# PARKES SPECIAL ACTIVATION PRECINCT

## ENABLING WORKS - URBAN DESIGN AND LANDSCAPE PLAN

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**FINAL**

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Cover image:
*Artist impression of potential ultimate primary gateway configuration*

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# CONTENTS


**1. INTRODUCTION ..... 1**
- 1.1 PROJECT OVERVIEW ..... 1
- 1.2 PURPOSE OF THIS REPORT ..... 1
- 1.3 PROJECT SCOPE ..... 3
- 1.4 REPORT STRUCTURE ..... 4

**2. CONTEXTUAL ANALYSIS ..... 5**
- 2.1 NATURAL CONTEXT ..... 5
- 2.2 BUILT CONTEXT ..... 7
- 2.3 HISTORY AND HERITAGE ..... 8

**3. URBAN AND LANDSCAPE DESIGN STRATEGY ..... 11**
- 3.1 GUIDANCE DOCUMENTS ..... 11
- 3.2 PARKES SAP URBAN AND LANDSCAPE DESIGN VISION ..... 11
- 3.3 URBAN AND LANDSCAPE DESIGN STRATEGY ..... 11
- 3.4 PROPOSAL-SPECIFIC DESIGN OBJECTIVES AND PRINCIPLES FOR BRIDGES ..... 14

**4. LANDSCAPE DESIGN TREATMENTS ..... 15**
- 4.1 ZONE 1 TREATMENTS ..... 15
- 4.2 ZONE 2 TREATMENTS ..... 19
- 4.3 ZONE 3 TREATMENTS ..... 30
- 4.4 ZONE 4 TREATMENTS ..... 30
- 4.5 OTHER TREATMENTS ..... 30
- 4.6 RETENTION OF EXISTING VEGETATION ..... 33
- 4.7 PLANTING DESIGN ..... 33
- 4.8 PROPOSED SPECIES ..... 34
- 4.9 EARTHWORKS DESIGN AND SLOPE STABILISATION ..... 38

**5. URBAN DESIGN ELEMENTS ..... 39**
- 5.1 BRIDGES ..... 39
- 5.2 RETAINING WALLS ..... 47
- 5.3 STOCK UNDERPASS CULVERT ..... 49
- 5.4 PEDESTRIAN AND CYCLE PATHS ..... 50
- 5.5 FURNITURE AND FIXTURES ..... 52
- 5.6 POTENTIAL FUTURE ARTWORK LOCATIONS ..... 54
- 5.7 URBAN DESIGN FINISHES ..... 55

**6. LANDSCAPE DESIGN IMPLEMENTATION ..... 59**
- 6.1 SITE PREPARATION ..... 59
- 6.2 STABILISATION METHODS ..... 59
- 6.3 STAKES AND TIES ..... 59
- 6.4 MULCHING ..... 59
- 6.5 MAINTENANCE ..... 60
- 6.6 LANDSCAPE MANAGEMENT AND MONITORING ..... 60
- 6.7 PROCEDURES FOR REMEDIATION OF DAMAGE AND FAILURES ..... 61
- 6.8 BUILT ELEMENTS MAINTENANCE ..... 61
- 6.9 MONITORING PROCEDURES ..... 62
- 6.10 MANAGEMENT RESPONSIBILITIES ..... 62

**7. REFERENCES ..... 63**

# LIST OF FIGURES


Figure 1. Inland rail network context ..... D
Figure 2. UNIDO Ecopark Framework ..... D
Figure 3. Parkes SAP Structure Plan showing location of the proposal ..... 1
Figure 4. Project overview ..... 3
Figure 5. The Goonumbla Hills landscape ..... 5
Figure 6. The Bimbi Plains landscape ..... 5
Figure 7. Key landscape values to be incorporated into design guidelines and the public domain plan ..... 5
Figure 8. Sensitive vegetation near the proposal (Stage 1) ..... 6
Figure 9. Significant vegetation in the vicinity of Brolgan Road ..... 6
Figure 10. Existing land use and access within the Parkes SAP ..... 7
Figure 11. Places of Aboriginal history and meaning ..... 8
Figure 12. Concept for potential future artwork at precinct gateways ..... 9
Figure 13. Artwork by Duncan Smith, a Wiradjuji man ..... 9
Figure 14. No Go Zone buffer surrounding site 43-3-0170, shown relative to the proposal area ..... 9
Figure 15. Location of Brolgan Road historic site relative to the Parkes SAP and the Brolgan Road corridor ..... 10
Figure 16. Urban and landscape and design strategy showing treatment types along Brolgan Road - Sheet 1 of 2 ..... 12
Figure 17. Urban and landscape and design strategy showing treatment types along Brolgan Road - Sheet 2 of 2 ..... 13
Figure 18. Typical plan of Parkway treatment in Zone 1 ..... 16
Figure 19. Typical cross section of Parkway treatment in Zone 1, shown at station 3,400 ..... 17
Figure 20. Typical cross section of Parkway treatment in Zone 2, shown at station 6,900 ..... 17
Figure 21. Typical cross section of Parkway treatment in Zone 4, shown at station 8,000 ..... 18
Figure 22. Typical embankment treatment plan, shown on the western approach to Bridge ST02 over the Parkes to Narromine rail corridor ..... 20
Figure 23. Typical cross section of Embankments treatment, shown at station 7,200 on the western approach to Bridge ST02 ..... 21
Figure 24. Typical plan of Boulevard treatment, shown in Zone 4 ..... 23
Figure 25. Typical cross section of Boulevard treatment in Zone 2, shown at station 6,300 ..... 24
Figure 26. Typical cross section of Boulevard treatment in Zone 4, shown at station 8,775 ..... 24
Figure 27. Artist impression showing the Primary Gateway ..... 26
Figure 28. Plan showing Primary Gateway treatment ..... 27
Figure 29. Plan showing Secondary Gateway treatment ..... 29
Figure 30. Locations of drainage basins ..... 31
Figure 31. Indicative locations of enabling utility infrastructure ..... 32
Figure 32. Bridge ST01 plan ..... 40
Figure 33. Bridge ST01 elevation ..... 41
Figure 35. Bridge ST01 cross section mid span ..... 42
Figure 34. Abutment treatment option 1: stone pitching ..... 42
Figure 36. Artist impression of bridge ST01 ..... 43
Figure 37. RSW concrete panels with smooth finish in natural grey ..... 44
Figure 38. Example of welded throwscreen mesh texture ..... 44
Figure 39. Bridge ST02 plan ..... 45
Figure 40. Bridge ST02 elevation ..... 46
Figure 41. Bridge ST02 indicative cross section at abutment ..... 46
Figure 42. North elevation of retaining wall in the western embankment (RW1) of bridge ST02 ..... 47
Figure 45. Section showing overhanging wall capping and concealed spoon drain along the top of the retaining wall ..... 48
Figure 43. ‘Free Form Birds’ mural over plain concrete RSW panels in Moggill Road, Pinjarra Hills (Brisbane) by artist Deb Mostert ..... 48
Figure 44. The Birds’ mural over plain concrete RSW panels in Dock Street, Brisbane by artist Noke ..... 48
Figure 46. Location of stock underpass culvert in bridge ST02 eastern embankment ..... 49
Figure 47. Plan showing the extent of shared path provided ..... 50
Figure 48. Examples of stencil overlays on paving that could be applied either to the gateway threshold and through the entire gateway/intersection ..... 51
Figure 49. Examples of artistic overlays on paving that could be applied either to the gateway threshold and through the entire gateway/intersection ..... 51
Figure 50. Shared path lighting pole, outreach arm and solar panel ..... 52
Figure 51. Typical gabion arrangement at gateways: plan ..... 52
Figure 52. Typical cross section illustrating gabion walls at gateways ..... 52
Figure 54. Plan diagram showing locations and types of lighting provided by the proposal ..... 53
Figure 53. Precedent images of gabion feature walls ..... 53
Figure 55. Pedestrian and cyclist safety fence with deflection rail ..... 54
Figure 56. Pedestrian safety fence - Monowills ..... 54
Figure 57. Hydromulch after 6 months ..... 59

# LIST OF TABLES


Table 1. Compliance with Baseline Conditions ..... 2
Table 2. Parkway treatment..... 15
Table 3. Embankments treatment..... 19
Table 4. Boulevard treatment..... 22
Table 5. Primary Gateway treatments..... 25
Table 6. Secondary Gateway treatment..... 28
Table 7. Indicative details of utilities infrastructure ..... 31
Table 8. Planting mix PM1 - native feature shrub mix ..... 34
Table 9. Planting mix PM2 - feature native groundcover mix..... 35
Table 10. Planting mix PM3 - roadside native grass mix..... 35
Table 11. Tree species..... 35
Table 12. Supplementary shrub species for constrained areas .... 35
Table 13. Cover crop composition - all seed mixes ..... 36
Table 14. Fuzzy Box Woodland native shrub and grass mix ..... 36
Table 15. Western Gray Box Tall Grassy Woodland native shrubs, grasses and groundcovers ..... 36
Table 16. White Cypress Pine Woodland native shrubs, grasses and groundcovers..... 36
Table 17. White Cypress Pine Woodland native trees, shrubs, grasses and groundcovers..... 36
Table 18. Fuzzy Box Woodland native grasses ..... 37
Table 19. Western Gray Box Tall Grassy Woodland native grasses and groundcovers..... 37
Table 20. Fuzzy Box Woodland native trees, shrubs and grasses . 37
Table 21. Western Gray Box Tall Grassy Woodland native trees, shrubs, grasses and groundcovers ..... 37
Table 22. Major embankments ..... 38
Table 23. ST01 description of bridge components ..... 39
Table 24. ST02 description of bridge components..... 44
Table 25. Urban design finishes..... 55


# LIST OF ACRONYMS

| Acronym/ Abbreviation | Meaning |
|---|---|
| ARTC | Australian Rail Track Corporation |
| BAR | Biodiversity Assessment Report |
| BC | Baseline Conditions |
| Delivery Plan | Parkes Special Activation Precinct Delivery Plan (Stage 1) |
| DPIE | NSW Department of Planning, Industry and Environment |
| ESD | Environmentally Sustainable Development |
| LMP | Landscape Management Plan |
| PCT | Plant community type |
| PSC | Parkes Shire Council |
| REF | Review of Environmental Factors |
| RFS | Rural Fire Service |
| RGDC | Regional Growth NSW Development Corporation |
| RMS | Roads and Maritime Services (now Transport for NSW) |
| RSW | Reinforced soil wall |
| SAP | Special Activation Precinct |
| Structure Plan | Parkes Special Activation Precinct Draft Structure Plan |
| SWTC | Scope of Works and Technical Criteria |
| TfNSW | Transport for NSW |
| UDLP | Urban Design and Landscape Plan |
| UNIDO | United Nations Industrial Development Organisation |
| WWTP | Wastewater Treatment Plant |

*Burrany . Artwork by Scott Turnbull,*
*Source: FH supplied artwork. Artwork by and Supplied by  Scott Turnbull*


*Figure 1.  Inland rail network context  (Source: DPIE 2020, p 12)*

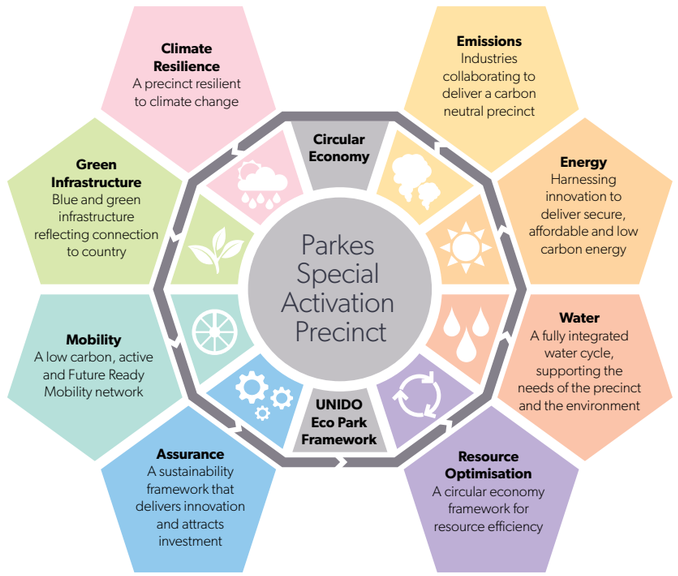



*Figure 2.  UNIDO Ecopark Framework (Source: DPIE 2020, p 23)*

# CHAPTER 1
# INTRODUCTION

## 1.1 PROJECT OVERVIEW

The Parkes Special Activation Precinct (SAP) is an initiative of Regional Growth NSW Development Corporation (RGDC).

The Parkes SAP covers approximately 4,800 hectares and is located approximately three kilometres west of the township of Parkes.

The Parkes SAP is planned to become a new and thriving enterprise hub, taking advantage of the east-west Sydney to Adelaide and Perth transcontinental rail line and the north-south inland rail from Brisbane to Melbourne - refer to **Figure 1**. The Parkes SAP will provide opportunities for new industries in agriculture, freight and logistics, manufacturing, energy and resource recovery and transport to co-locate.

The vision for the Parkes SAP as identified in the *Parkes Special Activation Precinct Draft Structure Plan* (Jensen Plus, 2019) (Structure Plan) is:

> *Stimulating economic development and employment, the Parkes Special Activation Precinct will be a hub of enterprise and sustainability that will enhance the local and regional community. Located at the centre of Australia's transport and logistics networks, Parkes will be a gateway to national and global markets.*

As outlined in the Structure Plan, the vision for the Parkes SAP includes the following core principles;

- Place
- Built Form and Landscape
- Environment
- Connectivity
- Land Use and Industry
- Eco- Industrial Park.

Further, the Parks SAP aspires to be the leader in sustainable regional enterprise areas. The *Environmentally Sustainable Development Plan* (WSP 2019a) for the Parkes SAP has the United Nations Industrial Development Organisation (UNIDO) Eco-Industrial Park framework at its foundation - refer to **Figure 2**. Accordingly, the Parkes SAP aspires to be "Australia's first UNIDO eco-industrial park, and the nation's leading circular economy precinct".

### 1.1.1. THE PROPOSAL

The proposal constitutes Stage 1 of the Parkes SAP and comprises land extending for approximately 9.2 kilometres along the existing Brolgan Road corridor. Stage 1 construction will enable activation of over 1,000 hectares of land within the Parkes SAP Regional Enterprise sub-precinct - refer to **Figure 3**. A detailed map of the proposal area is provided in **Figure 4**.

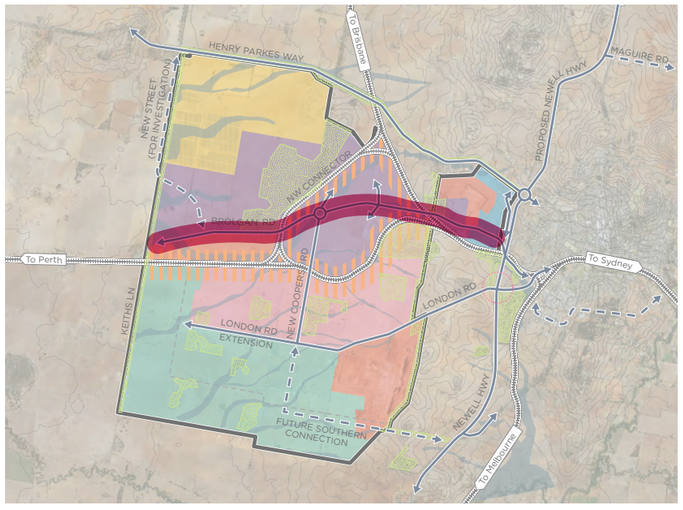
## 1.2 PURPOSE OF THIS REPORT

This report constitutes the Urban Design and Landscape Plan (UDLP) for the proposal. This UDLP was prepared by Spackman Mossop Michaels (SMM) for Fulton Hogan. Fulton Hogan is the construction company awarded the contract to design and construct the proposal.

The Department of Planning, Industry and Environment (DPIE) approved the Parkes SAP based on the Structure Plan. RGDC will deliver the Parkes SAP in accordance with *Parkes Special Activation Precinct Delivery Plan (Stage 1)* (Delivery Plan) and through the Stage 1 enabling works (the proposal). RGDC provided a number of Baseline Conditions (BC) for precinct delivery. They include the requirement under condition E55 to prepare a UDLP. E55 further stipulates the purpose of the UDLP which is to inform the final design of the proposal and to give effect to the commitments made in the:

- Parkes SAP Stage 1 enabling works Review of Environmental Factors (REF), including all environmental and technical assessment reports annexed to the REF
- Delivery Plan.

BC E56 stipulates the minimum level of information the UDLP needs to provide. **Table 1** outlines the requirements of BC E56 and provides cross references to the UDLP report section or sections that contain the respective information.




Legend

- Special Activation Precinct boundary
- Solar Sub-precinct
- Parkes Enterprise Sub-precinct
- Intensive Livestock Agriculture Sub-precinct
- Commercial Gateway Sub-precinct
- Mixed Enterprise Sub-precinct
- Brolgan Road
- High value vegetation and regeneration areas
- Stormwater flow paths
- New trunk roads within the Precinct
- New streets (for investigation)
- Railway
- 1km buffer zone
- Future upgrade (for investigation by TfNSW)

*Figure 3. Parkes SAP Structure Plan showing location of the proposal (Source: adapted from DPIE 2020, p 14)*

*Table 1. Compliance with Baseline Conditions*

| Requirement | Where addressed in this report |
|---|---|
| **The Urban Design and Landscape Plan must include:** | |
| (a) an analysis of the built, natural and community context and the urban design objectives, principles and standards for the Proposal; | A contextual analysis of the area in which the proposal is located is provided in **Chapter 1**.<br><br>The urban design objectives and principles are outlined in the urban and landscape design strategy in **Chapter 3**.<br><br>Urban design standards for project elements are provided in **Chapter 5**. |
| (b) the design of the Proposal elements including their form, materials and detail; | The urban and landscape design strategy is outlined in **Chapter 3**. A detailed description of landscape design treatments is provided in **Chapter 4**.<br><br>Urban design elements including major structures are described in **Chapter 5**. |
| (c) the design of the project landform and earthworks; | The design of the project landform and earthworks is described in **section 4.9** |
| (d) the location of existing vegetation, areas of vegetation to be retained and proposed planting and seeding details, including the use of local indigenous species for revegetation activities; | The location of existing vegetation including areas of vegetation to be retained is shown in **section 4.6**.<br><br>The approach to planting and seeding is discussed in **section 4.7**. Proposed planting and seeding details, including the use of local indigenous species for revegetation activities are described in **section 4.8**. |
| (e) the location of existing heritage items; | An overview of existing heritage including Aboriginal and non-Aboriginal heritage is provided in **section 2.3**. |
| (f) visual screening requirements; | Visual screening requirements are discussed in **section 4.7.4**. |
| (g) developed visuals, cross sections and plans showing the proposed design outcome; | An overview of the proposal and proposed design outcomes is provided in the urban and landscape design strategy in **Chapter 3**.<br><br>Detailed plans, cross sections, elevations and photomontages of the proposal are provided in **Chapter 4** and **Chapter 5**. |
| (h) details of strategies to rehabilitate, regenerate or revegetate disturbed areas and successfully establish and maintain the resulting new landscape. | The use of planting and seeding to rehabilitate, regenerate or revegetate disturbed areas is discussed in **section 4.7**.<br><br>Strategies to successfully establish and maintain the resulting new landscape are provided in **Chapter 6**. |

## 1.3 PROJECT SCOPE

The main features of the proposal include (**Figure 4**):

- All civil and road works for the upgrade of Brolgan Road from the eastern connection with the Newell Highway upgrade works to the western connection near Keith's Lane including:
  - A four-way intersection for a future local road (secondary gateway) - item A
  - A four-way roundabout with a northern leg for Pacific National and a southern leg for the new Coopers Road (primary gateway - item B
  - A three-way junction with road stub on the northern leg for the future north-south connector road - item C
  - Reinstatement of various existing local access driveways along Brolgan Road
  - 2.5 metre wide shared path adjacent to Brolgan Road.
- Bridge ST01 over the Australian Rail Track Corporation (ARTC) Parkes North West Link rail line corridor (western bridge) - item D
- Bridge ST02 over the Parkes to Narromine ARTC railway corridor (eastern bridge) - item E
- New potable water tank and associated infrastructure - refer **section 4.5.2**
- New recycled water network, including a connection the existing Parkes Shire Council recycled water network
- New sewerage network including (also refer **section 4.5.2**):
  - Gravity and rising main piping
  - Pump stations
  - A new packaged sewerage treatment plant with lagoons
- A new zone substation - refer **section 4.5.2**
- Extension of 11kV overhead Essential Energy electricity network along the upgrade section of Brolgan Road
- Extension of the existing TransGrid 132kV line along Brolgan Road to the East to the proposed zone substation

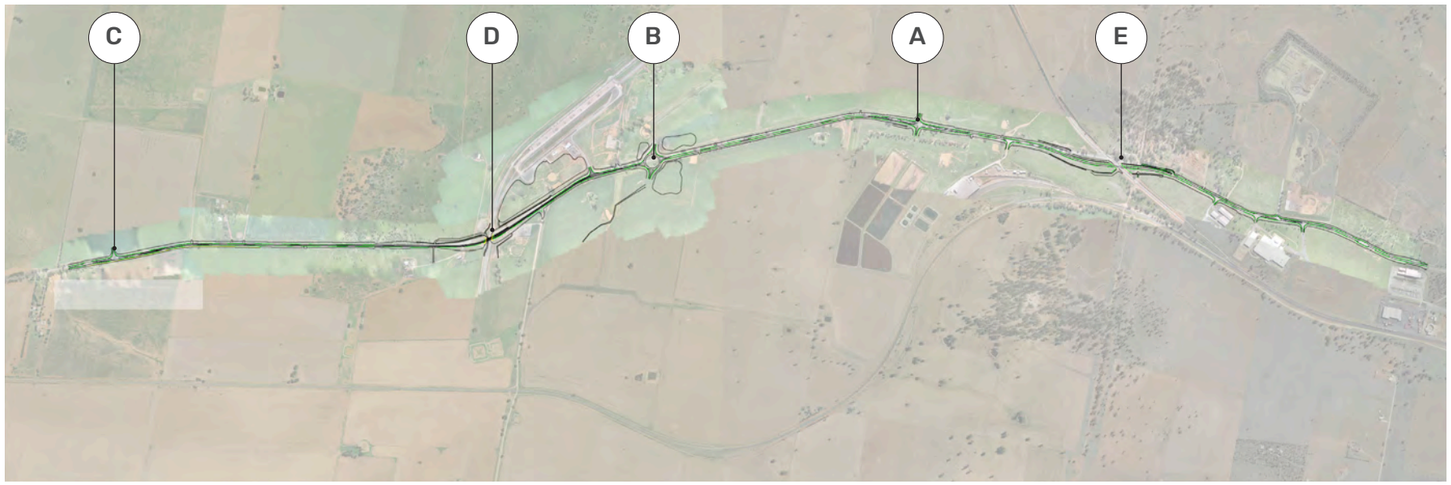



*Figure 4. Project overview*

- Two ring main units (RMU) along the electrical network, for future bi-directional flow
- Extension of the existing gas network with a hydrogen compatible gas network along Brolgan Road to connect to the existing Parkes Jemena network and be extended further west along Brolgan Road to the edge of the Works
- New telecommunications infrastructure for future use
- Other utilities works.

## 1.4 REPORT STRUCTURE

The UDLP is structured into several parts, as follows:

- **Chapter 1 – Introduction**
  Introduces the project, outlines the scope of the report and provides a table summarising relevant Conditions of Approval and where in this report they have been addressed
- **Chapter 2 – Contextual analysis**
  Provides a brief analysis of the built, natural and community context of the proposal with a focus on relevant urban and landscape design issues
- **Chapter 3 – Urban and landscape design strategy**
  Outlines the design vision, principles and objectives for the project and the overarching urban and landscape design strategy.
- **Chapter 4 – Landscape design treatments**
  Presents the main landscape design treatments along the proposal, the planting design philosophy, detailed information in respect of the species that will be used and the approach adopted for earthworks and slope stabilisation
- **Chapter 5 - Urban design elements**
  Presents the major urban design elements and information in respect of the form, materials and design detail including an urban design finishes schedule summarising the preferred colour palette and finishes for urban design elements
- **Chapter 6 – Landscape Design Implementation:**
  Describes the approach to be taken in the implementation of the landscape design, including the retention and protection of existing vegetation, soil management, revegetation and seed collection
- **Chapter 7 –References**
  Lists the documents that are referred to within the UDLP or were used in the preparation of the UDLP.

# CHAPTER 2
# CONTEXTUAL ANALYSIS

## 2.1 NATURAL CONTEXT

### 2.1.1. LANDSCAPE TYPES AND LANDFORM

The landform of the Parkes SAP slopes in a south-westerly direction within a generally open plain. The landscape of and adjoining the proposal is a combination of two landscape typologies, based on the Mitchell classification of NSW ecosystems:

- The Goonumbla Hills:
  The landform is characterised by gently rolling plains with rounded low hills - refer **Figure 5**. Elevation ranges from 290 to 390 metres above sea level with some local variations. Soils vary from stony yellow earths on the sands to thin brown structured loams on the hills merging with red-brown and red texture-contrast soils on the flats
- The Bimbi Plains:
  Predominantly flat plains landform on alluvial plains - refer **Figure 6**. Elevation ranges from 200 to 250 metres above sea level with only minor local variation. Soils include gravelly clay loams and red brown clays, red-brown texture-contrast soils on higher slopes grading to red-brown gradational and uniform profiles of clay loams and clays along creeks.

