that are likely to be difficult to establish as intended
- The changes would adversely affect the character of the LCZ, from that of a natural landform to one substantially defined by a transport corridor.

Landscape Character Assessment: High to Moderate

The rating is primarily influenced by:

- the relatively poor condition of the LCZ 2 landscape
- the low congruency of the proposal within that setting
- the extent of the proposed change, particularly with regard to the footprint

Table 4: Landscape character assessment - LCZ 2: Open Rural Landscape

Landscape Character Impact Assessment	
Sensitivity	Moderate
Magnitude of Change	High
Impact	High to Moderate

5.3 LCZ 3 - Industrial

Description of works:

The works associated with this LCZ would be limited to the upgrading of the Magpie Street intersection at the main entry to the industrial estate. This would provide a direct link between the LCZ and the proposal. No significant works would be undertaken within LCZ 3.

Sensitivity: Low

- The landscape value of the LCZ is low
- The likely congruency of the proposal with the LCZ is high

Magnitude: Negligible

- There would be no loss, change or addition of any feature within the LCZ

Landscape Character Assessment: Negligible

Table 5: Landscape character assessment - LCZ 3: Industrial

Landscape Character Impact Assessment	
Sensitivity	Low
Magnitude of Change	Negligible
Impact	Negligible

5.4 LCZ 4 - Large Lot Residential

Description of works:

The bypass travels adjacent to this LCZ about 200 metres to the east at is closest point, where it traverses the side of McDougalls Hill, through both cuttings and fill embankment. The eastern boundary of the LCZ is bounded by the existing highway. However, the proposal would not directly affect this edge.

Sensitivity: Low

- The landscape value of the LCZ is moderate within the context of its generally moderate to high tree cover, well-spaced housing and rural residential, large lot character

Magnitude: Negligible

- The magnitude of change to the LCZ is negligible given its substantial separation from the Project other than for relavtively minor intersection upgrading of the existing highway at its southern-eastern corner.

Landscape Character Assessment: Negligible

Table 6: Landscape character assessment - LCZ 4: Large Lot Residential

Landscape Character Impact Assessment	
Sensitivity	Low
Magnitude of Change	Negligible
Impact	Negligible

5.5 LCZ 5 – New Residential Suburbs

Description of works:

Travelling south, the proposed bypass would traverse across a raised embankment sufficient to bridge the Highway at Gowrie Gates, and to approach the Hunter River bridge crossing.

The proposal lies adjacent to the western edge of the LCZ, about 50 metres distant at its closest point near Gowrie Gates. North of this point, the LCZ 5 boundary quickly diverges from the proposal to a distance of nearly 500 metres east of the northern connection, separated by the steep side slopes of McDougalls Hill at a reduced elevation of about 40-50 metres. South of Gowrie Gates, the distance from LCZ 5 to the proposal extends to a maximum of about 150 metres.

A 3.5 metre high concrete panel retaining wall would be located along the southbound edge of the bypass from near the southern end of the large cutting to the Hunter River. This would be coloured and patterned to reflect the mosaic character of the agricultural floodplain.

The proposal requires some minor tie-in roadworks within the LCZ over a length of about 150 metres to the Highway.

Sensitivity: Low

- The landscape value of LCZ is low within the context of this being a suburban setting, common throughout much of the country
- The congruency of the proposed minor tie-in roadworks to the Highway is high

Magnitude: Negligible

- The magnitude of change to the LCZ is negligible

Landscape Character Assessment: Negligible

Table 8: Landscape character assessment – LCZ 5: New Residential Suburbs

Landscape Character Impact Assessment	
Sensitivity	Low
Magnitude of Change	Negligible
Impact	Negligible

5.6 LCZ 6 - Agricultural Floodplain

Description of works:

Upon crossing the Hunter River, the bypass would traverse the agricultural floodplain via an approximately 1.0 kilometre long series of embankments. These would pass through a long established market gardening area, and would incorporate two small bridges, and central connection of entry and exit ramps to Putty Road. The bypass would then transition to a bridge structure over a distance of some 1.7 kilometres, before again transitioning to an about 800 metre length of embankment and then the southern connection with the existing highway.

The bridge would form an arc passing at its northern end through outlying residential development within the settlement of Glenridding, and up to about 200 metres distant from it. At its southern extent it would cross the Main North Railway line. South of the Railway line, the bypass would be located about 300-400 metres from the edge of the old town. The bridge would be in the order of 11 metres high above the floodplain, allowing farm machinery to continue operating beneath it.

The embankment associated with the Putty Road connection remove much of the established market gardening area on a bank of the Hunter River, and sits uncomfortably within a narrow neck of land between the Hunter River and the Main North Railway Line.

The bridge and southern embankment section of the bypass would include a transparent sound barrier wall along its southbound edge. This would be coloured and patterned to reflect the chequered, mosaic forms and diverse array of greens, browns and khaki colouring characteristic of the agricultural floodplain, while still allowing views through it from the bypass across the historic old town. The areas under the bridge would be repaired and made good for agriculture, while the embankment batters would be subject to a cover of pasture grasses with nearby sporadic stands of trees on the floodplain.

The entry to Singleton would bridge over the beginning of the bypass, ramping up to and down from the structure by embankment. The entry road would be lined by a formal avenue of Silky Oaks (*Grevillea robusta*) and pasture grasses.

Sensitivity: High

- The landscape value of LCZ 6 is high, including: Aboriginal heritage, with the banks of the Hunter River identified as having High Significance to the local Aboriginal community as a traditional and historical camping, resource and gathering place (refer *Figure 20*: Cultural Place (Impacted) – Cultural Site A); productive agriculture with associated range of colours and textures; it's unique contrasting form within the context of otherwise variously elevated or excavated regional landforms; the Hunter River and associated extensive agricultural floodplain being the only major river crossing along the nearly 900 kilometres length of the highway
- The likely congruency of the bridge is high, in that it comprises a long, simple elevated form that steps 'lightly' across the floodplain, and at a height that facilitates visual and physical contact with the floodplain landscape beyond
- The likely congruency of the embankments is low, in that: they comprise uncharacteristic linear landforms within the planar landform setting; they remove visual and physical contact with the landscape beyond; and become a foreground to middle ground focus of resultant views from Singleton old town
- The likely congruency of the Putty Road connection is low given its tight fit between the Hunter River and the Main North Railway line, and disrupted form of embankments and bridges
- The likely congruency of the bridge and embankment floodplain elements as a whole is: moderate in that it comprises an elegant sinuous form which skirts much of the southern extent of the old town.

Magnitude: Moderate

- The proposal would provide about 2.3 kilometres of 11 metres high embankment and 1.7 kilometres run of bridge, both topped with a further 3.0 metre high transparent noise wall
- The duration over which the effects would be felt is long-term
- The proximity of the bridge to Glenridding would adversely affect the character of this settlement
- Other than for the use of embankments, the quality of the design solution is high, including the use of a transparent noise wall that reflects the character of the floodplain

Landscape Character Assessment: High to Moderate

The rating is primarily influenced by:

- the high landscape value of the agricultural landscape
- the likely low congruence of the embankment elements within the floodplain
- the proximity of the bridge to Glenridding
- the design of the Putty Road connection

Table 9: Landscape character assessment – LCZ 6: Agricultural Floodplain

Landscape Character Impact Assessment	
Sensitivity	High
Magnitude of Change	Moderate
Impact	High to Moderate

5.7 LCZ 7 – Singleton Old Town

Description of works:

LCZ 7 would be subject to minimal direct effects arising from the proposal. These would be limited to where the bridge over the floodplain would pass through the outskirts of Glenridding, requiring the removal of two residences, and resulting separation of several residences from the main settlement, located south of the proposal along Putty Road.