Both landscape types are extensively cleared, grazed and cultivated - also refer to **section 2.1.4.** The key characteristics of these landscapes are to be integrated within the Parkes SAP are summarised in **Figure 7**.

### 2.1.2. HYDROLOGY

Hydrological features in the Parkes SAP are minor, consisting generally of small ephemeral drainage lines and farm dams. The closest watercourses are Goobang Creek and Ridgey Creek, near the southern and northern boundary of the precinct respectively.

*Figure 5. The Goonumbla Hills landscape (Source: OzArk 2019, p 9)*

*Figure 6. The Bimbi Plains landscape (Source: OzArk 2019, p 9)*

### 2.1.3. VIEWS

The generally open and flat landscape allows for medium to long distance and broad expansive views in all directions - refer **Figure 5** and **Figure 6**.

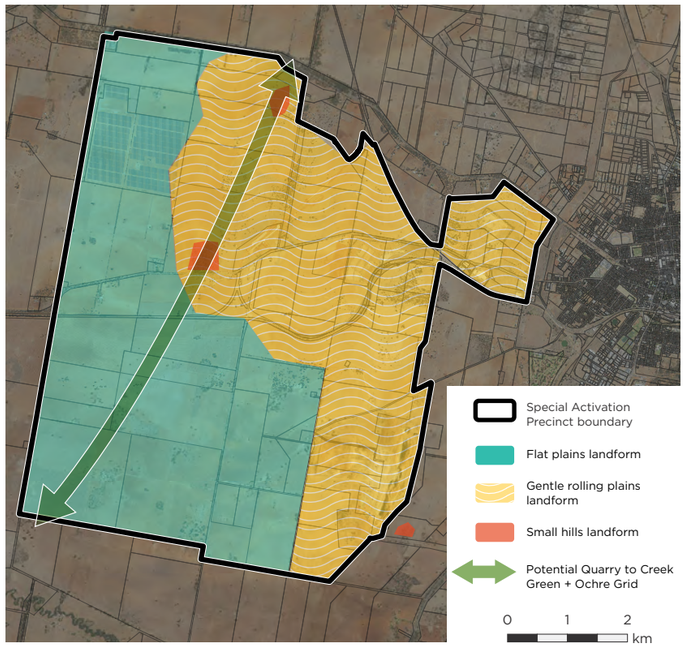



*Figure 7. Key landscape values to be incorporated into design guidelines and the public domain plan (Source: DPIE 2020, p 45)*


*Figure 8. Sensitive vegetation near the proposal (Stage 1)*


*Figure 9. Significant vegetation in the vicinity of Brolgan Road (Source: Adapted from DPIE 2020, p 26)*

### 2.1.4. EXISTING VEGETATION

The Parkes SAP area has a long agricultural history and has been extensively cleared for grazing and other rural land uses. Agricultural landscapes retain scattered remnant trees along roadsides and within open fields and paddocks. Some cultural plantings occur along property boundaries and fence lines. Remnant native trees are generally more prevalent on slightly steeper slopes and on hilltops.

Within the proposal area, the *Biodiversity Assessment Report* (BAR) (WSP 2019b) identifies eight plant community types (PCTs) including six native PCTs and one non native PCT (WSP 2021). Six native PCTs also form part of Threatened Ecological Communities. They are denoted with an asterisks*:

- Native PCTs:
  - PCT 70 – White Cypress Pine woodland on sandy loams in central NSW wheatbelt
  - PCT 76* – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions
  - PCT 82* – Western Grey Box – Poplar Box – White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion
  - PCT 201* – Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions
  - PCT 250 – Derived tussock grassland of the central western plains and lower slopes of NSW
  - PCT 267* – White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion
  - PCT 276* – Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion.
- Non-native PCTs:
  - Miscellaneous ecosystem (urban exotic/ native landscape plantings).

The predominant native canopy species of the area include Grey Box (*Eucalyptus microcarpa*), White Cypress Pine (*Callitris glaucophylla*), Bimble Box (*Eucalyptus populnea*) and Red Ironbark (*Eucalyptus sideroxylon*).

Native PCTs marked with an asterisks above form part of three Threatened Ecological Communities, namely:

- Inland Grey Box woodland
- Fuzzy Box Woodland
- White Box Yellow Box Blakely's Red Gum Woodland.

Sensitive native vegetation near the proposal includes trees of high ecological value, defined as Tier 1 and Tier 2 vegetation (**Figure 8**).

While the Parkes SAP is home to 14 threatened flora species, no threatened flora species or their habitats were identified within the proposal area. Significant vegetation identified for retention in the *Special Activation Precinct Parkes. Master Plan* (DPIE 2020) (Master Plan) are shown in **Figure 9**. Detailed biodiversity assessments estimate that 24.10 hectares of native vegetation and associated moderate to poor quality habitat may need to be removed for the proposal. These impacts were deemed unlikely to be significant and would be minimised during construction consistent with the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (TfNSW 2011). A Biodiversity Offset Strategy (BOS) would also be prepared based on the final clearing footprint for the proposal. The BOS would identify biodiversity credits and/or supplementary measures for impacted biodiversity including vegetation.

In addition, the landscape design has sought to maximise tree planting for the proposal, integrating canopy species from the native PCTs of the proposal area consistent with the requirements of the Delivery Plan. Refer to **section 4.7** for more detail.

## 2.2 BUILT CONTEXT

### 2.2.1. LOCAL SETTING AND BUILT FORM

The Parkes SAP is located to the west of the township of Parkes, in a predominantly rural setting. Built form remains limited to date with the exception of a number of agricultural buildings as well as commercial/ industrial facilities that have established in the eastern part of the precinct in recent years. They include the National Logistics National Hub, the SCT Logistics intermodal facility and the Pacific National intermodal terminal, approximately four kilometres west of Parkes. Other major land uses include the Linfox freight terminal and the Parkes Shire Council landfill near Goobang Junction and the Westlime quarry on London Road - refer **Figure 10**.

Built form associated with these land uses generally involves large metal sheds consistent with the functional needs of their operations.

### 2.2.2. ACCESS AND CONNECTIVITY

The Parkes SAP enjoys good access by both road and rail, being located at the junction of transcontinental and the inland rail lines and immediately adjoining the Newell Highway Parkes Bypass.

London Road, Coopers Road and Brolgan Road form the main connecting roads, together with Henry Parkes Way along the precinct's northern boundary. The existing road network will be augmented and extended to meet the future transport needs of the Parkes SAP. Brolgan Road is planned to become the major east-west vehicular spine connecting the precinct to the township of Parkes.

A travelling stock route also traverses the precinct and the proposal area in a north-south direction.

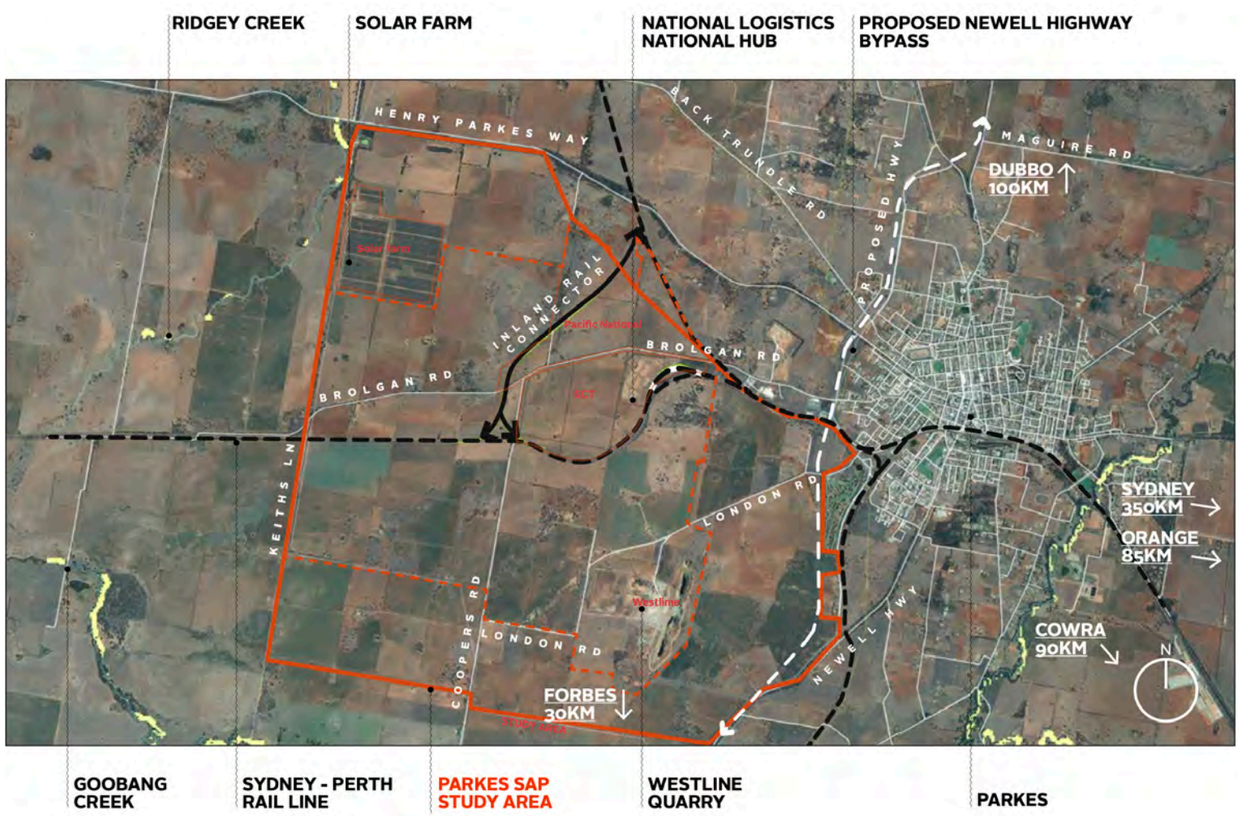



*Figure 10. Existing land use and access within the Parkes SAP (Source: Jensen Plus 2019, p 15)*

## 2.3 HISTORY AND HERITAGE

### 2.3.1. WIRADJURI COUNTRY

The Wiradjuri are the largest Aboriginal group in New South Wales and are the traditional land owners of land extending west of the Blue Mountains from Albury in the south to Coonabarabran in the north, including the Parkes Region.

The Parkes SAP has a strong cultural relevance to the Wiradjuri people - refer **Figure 11**. Culturally important elements recorded in the Parkes SAP investigation area include scar trees, isolated artefacts, artefact scatters and one stone quarry - refer *Environmental, Heritage and Sustainability Summary Report*.

**Aboriginal cultural planning principles**

The following Aboriginal cultural planning principles were identified for the Parkes SAP to ensure Country is cared for by guiding the design of the precinct and projects within it:

- Aboriginal led: all aspects that relate to Wiradjuri Country should be led or co-led by Aboriginal people
- Hierarchy: all Country is important, yet some holds more spiritual and practical significance for Aboriginal people
- Promote biodiversity: land was designed, managed and cultivated to promote diversity and ensure a large range of produce/ resources were available at all times of the year
- Connect people to Country: the built and designed environment provides an opportunity to celebrate and reinforce contemporary notions of Aboriginality and connect us all to place - refer **Figure 12**
- Orientation: understanding of the prevailing winds and sun orientation
- Let Country be what it wants to be: high value areas should be planned from the central point out in all future land use schemes
- Share the Country: keep the important places open for all to use
- Solar Control: optimum solar efficiency
- Promote culture - refer **Figure 13**.

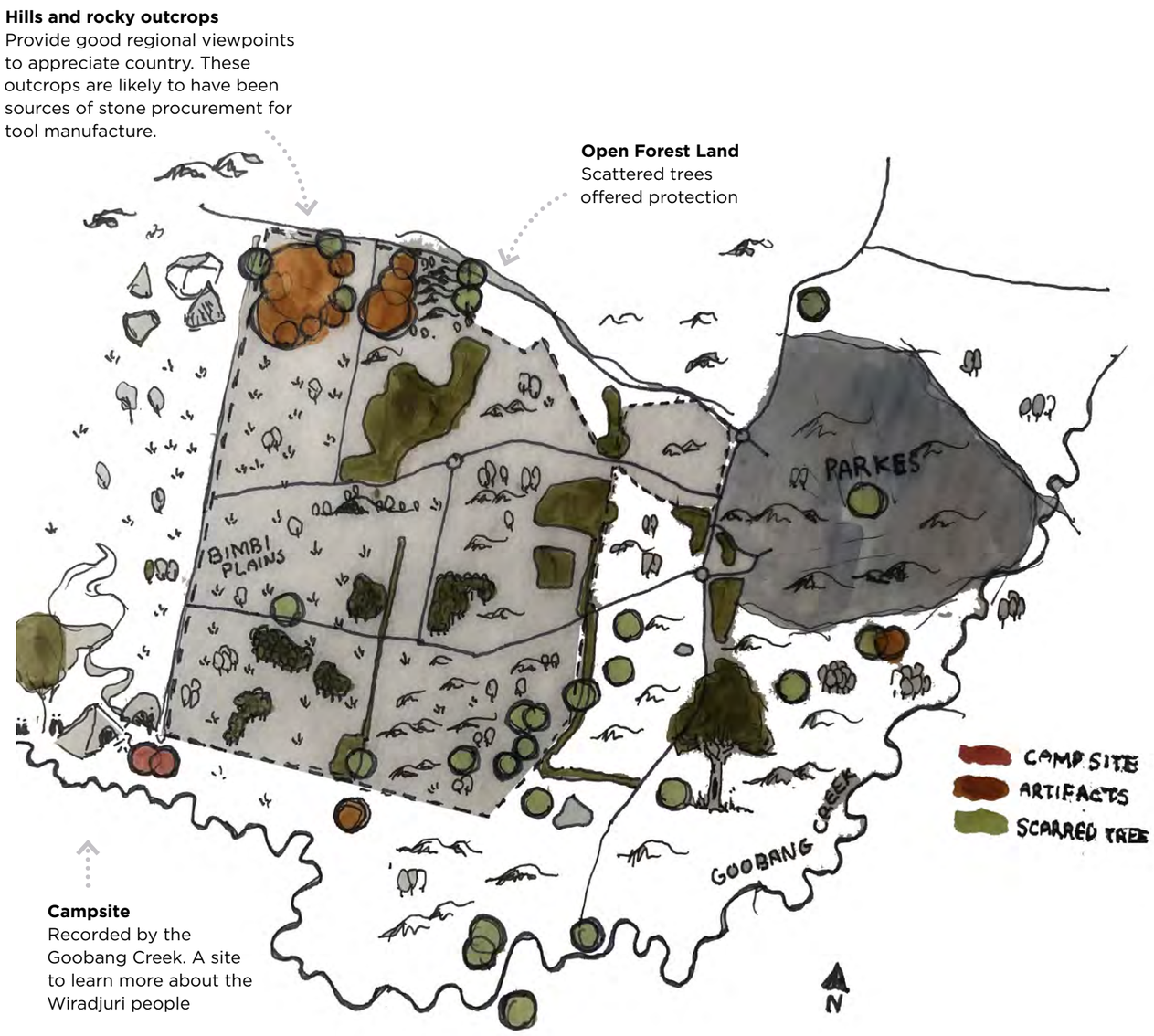



*Figure 11. Places of Aboriginal history and meaning (Source: DPIE 2020, p 10)*

### 2.3.2. ABORIGINAL CULTURAL SITES

An *Aboriginal Cultural Heritage & Historic Heritage Assessment* was carried out in 2019 (OzArk 2019) to determine Aboriginal cultural values in conjunction with Aboriginal stakeholders and through field work, as well as non-Aboriginal historic sites within the Parkes SAP. The assessment identified five Aboriginal sites within the Parkes SAP, one of which is located within the proposal area for Stage 1. All five sites were assessed as being isolated artefacts in disturbed contexts.

A further *Aboriginal Due Diligence Assessment* carried out in 2021 (OzArk 2021) determined that no Aboriginal objects or intact archaeological deposits would be harmed by the proposal, subject to the establishment of a ten metre no-go zone buffer surrounding site 'Parkes SAP IF-5', located at the western end of the proposal area - refer **Figure 14**. The *Aboriginal Due Diligence Assessment Report* also includes a number of additional recommendations to ensure the greatest possible protection of the area's Aboriginal cultural heritage values throughout the construction of the proposal.

*Figure 12. Concept for potential future artwork at precinct gateways (Source: Jensen Plus 2019, p 34)*

*Figure 13. Artwork by Duncan Smith, a Wiradjuji man (Source: DPIE 2020, p4)*

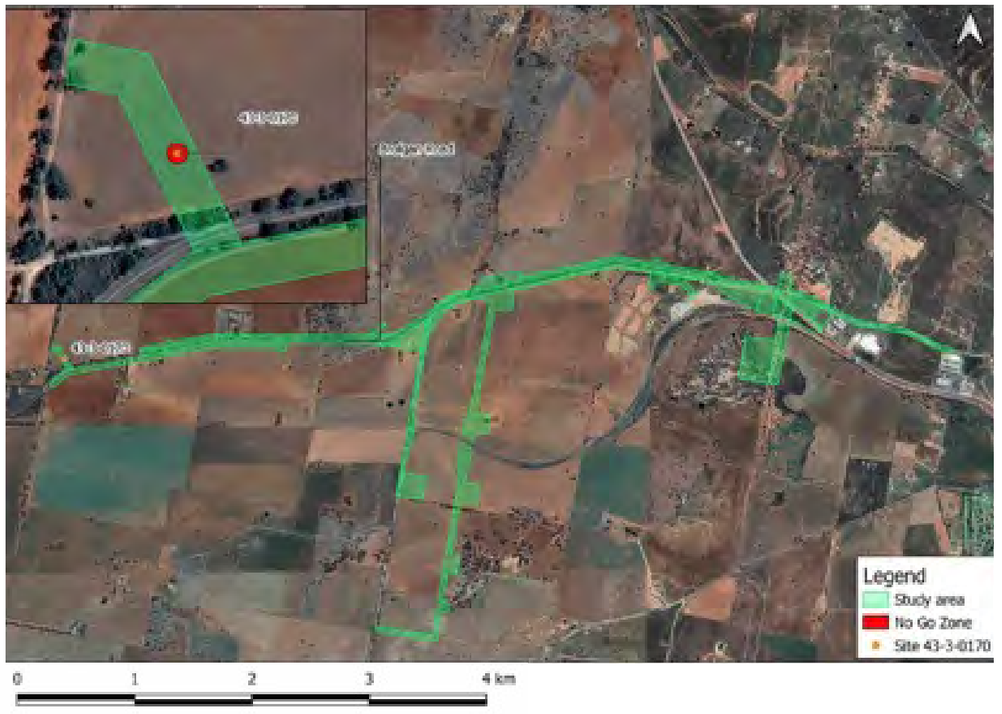



*Figure 14. No Go Zone buffer surrounding site 43-3-0170, shown relative to the proposal area (Source: OzArk 2021, p 17)*

### 2.3.3. NON-ABORIGINAL HERITAGE

The *Aboriginal Cultural Heritage & Historic Heritage Assessment* (OzArk 2019) found no historic sites recorded within the Parkes SAP. A previously recorded historic site, 'Brolgan Road-HS01' is located north of Brolgan Road, beyond the proposal area - refer **Figure 15**. As such there would be no impacts on historic heritage as a result of the proposal.


*Figure 15. Location of Brolgan Road historic site relative to the Parkes SAP and the Brolgan Road corridor (Source: Adapted from OzArk 2019, p 77)*

# CHAPTER 3
# URBAN AND LANDSCAPE DESIGN STRATEGY

## 3.1 GUIDANCE DOCUMENTS

The overarching document guiding the preparation of the urban and landscape design for the proposal is the brief provided by RGDC, specifically the *Scope of Works and Technical Criteria* (SWTC) which outline the requirements for the proposal's various components including urban design and landscaping.

As required by the SWTC, the urban and landscape design strategy for the proposal builds on and is consistent with the following documents, unless specified otherwise by the SWTC:

- *Special Activation Precinct Parkes. Master Plan* (DPIE 2020) (Master Plan)
- *Parkes Special Activation Precinct Draft Structure Plan* (Jensen Plus 2019) (Structure Plan) including the:
  - Aboriginal cultural planning and design principles for Wiradjuri Country
  - Landscape and urban design concepts for the Parkes SAP.
- *Parkes Special Activation Precinct Delivery Plan (Working Draft),* (NSW Government August 2020) (Delivery Plan) including the *Landscape and Urban Design Concept Stage 1*
- The urban design principles contained in *Beyond the Pavement: Urban design policy, procedures and design principles* (TfNSW 2014)
- *Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW* (TfNSW 2012).

## 3.2 PARKES SAP URBAN AND LANDSCAPE DESIGN VISION

The Delivery Plan integrates earlier planning work from the guidance documents above to provide a clear landscape and urban design vision for the Parkes SAP. The overall vision is for the precinct to:

- Respond to and respect the past and present natural environment
- Respect the cultural history, connect to Country and build on the landscape character of the Parkes region.

Together with the overarching vision for the Parkes SAP (refer to **section 1.1**) the vision outlined in the Delivery Plan forms the basis of the urban and landscape and design strategy for the proposal.

### 3.2.1. PRECINCT DESIGN PRINCIPLES AND OBJECTIVES

Building on the overall vision, the Delivery Plan outlines the overarching urban and landscape design principles and objectives for the Parkes SAP.

#### Urban and landscape design principles

The Parkes SAP will be a place where:

1) Everyone is welcome to participate, work, visit and play
2) There is a distinctive sense of place, through high quality precinct gateways, landscapes, streets, roads, public spaces and parks; respecting and incorporating cultural heritage
3) Environmental qualities are embraced across the Precincts.

#### Urban and landscape design objectives

The principles outlined above will be achieved by:

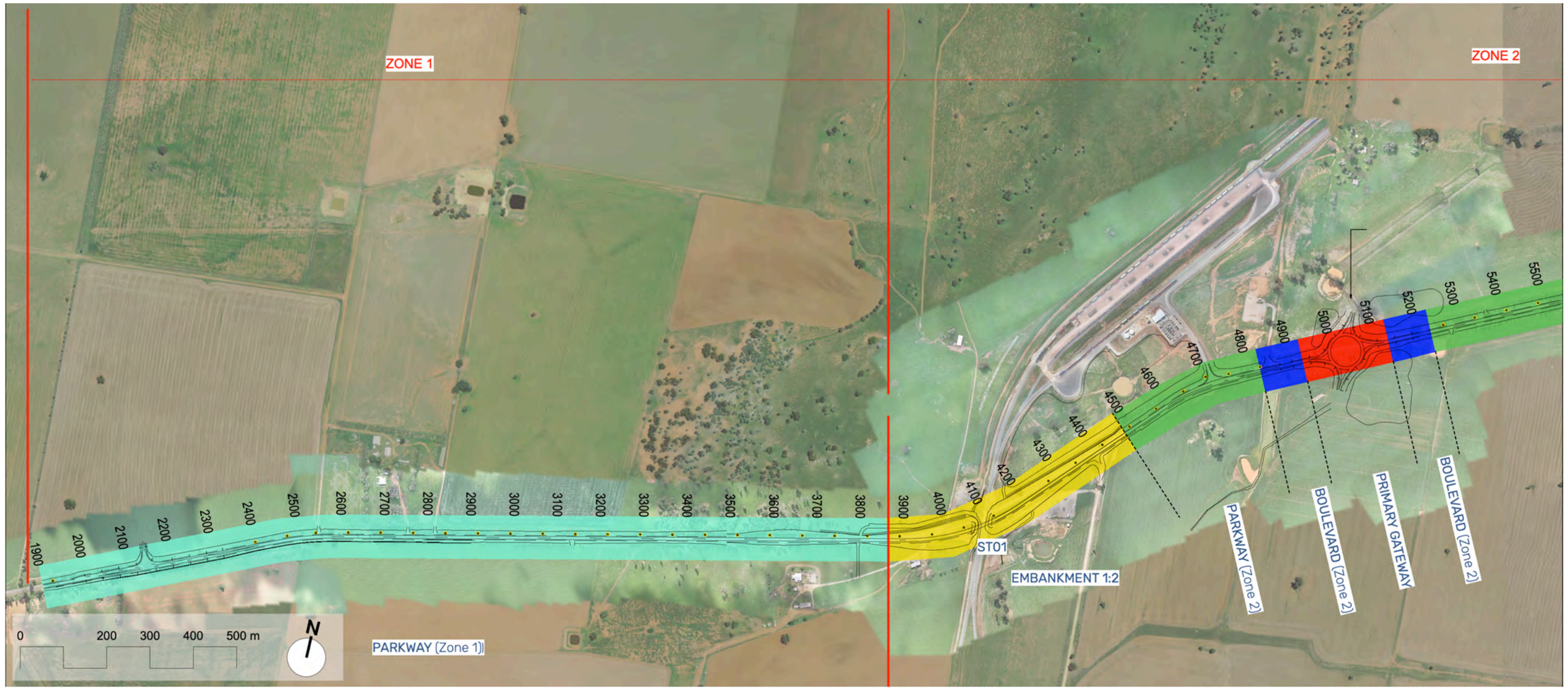
1) Developing appropriately scaled landscape elements for people in vehicles, people walking and people cycling within the Precincts
2) Creating green, water sensitive streetscapes that reflect Parkes' remnant landscapes, biodiversity and cultural character, connecting within Parkes SAP and to the surrounding Parkes community
3) Ensuring a sustainable Parkes SAP for generations through careful and climate appropriate species, material selection and maintenance practices.