Sensitivity: High

- The landscape value of LCZ is high within the context of: its European heritage, as reflected within LEP mapping (refer *Figure 16*) and heritage reporting; its location within the floodplain, in close association with the agricultural floodplain and the Main North Railway line
- The likely congruency of the bridge with the settlement of Glenridding is low, given: the separation of outlying residences from the main settlement; and the highly contrasting form and scale of the bridge

The proposal would also have indirect effects on LCZ 7, including:

- high level disruption of spatial qualities in relation to embankments which would comprise uncharacteristic elevated elements within the planar landscape; and loss of landscape context with the distant forested high ground containing the floodplain. Ideally, there would be no need for embankments within this exceptional floodplain landscape setting. The embankment associated with the southern connection is considered to be of greater concern in this regard than that of the Putty Road connection
- loss of much of the historic context of the old town as per the above.

Magnitude: Moderate

- the duration over which the effects would be felt is long-term
- the proximity of the bridge to Glenridding would adversely affect the character of the settlement
- the setting of the old town would indirectly be affected by the placement of embankments and subsequent loss of extensive floodplain context and backdrop views of the Greater Blue Mountains World Heritage Area, with these elements being seminal to the landscape character of the old town.

Landscape Character Assessment: High to Moderate

The rating is primarily influenced by the:

- high landscape and heritage values of the old town
- indirect effects on the landscape setting of the old town
- the long-term duration of the effects.

Table 10: Landscape character assessment – LCZ 7: Singleton Old Town

Landscape Character Impact Assessment	
Sensitivity	High
Magnitude of Change	Moderate
Impact	High to Moderate

6 SEEN AREAS

6.1 Zone of Theoretical Mapping

Zone of theoretical visibility (ZTV) mapping has been undertaken from six representative locations as listed in *Table 11*. This provides an indication of which parts of the proposal are likely to be viewed from surrounding land uses. The mapping process uses landform data only (topographic mapping) without any landcover, i.e. no trees or buildings are 'seen' by the program. Additionally, some receivers might only see parts of the proposal such as the deck level of a bridge over the floodplain, while other receivers would view more substantial parts of the proposal.

Table 11: Zone of theoretical visibility mapping locations

No.	Location	Height (AHD)
A	McDougalls Hill at the intersection of the New England Highway and Magpie Street	135.5 metres
B	New England Highway, towards the bottom of McDougalls Hill	73.5 metres
C	Hunter River crossing - bridge deck level	47.3 metres
D	Bridge crossing at Putty Road - bridge deck level	50.5 metres
E	Main Northern Railway line bridge crossing - bridge deck level	51.5 metres
F	New England Highway bridge crossing of bypass - bridge deck level	49.5 metres

6.1.1 Composite assessment map

A composite of the above six maps is shown in *Figure 100*. This illustrates the overlaying of the seen areas from all six assessment points to give an overall map of where the project could theoretically be seen from. As shown, the area from which the proposal would be seen is large, broadly comprising:

- much of the high ground east and west of Singleton
- parts of Singleton Heights and Hunterview
- Singleton old town, and
- much of the floodplain.

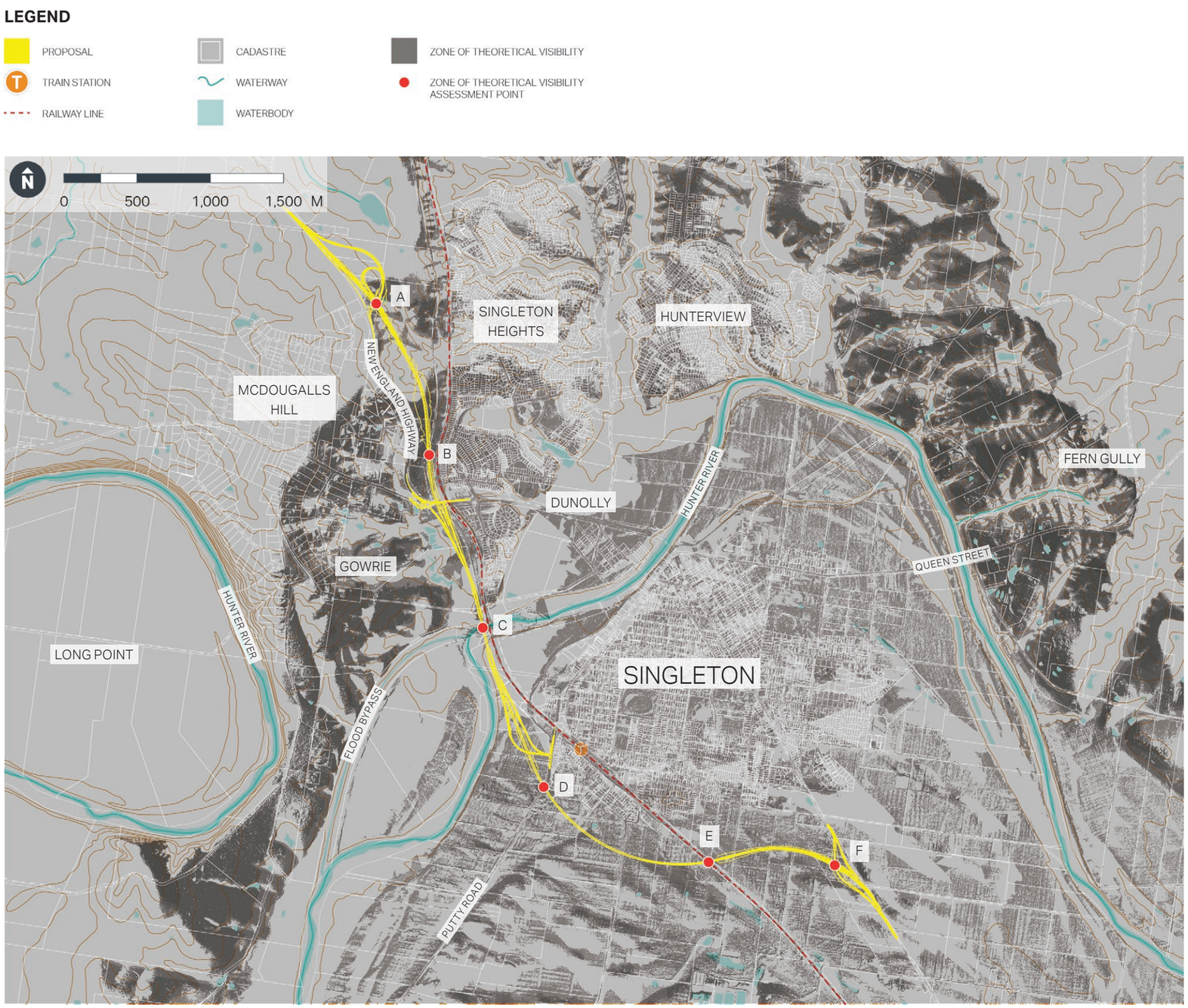

Figure 100: Composite Zone of Theoretical Visibility Map - Combined, 1:35,000 at A3 (Source: AECOM)

6.1.2 Individual assessment maps

Assessment ZTV mapping points A-F are shown from *Figure 101* to *Figure 106*. Issues that can be intimated from the mapping are as follows:

Assessment Point A:

View is limited due to being located back from the side slopes of McDougalls Hill.

A brief but substantial view across the landscape could be expected for southbound traffic as it nears the top of the bypass exit ramp, and from the Magpie Street intersection to the bypass.

Assessment Point B:

At about this point, southbound traffic would leave the bypass cutting and transition onto embankment, opening up a wide view east through to south across the floodplain to distant forested mountains.