## 3.3 URBAN AND LANDSCAPE DESIGN STRATEGY

**Figure 16** and **Figure 17** on the following pages illustrate the urban and landscape design strategy for the proposal. The strategy consists of a series of design treatments that were identified in the Delivery Plan and adopted for the proposal, taking into account site constraints and the functional requirements for the upgrade of Brolgan Road and associated utility works aimed at enabling precinct development.

The urban and landscape design treatments respond to the site conditions, constraints and project requirements, as well as the guidance documents referenced in **section 3.1**. This has led to the identification of a number of distinct treatment zones. The treatments zones have been arranged in a west to east direction to follow the road design stations along Brolgan Road. The treatment zones are:

- **Zone 1** is located at the eastern proposal extent, between Keiths Lane and the Parkes North West Link line rail corridor. It is comprised entirely of the 'Parkway' design treatment to provide quality interfaces for adjoining sub-precincts by providing Fuzzy Box Woodland canopy species where possible - also refer to **section 4.1.1**
- **Zone 2** is the largest treatment zone, located between the Parkes North West Link line corridor and the Parkes to Narromine rail corridor. The majority of the zone comprises the 'Parkway' design treatment. Other major treatments relate to Bridge ST01 (**section 5.1.1**) and its embankments (**section 4.2.1**), the primary and secondary gateways (**section 4.2.3** and **section 4.2.4** respectively) and high quality 'Boulevard' design treatment (**section 4.2.2**) to highlight the approaches to the two gateways




**KEY - LANDSCAPE TREATMENTS**

- PARKWAY TREATMENT (ZONE 1)
- EMBANKMENT TREATMENT (ZONE 2 & 3)
- PARKWAY TREATMENT (ZONE 2)
- BOULEVARD TREATMENT (ZONE 2)
- PRIMARY GATEWAY TREATMENT
- SECONDARY GATEWAY TREATMENT
- PARKWAY TREATMENT (ZONE 4)
- BOULEVARD TREATMENT (ZONE 4)

**ZONE 1 - Urban Design Treatments**

- Street lighting to intersection between station 2,000 to station 2,350
- Lighting to shared path.

**ZONE 2 - Urban Design Treatments**

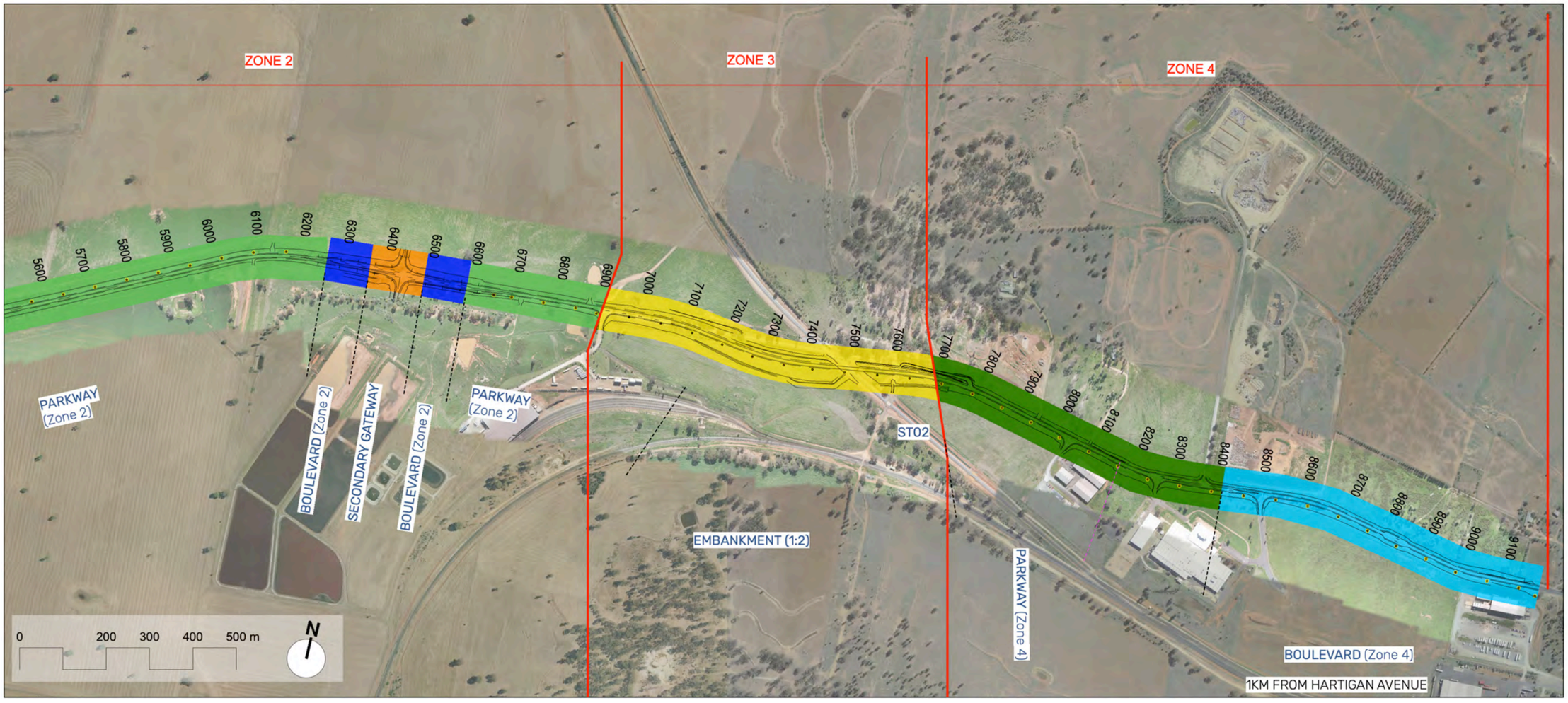
- Lighting to shared path.

**Bridge ST01 - Western Bridge**

**Primary Gateway**

- Street lighting
- Feature paving.

*Figure 16. Urban and landscape and design strategy showing treatment types along Brolgan Road - Sheet 1 of 2*




**Secondary Gateway**

- Street lighting.

**ZONE 3 - Urban Design Treatments**

- Lighting to shared path.

**Bridge ST02 - Eastern Bridge**

- Including retaining walls to northern approach embankments

**ZONE 4- Urban Design Treatments**

- Lighting to shared path.

*Figure 17. Urban and landscape and design strategy showing treatment types along Brolgan Road - Sheet 2 of 2*

- **Zone 3** is located around the Parkes to Narromine rail corridor. It is characterised by Bridge ST02 (**section 5.1.2**) and associated embankments (**section 4.2.1**)
- **Zone 4** is located east of the Parkes to Narromine rail corridor and comprises of both 'Parkway' (**section 4.1.1**) and 'Boulevard' (**section 4.2.2**) treatments to reinforce the developing precinct character.

The detailed design for the proposal will continue to be developed consistent with the nominated design treatments while responding to project requirements and respective design refinements made in collaboration with the project team.

Further detail on the design treatments is provided in **Chapter 4**.

## 3.4 PROPOSAL-SPECIFIC DESIGN OBJECTIVES AND PRINCIPLES FOR BRIDGES

Recognising the significant landmark function of bridges within the flat plains landscape of the Parkes SAP, project-specific objectives and principles were developed for the two bridges and associated embankments along Brolgan Road.

The bridges will constitute major urban design elements that will interface with road users and the rail lines in the precinct. The objectives and principles define the urban design standards that will guide the design development of these major proposal elements.

The project-specific urban design objectives for bridges and embankments are:

**Objective:**

- To achieve an integrated form and character that contributes to the unique character of the precinct while minimising visual impacts on adjoining areas.

**Principles:**

- Design proposed bridge structures to be of contemporary form and scale to complement the desired future character of the surrounding environment, with a simple design comprised of smooth finishes and clean lines to produce an elegant outcome
- Maximise visual consistency to support the developing precinct character
- Maximise consistency of throwscreen designs with the Newell Highway (Parkes Bypass) bridge currently proposed by Parkes Shire Council (PSC)
- Embankments are integral to the design and experience of bridges. Landform will integrate with the surrounding landscapes at ground level while at the same time providing a distinct contrast to the surrounding open plains landscape, providing for views over the landscape to add visual excitement and contribute to the precinct character and sense of place.

**Chapter 5** outlines how the objectives and principles have been translated into the design of bridges and embankments.

# CHAPTER 4
# LANDSCAPE DESIGN TREATMENTS

## 4.1 ZONE 1 TREATMENTS

Zone 1 is located between Keiths Lane and the Parkes North West Link rail corridor. It comprises of the following distinct design treatments and elements:

- Parkway (**section 4.1.1**).

### 4.1.1. PARKWAY

In accordance with the Delivery Plan, 'Parkway' is the treatment proposed for the majority of Brolgan Road. The design intent is focused on experience and quality interfaces for the Commercial Gateway sub-precinct and Regional Enterprise sub-precinct along the main spine of the Parkes SAP.

Landscaping will reinforce the existing vegetation communities while developing a formal precinct character. The design will allow for entrances to new developments to feature formal, landscaped entry thresholds.

**Table 2** outlines the desired outcomes for Parkways as described in the Delivery Plan, together with a description of how these aspirations have been incorporated in the design of the proposal.

*Table 2. Parkway treatment*

| Design parameter | Desired outcome as per Delivery Plan | Design response |
|---|---|---|
| Locations | Sections of Brolgan Road which are not Boulevard, Embankments, Primary or Secondary Gateway treatments. | |
| Ecology | Mixed species based on Fuzzy Box Woodland | Mixed species based on Fuzzy Box Woodland, supplemented with species suited to harsh roadside conditions that are commercially readily available. |
| Tree canopy | Double avenue of staggered trees: mixed species based on Fuzzy Box Woodland | Tree planting with Fuzzy Box Woodland canopy species where possible (based on clear zones and utility constraints).<br>Tree species to include Fuzzy Box (*Eucalyptus conica*), Grey Western Box (*Eucalyptus microcarpa*) and Yellow Box (*Eucalyptus melliodora*) - refer to **section 4.8** for more information on proposed species for landscaping.<br>Trees are set out to provide shade to the shared path while allowing solar access to shared path solar lights and views over the landscape. |
| Understorey | Informal grassland and colourful native shrubs adjacent to shared path<br>Mixed species based on Fuzzy Box Woodland | Native grasses and groundcovers to reflect the Fuzzy Box Woodland ecological community, supplemented by species proven to perform well in modified landscapes and harsh roadside conditions - refer to **section 4.8** for more information on proposed species.<br>Extent of shrub species (if any) to be confirmed) |
| Irrigation | Non-irrigated, with allowance for establishment irrigation | |
| Drainage | Minimum 3m wide swales on both sides of Brolgan Road, vegetated with dryland grasses | Roadways drain to swales which have been sized and located to suit the hydraulic requirements - refer **section 4.5.1**.<br>Swales are landscaped with native grasses and groundcovers to provide consistency within the road corridor. |
| Lighting | Intersections and junctions: regulatory street lighting<br>Shared path: solar lighting<br>Feature lighting within street furniture | As per Delivery Plan except for feature lighting within furniture.<br>Furniture installation is not included in the scope of the proposal. Furniture would be provided by RGDC in subsequent stages of Parkes SAP delivery.<br>Also refer to **section 5.5.1** for lighting. |
| Wayfinding signage | Wayfinding signage | Wayfinding signage is not included in the scope of the proposal. It would be provided by RGDC in subsequent stages of Parkes SAP delivery. |
| Furniture | Benches, shelters, etc | Furniture installation is not included in the scope of the proposal. Furniture would be provided by RGDC in subsequent stages of Parkes SAP delivery. |

**Constrained corridor**

It should be noted that landscaping opportunities vary along the length of Brolgan Road due to the variable constraints imposed by utilities and the clear zone, both of which restrict tree planting. The following constitute descriptions of typical landscape outcomes that can be expected for Parkway sections within each treatment zone:

**Zone 1 Parkway**

- Tree canopy cover:
  - Double line of trees, located in small groups along the northern side of Brolgan Road
  - Single line of trees, location in small groups along the southern side of Brolgan Road.
- Understory:
  - Native grasses and groundcovers.

Refer to **Figure 18** and **Figure 19**.

**Zone 2 and Zone 3 Parkway**

- Tree canopy cover:
  - Double line of trees, located in small groups along the northern side of Brolgan Road
  - No trees along the southern side of Brolgan Road.
- Understory:
  - Native grasses and groundcovers.

Refer to **Figure 20**.

**Zone 4 Parkway**

- Tree canopy cover:
  - Single line of trees, located in small groups along the northern side of Brolgan Road
  - Single line of trees, located in small groups along the southern side of Brolgan Road.
- Understory:
  - Native grasses and groundcovers.

Refer to **Figure 21**.

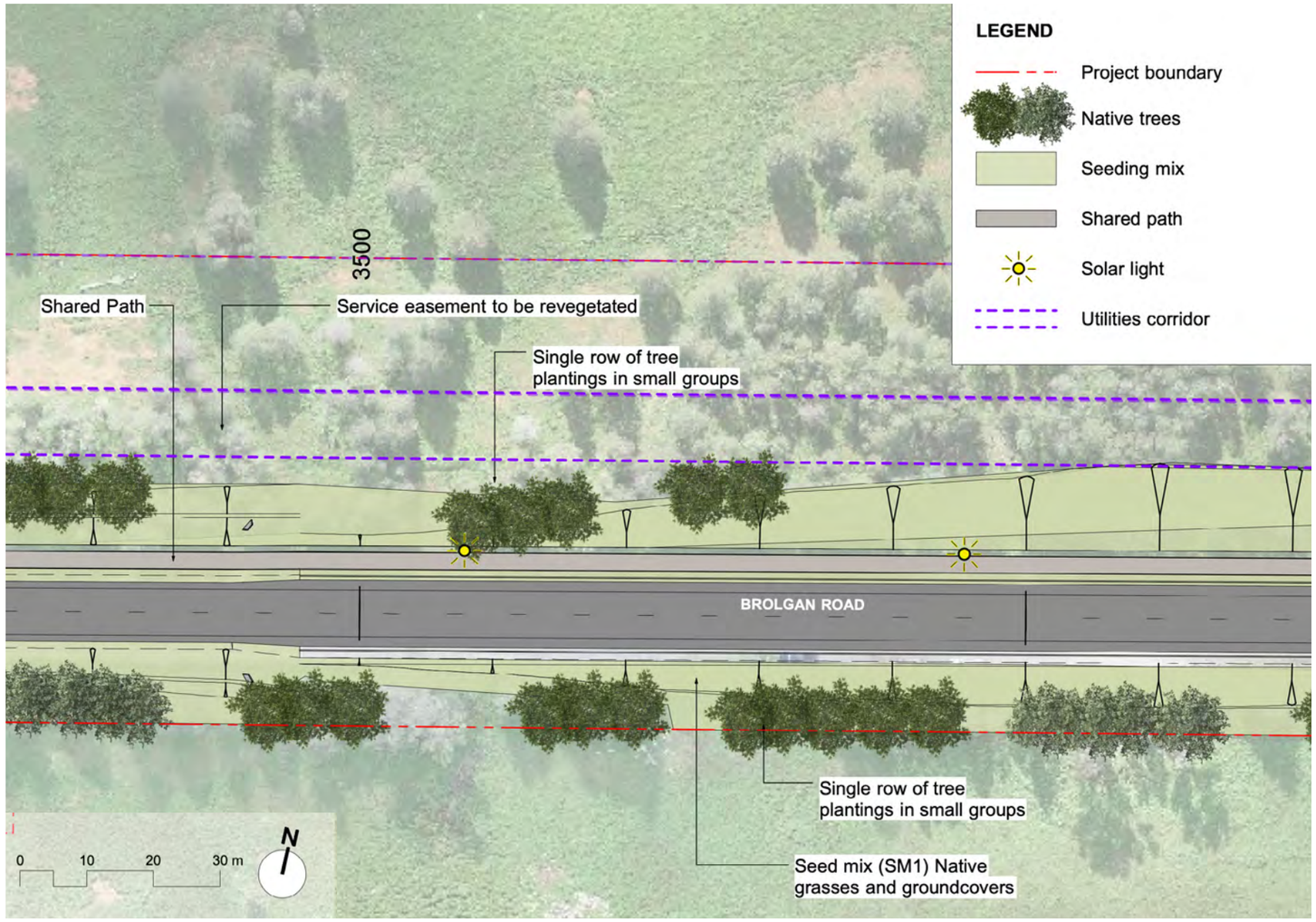



*Figure 18. Typical plan of Parkway treatment in Zone 1*

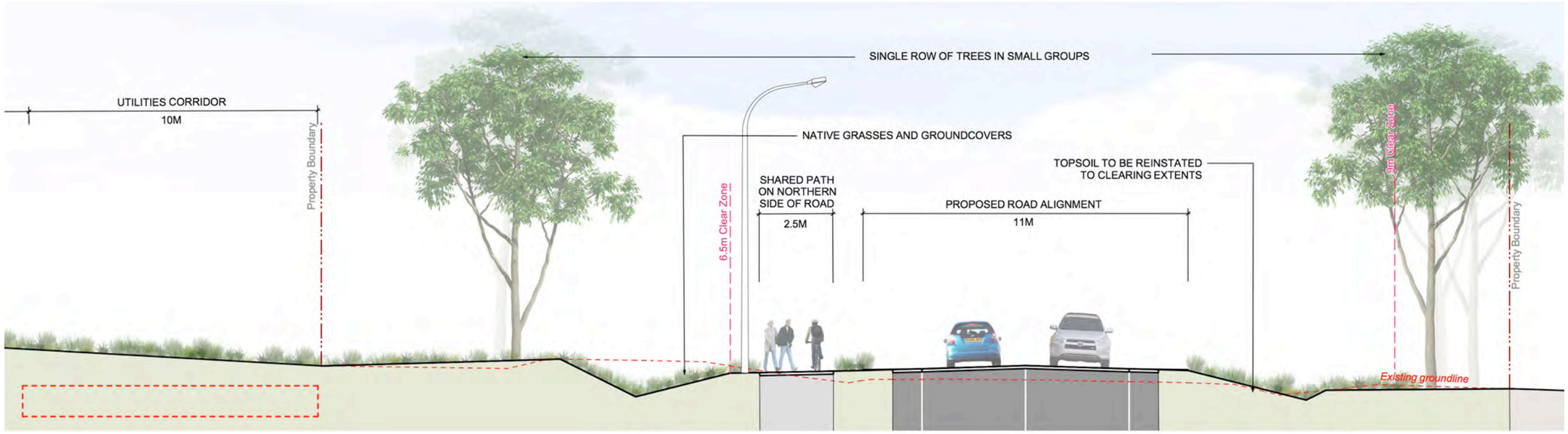



*Figure 19. Typical cross section of Parkway treatment in Zone 1, shown at station 3,400*

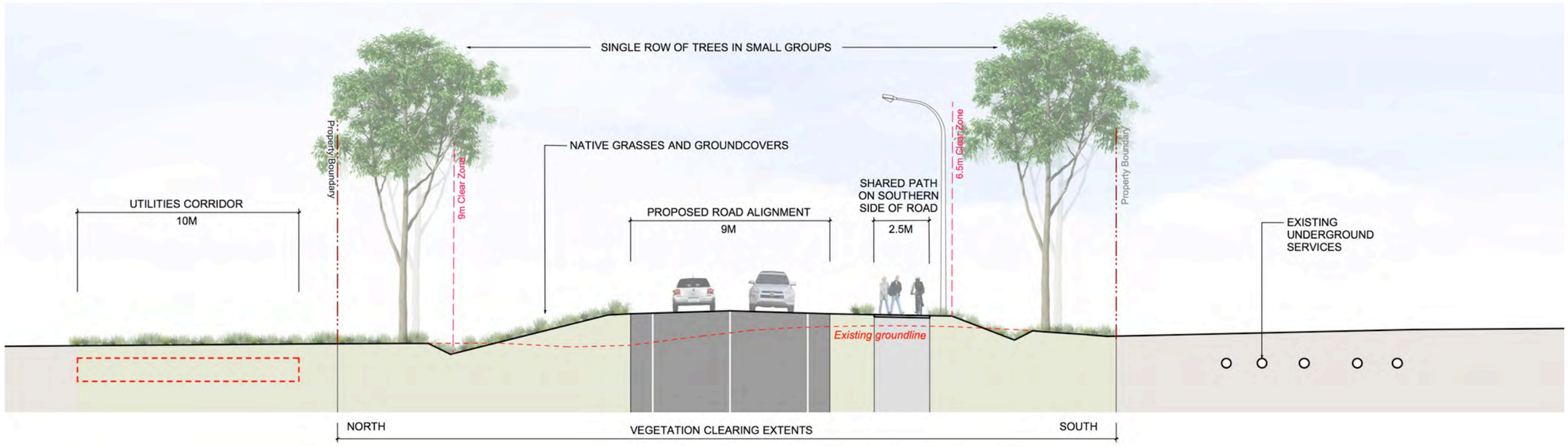



*Figure 20. Typical cross section of Parkway treatment in Zone 2, shown at station 6,900*

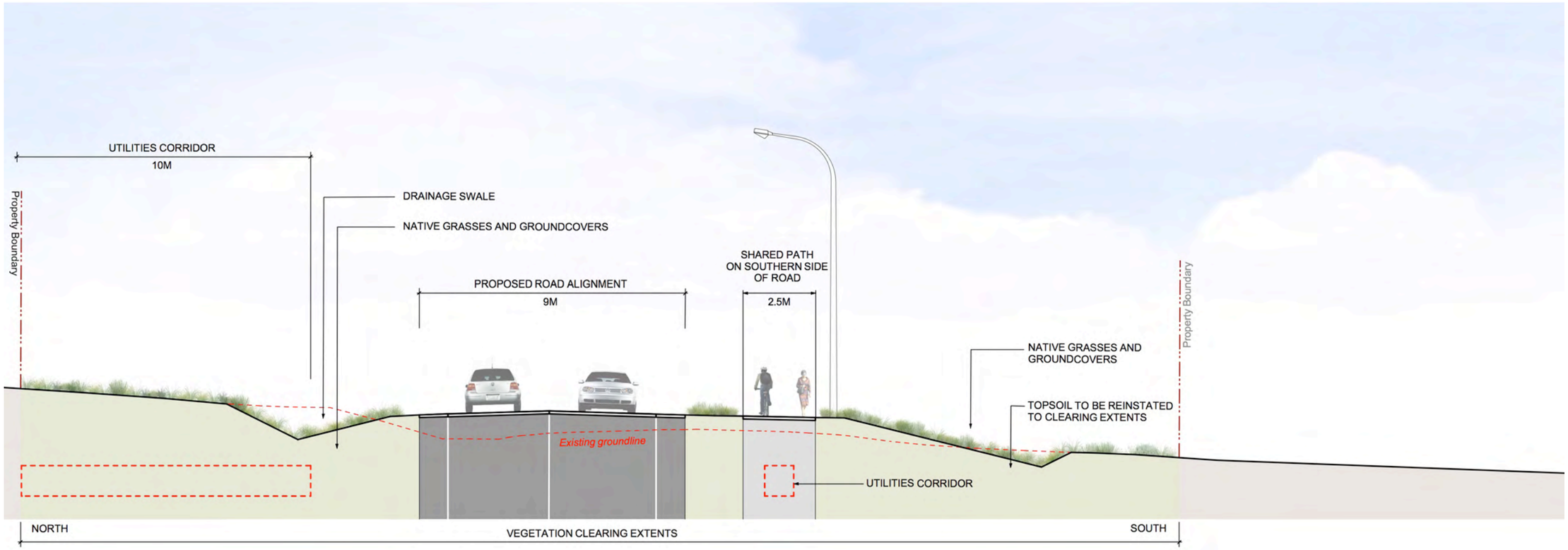



*Figure 21. Typical cross section of Parkway treatment in Zone 4, shown at station 8,000*

## 4.2 ZONE 2 TREATMENTS

Zone 2 is the largest treatment zone, located between the two major rail corridors. It comprises the following distinct design treatments and elements:

- Embankments (**section 4.2.1**)
- Western bridge ST01 (**section 5.1.1**)
- Parkway treatment (**section 4.1.1**)
- Boulevard (**section 4.2.2**)
- Primary gateway (**section 4.2.3**)
- Secondary gateway (**section 4.2.4**).