Assessment Point C:

The view is shown to be highly restricted by landform at this point

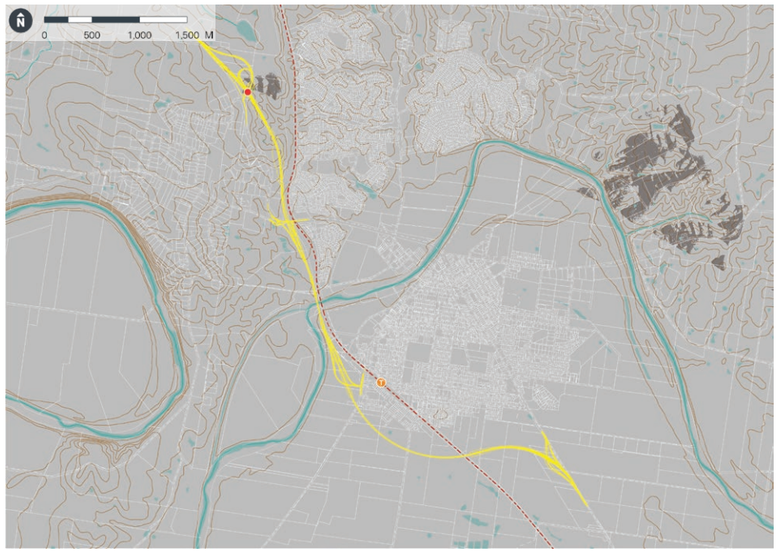

Figure 101: Assessment Point A

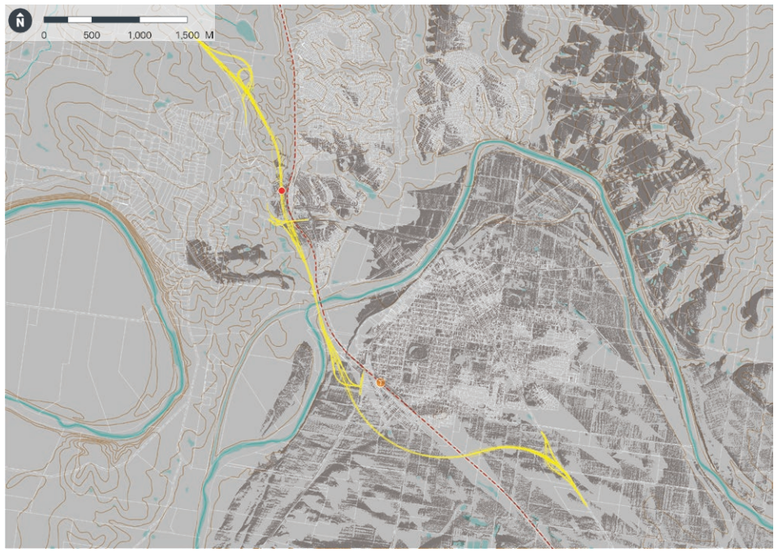

Figure 102: Assessment Point B

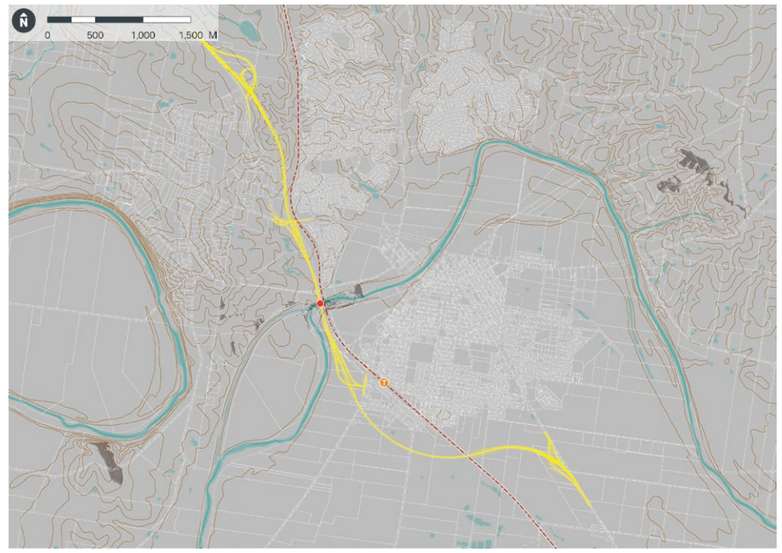

Figure 103: Assessment Point C

Assessment Point D:

A wide view south across the floodplain for southbound traffic, and views to the north across McDougalls Hill and east to the forested footslopes of the Fern Gully area

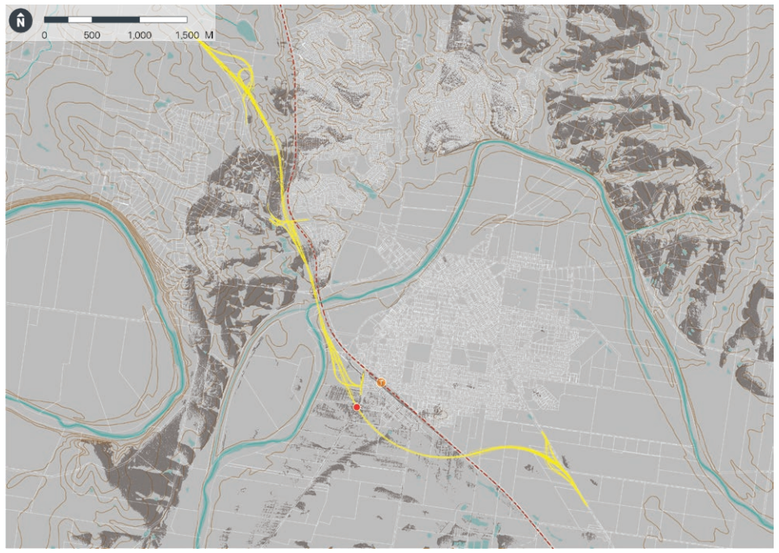

Figure 104: Assessment Point D

Assessment Point E:

Long views south across the floodplain and west across Hambledon Hill and Gowrie, and east towards the Fern Gully area

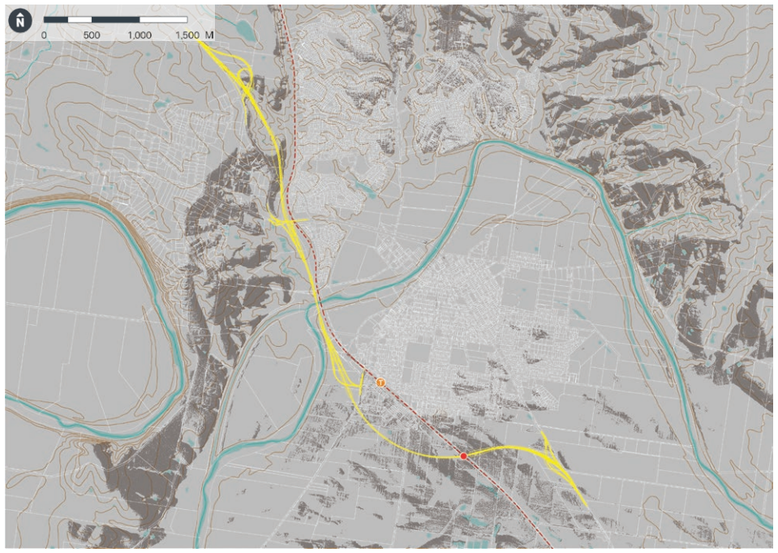

Figure 105: Assessment Point E

Assessment Point F:

Views north-west across Gowrie and McDougalls Hill, and north-east towards the Fern Gully area.

As discussed above, built-form and forest cover would also be visually prominent from many of the above areas, including Singleton old town.

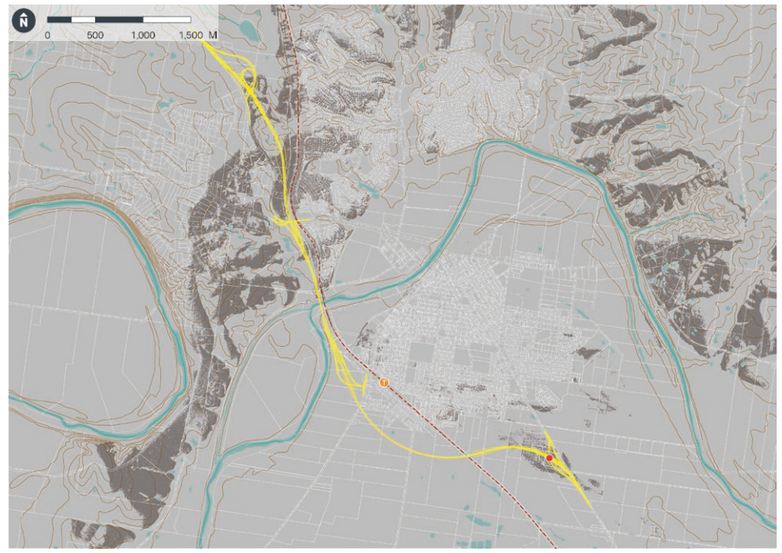

Figure 106: Assessment Point F

7 VISUAL IMPACT ASSESSMENT

7.1 Visual receptors

Two visual receptor types have been defined, each of which are considered to typically share defined sensitivity to change in the character of the current views:

- Private Domain – Views from residences
- Public Domain – From parks, sports fields, roads, cyclists using dedicated bicycle routes, motorists / cyclists using public roads and other public facilities.

7.1.1 Representative Viewpoints

Seven representative viewpoints have been chosen to assess potential impacts on existing views enjoyed by the above visual receptors. Preliminary viewpoints were identified using aerial photography, GIS mapping and 3D terrain modelling. Viewpoints were then refined and confirmed on-site (refer *Figure 107*).

The rationale for choice of viewpoint locations comprises:

- **VP 1 - New England Highway - South:** representative view for motorists approaching Singleton from the south
- **VP 2 - Ellen Avenue:** representative view for residents along the edge of Singleton old town and cyclists travelling along dedicated bicycle routes with views looking south over the floodplain
- **VP 3 - Army Camp Road:** representative view for motorists and cyclists travelling north on the floodplain towards Singleton
- **VP 4 - New England Highway - North:** representative view for motorists travelling south towards Singleton
- **VP 5 - New England Highway - Bunnings:** representative view for motorists travelling north to McDougalls Hill Industrial Park main entry, and beyond towards Muswellbrook
- **VP 6 – Maison Dieu Road:** representative view for motorists and cyclists looking east from McDougalls Hill including visual receptors from an extensive rural residential development, and the southern exit to McDougalls Hill Industrial Park
- **VP 7 - Mitchell Avenue –** representative view from Singleton Heights for residents, and recreational users of Alroy Park looking west towards McDougalls Hill.

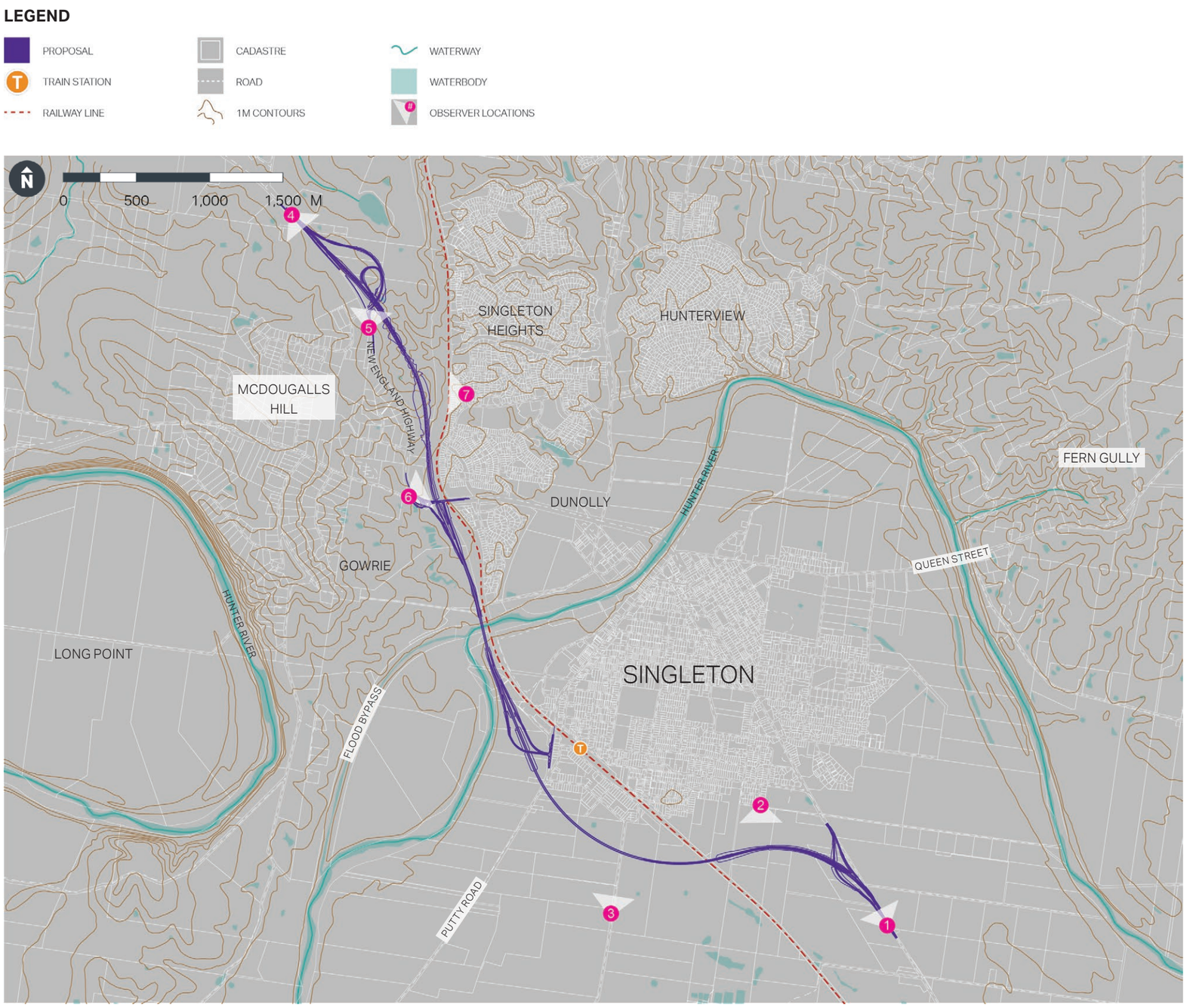

Figure 107: Visual Receptor Location Map, 1:35,000 at A3 (Source: AECOM)

7.2 Viewpoints

7.2.1 Viewpoint 1 - New England Highway South

Description of current view:

The view is open and expansive, looking across the flat agricultural floodplain to the forested backdrop of the Greater Blue Mountains World Heritage Area. Intermittent residences set back from the highway can be seen perched on local high points, with cultural plantings such as a tall Hoop Pine (*Araucaria cunninghamii*) seen in the middle ground projecting above the horizon. The view to the north contains many mature trees, roadside advertising and powerlines indicating proximity to the edge of Singleton township. Refer *Figure 108*

Anticipated change to the view:

The view would include the addition of a large scale, grade separated connection consisting of the bypass, first on embankment until bridging the Main Northern Railway line, then followed by bridge. This would include a transparent, coloured noise wall and road furniture. Vehicles would be seen travelling on the bypass. A further feature would comprise a separated embankment and bridge crossing of the bypass for the entry to Singleton would be in place, including a semi-formal avenue of seasonally colourful trees. The connection would be subject to lighting, substantially changing the view at night. Refer *Figure 109*.