### 4.2.1. EMBANKMENTS

Embankments are the result of the need to bridge over the rail lines to provide grade separation between rail and road traffic. From certain locations embankments will be visually prominent. As identified in the Delivery Plan, this presents an opportunity to express the Parkes landscape character. This will be achieved by reinforcing the existing White Cypress Pine Woodland vegetation community.

Due to land constraints embankments are generally graded with a 2:1 (vertical:horizontal) slope. In addition, a retaining wall is required at the eastern bridge ST02 - refer **section 5.1.2** and **section 5.2**.

**Table 3** outlines the desired outcomes for Embankments as described in the Delivery Plan, together with a description of how these aspirations have been incorporated in the design of the proposal.

The typical design treatment of embankments is illustrated in **Figure 22** and **Figure 23**.

*Table 3. Embankments treatment*

| Design parameter | Desired outcome as per Delivery Plan | Design response |
|---|---|---|
| Locations | On the approaches to bridges ST01 and ST02. | |
| Ecology | Mixed species based on White Cypress Pine Woodland | Mixed species based on White Cypress Pine Woodland, supplemented with species suited to harsh roadside conditions that are commercially readily available. |
| Tree canopy | Semi-ordered stands of mixed endemic eucalyptus species, located at the bottom of embankments in grids of 10-15 with gaps to allow filtered views across precinct.<br>Informal planting of White Cypress Pine (*Callitris glaucophylla*) | There were inconsistencies in the Delivery Plan in respect of tree species. The landscape design has adopted an approach that reflects the endemic Cypress Pine Woodland community. Tree planting will consist of White Cypress Pine (*Callitris glaucophylla*) in small groups along the base of the embankments on both sides of the road. |
| Understorey | Feature shrubs associated with White Cypress Pine Woodland and endemic grasses in bands | Native shrubs grasses and groundcovers based on the endemic Cypress Pine Woodland community. They are supplemented by species proven to perform well in modified landscapes and harsh roadside conditions - refer to **section 4.8** for more information on proposed species. |
| Irrigation | Non-irrigated. | |
| Drainage | Minimum 3m wide swales on both sides of Brolgan Road, vegetated with dryland grasses | Roadways drain to swales which have been sized and located to suit the hydraulic requirements - refer **section 4.5.1**.<br>Swales are landscaped where possible with native grasses and groundcovers to provide consistency within the road corridor. |

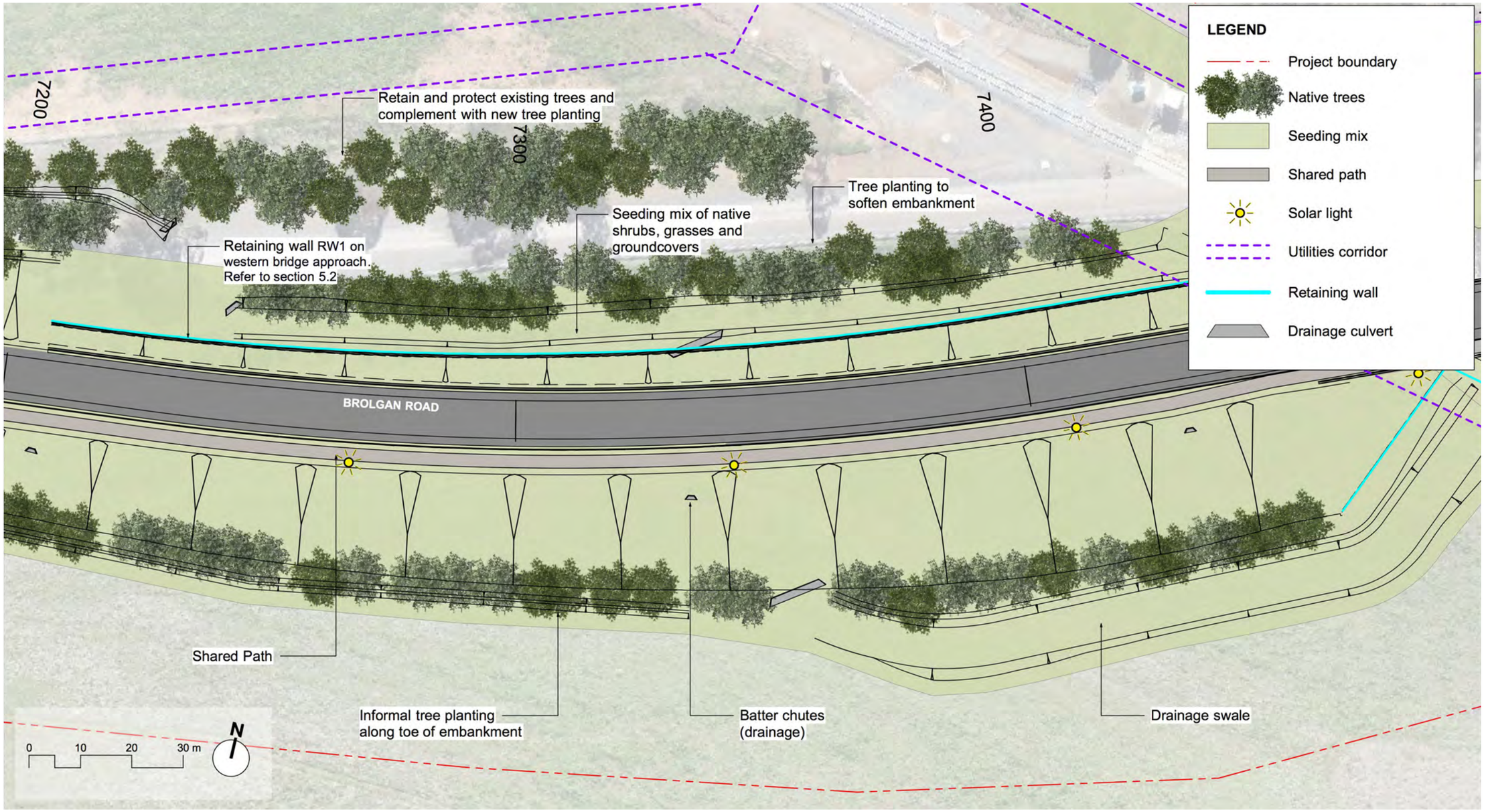



*Figure 22. Typical embankment treatment plan, shown on the western approach to Bridge ST02 over the Parkes to Narromine rail corridor*

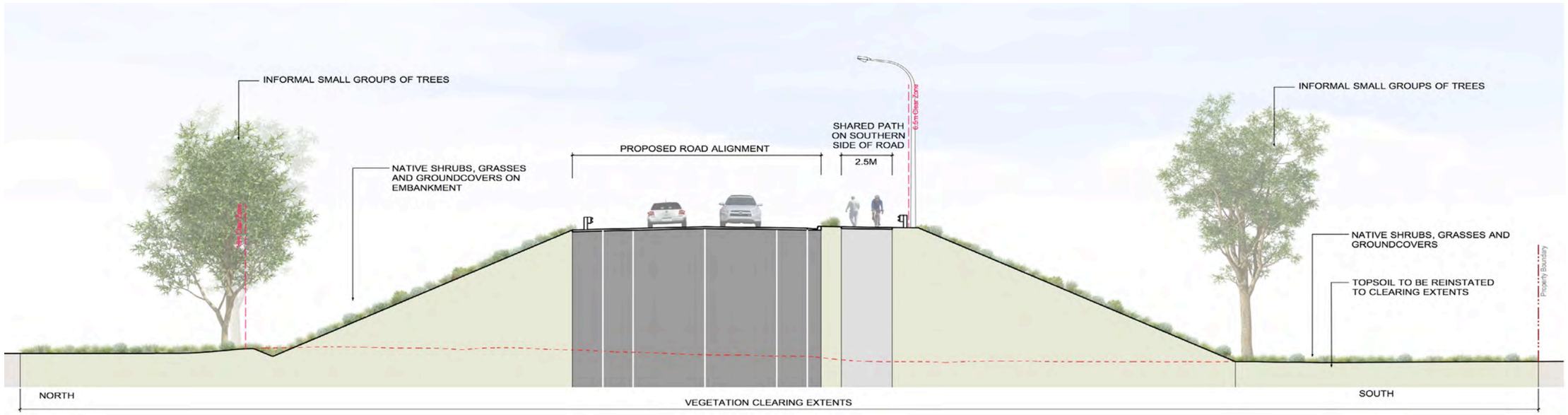



*Figure 23. Typical cross section of Embankments treatment, shown at station 7,200 on the western approach to Bridge ST02*

### 4.2.2. BOULEVARD

Boulevards will provide the highest quality streetscape finish within the Parkes SAP, with an emphasis on impact, experience and quality interfaces with the Commercial Gateway sub-precinct. Boulevards are intended as a formal treatment that will reinforce the precinct character while allowing adjoining land users to create formal landscaped entry thresholds as the precinct develops.

**Table 4** outlines the desired outcomes for Boulevards as described in the Delivery Plan, together with a description of how these aspirations have been incorporated in the design of the proposal.

The typical design treatment of Boulevards is illustrated in **Figure 24** to **Figure 26** and will be refined during detailed design, in consideration of other project requirements including utility design.

*Table 4. Boulevard treatment*

| Design parameter | Desired outcome as per Delivery Plan | Design response |
|---|---|---|
| Locations | On the approaches to the Primary Gateway, extending 100m in both directions along Brolgan Road from the end of the Primary Gateway treatment.<br>On the approaches to the Secondary Gateway, extending 100m in both directions along Brolgan Road from the end of the Secondary Gateway treatment.<br>Extending west for about 800m from the eastern proposal extent of works. | |
| Ecology | Mixed species based on Western Gray Box Tall Woodland | Mixed species based on Western Gray Box Tall Woodland, supplemented with species suited to harsh roadside conditions that are commercially readily available. |
| Tree canopy | Double avenue of staggered trees:<br>• Outer tree: endemic species such as Western Grey Box and Yellow Box<br>• Inner tree: stronger form trees such as River Red Gum (*Eucalyptus camaldulensis*), planted formally. | Tree planting with Western Gray Box Tall Woodland canopy species where possible (based on clear zones and utility constraints).<br>Tree species include Fuzzy Box (*Eucalyptus conica*), Grey Western Box (*Eucalyptus microcarpa*) and Yellow Box (*Eucalyptus melliodora*) - refer to **section 4.8** for more information on proposed species for landscaping.<br>Where space permits a more formalised double avenue, Fuzzy Box (*Eucalyptus conica*) is used as the inner tree species.<br>Trees are set out to provide shade to the shared path while allowing solar access to shared path solar lights and filtered views over the landscape. |
| | Deciduous feature trees at key locations. | Deciduous feature trees at key locations such as driveways, intersections stopping bays (approach side) and bends in the road alignment. These locations are indicative and will be refined during the detailed design in consultation with RGDC and PSC. |
| Understorey | Mixed species based on Western Gray Box Tall Woodland.<br>Feature landscape areas of native shrubs in formal arrangements and colourful feature ribbons. | Native grasses and groundcovers to reflect the Western Gray Box Tall Woodland ecological community, supplemented by species proven to perform well in modified landscapes and harsh roadside conditions.<br>A 1m strip of native feature shrub planting is provided between the shared path and the drainage. It will include the following typical species: 'Little John' Bottlebrush (*Callistemon viminalis 'Little John'*), Common Correa (*Correa reflexa*) and Rosemary Grevillea (*Grevillea rosmarinifolia*).<br>Refer to **section 4.8** for more information on proposed species. |
| Irrigation | General landscape areas: non-irrigated, with allowance for establishment irrigation.<br>No irrigation to outer trees.<br>Permanent irrigation to inner trees.<br>Formal areas of feature landscape located between the shared path and the channel (1m wide strip): permanently irrigated. | |
| Drainage | Minimum 3m wide swales on both sides of Brolgan Road, vegetated with dryland grasses | Roadways drain to swales which have been sized and located to suit the hydraulic requirements - refer **section 4.5.1**.<br>Swales are landscaped with native grasses and groundcovers to provide consistency within the road corridor. |
| Lighting | Intersections and junctions: regulatory street lighting<br>Shared path: solar lighting<br>Feature lighting within street furniture | As per Delivery Plan except for feature lighting within furniture.<br>Furniture installation is not included in the scope of the proposal. Furniture would be provided by RGDC in subsequent stages of Parkes SAP delivery.<br>Also refer to **section 5.5.1** for lighting. |
| Wayfinding signage | Wayfinding signage | Wayfinding signage is not included in the scope of the proposal. It would be provided by RGDC in subsequent stages of Parkes SAP delivery. |
| Furniture | Benches, shelters, etc | Furniture installation is not included in the scope of the proposal. Furniture would be provided by RGDC in subsequent stages of Parkes SAP delivery. |
| Rest stops | Rest stops associated with the shared path along the Boulevard. | The location and frequency of rest stops will be resolved by RGDC in consultation with PSC as part of the broader strategy of artworks and signage and are excluded from Enabling Works. |

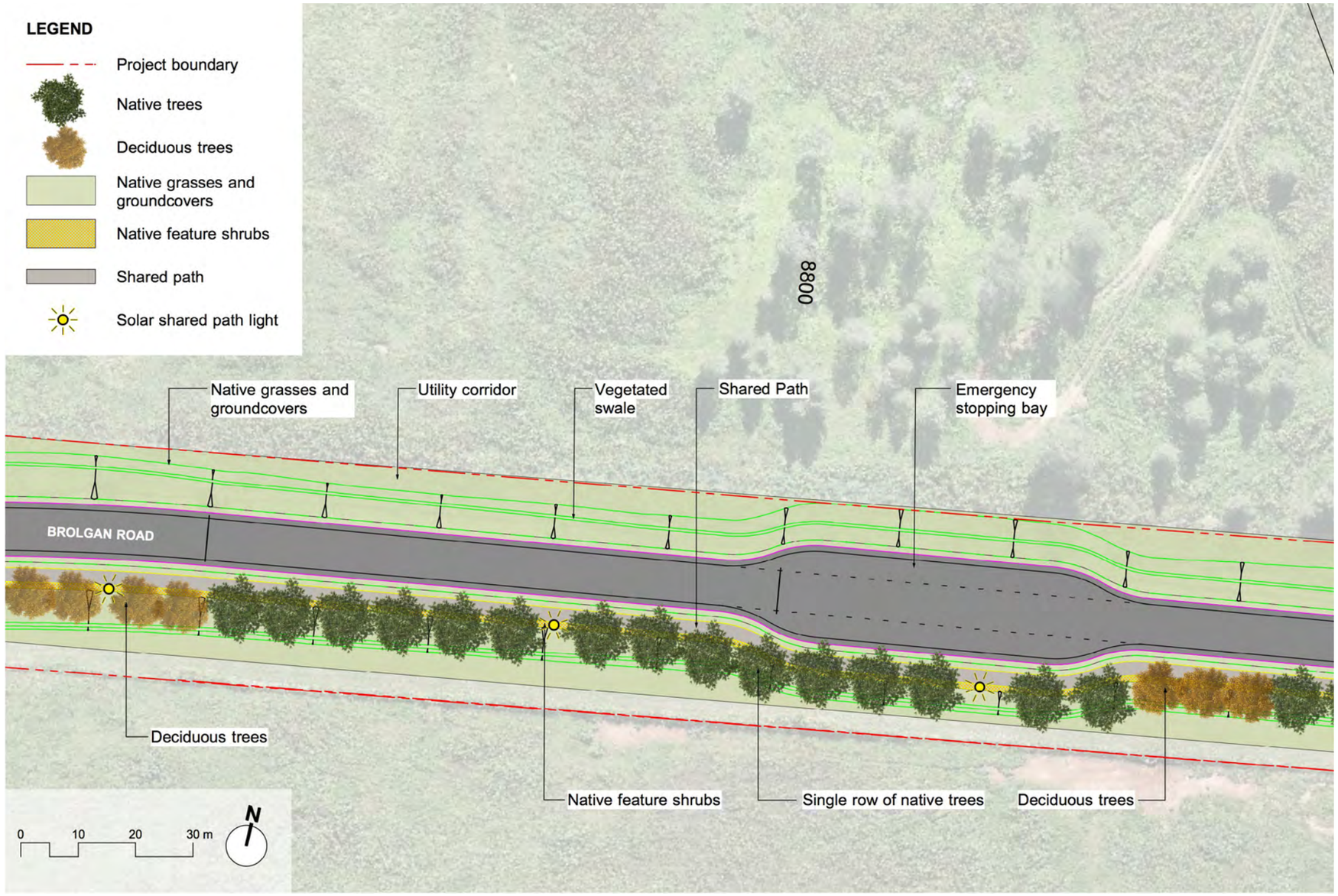



*Figure 24. Typical plan of Boulevard treatment, shown in Zone 4*

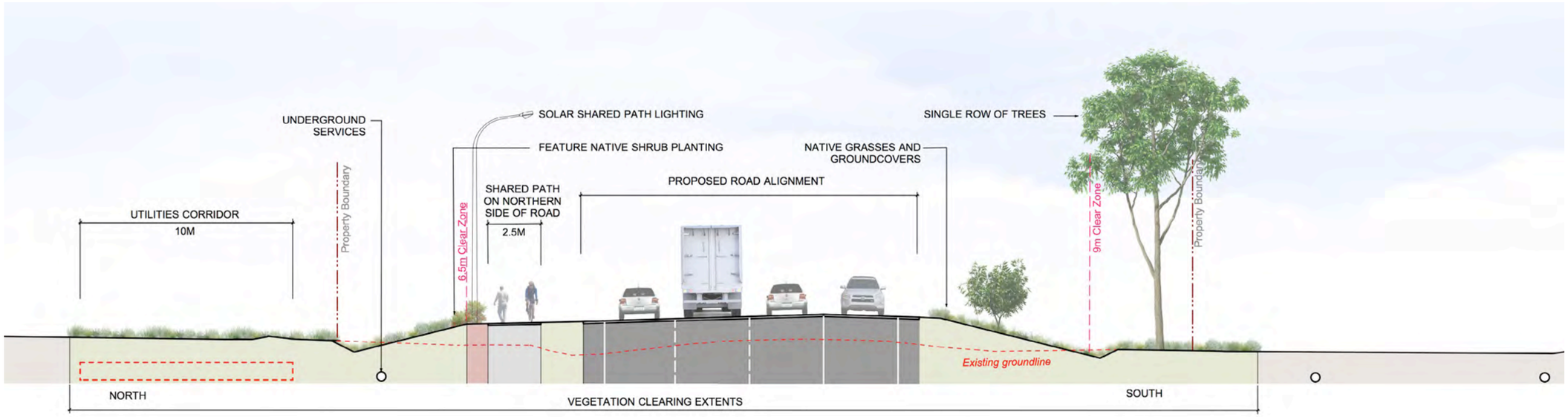



*Figure 25. Typical cross section of Boulevard treatment in Zone 2, shown at station 6,300*

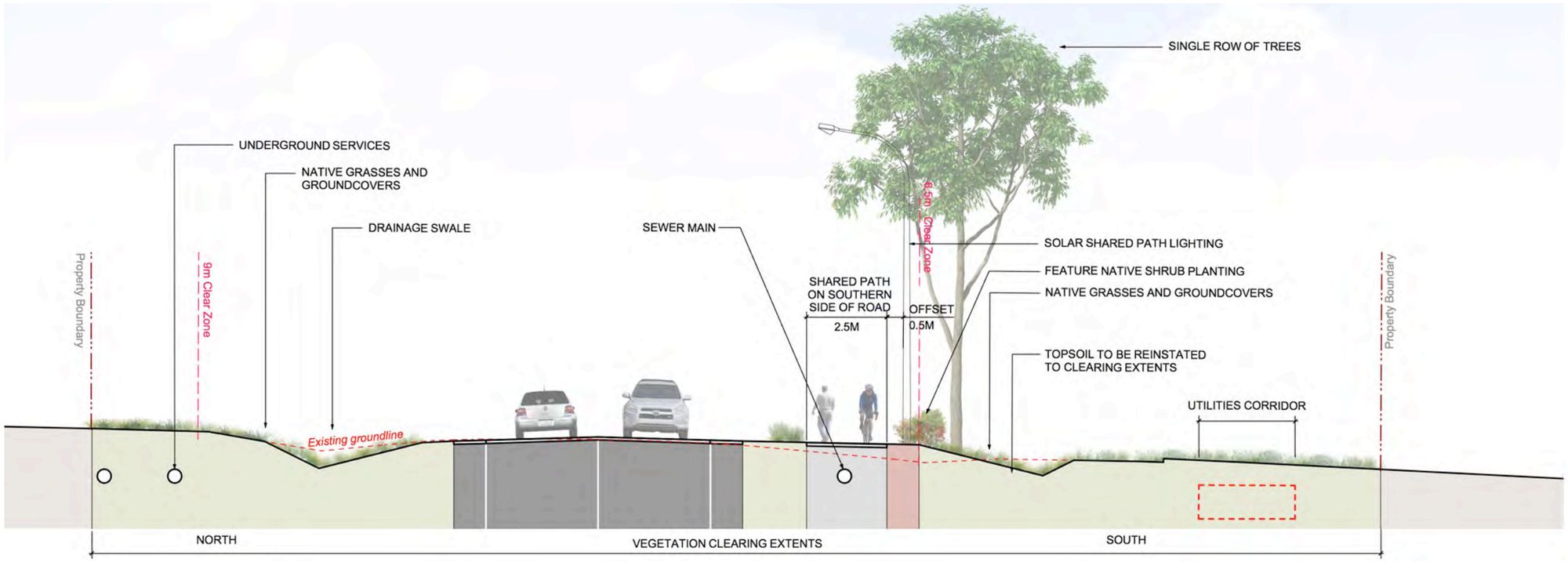



*Figure 26. Typical cross section of Boulevard treatment in Zone 4, shown at station 8,775*

It should be noted that landscaping opportunities vary along the length of Brolgan Road due to the variable constraints imposed by available corridor width, utilities and the clear zone, with the latter two both restricting tree planting. The following constitute descriptions of typical landscape outcomes that can be expected for Boulevard sections within each treatment zone:

**Zone 2 Boulevard**

- Tree canopy cover:
  - Varies: single line or double line (avenue) of trees on both sides of Brolgan Road.
- Understory:
  - Strip of native feature shrubs between the shared path and the drainage swale
  - Native grasses and groundcovers.

Refer to **Figure 25**.

**Zone 4 Boulevard**

- Tree canopy cover:
  - Northern side of Brolgan Road: single line of trees, planted in small groups
  - Southern side of Brolgan Road: varies: single line or double line (avenue) of trees.
- Understory:
  - Strip of native feature shrubs between the shared path and the drainage swale
  - Native grasses and groundcovers.

Refer to **Figure 24** and **Figure 26**.

### 4.2.3. PRIMARY GATEWAY

Primary Gateways define the Parkes SAP and are located at intersections and major entries. They create a defining and memorable experience into and out of the Parkes SAP. To support a strong first impression of the precinct they will be designed present with a structured and formal response.

The Primary Gateway within the proposal area is a large roundabout, required to enable large vehicles to navigate turns and access the precinct. The Primary Gateway concept is to create an immersive and concentrated design that expresses the character, cultural history and biodiversity of the Parkes area. This will include opportunities for artworks and design installation to connect to Country that will be installed by RGDC subsequent to completion of Enabling Works. Opportunities identified in the Delivery Plan include:

- Feature pavement patterns within the splitter islands which reflect local Aboriginal emblems and artwork
- Public artwork to centre of roundabout
- Signage and wayfinding including shared path to incorporate themes of Wiradjuri design.

**Table 5** outlines the desired outcomes for the Primary Gateway as described in the Delivery Plan, together with a description of how these aspirations have been incorporated in the design of the proposal.

The design treatment of the Primary Gateway is illustrated in **Figure 27** to **Figure 28**. For more information on threshold treatments on the approach to the Gateway including feature walls and paving, refer to **section 5.4.1**.