Sensitivity: Low

- The pasture landscape character of the floodplain is broadly consistent with much of that south to around Whittingham
- Road users in large numbers would be the primary visual receptor. Many of these would have travelled along the Hunter Expressway to this point, and be familiar with carriageway scenes of bridges, walls, embankments, etc. The duration of the view would be short
- A further sensitive receptor group would be nearby farm residents of relatively very low numbers. Some of these could have views to the project from living spaces within the home. Given their proximity to the Highway, many of these have moderate to high levels of tree planting to screen around them which would limit visibility of the proposal.

Magnitude: Moderate

- At a viewing distance of about 500 metres, the proposal would be moderately visually prominent, decreasing in visibility over time as the semi-formal avenue of the town entry feature trees matured
- The proposal would comprise a visually contrasting large infrastructure element about 14 metres high to the top of the noise wall, including an 800 metre length of embankment which would remove some of the view to the southern edge of Singleton
- The embankment batters would be planted to pasture grass, assisting visual integration of the proposal with the floodplain
- The bridge would comprise a visually interesting feature stepping across the floodplain, seen against the skyline, and winding its way around the old town
- The scale of the proposal would be visually compatible with the extensive scale of the floodplain.

Visual Impact Assessment : Moderate to Low

The rating is primarily influenced by:

- the landscape character of the floodplain with pasture cover which is broadly consistent south to Whittingham
- road users comprise the main visual receptor group
- the scale of the proposal would be compatible with that of the floodplain setting
- the embankment batters would be planted to pasture grass, assisting visual integration of the proposal with the floodplain.

Table 12: Visual Impact Assessment – Viewpoint 1: New England Highway South

Visual Impact Assessment	
Sensitivity	Low
Magnitude of Change	Moderate
Impact	Moderate to Low

Figure 108: Current View of New England Highway South

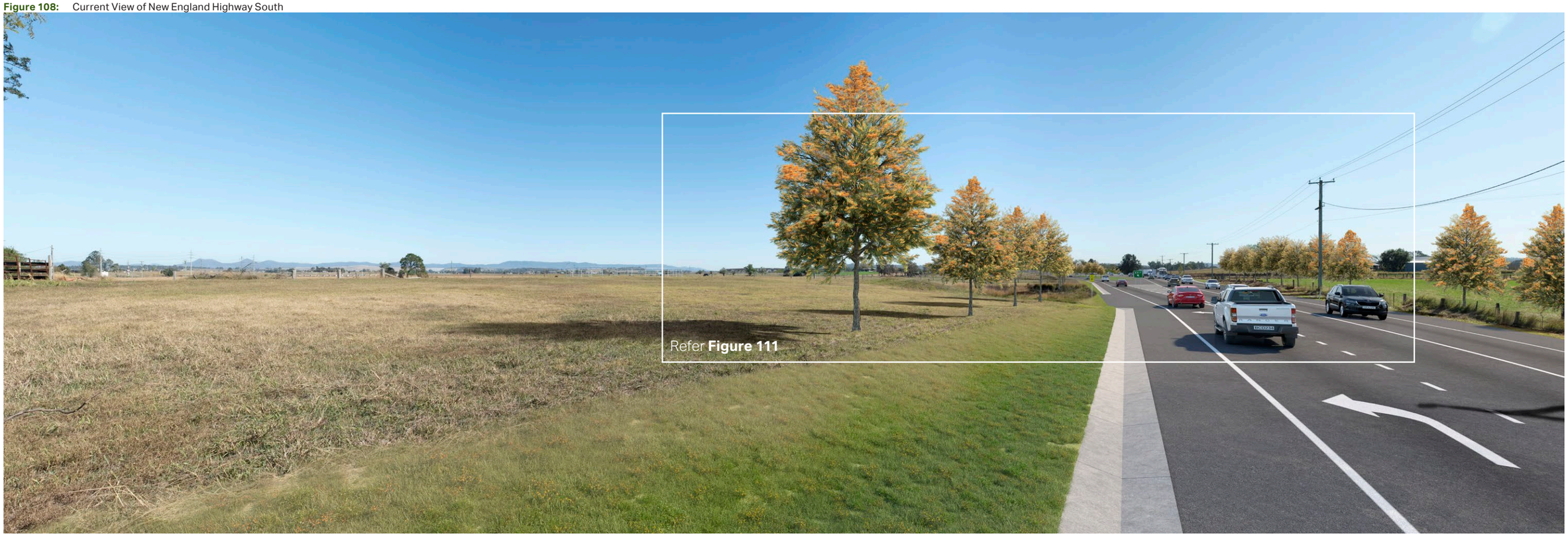

Figure 109: Indicative View of Proposal at New England Highway South

Figure 110: Zoomed-in current View of New England Highway South

Figure 111: Zoomed-in indicative View of Proposal at New England Highway South

7.2.2 Viewpoint 2 - Ellen Avenue

Description of current view:

This view is representative for residents living along the southern edges of the old town, and cyclists using the low traffic perimeter roads. The view looks across the pasture floodplain with sporadic old farmhouses and very low tree cover in the foreground, to a re-afforestation planting around the Singleton Army Base in the middle ground, and the forested Greater Blue Mountains World Heritage Area seen in the background against the skyline, at a distance of some 20 kilometres. A small, picturesque farm dwelling with garden is located within the foreground of the view at a distance of about 200 metres. Refer *Figure 112*.

Anticipated change to the view:

The change in the view is substantial, in that it would remove the middle ground and background parts of the view, making the proposal the view, at a distance of about 450 metres. The embankment would have a pasture grass cover similar to that with the floodplain, and a three-metre high transparent noise wall atop with a simple pattern of colours complementary to that of the pasture grasses. Subject to detail design, the noise wall colour would be of a strength that it allowed both broad views from the bypass across Singleton old town, while also reducing the visual prominence of moving vehicles from the residential edge. Refer *Figure 113*.

Sensitivity: High

- The proposal would wrap around the southern edge of Singleton as described in *Section 5.6*
- Key receptors would be residents, including the residents of the farm dwelling who would be located within about 240 metres of the proposal, and cyclists using low trafficked perimeter roads, with both groups expected to have high sensitivity to the proposal
- The number of residential receptors would be high, and that of recreational cyclists would potentially be low
- The quality of the existing view is considered to be high within the context of its simplicity and extensive nature
- The duration of viewing would potentially occur for moderate to relatively high periods of time for residents with views from their homes, and moderate for both residents walking for recreation along the old town perimeter and cyclists

Magnitude: Moderate

- The extent of visibility and scale of the proposal is high
- The character of the proposal is simple and uses native pasture grasses, which in this respect is broadly compatible with the character of the floodplain
- The proposal removes the middle ground and background of the existing view
- The degree of contrast with the existing view is high
- The quality of the design outcome is moderate, in that notwithstanding view loss: the proposal is vegetated with complimentary pasture grasses; maintains a low horizon line; and the noise wall uses a simple pattern of colours complementary to that of the pasture landscape

Visual Impact Assessment: High to Moderate

- The rating is primarily influenced by:
- the high sensitivity of residential receptors to the proposal, high numbers and duration of viewing
- the high quality of the existing view
- loss of the existing view
- the moderate quality of the design outcomes

Table 13: Visual Impact Assessment – Viewpoint 2: Ellen Avenue

Visual Impact Assessment	
Sensitivity	High
Magnitude of Change	Moderate
Impact	High to Moderate

Figure 112: Current View of Ellen Avenue

Figure 113: Indicative View of Proposal at Ellen Avenue

Figure 114: Zoomed-in current View of Ellen Avenue

Figure 115: Zoomed-in indicative View of Proposal at Ellen Avenue

7.2.3 Viewpoint 3 - Army Camp Road

Description of current view:

The current view is characterised by an extensive, open agricultural floodplain, set against the close horizon of a thin, dark cultural planting line with intermittent low housing visible within it. This rises gently north (left of frame) to the wooded slopes of McDougalls Hill. Beyond the old town, blue forested peaks of Mount Royal National Park can be seen faintly, separately projecting above the horizon line. The floodplain is clothed in a broad patchwork of textures and colours, reflecting tilled paddocks, pasture and low cropping. Refer *Figure 116*.