*Table 5. Primary Gateway treatments*

| Design parameter | Desired outcome as per Delivery Plan | Design response |
|---|---|---|
| Locations | Intersection of Brolgan Road and New Coopers Road | |
| Ecology | Mixed species based on Western Gray Box Tall Woodland | Mixed species based on Western Gray Box Tall Woodland, supplemented with species suited to harsh roadside conditions that are commercially readily available. |
| Tree canopy | Roundabout surround: large mature trees for immediate impact consisting of River Red Gum (*Eucalyptus camaldulensis*) and deciduous species in formal rows to provide seasonal colour.<br>No trees inside roundabout. | Tree planting is provided in areas where possible subject to clear zone requirements and utilities. Planting will provide a formal treatment utilising native species as well as feature deciduous trees surrounding the roundabout.<br>Roundabout surround:<br>• Inner trees: formal planting of Autumn Blaze Maple (*Acer x freemanii 'Jeffersred'*) to provide seasonal colour<br>• Outer trees: large mature River Red Gum (*Eucalyptus camaldulensis*) and Grey Western Box (*Eucalyptus microcarpa*).<br>Roundabout approaches: mature Grey Western Box (*Eucalyptus microcarpa*) and Fuzzy Box (*Eucalyptus conica*). |
| Understorey | Surrounding the roundabout: mixed species based on Western Gray Box Tall Woodland. Ranging from dryland grasslands to formalised gardens in high traffic areas.<br>Centre of roundabout: native grasses in formal arrangement. | Centre of roundabout: swathes of native grasses alternating with different colour bands of compacted granite gravel.<br>Roundabout surround: bands of native grasses, rambling native groundcovers up to 500mm tall and native feature shrubs.<br>Refer to **section 4.8** for more information on proposed species. |

| Design parameter | Desired outcome as per Delivery Plan | Design response |
|---|---|---|
| Irrigation | Roundabout: either permanent irrigation or establishment irrigation.<br>Surrounds: non-irrigated. | Establishment irrigation to the centre of the roundabout.<br>Surrounds: consistent with adjoining 'Boulevard' treatment - refer to **section 4.2.2**. |
| Drainage | Minimum 3m wide swales on both sides of Brolgan Road, vegetated with dryland grasses | Roadways drain to swales which have been sized and located to suit the hydraulic requirements - refer **section 4.5.1**.<br>Swales are landscaped with native grasses and groundcovers to provide consistency within the road corridor. |
| Lighting | Intersections and junctions: regulatory street lighting<br>Shared path: solar lighting<br>Feature lighting within street furniture | As per Delivery Plan except for feature lighting within furniture.<br>Furniture installation is not included in the scope of the proposal. Furniture would be provided by RGDC in subsequent stages of Parkes SAP delivery.<br>Also refer to **section 5.5.1** for lighting. |
| Gabion walls | Integrated gabion walling and seat on the roundabout approaches | Gabion walls act as feature walls to provide a threshold treatment on the approach to the roundabout.<br>Refer to **section 5.5.2**. |
| Sculptures, entry statements, furniture and artworks | Elements such as totem poles, pavement patterning, feature bollards, feature shelter and other sculptures | These elements are not included in the scope of the proposal. They would be provided by RGDC in consultation with PSC during subsequent stages of Parkes SAP delivery. |

*Figure 27. Artist impression showing the Primary Gateway (Note: potential totem pole artwork to be installed by RGDC subsequent to completion of Enabling Works)*


*Figure 28. Plan showing Primary Gateway treatment*

### 4.2.4. SECONDARY GATEWAY

Secondary Gateways are located at key junctions where they create a threshold for turning as well as for orientation. A structured and formal design will help define and establish an identity for the precinct. The Secondary Gateway within the proposal area will provide a four-way intersection including the major entry into Pioneer Flat located immediately north-east of the Gateway.

**Table 6** outlines the desired outcomes for the Primary Gateway as described in the Delivery Plan, together with a description of how these aspirations have been incorporated in the design of the proposal.

The design treatment of the Secondary Gateway is illustrated in **Figure 29**. For more information on threshold treatments on the approach to the Gateway including feature walls and paving, refer to **section 5.4.1**.

*Table 6. Secondary Gateway treatment*

| Design parameter | Desired outcome as per Delivery Plan | Design response |
|---|---|---|
| Locations | Intersection of Brolgan Road and an unnamed local road providing access to Pioneer Park environmental area, located at station 6,400 approximately. The treatment extends from the centre of the intersection for 100m to the west, for 80m to the east, for 54m to the north and 54m to the south. | |
| Ecology | Mixed species based on Western Gray Box Tall Woodland | Mixed species based on Western Gray Box Tall Woodland, supplemented with species suited to harsh roadside conditions that are commercially readily available. |
| Tree canopy | Outer avenue of Western Gray Box (*Eucalyptus microcarpa*) and an inner avenue of smaller deciduous trees. | Tree planting is provided in areas where possible subject to clear zone requirements and utilities. Planting to be provide a formal treatment utilising native species as well as feature deciduous trees surrounding the intersection.<br>Intersection feature trees: formal planting of Autumn Blaze Maple (*Acer x freemanii 'Jeffersred'*) to provide seasonal colour<br>Intersection approach trees consistent with Parkway treatment: large mature River Red Gum (*Eucalyptus camaldulensis*) and Grey Western Box (*Eucalyptus microcarpa*). |
| Understorey | Feature shrubs and grasses provide a layered effect around the intersection. | Bands of native grasses, rambling native groundcovers up to 500mm tall and native feature shrubs. Refer to **section 4.8** for more information on proposed species. |
| Irrigation | Not specified | Consistent with adjoining 'Boulevard' treatment - refer to **section 4.2.2**. |
| Lighting | Intersections and junctions: regulatory street lighting.<br>Shared path: solar lighting. | As per Delivery Plan. Also refer to **section 5.5.1** for lighting. |
| Gabion walls | Feature gabion walls around the intersection, arranged amongst planting layers. | Gabion walls act as feature walls to provide a threshold treatment on the approach to the roundabout.<br>Refer to **section 5.5.2**. |
| Sculptures, entry statements, furniture and artworks | Elements such as grassland patterning, feature bollards, feature shelter and other sculptures | These elements are not included in the scope of the proposal. They would be provided by RGDC in consultation with PSC during subsequent stages of Parkes SAP delivery. |

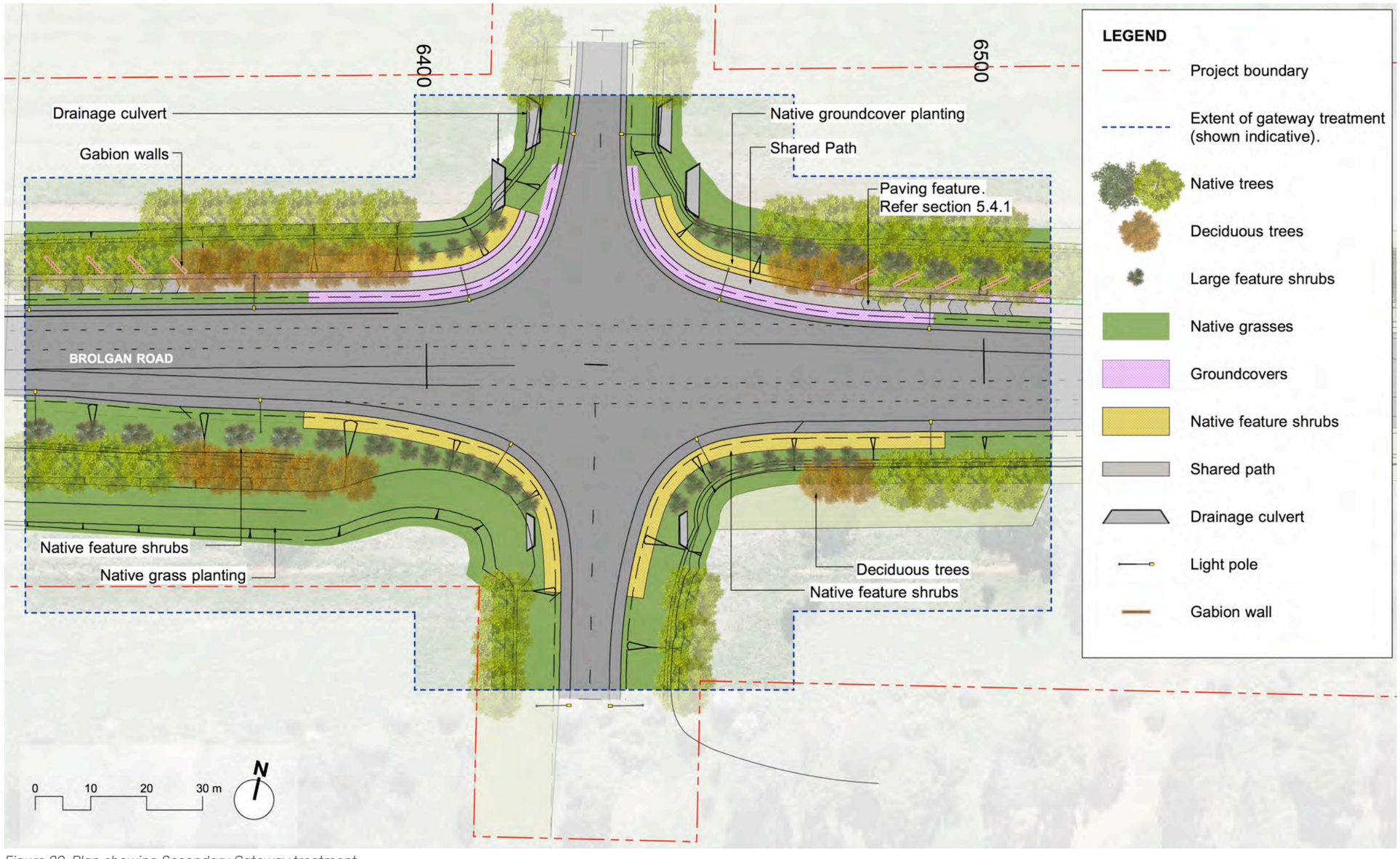



*Figure 29. Plan showing Secondary Gateway treatment*

## 4.3 ZONE 3 TREATMENTS

Zone 3 is located around the Parkes to Narromine rail corridor. It is comprised of:

- Parkway treatment (**section 4.1.1**)
- Eastern bridge ST02 (**section 5.1.2**) and associated retaining wall
- Embankments treatment associated with Bridge ST02 (**section 4.2.1**).

## 4.4 ZONE 4 TREATMENTS

Zone 4 is located at the eastern end of Brolgan Road, between the Parkes to Narromine rail corridor and about one kilometre west of Hartigan Avenue. Zone 4 comprises of the following design treatments:

- Boulevard treatment (**section 4.2.2**)
- Parkway treatment (**section 4.1.1**).

## 4.5 OTHER TREATMENTS

### 4.5.1. DRAINAGE

A number of major drainage structures and detention basins are required to achieve the desired level of flood immunity along Brolgan Road. Drainage works include:

- Cross drainage will be provided by a series of culverts and pipes that connect to natural drainage lines
- Longitudinal drainage will be managed via a series of open drainage swales collecting road runoff
- Five detention basins will temporarily store flood waters for controlled release.

Where possible based on hydraulic constraints and requirements, open swales will be landscaped to fully integrate with the landscape treatments through which they pass. To this end, landscaped swales have been designed with batter slopes that can be successfully vegetated. Batter slopes are generally 4h:1v towards the road formation and 2h:1v towards the outside of the road corridor. The design of swale profiles has also considered earthworks design constraints and requirements - refer **section 4.9**.

Drains required to be constructed of concrete for hydraulic performance or due to the risk of scour, would be integrally coloured in locations where they would be potentially highly visible. Integral oxide colouring will minimise the risk of drains becoming visually intrusive elements in the landscape. A visibility assessment has been carried out during detailed design to determine potential locations where drains should be coloured.

Consistent with the *Landscape design guideline* (Roads and Maritime Services 2018), detention basin design will maximise a natural rounded shape and form where possible based on land constraints and other requirements including clear zones.

### 4.5.2. UTILITY INFRASTRUCTURE WORKS

The proposal includes the provision of essential infrastructure and services that will enable precinct development. The major utility infrastructure elements delivered as part of the proposal are:

1) Wastewater Treatment Plant
2) Sewerage pumping stations (SPS1 and SPS2)
3) Potable water reservoir
4) Zone substation.

**Figure 31** shows the indicative locations of these elements. The following provides a brief summary of the main features associated with utility infrastructure. Locations, detailed design configurations and component elements will continue to be refined throughout the detailed design, in consultation with utility providers.

**Wastewater Treatment Plant**

The Wastewater Treatment Plant (WWTP) is proposed to be located some 1.5km south along Coopers Road, outside the main utility corridor along Brolgan Road. Access will be directly from Coopers Road via a driveway. Coopers Road may be accessed initially via Brolgan Road but ultimately via the south from Brolgan Road.

The WWTP will encompass the Stage 1 plant. The ultimate stage WWTP would have a capacity of 8 ML/day, with site dimensions confirmed at a later design stage.

The plant includes HDPE lined in-ground storage basins, a vendor packaged Waste Water Treatment Plant (WWTP) unit, administration building, four-space car park and an electrical switchroom. The plant site would also host above ground storage tanks, including a recycled water tank. Additionally, a skid-mounted recycled water pumping station is also located within the WWTP.

**Sewerage pumping stations (SPS1 and SPS2)**

The sewer reticulation design works comprise two gravity trunk sewers, two sewage pumping stations (SPSs), two pressure mains, as well as associated works.

Aside from the sewerage pumping stations SPS1 and SPS2, the majority of the remaining sewerage reticulation scope of works are underground. Any ground disturbed by sewerage reticulation works would be made good by restoration to its current condition.

### Potable water reservoir

The proposed potable water reservoir has a storage capacity of 3.5 ML, and is accompanied by associated infrastructure including site pipework, site drainage, instrumentation, controls and telemetry, access to reservoir (site roads only) and site fencing.

The potable water reservoir is proposed to be a bolted panel tank with a suitable internal and external coating. The location is a high point within Lot 1 DP1036122 near the southern tree line. The site is on a mild slope, approximate ground level in the range of 332–344m above sea level. The final location of the reservoir is being refined in consideration of the functional requirements and in order to avoid potential impacts on native vegetation

### Zone substation

The zone substation comprises a new 132/33/11kV electrical substation for the Parkes SAP. It is noted that Essential Energy has not commenced the design for this substation and the specifications provided below are indicative only. Further coordination in regards to the zone substation will be undertaken with Essential Energy.

### Infrastructure form and dimensions

**Table 7** below summarises the indicative size and structure details of the key utilities infrastructure described in the preceding sections. As noted above, these will continue to be refined throughout the detailed design in consultation with the ultimate utility owners. It should be noted that any associated fencing types are yet to be determined. In doing so, consideration will be given to the SWTC, PSC standards as well as Safety in Design.

*Table 7. Indicative details of utilities infrastructure*

| Description | Approximate site fencing dimensions | Indicative above ground structures | Indicative below ground structures |
|---|---|---|---|
| UT-04: SEWAGE TREATMENT PLANT | | | |
| Wastewater Treatment Plant (WWTP) | Up to 200m x 200m (pending final design) | Single storey structures and miscellaneous containerised equipment | Potentially multiple open surface-level storage basins, minor sumps, pump wells etc. |


*Figure 30. Locations of drainage basins*

| Description | Approximate site fencing dimensions | Indicative above ground structures | Indicative below ground structures |
|---|---|---|---|
| UT-05: Sewerage Reticulation | | | |
| Sewerage Pump Station 1 (SPS1) | 80m x 50m | Vent stack and single storey electrical switch room; concrete hardstand and gravel access road; stormwater drainage including rock and grass lined swales, inlet pits and rip rap outlets | Emergency storage tank, emergency bypass pump, pump station wet well and valve chamber, emergency gas relief check pit. Underground pipe connections including discharge pipe connecting to road drainage swales |
| Sewerage Pump Station 2 (SPS2) | 70m x 30m | Vent stack and single storey electrical switch room; concrete hardstand and gravel access road; rock and grass lined swales | Emergency storage tanks, emergency bypass pump, pump station wet well and valve chamber, emergency gas relief check pit. Underground pipe connections including discharge pipe connecting to road drainage swales |
| UT-06: Potable Water Reservoir | | | |
| 3.5ML potable water storage reservoir, including space provision for an additional 30ML potable water reservoir, and 1ML recycled water reservoir. | 50m x 50m | Painted steel tank (27m diameter and 7m height), steel handrails along tank, single storey containerised chlorination unit | - |
| UT-10: Zone Substation | | | |
| 132/33/11kV Zone Substation | Approximate site fencing dimensions: 70m x 85m | Concrete building exterior | - |

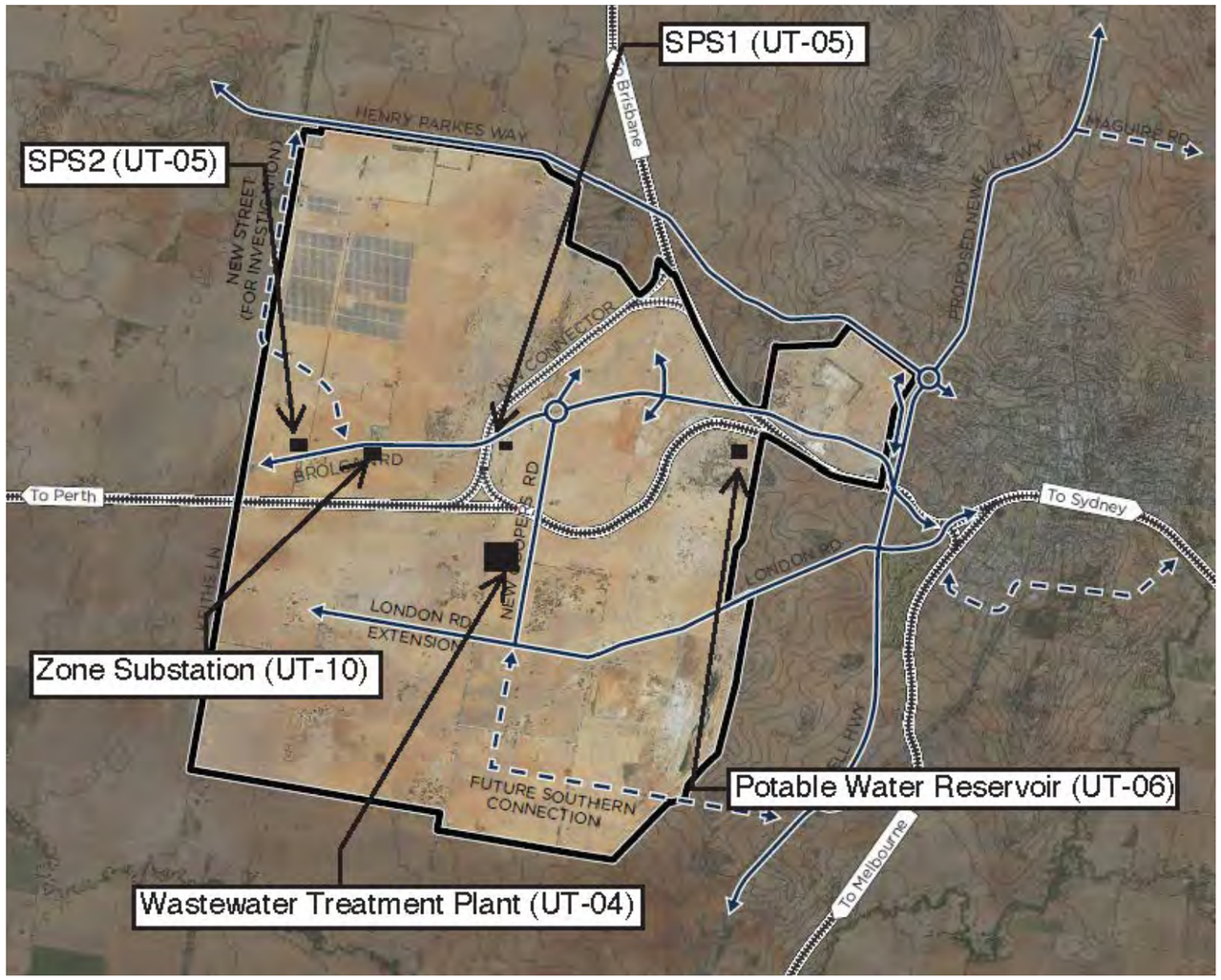



*Figure 31. Indicative locations of enabling utility infrastructure*

## 4.6 RETENTION OF EXISTING VEGETATION

Due to the functional requirements for the proposal and the need to meet land manager's requirements for weed management, clearing of vegetation would be required along Brolgan Road.

The design has sought to maximise the retention of existing vegetation to minimise disturbance, protect biodiversity values and contribute to an immediate established landscape. Accordingly, clearing would be limited to areas within the proposal boundary and clearing limits have been documented to minimise impacts on environmentally sensitive areas.

Key factors and constraints limiting the retention of existing vegetation within the proposal area include:

- The functional requirements of road geometry, drainage and flood immunity
- The need to remove high threat and priority environmental weeds under the *Biosecurity Act 2015*
- The need for utility adjustments and new utility installations enabling precinct development, including establishment of utility corridors for additional utility installations when required in the future
- The need to maintain Brolgan Road open to traffic while the upgrade is being constructed, necessitating a temporary roadway duplication in parts of the corridor during construction.

As a result, clearing would be required along much of the length of Brolgan Road within the proposal area. The extent of clearing is being determined as part of the detailed fencing design package - refer to design lot PSAP-FE-01 which includes detailed plans showing areas of existing vegetation able to be retained. As highlighted in **section 2.1.4**, vegetation clearing is deemed unlikely to result in significant biodiversity impacts.

Any vegetation not requiring clearing for road construction, utility works or other aspects of the proposal would be retained and protected within the landscape design.

## 4.7 PLANTING DESIGN

The approach to the planting design has been to support the aspirations of the Delivery Plan in terms of establishing a unique and high quality identity for the Parkes SAP through the application of the design principles and treatments. In addition, the design recognises the unique climate and growing conditions of the Parkes area. Maximising the degree to which the landscape is self-sustaining will contribute to the success of the precinct to create a high quality character while reducing the ongoing maintenance burden.

**Climate appropriate planting**

Plant selection has focused on resilience and suitability for the tough climatic and growing conditions of the site which are characterised by an open and exposed environment with extreme seasonal variations of both temperature and water availability. The species list adopted for the proposal has been developed based on the reference species listed in the Delivery Plan. Further refinement is taking place throughout the detailed design phase and in consultation with PSC.

### 4.7.1. SEEDING

Seeding will be the primary vegetation technique for the proposal. It will be used to revegetate non-planted vegetated areas of the works, including cut and fill batters, verges, medians and other unsealed areas which are not easily accessible for planting and maintenance work. The seed mix will include indigenous non-invasive grass and cover crop species to minimise establishment time and provide adequate protection against erosion. Seed mixes would be applied at a minimum rate of 10 kg of native seed per hectare, plus cover crop.

The proposal includes a number of seed mixes that vary in their composition to include ground covers, native grasses, shrubs and trees in a ratio designed to reflect the adjoining landscapes through which Brolgan Road passes. Tall shrub and tree species are omitted from seed mixes in areas where open views are to be retained - refer to **section 4.8.2** for the proposed seed mixes.

**Seeding application techniques**

Seeding application techniques vary along the length of the proposal and have been selected consistent with the *Guideline for Batter Surface Stabilisation using vegetation* (TfNSW 2015), to ensure appropriate batter stabilisation and erosion protection while maximising establishment success. The following application techniques are proposed:

- General landscape areas on areas with slopes less than 2h:1v: hydro-seeding
- Landscaped drainage swales (slopes vary 2h:1v and 4h:1v): hydromulch with organic fibre mesh
- Embankments with slopes of 2h:1v: hydro-mulching with bonded fibre matrix. Alternatively, a compost blanket application may be used.

The preferred treatment/application types will be agreed in consultation with PSC.

### 4.7.2. INSTALLATION SIZES FOR PLANTING

Planting will be used to install trees, shrubs and ground covers at intersections (the Primary and Secondary gateway) in order to realise early landscape and visual effect upon completion of the construction works.

Consistent with the Delivery Plan, plant material will be installed at a variety of container sizes to balance the desire for immediate impact and cost. The following typical container sizes will be used for proposal planting works:

- Key locations such as the Primary and Secondary Gateway and the eastern end of Brolgan Road:
  - Trees: 100 litre (mature) trees
  - Shrubs and grasses: tubestock.
- Boulevard areas:
  - Trees: 25 litre (semi-mature–) trees
  - Shrubs: tubestock for feature planting, otherwise seeding
  - Grasses: tubestock for feature planting, otherwise seeding.
- Parkway and Embankment areas:
  - Trees: 25 litre (semi-mature–) trees.

### 4.7.3. PLANTING DENSITIES

**Tree spacing**

Tree spacing reflects the context and character of the landscape, in accordance with the landscape treatment types described in **section 4.1** to **section 4.4**. Tree setout has further considered the functional and safety constraints associated with the upgrade of Brolgan Road. Major constraints to tree planting include:

- Existing and relocated utilities (within and outside of easements/ dedicated utility corridors)
- Dedicated utility corridors for placement of new and relocated utilities both during the proposal at during future stages of precinct delivery
- Clear zones are determined by the *Austroads Guide to Road Design Part 6 Table 4.1* and the *Landscape design guideline* (RMS 2018). Factors influencing the width of the clear zone include design speed and roadside embankment slopes. Based on the requirements, the clear zone along Brolgan Road varies from generally 6.5 metres up to nine metres in some locations. All roadside furniture and landscaping in the clear zone must be frangible (break easily on impact), unless protected with a safety barrier.

In unconstrained areas, tree planting has been maximised as appropriate to realise the desired future effect outlined in the Delivery Plan. Consistent with the requirements of the SWTC, the following tree spacings were adopted in these areas:

- Key locations such as the Primary and Secondary Gateway and the eastern end of Brolgan Road: 1 tree per 36m$^2$
- Boulevards, Parkways and Embankments: Tree spacing no greater than 10 metres.

Spacing has been varied locally within these parameters to create open areas between small groupings of trees, providing for views to respond to the landscape character.

**Shrubs and groundcovers**

Where shrubs and groundcovers will be planted, they will be installed at the following container sizes and densities:

- Key locations such as the Primary and Secondary Gateway and the eastern end of Brolgan Road:
  - Grasses: 4 to 7 per square metre (tubestock, depending on species)
  - Shrubs: 3-4 per square metre (tubestock)
  - Grasses: 2 – 4 per square metre (tubestock)
- Boulevard areas:
  - Shrubs: 2 per square metre
- All other areas:
  - Grasses: 2 – 4 per square metre (tubestock depending on species)
  - Shrubs: 1 – 3 per square metre (tubestock depending on species).

### 4.7.4. VISUAL SCREENING REQUIREMENTS;

An analysis of adjoining land uses was carried out. This found that there was no requirement for the provision of visual buffers or visual screening within the scope of the proposal.

Visual screening may be required for certain developments within the precinct and would be determined for each proposed development. Screen planting, if deemed required, would need to be installed within adjoining properties outside the scope of Enabling Works, considering the principles outlined in the Delivery Plan and Structure Plan.

### 4.7.5. IRRIGATION

Establishment and permanent irrigation is being provided consistent with the landscape treatments described in **section 4.1** to **section 4.4** and will comprise of an automatic irrigation system.

## 4.8 PROPOSED SPECIES

The following plant schedules and seed mixes provide an initial indication of the vegetation species that will be used in the works. Species have been selected based on the following guidance and criteria:

- The Delivery Plan
- The detailed landscape designs for the Newell High Parkes Bypass
- The *Landscape design guideline* (Roads and Maritime 2018)
- TfNSW D+C specifications R178 and R179
- Commercial availability
- Suitability to the tough climatic and roadside conditions
- Consultation with PSC.

The nominated selections are preliminary and will be finalised through the detailed landscape design in consultation with key stakeholders.

### 4.8.1. PLANTED VEGETATION

**Native shrubs and groundcover mixes**

There are a number of planting mixes for native shrubs and groundcovers including grasses. They are:

- Planting mix PM1 - native feature shrub mix (**Table 8**)
- Planting mix PM2 - feature native groundcover mix (**Table 9**)
- Planting mix PM3 - roadside native grass mix (**Table 10**).

*Table 8. Planting mix PM1 - native feature shrub mix*

| Botanical name | Common name |
|---|---|
| *Callistemon viminalis 'Little John'* | Callistemon 'Little John' |
| *Correa reflexa* | Common Correa |
| *Eriostemon myoporoides* | Long-leaf Waxflower |
| *Grevillea rosmarinifolia* | Rosemary Grevillea |

*Table 9. Planting mix PM2 - feature native groundcover mix*

| Botanical name | Common name |
|---|---|
| *Hardenbergia violacea 'Meema'* | Hardenbergia 'Meema' |
| *Grevillea juniperina* | Juniper-leaf Grevillea |
| *Helichrysum ramosissimum* | Yellow Buttons |
| *Myoporum parvifolium* | Creeping Boobialla |

*Table 10. Planting mix PM3 - roadside native grass mix*

| Botanical name | Common name |
|---|---|
| *Anigozanthos sp.* | Kangaroo Paws |
| *Carex inversa* | Knob Sedge |
| *Dianella caerulea* | Flax Lily |
| *Lomandra longifolia* | Spiny-headed mat-rush |
| *Poa labillardieri* | Tussock Grass |
| *Themeda triandra (syn Themeda australis)* | Kangaroo Grass |

**Tree species**

**Table 11** lists the tree species that will be used for the proposal, including the intended planting location/s.

*Table 11. Tree species*

| Botanical name | Common name | Planting location/s |
|---|---|---|
| *Acer x freemanii "Jeffersred"* | 'Jeffersred' Maple | • Primary Gateway surrounds |
| *Acer negundo 'Elsrijk'* | 'Elsrijk' Maple | • Boulevard<br>• Parkway |
| *Brachychiton populneus* | Kurrajong | • Boulevard<br>• Parkway |
| *Callitris glaucophylla* | White Cypress Pine | • Primary Gateway surrounds |
| *Eucalyptus conica* | Fuzzy Box | • Primary Gateway approaches<br>• Boulevard<br>• Parkway |
| *Eucalyptus melliodora* | Yellow Box | • Boulevard<br>• Parkway |
| *Eucalyptus microcarpa* | Grey Western Box | • Primary Gateway surrounds<br>• Primary Gateway approaches<br>• Secondary Gateway surrounds<br>• Boulevard<br>• Parkway |
| *Jacaranda mimosifolia* | Jacaranda | • Boulevard<br>• Parkway |
| *Lagerstroemia indica x L. fauriei "Natchez"* | 'Natchez' Crepe Myrtle | • Secondary Gateway surrounds |
| *Zelkova serrata "Schmidtlow"* | Wireless Zelkova | • Boulevard<br>• Parkway |

In areas where site constraints restrict tree planting, a number of larger shrub species are proposed to provide a three-dimensional effect. They are listed in **Table 12**:

*Table 12. Supplementary shrub species for constrained areas*

| Botanical name | Common name | Planting location/s |
|---|---|---|
| *Acacia buxifolia* | Box-leaf Wattle | • Primary Gateway surrounds and approaches<br>• Secondary Gateway surrounds and approaches |
| *Acacia cardiophylla* | Wyalong Wattle | • Primary Gateway surrounds and approaches<br>• Secondary Gateway surrounds and approaches |
| *Acacia cultriformis* | Golden Glow | • Primary Gateway surrounds and approaches<br>• Secondary Gateway surrounds and approaches |
| *Cassia eremophila* | Desert Cassia | • Primary Gateway surrounds and approaches<br>• Secondary Gateway surrounds and approaches |

### 4.8.2. SEED MIXES

A number of different seed mixes are proposed to be used. They respond to the functional requirements, safety, maintability and biological diversity. The final composition of seed mixes will be refined through the detailed landscape design. Indicative proposed seed mixes are:

- Seed mixes for use on the road formation (cut batters and fill embankments):
  - Fuzzy Box Woodland native shrub and grass mix (**Table 14**)
  - Western Gray Box Tall Grassy Woodland native shrubs, grasses and groundcovers (**Table 15**).
- Seed mixes for use on embankments on the bridge approaches:
  - White Cypress Pine Woodland native shrubs, grasses and groundcovers (**Table 16**)
  - White Cypress Pine Woodland native trees, shrubs, grasses and groundcovers (**Table 17**).
- Seed mixes for use in utility easements:
  - Fuzzy Box Woodland native grasses (**Table 18**)
  - Western Gray Box Tall Grassy Woodland native grasses and groundcovers (**Table 19**).

- Seed mixes integrating native tree species for use beyond the road formation to maximise canopy cover and enhance biological diversity:
  - Fuzzy Box Woodland native trees, shrubs and grasses ()
  - Western Gray Box Tall Grassy Woodland native trees, shrubs, grasses and groundcovers ().

All mixes will comprise of native seed plus cover crops to ensure quick establishment and protection against erosion. The cover crop used will vary in accordance with the seasons (**Table 13**).

*Table 13. Cover crop composition - all seed mixes*

| COVER CROP | |
|---|---|
| Species | Season |
| Japanese Millet | Sept to March (summer) |
| Coolibah Oats | April to August (winter) |
| Eclipse/Crusader Rye, Red Clover/ Red Hamua, Couch, Forage Sorghums | All year |

*Table 14. Fuzzy Box Woodland native shrub and grass mix*

| Botanical name | Common name |
|---|---|
| NATIVE GRASSES | |
| *Enteropogon acicularis* | Windmill Grass |
| *Rytidosperma richardsonii* | Straw Wallaby Grass |
| *Solanum esuriale* | Quena |
| NATIVE SHRUBS | |
| *Acacia deanei* | Green Wattle |
| *Maireana enchylaenoides* | Wingless Bluebush |
| *Maireana microphylla* | Small–leaved Blue Bush |
| *Salsola australis* | Tumbleweed |
| *Sclerolaena muricata* | Black Rolypoly |

*Table 15. Western Gray Box Tall Grassy Woodland native shrubs, grasses and groundcovers*

| Botanical name | Common name |
|---|---|
| NATIVE GRASSES AND GROUNDCOVER | |
| *Austrostipa scabra subsp scabra* | Rough Spear Grass |
| *Bothriochloa macra* | Redgrass |
| *Carex inversa* | Knob Sedge |
| *Einadia nutans subsp nutans* | Climbing Saltbush |
| *Enteropogon acicularis* | Windmill Grass |
| *Lomandra filiformis subsp filiformis* | Wattle Mat-rush |
| *Maireana enchylaenoides* | Wingless Bluebush |
| *Paspalidium constrictum* | Knottybutt Grass |
| *Rytidosperma caespitosum* | Ringed Wallaby Grass |
| *Sida corrugata* | Corrugated Sida |
| *Solanum esuriale* | Quena |
| NATIVE SHRUBS | |
| *Maireana microphylla* | Small–leaved Blue Bush |
| *Salsola australis* | Tumbleweed |
| *Sclerolaena muricata* | Black Rolypoly |

*Table 16. White Cypress Pine Woodland native shrubs, grasses and groundcovers*

| Botanical name | Common name |
|---|---|
| NATIVE SHRUBS | |
| *Sclerolaena birchii* | Galvanised Burr |
| NATIVE GRASSES AND GROUNDCOVER | |
| *Austrostipa scabra subsp scabra* | Spear Grass |
| *Digitaria divaricatissima* | Umbrella Grass |
| *Dysphania pumilio* | Small Crumbweed |
| *Einadia nutans subsp nutans* | Climbing Saltbush |
| *Enteropogon acicularis* | Windmill Grass |
| *Sida corrugata* | Corrugated Sida |
| *Solanum esuriale* | Quena |

*Table 17. White Cypress Pine Woodland native trees, shrubs, grasses and groundcovers*

| Botanical name | Common name |
|---|---|
| NATIVE TREES | |
| *Allocasuarina luehmannii* | Bull Oak |
| *Callitris glaucophylla* | White Cypress Pine |
| *Eucalyptus melliodora* | Yellow Box |
| *Eucalyptus microcarpa* | Inland Grey Box |
| *Eucalyptus populnea subsp bimbil* | Poplar Box |
| NATIVE SHRUBS | |
| *Sclerolaena birchii* | Galvanised Burr |
| NATIVE GRASSES AND GROUNDCOVER | |
| *Austrostipa scabra subsp scabra* | Spear Grass |
| *Digitaria divaricatissima* | Umbrella Grass |
| *Dysphania pumilio* | Small Crumbweed |
| *Einadia nutans subsp nutans* | Climbing Saltbush |
| *Enteropogon acicularis* | Windmill Grass |
| *Sida corrugata* | Corrugated Sida |
| *Solanum esuriale* | Quena |

*Table 18. Fuzzy Box Woodland native grasses*

| Botanical name | Common name |
|---|---|
| NATIVE GRASSES | |
| *Enteropogon acicularis* | Windmill Grass |
| *Rytidosperma richardsonii* | Straw Wallaby Grass |
| *Solanum esuriale* | Quena |

*Table 19. Western Gray Box Tall Grassy Woodland native grasses and groundcovers*

| Botanical name | Common name |
|---|---|
| NATIVE GRASSES AND GROUNDCOVER | |
| *Austrostipa scabra subsp scabra* | Rough Spear Grass |
| *Bothriochloa macra* | Redgrass |
| *Carex inversa* | Knob Sedge |
| *Einadia nutans subsp nutans* | Climbing Saltbush |
| *Enteropogon acicularis* | Windmill Grass |
| *Lomandra filiformis subsp filiformis* | Wattle Mat-rush |
| *Maireana enchylaenoides* | Wingless Bluebush |
| *Paspalidium constrictum* | Knottybutt Grass |
| *Rytidosperma caespitosum* | Ringed Wallaby Grass |
| *Sida corrugata* | Corrugated Sida |
| *Solanum esuriale* | Quena |

*Table 20. Fuzzy Box Woodland native trees, shrubs and grasses*

| Botanical name | Common name |
|---|---|
| NATIVE TREES | |
| *Eucalyptus blakelyi* | Blakely's Red Gum |
| *Eucalyptus bridgesiana* | Apple Box |
| *Eucalyptus conica* | Fuzzy Box |
| *Eucalyptus macrorhyncha* | Red Stringybark |
| *Eucalyptus melliodora* | Yellow Box |
| NATIVE GRASSES | |
| *Enteropogon acicularis* | Windmill Grass |
| *Rytidosperma richardsonii* | Straw Wallaby Grass |
| *Solanum esuriale* | Quena |
| NATIVE SHRUBS | |
| *Acacia deanei* | Green Wattle |
| *Maireana enchylaenoides* | Wingless Bluebush |
| *Maireana microphylla* | Small–leaved Blue Bush |
| *Salsola australis* | Tumbleweed |
| *Sclerolaena muricata* | Black Rolypoly |

*Table 21. Western Gray Box Tall Grassy Woodland native trees, shrubs, grasses and groundcovers*

| Botanical name | Common name |
|---|---|
| NATIVE TREES | |
| *Allocasuarina luehmannii* | Bull Oak |
| *Casuarina cristata* | Belah |
| *Eucalyptus populnea subsp. Bimbil* | Poplar Box |
| *Eucalyptus largiflorens* | Black Box |
| *Eucalyptus microcarpa* | Inland Grey Box |
| NATIVE SHRUBS | |
| *Maireana microphylla* | Small–leaved Blue Bush |
| *Salsola australis* | Tumbleweed |
| *Sclerolaena muricata* | Black Rolypoly |
| NATIVE GRASSES AND GROUNDCOVER | |
| *Austrostipa scabra subsp scabra* | Rough Spear Grass |
| *Bothriochloa macra* | Redgrass |
| *Carex inversa* | Knob Sedge |
| *Einadia nutans subsp nutans* | Climbing Saltbush |
| *Enteropogon acicularis* | Windmill Grass |
| *Lomandra filiformis subsp filiformis* | Wattle Mat-rush |
| *Maireana enchylaenoides* | Wingless Bluebush |
| *Paspalidium constrictum* | Knottybutt Grass |
| *Rytidosperma caespitosum* | Ringed Wallaby Grass |
| *Sida corrugata* | Corrugated Sida |
| *Solanum esuriale* | Quena |

**Nominated seed supplier**

RGDC has identified PSC as the potential supplier of native seed for the proposal. This represents a valuable opportunity for the project to integrate and maximise locally sourced seed material in the implementation of the landscape works, thereby helping to strengthen local biodiversity. Depending on the species and quantities able to be sourced from PSC, the proposal will supplement seed from the PSC seed bank with seed from additional seed supply sources.

## 4.9 EARTHWORKS DESIGN AND SLOPE STABILISATION

The design of any cuttings and embankments is determined by the functional requirements for Brolgan Road as well as the land constraints arising from available space within the road corridor. Balancing cut and fill volumes and minimising the construction footprint where other important considerations in the earthworks design.

Within these parameters, the design has sought to ensure that cuttings and embankments fit in with the local landform and character of the landscape. To this end, the revegetation of cuttings and embankments is a key outcome, reducing the potential visual impacts associated with the road formation. Building on the local ecology, both cuttings and tall embankments (also refer to **section 4.2.1**) represent an opportunity to express and strengthen the landscape character of the Parkes SAP.

The following sections provide more information on the design of cuttings and embankments. Typical earthworks associated with the proposal are illustrated in **Figure 19**, **Figure 20**, **Figure 21**, **Figure 22**, **Figure 23**, **Figure 25** and **Figure 26**.

### 4.9.1. CUTTINGS

The main cutting associated with the proposal extends from about station 3,500 to station 3,800, immediately west of bridge ST01. The height of the cutting varies up to a maximum of about 4.3 metres in height. Minor cuttings are also associated with the creation of drainage swales (refer to **section 4.5.1**).

The design of the cuttings has generally adopted a 2h:1v grade, providing a low maintenance cut batter slope that is able to be vegetated - also refer to **section 4.7.1** for slope stabilisation techniques to be used.

In the event that sound rock is uncovered during excavation on site, it may present an opportunity to be retained as an exposed finish. Where geotechnical conditions and safety requirements permit, an exposed rock finish can be a desirable outcome as it expresses the underlying geology of the area. In addition, the raw and robust nature of exposed rock material adds drama and texture to the visual landscape, providing a contrast with the designed elements of the road corridor.

This approach aims to remove the need for applying shotcrete to exposed rocks areas where significant areas of rock are unsuitable for revegetation. In the unlikely event that exposed rock would required shotcrete for stabilisation, any shotcrete application would be designed and carried out consistent with the *Shotcrete design guideline. Design guideline to improve the appearance of shotcrete in NSW* (TfNSW 2016).

### 4.9.2. EMBANKMENTS

The combination of existing landform, road geometry and flood immunity requirements means that the vast majority of the proposal is associated with fill embankments.

Due to the available width within the civil works boundary, the majority of the batter slopes are 4h:1v, with the exception of the approaches to the eastern and western bridges where the batter slopes increase to 2h:1v (refer to **section 4.2.1**). With the exception of the major embankments associated with the bridge approaches, embankments are generally minor, remaining below 1.5 metres in height. Locations where the proposed embankments are greater than 1.5 metres in height are associated with the bridge approaches and areas of limited corridor width. They are summarised in **Table 22**:

*Table 22. Major embankments*

| Location (station) | Slope gradient | Max embankment height | Description/ constraints |
|---|---|---|---|
| 3,525 - 3,765 | 2h:1v | 4.5m | Limited width along existing road corridor |
| 3,840 - 4,545 | 2h:1v | 10.8m | Approach to ST01 |
| 4,825 - 5,070 | 4h:1v | 2m | Limited width along existing road corridor |
| 6,960 - 7,920 | 2h:1v | 12m | Approach to ST01 |

The aim of the embankment design was to provide slopes that can be successfully vegetated for the full length of the proposal. Embankments will be vegetated as follows (also refer to **section 4.7.1** for slope stabilisation techniques to be used):

- 4h:1v embankments: seeding with a mixture of native and exotic pasture grasses and planted with clusters of native trees where clear zones and utilities permit and consistent with the major design treatments along the project (refer **section 4.1.1** to **section 4.2.4**)
- 2h:1v embankments: seeding with a mixture of native shrubs, native grasses and pasture grasses. Planting of trees along the base of the embankments where clear zones and utilities permit and consistent with the 'Embankments' design treatment (refer to **section 4.2.1**).

# CHAPTER 5
# URBAN DESIGN ELEMENTS

The sections in this chapter describe the project urban design elements and the respective urban design standards and direction adopted for the proposal. The urban design elements are :

1) Bridges (**section 5.1**)
2) Retaining walls (**section 5.2**)
3) Stock underpass culvert (**section 5.3**)
4) Pedestrian and cycle paths (**section 5.4**)
5) Furniture and fixtures (including lighting, feature walls and fencing) (**section 5.5**).

## 5.1 BRIDGES

### Compliance

The proposal includes two bridges that are described in the following sections:

- The western bridge, bridge ST01 over the Parkes North West Link line (**section 5.1.1**)
- The eastern bridge, bridge ST02 over the Parkes to Narromine rail line (**section 5.1.2**).

### 5.1.1. ST01 - WESTERN BRIDGE

Bridge ST01 provides a grade separated crossing of Brolgan Road over the Parkes North West Link Line. **Table 23** summarises the major bridge elements:

*Table 23. ST01 description of bridge components*

| Bridge component | Design description |
|---|---|
| Lane configuration | • Two traffic lanes (one in each direction)<br>• Shared path on the northern side |
| Traffic barriers | • Bridge: Steel rail and post system traffic barriers are used on both sides of the road to allow through views to the surrounding landscape and to reduce the height of the concrete element of the barrier in elevation<br>• Bridge approaches: type F concrete barrier<br>• Bridge embankments: W beam. |
| Drainage | • Surface drainage is captured via a pit and pipe network, located either side of the bridge. Drainage is captured in the pits and directed towards the proposed swales at the toe of the embankment via a batter chute. |
| Lighting | • No lighting<br>• Space provision under parapet skirt for future installation of electrical conduits to power feature parapet lighting (to be provided by RGDC subsequent to proposal completion). |
| **Superstructure** | |
| Girder/ structure | • Single span, approx 37m long<br>• 1.815m deep Super-T. |
| Parapet | • Precast concrete with skirt to provide a drip edge and allow for concealed future installation of electrical conduits for feature lighting (to be provided by RGDC subsequent to proposal completion). |
| Throwscreen | • Integral with the parapet, on both sides of the bridge<br>• Welded mesh screen, generally consistent with the throwscreens installed as part of the Newell Highway Parkes Bypass (no artwork) - also refer to **section 5.7**. |
| **Substructure** | |
| Abutment | • Spill through abutment<br>• Gradient: 1h:1v<br>• Finish: stone pitching - refer **Figure 34**<br>• Maintenance access bench: 0.75m wide with pedestrian safety rail - refer to **section 5.5.3**. |
| Embankments | • 2h:1v embankments - refer **section 4.2.1** and **section 4.9.2**. |
| Artworks and other features | • Name plaques<br>• Artwork to be provided by RGDC subsequent to proposal completion. |

The concept for bridge ST01 is illustrated in **Figure 32** to **Figure 36** and will be refined through the detailed structural design.