Anticipated change to the view:

The bridge over the floodplain comprises a major new and contrasting element within the view, which would be seen with vehicles moving atop it. A thin, intermittent undulating line of blue sky can be seen below the bridge deck, acknowledging the old town and the distant landscape behind it. The strong arc of the bridge with its slender form and precisely spaced piering is visually prominent, as is the gentle gradient and mass of the pasture covered southern embankment to the south (right of frame). This rises to the rail crossing before transitioning to the bridge over the floodplain. The earthen colours of the transparent noise wall reflect the low and rough textured floodplain landscape. Refer *Figure 117*.

Sensitivity: Moderate

- The receptor location is on a secondary road that leads to the Singleton Army base
- Anticipated receptor types would include: residents comprising local farmers (low numbers); workers such as army personnel (low to moderate numbers) and mine workers travelling to Mount Thorley and Warkworth (moderate to high numbers). Tourists (e.g. grey nomads) travelling cross-country would also be expected to use the road, e.g. from Golden Highway, Bylong Valley, Putty Road, etc. (low to potentially moderate numbers)
- The quality of the existing view is high
- The enduring character of the view, i.e. of the historic town of Singleton, its location defined by a low rise within a large bend of the Hunter River, with extensive surrounding floodplain dependent agriculture
- The duration of viewing would typically be low

Magnitude: Moderate

- The visibility of the change would be extensive (refer *Figure 105*)
- The scale of the proposal is large
- The character of the proposal is highly contrasting with the existing view, but considered to be visually compatible
- The quality of the design outcome is high
- The angle of the view is low, looking up to the deck structure, and providing views to old Singleton town and the horizon line below it
- The distance from the viewing point ranges between about 350 metres and 1.0 kilometre

Visual Impact Assessment: Moderate

The rating is primarily influenced by:

- the quality of the view
- tourists in low to potentially moderate numbers
- the high quality / enduring character of the existing view
- the character of the proposal is highly contrasting but visually compatible within the view
- The quality of the design outcome is high

Table 14: Visual Impact Assessment – Viewpoint 3: Army Camp Road

Visual Impact Assessment	
Sensitivity	Moderate
Magnitude of Change	Moderate
Impact	Moderate

Figure 116: Current View of Army Camp Road

Figure 117: Indicative View of Proposal at Army Camp Road

Figure 118: Zoomed-in current View of Army Camp Road

Figure 119: Zoomed-in indicative View of Proposal at Army Camp Road

7.2.4 Viewpoint 4 - New England Highway - North

Description of current view:

The view from the northern approach along the New England Highway is somewhat uncharacteristic of the identified LCZ 1 – Enclosed Landscape, in that the land adjoining the southbound lane at this location is more open than the rest of the corridor. The view is on the whole confined to the immediate road corridor and enclosed by remnant native trees and bushland. Refer *Figure 120*.

Anticipated change to the view:

The immediate view to the south and east would be altered by the inclusion of a single exit lane and associated low embankment and planting, and signage. The road is seen to curve away from the Highway, therefore retaining a backdrop of bushland. The continuity of the bushland corridor would therefore result in an unbroken bushland backdrop being retained when seen from this location, although diminished in scale. Retention of the backdrop would be reinforced by proposed relatively dense native tree planting within the landscape 'island' setting between the exit lane and the Highway. Refer *Figure 121*.

Sensitivity: Low

The sensitivity is considered to be low as:

- the view is seen from a major highway, by motorists who would be expected to primarily be focussing on the road and traffic
- many of the motorists would be driving to and from, or as part of work-related activities, and as such not having a primary focus on the amenity of the landscape
- visual receptor types would primarily fall within the above described 'workers' category, with a smaller number comprising tourists or holiday makers
- the quality of the view is low to moderate in that it does comprise an enclosed forest setting which is uncommon along this stretch of the highway
- the view is a relatively fleeting one within what is currently an 80 km/h speed zone.

Magnitude: Low

- The magnitude of change is considered to be low as:
- the visibility of the change is high
- the scale and character of the change is complementary to the existing setting, with a low to moderate degree of contrast
- the quality of the design outcome is moderate to high in that it conserves and seeks to strengthen the enclosed nature of the corridor
- the distance to the change ranges between about 40 metres and 400 metres.

Visual Impact Assessment: Low

The rating is primarily influenced by:

- the scale and character of the change is complementary to the existing setting, with low to moderate degree of contrast
- the quality of the design outcome is moderate to high in that it conserves and seeks to strengthen the enclosed nature of the corridor

Table 15: Visual Impact Assessment – Viewpoint 4: New England Highway - North

Visual Impact Assessment	
Sensitivity	Low
Magnitude of Change	Low
Impact	Low

Figure 120: Current View of New England Highway South

Figure 121: Indicative View of Proposal at New England Highway South

Figure 122: Zoomed-in current View of New England Highway South

Figure 123: Zoomed-in indicative View of Proposal at New England Highway South

7.2.5 Viewpoint 5 - New England Highway - Bunnings

Description of current view:

The existing view is taken from the side of the New England Highway adjacent to the Bunnings development looking north, and is representative for motorists travelling in this direction. The view is taken at a high point in the landscape (McDougalls Hill), and is contained within a foreground and middle ground, seen against the skyline. The Bunnings car park is set down and moderately visible. A wide turfed verge and stormwater swale extend from the Bunnings boundary to the carriageway. The view beyond the southbound lane comprises sporadic paddock trees in the foreground and a relatively dense regrowth of paddock trees in the middle ground. The Magpie Street intersection is set either side with street lighting over a distance of about 60m. Refer *Figure 124*.

Anticipated change to the view:

The changed view would include the development of the intersection opposite Magpie Street, with the following elements visible: bridge crossing (parapet) of the proposed bypass; new connection to the existing intersection and associated traffic lights; a new southbound slip lane immediately prior to the intersection; street lights for the new connection, slip lane and bridge; and vehicles crossing the bridge, and queueing / passing through the intersection and onto the southbound lane of the existing highway via the slip lane. The bridge and vehicles crossing it would be partially seen against the skyline. Proposed tree planting would visually compensate for much of the tree loss arising from the proposal as seen in this view. Refer *Figure 125*.

Sensitivity: Low

The sensitivity is considered to be low as:

- the view is seen from a major highway, by motorists who would be expected to primarily be focussed on the road and traffic, their destination and tasks at hand (e.g. activities within the McDougalls Hill Industrial Estate)
- many of the motorists would be driving to and from, or as part of work-related activities including shopping, and as such not having a primary focus on the amenity of the landscape
- the quality of the view is low in that it is effectively confined to the Bunnings development, the Highway and scattered trees beyond the southbound lane
- the view is from a vehicle and therefore relatively fleeting.

Magnitude: Low

The magnitude of change is considered to be low as:

- the visibility of the change is low to moderate, in that much of the proposal is screened by landform and tree cover
- the scale and character of the change is complementary to the existing highway setting, with a proportionally small amount of change seen within the overall context of the view
- the degree of contrast arising from the change is low to moderate given that part of the proposal would be seen within the previous more natural setting, and seen against the skyline, potentially making it more visually prominent than otherwise
- the quality of the design outcome is moderate in that it partially conserves the natural character of the setting with tree planting similar to that in place
- the distance to the change ranges between about 100 metres and 200 metres and is therefore seen in a considerable level of detail.