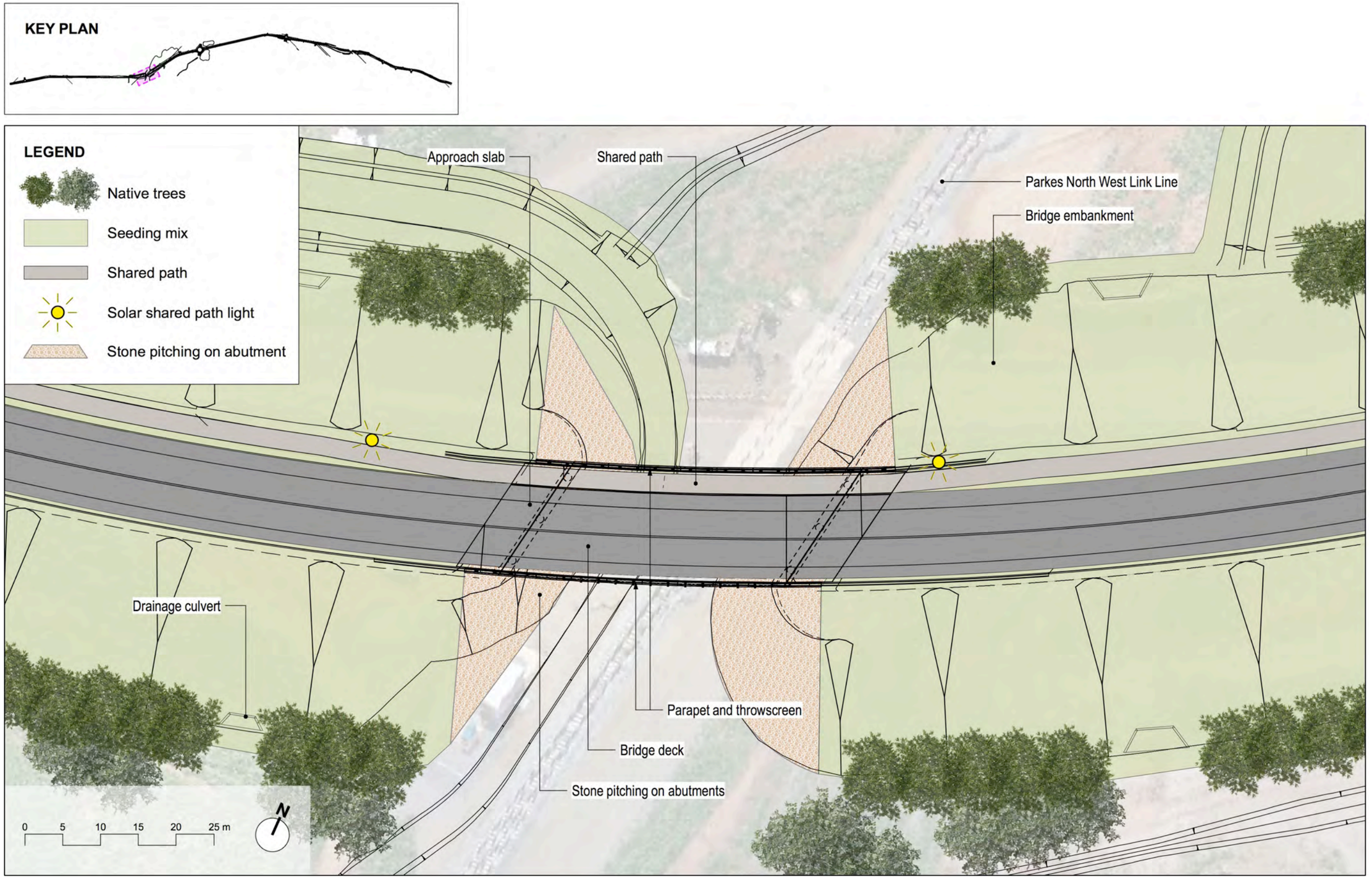



*Figure 32. Bridge ST01 plan*

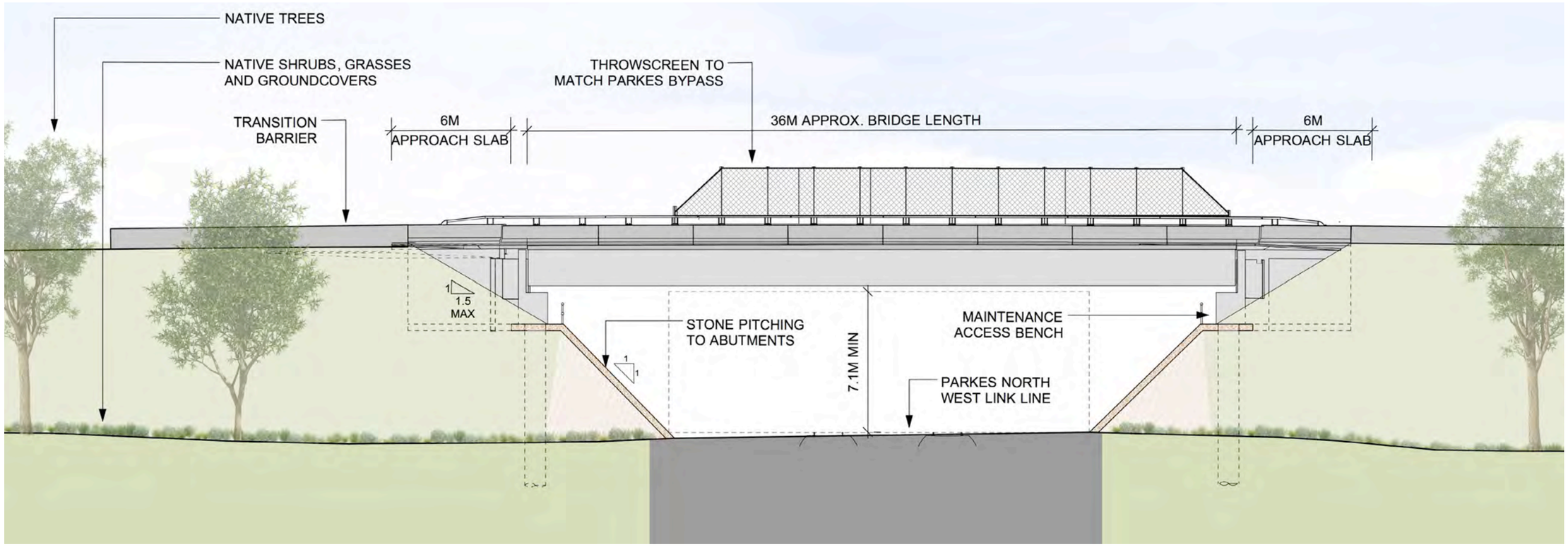



*Figure 33. Bridge ST01 elevation*

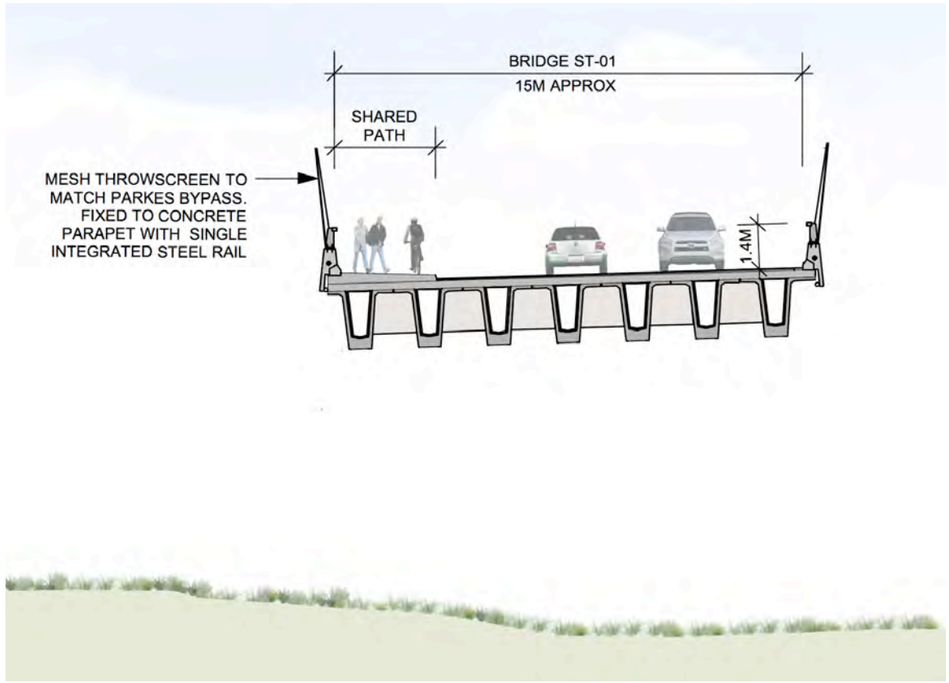



*Figure 35. Bridge ST01 cross section mid span*

*Figure 34. Abutment treatment option 1: stone pitching*

*Figure 36. Artist impression of bridge ST01 (Note: potential throwscreen artwork excluded from Enabling Works)*

### 5.1.2. ST02 - EASTERN BRIDGE

Bridge ST02 provides a grade separated crossing of Brolgan Road over the Parkes to Narromine Rail Line. The bridge will also provide an entry statement for the Parkes SAP. **Table 24** summarises the major bridge elements:

*Table 24. ST02 description of bridge components*

| Bridge component | Design description |
|---|---|
| Lane configuration | • Two traffic lanes (one in each direction) plus shoulders<br>• Shared path on the southern side |
| Traffic barriers | • Bridge: min 1,400mm tall medium performance barrier on both sides incorporating steel rail and posts to allow through views to the surrounding landscape and to reduce the height of the concrete element of the barrier in elevation<br>• Bridge approaches: type F concrete barrier<br>• Bridge embankments: W beam. |
| Drainage | • Surface drainage is captured via a pit and pipe network, located either side of the bridge. Drainage is captured in the pits and directed towards the proposed swales at the toe of the embankment via a batter chute. |
| Lighting | • No lighting<br>• Space provision under parapet skirt for future installation of electrical conduits to power feature parapet lighting (to be provided by RGDC subsequent to proposal completion). |
| **Superstructure** | |
| Girder/ structure | • Single span, approx 53m long<br>• 2,600mm deep weathering steel box girders with reinforced concrete cross girders<br>• Clearance over rail line: min 7,100. |
| Parapet | • Precast concrete with skirt to provide a drip edge and allow for concealed future installation of electrical conduits for feature lighting (to be provided by RGDC subsequent to proposal completion)<br>• Name plate provided. |
| Throwscreen | • Integral with the parapet, on both sides of the bridge<br>• Welded mesh screen, generally consistent with the throwscreens installed as part of the Newell Highway Parkes Bypass (no artwork) - also refer to **section 5.7**. |
| **Substructure** | |
| Abutment | • Abutment A (west): vertical rail deflection wall<br>• Abutment B (east): vertical reinforced soil wall (RSW) to integrate with the northern embankment retaining wall - refer to **section 5.2**<br>• Wall finishes: smooth panels in natural grey colour<br>• Maintenance access bench: 0.75m wide in warm grey-brown concrete colour, with pedestrian safety rail - refer to **section 5.5.3**.<br>• Refer to **section 5.7** for full details of finishes. |
| Embankments | • 2h:1v embankments - refer to **section 4.2.1** and **section 4.9.2**<br>• A stock underpass culvert may be provided through the eastern embankment - refer to **section 5.3**. |
| Artworks and other features | • Artwork to be provided by RGDC subsequent to proposal completion. |

The concept for bridge ST02 is illustrated in **Figure 37** to **Figure 41** and will be refined through the detailed structural design.

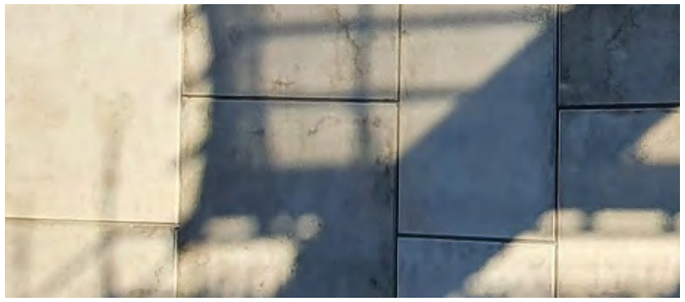


*Figure 37. RSW concrete panels with smooth finish in natural grey*

*Figure 38. Example of welded throwscreen mesh texture*

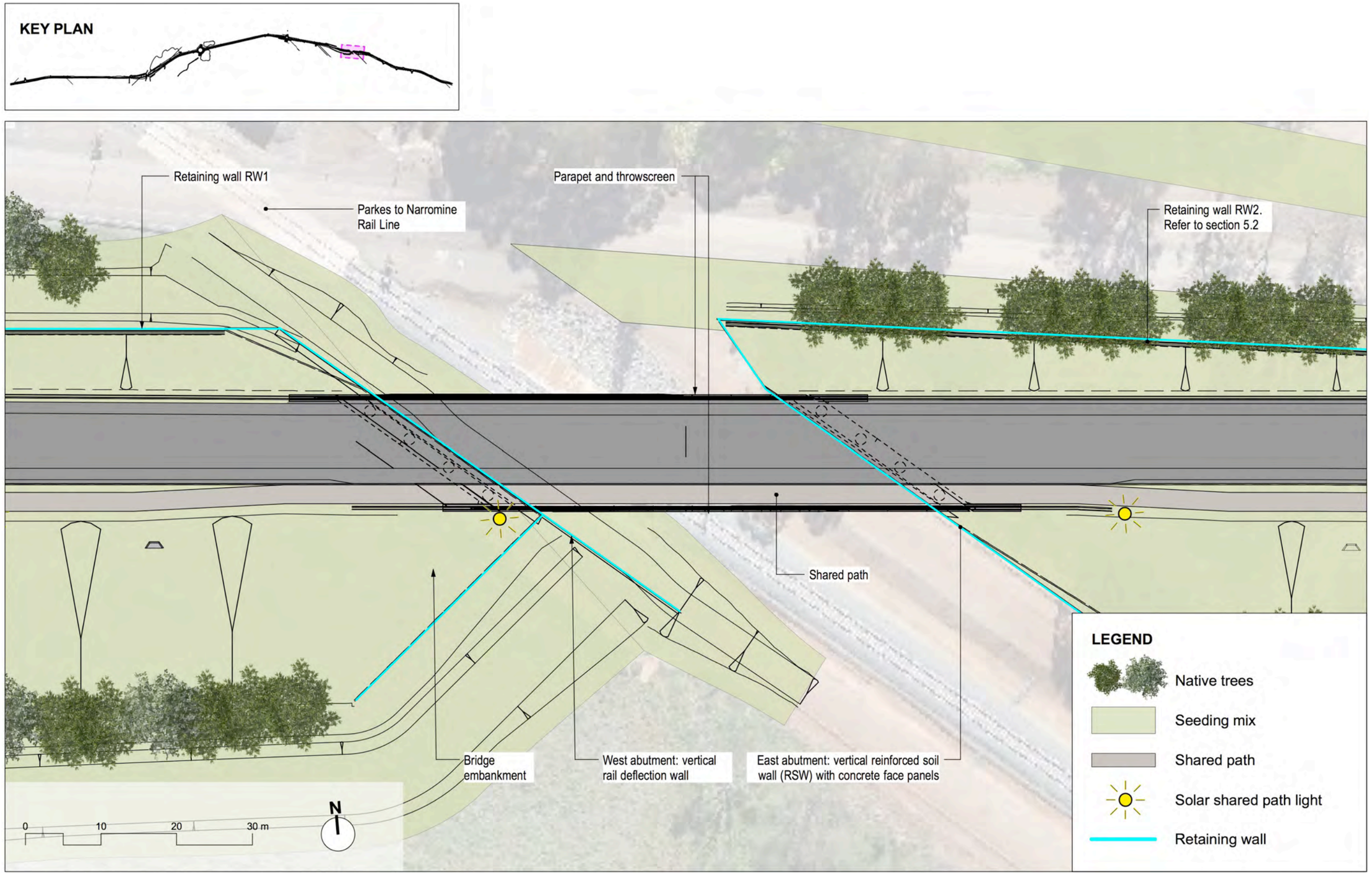



*Figure 39. Bridge ST02 plan*

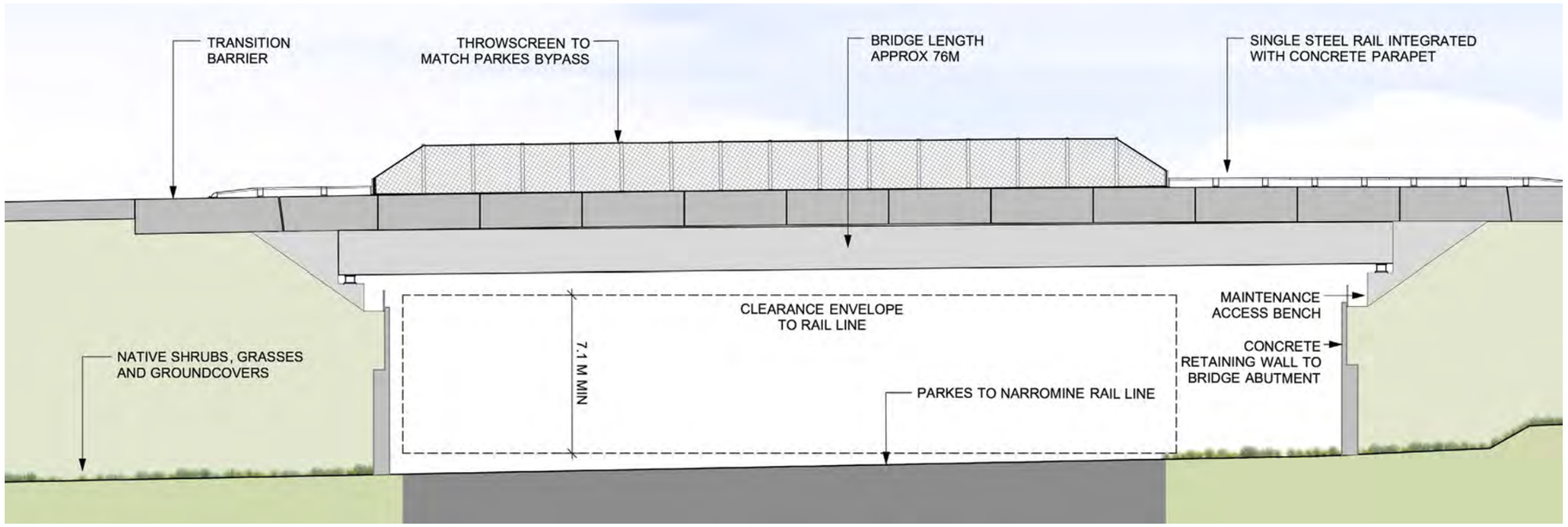



*Figure 40. Bridge ST02 elevation*

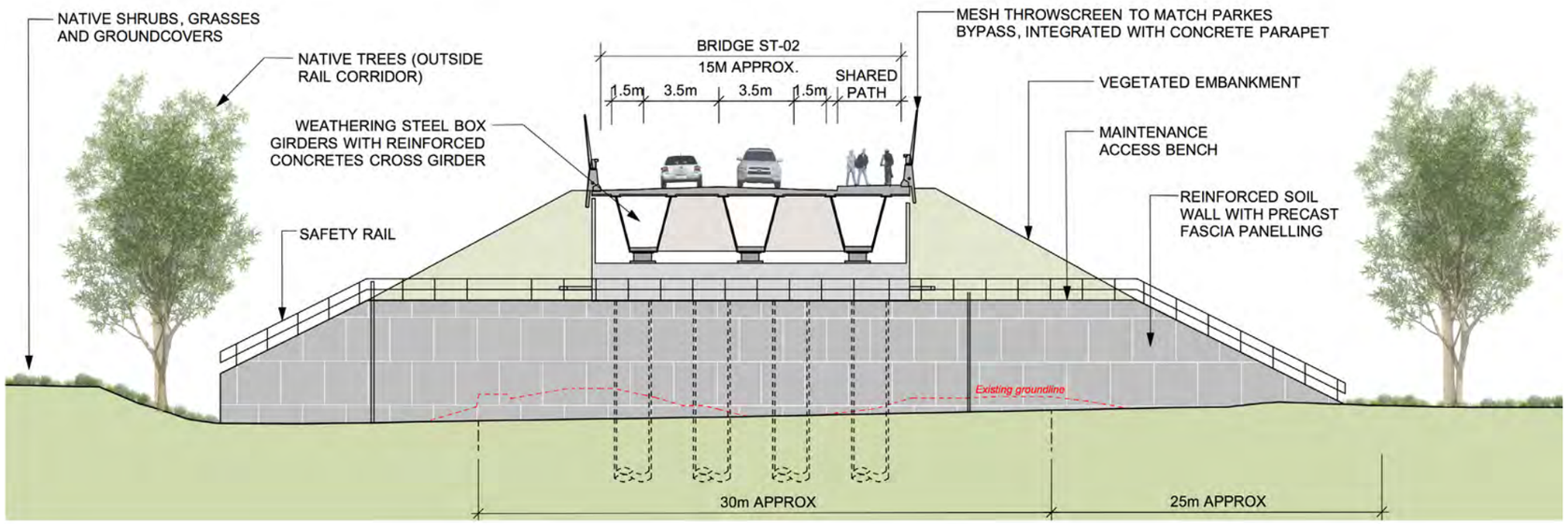



*Figure 41. Bridge ST02 indicative cross section at abutment*

## 5.2 RETAINING WALLS

Retaining walls within the scope of the proposal are limited to those associated with bridge ST02. Retaining walls extend along the northern embankments of ST02, for a length of about:

- Retaining wall RW1: 300 metres on the western embankment (**Figure 22**)
- Retaining wall RW2: 150 metres on the eastern embankment (**Figure 39**).

Due to structural requirements, the retaining wall will be constructed as Reinforced Soil Walls (RSW) with precast concrete fascia panels with a high quality finish.

Due to the limited number of viewers, it is proposed that the finish of the retaining walls is characterised by a simple treatment that reflects the functional nature of the wall in supporting the bridge structure and embankment. At the same time, the retaining walls will present as a considered suite of elements when seen in conjunction with bridge ST02.

### 5.2.1. URBAN DESIGN CONSIDERATIONS

There are two main urban design considerations for the design of the retaining walls:

- Wall elevation:
  The appearance of the walls will in large part be derived from their three-dimensional form, in particular the elevations. The elevations will be designed to present a smooth flowing curve that responds to the landscape setting and the shape of the bridge embankments, creating a harmonious contrast with the strong horizontal lines associated with bridge ST02. Cappings will be smoothly raked to support this outcome - refer **Figure 42** showing the western wall elevation. Wall cappings will further include an overhang to provide a subtle shadow line, concealing the capping and panel junction. Any drains required at the top back of the walls will be concealed behind the cappings - refer **Figure 45**
- Wall colour:
  Consideration of the walls' colour will be critical in order to minimise the potential for glare from light being reflected off the north-facing faces and to ensure integration with the surrounding natural environment. To protect the walls' finish against vandalism, concrete panels would be treated with a sealer to ensure ease of graffiti removal. Refer to **section 5.7** for urban design finishes.


*Figure 42. North elevation of retaining wall in the western embankment (RW1) of bridge ST02*

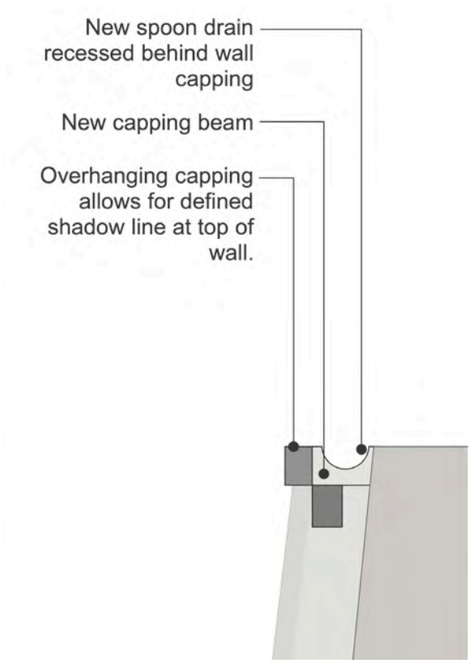



*Figure 45. Section showing overhanging wall capping and concealed spoon drain along the top of the retaining wall*

### 5.2.2. WALL FACING DESIGN

RSW would be finished with high quality concrete panels. The surface of the panels would be smooth and plain to provide a suitable surface that would allow for the potential future installation of an interpretive or community artwork by RGDC or PSC, if desired - refer **Figure 37**. Example would include a mural or a sculptural element attached to the wall - refer **Figure 43** and **Figure 44**). Panel joints would be subtle, emphasising neither horizontal nor vertical qualities so as not to detract from future artworks. This would provide a plain concrete wall finish in the short term and would allow for the application of murals or artworks in the future, by either RGDC or PSC. Landscaping in front of the wall would be provided to mitigate the scale of the wall and assist its integration with the landscape setting.


*Figure 43. 'Free Form Birds' mural over plain concrete RSW panels in Moggill Road, Pinjarra Hills (Brisbane) by artist Deb Mostert*

*Figure 44. The Birds' mural over plain concrete RSW panels in Dock Street, Brisbane by artist Noke*

## 5.3 STOCK UNDERPASS CULVERT

A stock underpass culvert may be provided in the eastern embankment of bridge ST02, at station 7,600 approximately - refer **Figure 46**. The underpass culvert would provide north-south access along the travelling stock route, across the upgraded Brolgan Road.

The urban design treatment for the stock underpass would focus on supporting the key functional and safety requirements by providing a simple and clean design solution that minimises the risk of injury for users (including cattle) and maintenance staff. The design of the stock underpass culvert including associated head and wing walls will be robust, easy to clean and discourage graffiti and other forms of vandalism. To maximise integration with nearby structural elements, wall cappings and any drains along the head and wing walls would be consistent in treatment with the capping detail proposed for retaining walls - refer **section 5.2** and **Figure 45**.

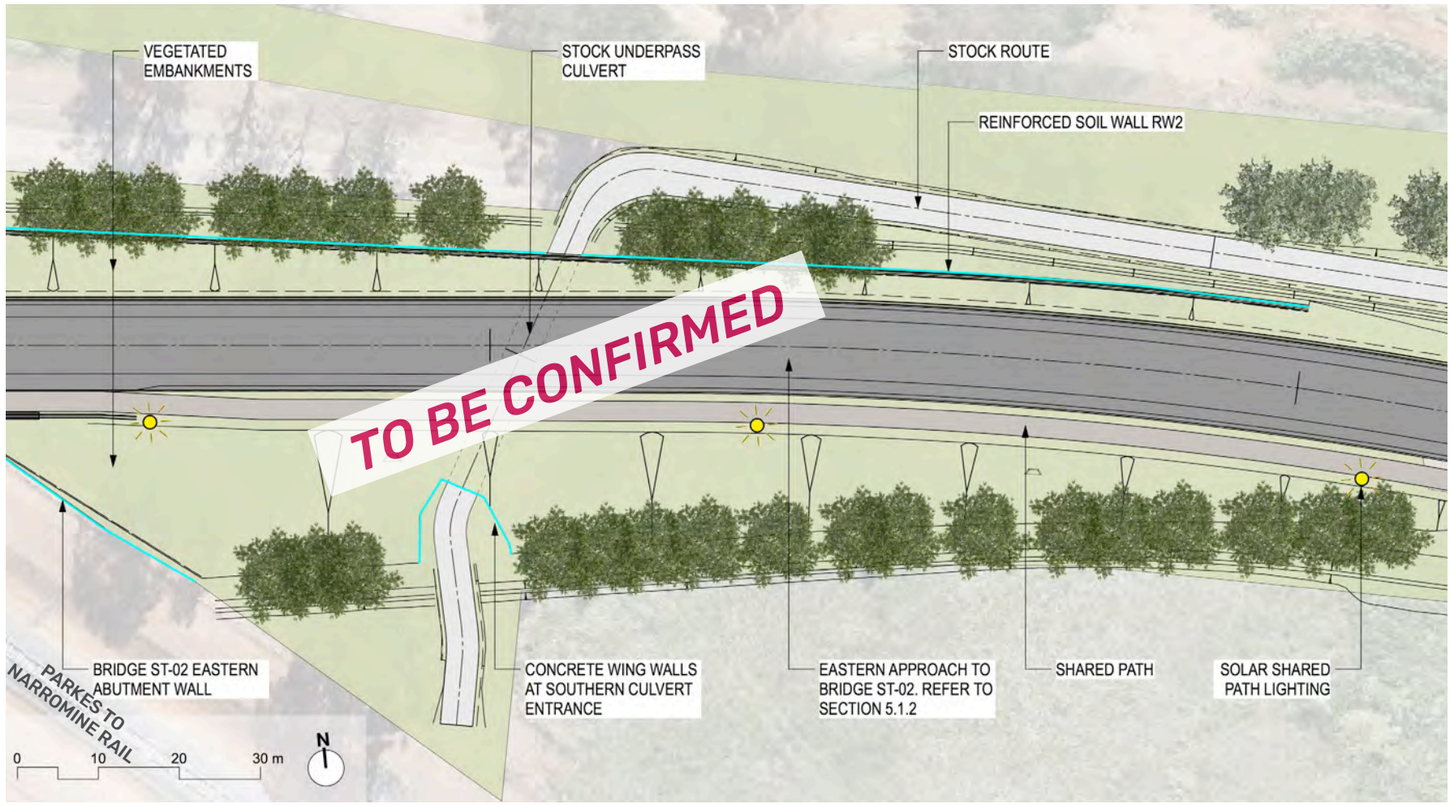



*Figure 46. Location of stock underpass culvert in bridge ST02 eastern embankment*

## 5.4 PEDESTRIAN AND CYCLE PATHS

To cater for the movement of pedestrians and cyclists within the precinct, a 2.5 metre wide shared path will be provided along the full length of the proposal. It is generally located along the northern side of Brolgan Road, maximising user comfort derived from shade by trees planted on the northern side of Brolgan Road.