Visual Impact Assessment: Low

The rating is primarily influenced by:

- the view is seen within the context of a major highway and controlled intersection
- visual receptor types would primarily fall within a work-related activities category
- the view is a relatively fleeting one
- the scale and character of the change is complementary to the existing highway setting, with a proportionally small amount of change seen within the overall context of the view

Table 16: Visual Impact Assessment – Viewpoint 5: New England Highway - Bunnings

Visual Impact Assessment	
Sensitivity	Low
Magnitude of Change	Low
Impact	Low

Figure 124: Current View of New England Highway Bunnings

Figure 125: Indicative View of Proposal at New England Highway Bunnings

Figure 126: Zoomed-in current View of New England Highway Bunnings

Figure 127: Zoomed-in indicative View of Proposal at New England Highway Bunnings

7.2.6 Viewpoint 6 - Maison Dieu Road Intersection

Description of current view:

The current view is one of a peri-urban setting with a sealed, two lane road with rough grassed verges, and a low to moderate level of both road and advertising signage. The guard rail for the New England Highway can be seen to centre left of frame at the top of the batter, with moving vehicles regularly seen beyond this. The road is flanked by open paddocks with intermittent trees and rural fencing, one of which is subject to ploughing. The area is located on a hillside (falling from left to right of frame), with steep grassed batter on the uphill side of the road which accommodates the Highway. A long and intermittent view across the Hunter River floodplain to forested hills on the horizon is visible to right of frame. Refer *Figure 128*.

Anticipated change to the view:

The key change to the view would be the realignment of the intersection with the Highway, with the proposed road swinging out to the right to facilitate entry to a new roundabout as seen in *Figure 120*, including a slip lane to turn directly onto the northbound lane of the Highway. This would result in an increase to the width of the grassed verge on the inside of the curve, including a flattening of this edge and a reduction in the seen area of both pasture to the outside curve, and a few existing trees along this edge. Of less visual prominence, part of the bypass bridge crossing would be visible, including the coloured throw screen which would be seen against the skyline. Substantial tree planting around the new road intersection would assist in reducing the visual prominence of these elements. Refer *Figure 129*.

Sensitivity: Low

The sensitivity is considered to be low as:

- The proposal comprises a reasonably standard upgrading of an intersection with a roundabout, with the main visual receptors comprising a low to moderate number of motorists. These would predominantly comprise residents (mainly nearby rural residential developments), and both workers and visitors to the McDougalls Hill Industrial Park, who would be considered to have a low to moderate level of interest in the view
- The quality of the existing view is low to moderate within the context of the peri-urban setting
- The view would be a fleeting one.

Magnitude: Low

The magnitude of change is considered to be low as:

- The extent of the visibility of the change is low to moderate
- The visual scale of the change is low, and it exhibits a good visual fit with the landscape
- The quality of the design outcome is consistent with that of a typical secondary road upgrade, other than for the number of trees proposed which is considered to further improve the quality of the outcome
- The change is between 20 metres and 200 metres distant, and would be seen in a high level of detail.

Visual Impact Assessment: Low

The rating is primarily influenced by:

- The proposal comprises a reasonably standard upgrading of an intersection with a roundabout, with the main visual receptors comprising a low to moderate number of motorists
- The view would be a fleeting one
- The visual scale of the change is low, and it exhibits a good visual fit with the landscape

Table 17: Visual Impact Assessment – Viewpoint 6: Maison Dieu Road Intersection

Visual Impact Assessment	
Sensitivity	Low
Magnitude of Change	Low
Impact	Low

Figure 128: Current View of Maison Dieu Road Intersection

Figure 129: Indicative View of Proposal at Maison Dieu Road Intersection

Figure 130: Zoomed-in current View of Maison Dieu Road Intersection

Figure 131: Zoomed-in indicative View of Proposal at Maison Dieu Road Intersection

7.2.7 Viewpoint 7 - Mitchell Avenue

Description of current view:

The view is looking uphill along a residential street typical of Singleton Heights. The hillside comprises a visually prominent 'natural', wooded backdrop to the view, flanking the western edge of Singleton Heights. Housing on the cross street seen at the end of the road backs onto the Main Northern Railway line corridor (the lightly coloured rail corridor noise wall can just be seen stepping up the slope above the grey-roofed house), as it does for most of the western edge of this suburb.

The gently cresting ridge on the skyline defines the location of an earlier route of the Main Northern Railway line which traversed across the hillslope within a shall cutting just behind it. The hillside is subject to a sparse cover of grasses with areas of surface and gully erosion, and with no substantial trees on it. The tall trees seen on the crest of the hill are located behind and upslope of both the crest and the old rail corridor. Several larger trees are located between the residential lots and the rail corridor noise wall, although most of these do not extend above the skyline. Refer *Figure 132*.

Anticipated change to the view:

The proposal would be located beyond the above described hillside crest. No built works would be visible from this location. However, all of the mature trees seen at the top of the hill would be removed. As per the methodology (refer s.1.7.3), the VIA is based on landscape outcomes at 12-18 months after completion. On this basis, although scattered tree planting would be undertaken within the proposal property boundary, the anticipated change to the view would be limited as above to the removal of the tall skyline trees from the view. For the proposed tree planting to become visually prominent from this location (and from the nearby 'Alroy Park' regional facility), this could be expected to occur over a period of say 10-15 years. Reinstatement of a similar wooded skyline to that currently in place could be expected to occur over a period of say 30-50 years. The seen portion of the hillside would remain unchanged. Refer *Figure 133*.

Sensitivity: High

The sensitivity is considered to be high as:

- The location is a residential area with a large number of visual receptors. Residents are typically anticipated to take an interest in views from their homes and within their local environment, and in this context that level of interest could be expected to be within a range of high to moderate
- The landscape setting of the hill can be expected to be valued and enjoyed by the local community
- The quality of the existing view is high to moderate, in that notwithstanding the above described degraded nature of the hillside, it provides a 'natural area' backdrop, of which the mature trees on the skyline provide an important element of the experienced landscape amenity
- The view has the potential to observed over moderate to long periods of time when viewed from front and back garden areas including front and back porches, and from living areas within the residences, e.g. from kitchen and living room areas

Magnitude: High

The magnitude of change is considered to be high as:

- The extent of visibility of the hillside is high
- Given the scale of the hill, it can be expected to be visible from an extensive range of locations across the suburbs of both Singleton Heights and Hunterview
- The built form of the project would not be visible, however the degree of contrast between the existing view and the proposed view would be high to moderate, with the loss of all mature trees seen on the skyline, but retention of lower tree cover both with existing residential lots and downslope of the rail corridor noise wall
- Visual receptors look up towards the rising hill, causing the higher parts of the hill behind to be lost to view behind the relatively nearby hillside crest
- The view is seen in a high level of detail at a distance of between about 250 metres and 300 metres.

Visual Impact Assessment: High

The rating is primarily influenced by:

- The location is a residential area with a large number of sensitive visual receptors
- The landscape setting of the hill can be expected to be valued and enjoyed by the local community
- The project would result in the loss of all of the mature trees seen on the skyline, above a steep hillside which has no tree cover and appears to be in a visually degraded condition
- The quality of the existing view is high to moderate, and has the potential to observed over moderate to long periods of time
- the degree of contrast between the existing view and the proposed view would be high to moderate
- The view is seen in a high level of detail.

Table 18: Visual Impact Assessment – Viewpoint 7: Mitchell Avenue

Visual Impact Assessment	
Sensitivity	High
Magnitude of Change	High
Impact	High

Figure 132: Current View of Mitchell Avenue

Figure 133: Indicative View of Proposal at Mitchell Avenue

Figure 134: Zoomed-in current View of Mitchell Avenue

Figure 135: Zoomed-in indicative View of Proposal at Mitchell Avenue

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8 SUMMARY OF OUTCOMES

8.1 Summary of effects on landscape character

As shown in *Table 19*, three of the seven LCZs were subject to Negligible landscape character impacts arising from the Proposal, and one LCZ subject to a Moderate to Low impact. The remaining three LCZs (LCZ 2 – Open Rural Landscape, LCZ 6 – Agricultural Floodplain and LCZ 7 – Singleton Old Town) were subject to impact ratings of High to Moderate which are considered to comprise considerable impacts on their landscape character.

Table 19: Summary of landscape character impacts

LANDSCAPE CHARACTER ZONE	SENSITIVITY	MAGNITUDE	LANDSCAPE CHARACTER IMPACT
LCZ 1 – ENCLOSED RURAL LANDSCAPE	LOW	MODERATE	MODERATE TO LOW
LCZ 2 – OPEN RURAL LANDSCAPE	MODERATE	HIGH	HIGH - MODERATE
LCZ 3 – INDUSTRIAL	LOW	NEGLIGIBLE	NEGLIGIBLE
LCZ 4 – LARGE LOT RESIDENTIAL	MODERATE	NEGLIGIBLE	NEGLIGIBLE
LCZ 5 – NEW RESIDENTIAL SUBURBS	MODERATE	NEGLIGIBLE	NEGLIGIBLE
LCZ 6 – AGRICULTURAL FLOODPLAIN	HIGH	MODERATE	HIGH - MODERATE
LCZ 7 – SINGLETON OLD TOWN	HIGH	MODERATE	HIGH - MODERATE

8.2 Summary of effects on views and visual amenity

As shown in *Table 20*, three of the seven visual receptor locations were subject to low landscape character impacts arising from the Proposal, and one each subject to Moderate and Moderate to Low impact. The remaining two visual receptor locations (VR 2 – Ellen Avenue and VR 7 – Mitchell Avenue) were subject to impact ratings of High to Moderate which are considered to comprise considerable impacts on their visual amenity.

Table 20: Summary of visual impacts

VISUAL RECEPTOR LOCATION	SENSITIVITY	MAGNITUDE	VISUAL IMPACT
VR 1 – NEW ENGLAND HIGHWAY - SOUTH	LOW	MODERATE	MODERATE TO LOW
VR 2 – ELLEN AVENUE	HIGH	MODERATE	HIGH - MODERATE
VR 3 – ARMY CAMP ROAD	MODERATE	MODERATE	MODERATE
VR 4 – NEW ENGLAND HIGHWAY - NORTH	LOW	LOW	LOW
VR 5 – NEW ENGLAND HIGHWAY - BUNNINGS	LOW	LOW	LOW
VR 6 – MAISON DIEU ROAD	LOW	LOW	LOW
VR 7 – MITCHELL AVENUE	HIGH	HIGH	HIGH

9 LANDSCAPE CHARACTER AND VISUAL IMPACT MITIGATION STRATEGY

9.1 Impacts avoided or minimised through the design process

(a) Pasture grasses applied to floodplain embankment walls to provide increased visual integration with floodplain pasture grass cover

(b) Infill and edge planting to LCZ 1 to improve edge conditions for this Critically Endangered Ecological Community, and enhance the sense of visual enclosure which visually defines it.

9.2 Strategy to mitigate adverse impacts

(a) All plant material to be locally sourced (seed collection preferred), with any seed collection to commence within three months of construction contract award, where possible.

(b) An Urban Design Plan will be prepared as part of the CEMP. The Plan will include:

- Location and identification of vegetation in the proposal area to be retained and proposed landscaped areas
- Details of the staging of built elements including retaining walls, bridges and noise walls
- Details of the staging of landscape works
- Maintenance measures for landscaped or rehabilitated areas, including timings
- A landscape monitoring program including an inspection program with frequency.

(c) Consider design measures during detailed design to reduce landscape character and visual amenity impacts arising from the placement of embankments on the Hunter River floodplain.

10 CONCLUSION

Overall, the proposal can be seen to have good alignment and design qualities with regard to urban design and landscape character and visual impacts, including the lightly stepping character of the bridge crossing of the agricultural floodplain, the climb across McDougalls Hill which is substantially lost to view through the use of cuttings, the retention and supplementary planting of a substantial re-growth bushland remnant at the Northern connection.

The key adverse findings of the report relate to the three landscape character zones and two visual receptor locations that were assessed as being subject to considerable impacts arising from the project, as described in s.8.0. With regard to landscape character zones, the key impacts can be summarised as:

- The permanent extent and contrasting effects of embankments (2.3 kilometres in total length compared with a 1.7 kilometre length of bridge over the floodplain) within the agricultural floodplain. Subsequent adverse effects on this character, including loss of extensive middle ground and background views from the southern edge of Singleton old town, with associated impacts on the historic connection between the two
- The proximity of the bridge over the floodplain to the old town historic settlement of Glenridding west of the Main Northern Railway line, including loss of residences and subsequent separation of outlying residences from the main settlement
- The placement of three large embankments associated with the Putty Road connection, which pass through a long established market gardening area on a bank of the Hunter River, and sits uncomfortably within a narrow neck of land between the Hunter River and the Main Northern Railway line.

Ideally, there would be no need for embankments within this exceptional floodplain landscape setting, relative to the historic character of the old town, and it being the only major river crossing of the New England Highway along its 900 kilometre length. The embankment associated with the Southern connection is considered to be of greater concern in this regard than that of the Putty Road connection.

With regard to views, the key impacts occur from the southern edge of Singleton old town (as represented by VR 2 – Ellen Avenue), and from Singleton Heights (as represented by VR 7 – Mitchell Crescent), as follows:

- The quality of the existing views
- The permanent loss of extensive middle ground and background views as discussed above for VR 2, and medium-term loss of substantial tree cover on the skyline for VR 7
- The high sensitivity, and large number of residential receptors subject to close views with high levels of detail
- The likely moderate to relatively high duration of viewing.

Mitigation measures have been provided for consideration, the adoption of which would reduce some of the above described impacts. Additionally, visual amenity arising from the project is assessed conservatively at 12-18 months post-construction, and as such landscape and visual amenity outcomes can be expected to improve over time in this regard.

11 APPENDIX

11.1 References

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GIS SOURCES

Dataset	Source	Date
Aerial Image	Nearmap	10/09/2018
Aboriginal Heritage	AECOM Heritage Team	2019
Cadastre	Spatial Services, NSW Department of Finance, Services and Innovation (DFSI)	2019
Contours	Spatial Services, NSW Department of Finance, Services and Innovation (DFSI)	2019
DEM*	Spatial Services, NSW Department of Finance, Services and Innovation (DFSI)	Oct/Nov 2011
Ecological Communities	Eco Logical Australia (ELA)	TBA
Geology (250K)	NSW Department of Primary Industries	2016
Heritage - LEP	NSW Department of Planning and Environment (DPE)	2019
Heritage - SHR	NSW Department of Planning and Environment (DPE)	2019
Land and Soil Capability	NSW Office of Environment and Heritage (OEH)	2017
Land Capability	NSW Department of Infrastructure, Planning and Natural Resources	2004
Land Use	NSW Office of Environment and Heritage (OEH)	2013
Land Zoning - LEP	NSW Department of Planning and Environment (DPE)	2019
Railway Stations	Spatial Services, NSW Department of Finance, Services and Innovation (DFSI)	2019
Railways	Spatial Services, NSW Department of Finance, Services and Innovation (DFSI)	2019
Roads	Spatial Services, NSW Department of Finance, Services and Innovation (DFSI)	2019
Waterbodies	Spatial Services, NSW Department of Finance, Services and Innovation (DFSI)	2019
Waterways	Spatial Services, NSW Department of Finance, Services and Innovation (DFSI)	2019

* all variants of DEM (e.g. hillshade, drainage, viewshed, etc.) produced by AECOM with data from DFSI

11.2 List of Figures

11.3 List of Tables

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