East of the Secondary Gateway (station 6,640 approximately) the shared path switches to the southern side of Brolgan Road to connect with the shared pathway that will be constructed as part of the Newell Highway Parkes Bypass. The proposed crossing is located on a straight section of Brolgan Road where good safe lines maximise the safety for cyclists crossing from one side of the corridor to the other. In addition, the road width is relatively narrow, being located well away from intersections. The shared path approaches Brolgan Road at a perpendicular angle, intentionally slowing down cyclists and to provide for good sight lines in both directions along Brolgan Road. Signage advising both shared path users and vehicles of the approaching crossing point will be provided consistent with regulatory requirements.

Due to the location of the shared path in a non urbanised rural area with relative low pedestrian and cyclist usage, and consistent with other shared paths in the area, there will be no linemarking of the shared path. Lighting will be provided along the full length of the shared path (refer to **section 5.5.1**).

The shared path is generally set back from Brolgan Road to maximise user safety and comfort. The setback varies along the length of the proposal between 0.5m and 1m minimum distance to the edge of the road formation. The exception are the two bridges where the shared path abuts the carriageway. A kerb and the road shoulder provide physical separation between vehicular traffic and pedestrians and cyclists on the shared path - refer **Figure 35** and **Figure 41**.

A flat buffer zone is provided between the shared path and any adjacent drainage swale - refer to the cross sections in **Figure 19** to **Figure 23**, **Figure 25** and **Figure 26**.

The design of the shared path has sought to maximise compliance with the relevant standards for disabled access, consistent with the *Disability Discrimination Act 1992* (DDA). The exception is the two bridge approaches where the shared path will slope at a maximum gradient of 25h:1v (4%) between stations 3,360-3,450, 7,050-7,400 and 8,605-8,645. Due to the need to avoid level differences between the shared path and the road on the constrained bridge approaches, as well as the need to maximise cyclists comfort, no landings were provided. This treatment is consistent with the design of the section of shared path constructed along Brolgan Road as part of the Parkes Bypass.

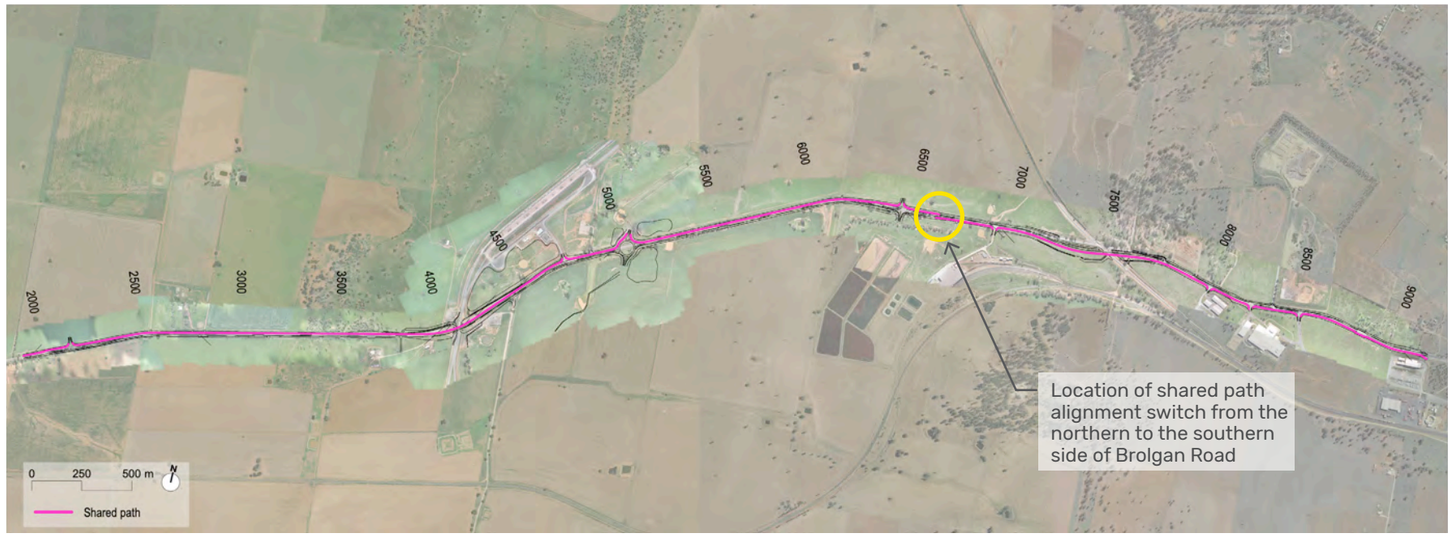



*Figure 47. Plan showing the extent of shared path provided*

### 5.4.1. GATEWAY THRESHOLDS

On the approach to the Primary and Secondary Gateway, there is an opportunity to incorporate a paving feature to highlight the approach to the gateways.

The Delivery Plan anticipated a change of paving material at the gateways to coloured concrete. The design has considered this and recommends to retain the standard chipseal paving material, for the following reasons:

- Change of pavement material: concrete reduces cyclist comfort (due to jointing), representing a downgrade in the cyclist experience that could undermine the intention of the gateway being experienced as a highlight or special place
- Location of highlight treatment: A feature highlight on the approach to the gateways may assist in creating a sense of anticipation, announcing the approaching gateway
- There is limited artistic/interpretive merit in a change of pavement material or colour alone.

Instead of coloured concrete, the design proposes to highlight the gateways through an artistic overlay that presents an additional opportunity to integrate art or Place-making elements into the proposal, with potential for community involvement and capacity building.

Artwork would be able to be incorporated into the gateway approaches through an applied finish such as thermoplastics. Application could be either limited to the gateway thresholds, for example a stencil artwork (**Figure 48**). There would also be an option to continue the treatment through the entire gateway (**Figure 49**).

*Figure 48. Examples of stencil overlays on paving that could be applied either to the gateway threshold and through the entire gateway/intersection*

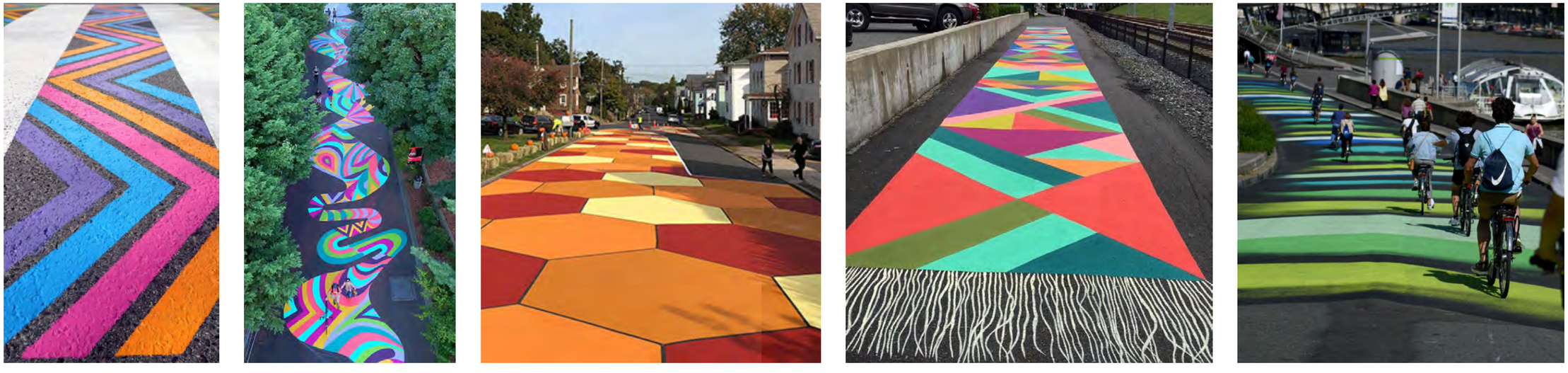


*Figure 49. Examples of artistic overlays on paving that could be applied either to the gateway threshold and through the entire gateway/intersection*

## 5.5 FURNITURE AND FIXTURES

A range of furniture and fixtures will be provided as part of the proposal including lighting, feature walls and fencing, as described in the following sections.

Non-statutory signage such as way-finding and interpretive signage is excluded from the scope of stage 1 enabling works. Consistent with the principles outlined in the Delivery Plan, a strategic approach for non-statutory signage is currently being developed by RGDC. This work will guide the installation of non-statutory signage in subsequent stages of precinct delivery.

### 5.5.1. LIGHTING

The proposal will provide two types of lighting:

- Road lighting
- Shared path lighting.

The location of lighting provided as part of the proposal is illustrated in **Figure 54**.

#### Road lighting

Road lighting is generally limited to the intersections (including the Primary and Secondary Gateways) and will be provided between stations 2,000-2,350, 4,900-5,250 and 6,300-6,600. Lighting will be consistent with TfNSW requirements and comprise of pole top lighting with a 6 metre outreach arm. The minimum height of light poles will be 8.5m, with a typical light mounting height of 10.5m.

#### Shared path lighting

Lighting will be provided to the full length of the shared path. Lighting will comprise of solar-powered lighting that will ultimately be owned by operated by PSC. Lighting will be fixed to an outreach arm attached to an 8.5m tall pole, resulting in a mounting height of 10 metres - refer **Figure 50**. Poles will be powdercoated in standard grey and spaced approximately 60 metres apart and will be set back from the shared path by 1.5m.

For more information, refer to the finishes schedule in **section 5.7**.

*Figure 50. Shared path lighting pole, outreach arm and solar panel*

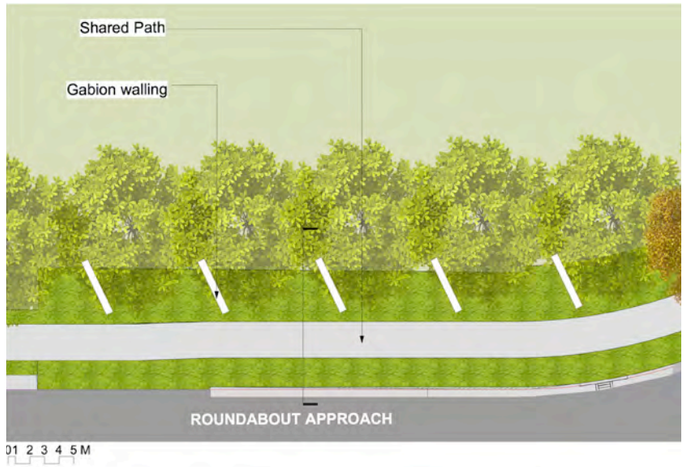



*Figure 51. Typical gabion arrangement at gateways: plan*

### 5.5.2. FEATURE WALLS

Gabion walls are proposed at the Primary and Secondary Gateways where they will provide a sculptural element to highlight the gateways, in conjunction with shared path threshold treatments (refer to **section 5.4.1**).

The gabion walls are designed to allow mounting of precinct signage to the walls, should this be desired by RGDC or PSC in the future. Walls are located offset from the shared path and outside the clear zone for maximum safety. They are angled relative to the shared path and road alignment, creating a chevron-like geometric patterning effect. Walls are a seating height near the shared path. As they are located on sloping embankments, the height of the wall increases relative to the ground surface. The top of the wall is horizontal to ensure walls remain a fully visible feature element when travelling around the gateways. Where possible, gabion rock fill will be sourced locally to strengthen local character.

A typical plan and cross section of gabion walls is provided in **Figure 51** and **Figure 52**. An indication of the potential wall character is provided in **Figure 53**.

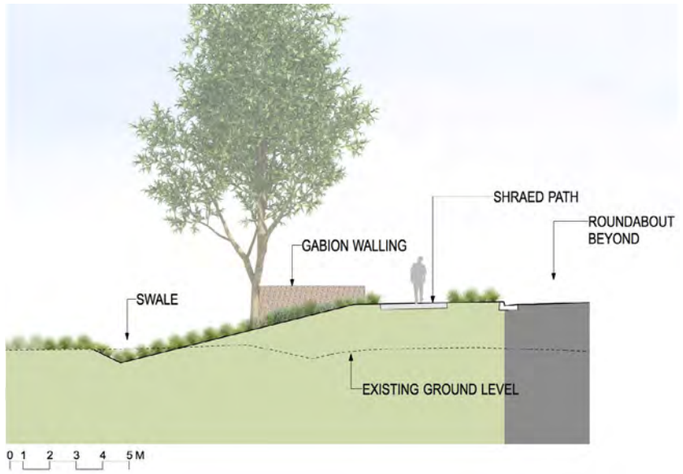



*Figure 52. Typical cross section illustrating gabion walls at gateways*


*Figure 54. Plan diagram showing locations and types of lighting provided by the proposal*

*Figure 53. Precedent images of gabion feature walls*

### 5.5.3. FENCING

The project involves the following types of fencing:

1) Road corridor fencing at the interfaces to private property including access gates
2) Pedestrian and cyclist safety fencing
3) Other.

**Road corridor fencing and access gates**

The fencing strategy adopted for the proposal is to replace any existing fences that require adjustment as part of Stage 1 enabling works with fences of the same type and height (like-for-like replacement). Where an existing fence is not being relocated, an alternate stockproof fence, would be installed along the proposed project boundary, consistent with standard TfNSW fencing details. Fences along the rail corridor would be either retained or replaced like for like where there is a need for relocation.

Gates will be relocated or provided where necessary to retain property access. Entry gates will be similar to the existing or a standard rural type gate, 3.6 metres wide consisting of galvanised steel post as per the TfNSW standard for boundary fencing gates. This will be subject to the outcomes of the negotiations with property owners.

**Pedestrian and cyclist safety fencing**

In a number of locations (station 3,800-4,070, 4,130-4,490, 4,490-4,700, 6,610-6,800 and 7,130-7,760), the shared path is located along the top of embankment slopes. In these locations a 1,200mm tall pipe handrail will be used to ensure the safety of shared path users. Consistent with the requirements of the *Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling*, the rail will include a top rail with a 150mm inhang (deflection rail) to ensure handlebars and pedals cannot be caught in the vertical components of the fence - refer to **Figure 56**.

Safety rails will also be provided along the maintenance access benches under bridges ST01 (**section 5.1.1**) and ST02 (**section 5.1.2**) and around the portals to the stock underpass culvert (**section 5.3**). In these instances a Monowills style pipe handrail will be used - refer to **Figure 56**. The height would vary from 1.0m to 1.2m, as required based on potential fall heights.

**Other**

Fencing may also be required to protect utility assets. Specific requirements will be resolved with asset owners during the detailed design of the proposal.

## 5.6 POTENTIAL FUTURE ARTWORK LOCATIONS

The provision of artworks and interpretive installations is excluded from the scope of Enabling Works. Consistent with the principles outlined in the Delivery Plan, a strategic and curated approach for precinct artworks will be developed by RGDC, in consultation with PSC. Potential locations for future artworks within the stage 1 area include:

- Primary Gateway:
  - Potential for sculptural installation in the centre of the roundabout
  - Artistic pavement patterning in traffic islands on the roundabout approaches
  - Feature bollards around the outside of the roundabout
  - Feature shelter
  - Pavement artwork, if desired (refer to **section 5.4.1**).
- Secondary Gateway:
  - Potential for sculptural installation to highlight the highlight the environmental area and future park at Pioneer Flat
  - Pavement artwork, if desired (refer to **section 5.4.1**).
- Rest stops along the Boulevard
- Throwscreens on bridges ST01 and ST02
- Northern embankment retaining wall at ST02
- Culvert crossings of creeks and ephemeral drainage lines: opportunity to highlight the ecology and natural landscape features of the area.

*Figure 55. Pedestrian and cyclist safety fence with deflection rail*

*Figure 56. Pedestrian safety fence - Monowills*

## 5.7 URBAN DESIGN FINISHES

**Table 25** summarises the finishes for the various proposal elements described in previous sections of this report.

*Table 25. Urban design finishes*

| CODE | STRUCTURE | FINISH | PROPRIETARY ITEM OR APPROVED EQUIVALENT | CODE/ COLOUR OR APPROVED EQUIVALENT | PROPRIETARY SUPPLIER OR APPROVED EQUIVALENT | NOTES | REV |
|---|---|---|---|---|---|---|---|
| STRUCTURES: BRIDGES, ABUTMENTS AND RETAINING WALLS | | | | | | | |
| S1 | BRIDGE ST01 (western bridge) SPILL THROUGH ABUTMENTS | • Stone pitching<br>• Anti-graffiti coating: required to all exposed concrete elements such as edging strips | • Stone pitching: rock sourced locally from a single source<br>• Stone size: acceptable range is 200-400mm | Stones of neutral or warm earthy tones.<br>Bedding concrete/mortar mix: add oxide to darken, matching the colour of the darkest stones in the approved sample colour range. | N/A | Joints: generally < 30mm, localised increases in joint width may be acceptable to accommodate irregular stone sizes. At all times the joint width must not exceed 50mm.<br>Stone colouring: variability is acceptable provided stones of different colours/hues are distributed to ensure an even texture and consistent appearance of all stone pitched areas.<br>Stones must conform to the structural engineer's specifications in respect of strength and durability.<br>Samples: Provide a photographic sample of stones proposed to be used for urban designer approval prior to installation. Photos must clearly indicate stone sizes (or range of sizes) and colours (or range of colours) and texture. Photographic samples must include close-ups as well as images illustrating the appearance of the stones over a larger area of min 2m x 2m.<br>Provide a photographic sample for urban design approval, showing mortar/ concrete bedding colouring matching the darkest of the approved stones.<br>Installation: flat stone faces to be face up to avoid jagged edges on the abutment surface.<br>Weep holes to be black pipe, cut flush with angle of the abutment slope to assist with blending into the pitching.<br>Refer S7 for anti-graffiti coating to exposed concrete surfaces. | 01 |
| S2 | BRIDGE ST02 (eastern bridge) WALLED ABUTMENTS | • RSW with concrete fascia panels<br>• Anti-graffiti coating: required | RSW pattern: ensure staggered joints | Colour: grey cement | N/A | Sample panel of at least 500 x 500mm clearly demonstrating colour and texture and including anti-graffiti coating to standard TfNSW requirements as this can affect the final colour appearance. Ensure consistency of colour/finish throughout the entire RSW panel. Sample to be produced for approval by the urban designer.<br>Refer S7 for anti-graffiti coating. | 01 |
| S3 | ST01 and ST02 ABUTMENT STEPS AND MAINTENANCE BENCHES | • Grey concrete, integrally coloured in warm grey-brown concrete colour, darker than abutments to achieve a more recessive finish | Integral oxide/pigment in concrete | Colour: CCS Lizard Skin at 5%, unless otherwise recommended by the manufacturer | Concrete Colour Systems (CCS) Australia | Sample panel of at least 500 x 500mm clearly demonstrating colour and texture and including anti-graffiti coating to standard TfNSW requirements as this can affect the final colour appearance. Ensure consistency of colour/finish throughout the entire RSW panel. Sample to be produced for approval by the urban designer.<br>Refer S7 for anti-graffiti coating. | 01 |

| CODE | STRUCTURE | FINISH | PROPRIETARY ITEM OR APPROVED EQUIVALENT | CODE/ COLOUR OR APPROVED EQUIVALENT | PROPRIETARY SUPPLIER OR APPROVED EQUIVALENT | NOTES | REV |
|---|---|---|---|---|---|---|---|
| S4 | RETAINING WALLS<br>Northern embankment edge on both approaches to ST02. | RSW concrete panels:<br>• Colour: standard off-white (grey) concrete<br>• Pattern: Square panels in vertical stretcherbond<br>• Panel surface: smooth off-form finish<br>• Anti-graffiti coating: required | | Refer engineering/structures drawings | | The retaining wall designer is to provide shop drawings of RSW for review and approval by the urban designer, prior to manufacture. Shop drawings are to include elevations, clearly illustrating the RSW in its context and any interfaces with other project structures including the stock underpass culvert. Shop drawings are to include details of proposed panel types, pattern (including jointing layout) and texture of concrete panels.<br>Provide a sample RSW concrete facing panel for approval by the urban designer. The sample must be a minimum 500 x 500mm concrete panel clearly demonstrating colour and texture and including anti-graffiti coating to standard TfNSW requirements as this can affect the final colour appearance. Ensure consistency of colour/finish throughout the entire RSW panel.<br>Refer S7 for anti-graffiti coating. | 01 |
| S5 | BRIDGE PARAPETS<br>On ST01 and ST02 | • Off-white cement (concrete) | | Refer engineering/structures drawings | | Refer structural drawings and specifications. | 01 |
| S5 | STOCK UNDERPASS CULVERT<br>***TO BE CONFIRMED*** | • In situ concrete wing walls<br>• Colour: standard off-white (grey) concrete<br>• Anti-graffiti coating: required | | Refer engineering/structures drawings | | Test panels must be provided for cast in situ concrete retaining walls. The first in situ concrete pour for each wall finish type must be a test panel. Sufficient time and access must be allowed for the verification of the finished quality of the test panel before full production commences on the tested wall finish type.<br>Refer S7 for anti-graffiti coating. | 01 |
| S7 | ANTI GRAFFITI COATING to:<br>• Bridge spill through abutments (ST01)<br>• Bridge walled abutments and retaining walls (ST01 and ST02)<br>• Stock underpass culvert wing walls and entrance portals. | To be applied to the full height of walls/concrete elements | Anti-graffiti coating | HZ 2004 in matt finish or equivalent | Dupont or equivalent | • As per TfNSW standard requirements<br>• Colour neutral. Should not change colour of concrete when applied<br>• Sample to be applied to concrete sample panel of minimum size 1.0m x 1.0m to be approved by urban designer<br>• Paint system to be as per supplier specifications to achieve required warranty<br>• Anti graffiti coating is not required on painted surfaces, as the paint performs a similar function. | 01 |
| TRAFFIC BARRIERS | | | | | | | |
| B1 | CONCRETE BARRIERS | Type F concrete barrier | Anti-graffiti coating | Off-white cement/ TfNSW standard | TfNSW standard profile | Refer S7 for anti-graffiti coating. | 01 |
| B2 | BRIDGE RAILS<br>on ST01 and ST02 | Galvanised steel rail and posts fixed to concrete barrier | | Refer engineering/structures drawings | | To Australian Standards as specified in the engineering drawings. | 01 |
| B3 | GUARDRAILS | Galvanised steel | | Refer engineering/structures drawings | | To Australian Standards as specified in the engineering drawings. | 01 |

| CODE | STRUCTURE | FINISH | PROPRIETARY ITEM OR APPROVED EQUIVALENT | CODE/ COLOUR OR APPROVED EQUIVALENT | PROPRIETARY SUPPLIER OR APPROVED EQUIVALENT | NOTES | REV |
|---|---|---|---|---|---|---|---|
| FURNITURE AND FIXTURES | | | | | | | |
| F1 | THROWSCREENS<br>on ST01 and ST02 | • Galvanised mesh supported by posts at nominally 2.4m spacing coordinated with parapet jointing | | Refer engineering/structures drawings | | Throwscreens to match Newell Highway Parkes Bypass. Refer structural drawings and specifications. | 01 |
| F2 | LIGHTING<br>Along Brolgan Road/at intersections | Light poles and fittings consistent with standard TfNSW road lighting requirements.<br>Finished with powdercoat in standard grey. | | | | Provide min 1m length of finished powdercoated light pole as a sample for approval to confirm satisfactory paint finish. | 01 |
| F3 | LIGHTING<br>shared path lighting | Solar powered shared path lighting | Saferoads Roadway Solar Light with LED light fitting.<br>Pole/column:<br>• 8.5m slip based pole with 3m Vesi outreach arm (mounting height 10m)<br>Fitting:<br>• Housing: high pressure die cast aluminium<br>• 75W Aldridge LED<br>Power source:<br>• 320W Solar Panel. | • Pole finish: powdercoat in standard grey<br>• Fitting housing finish: powder coat in standard grey | • Pole: Saferoads<br>• LED: Cree | • Provide min 1m length of finished powdercoated light pole as a sample for approval to confirm satisfactory paint finish<br>• Also refer to electrical engineer's specification<br>• Light fitting to achieve minimum IP rating of IP66 | 01 |
| F4 | PROPERTY BOUNDARY FENCES | To match existing | | Like for like to match existing | | Also refer to clearing and fencing package FE-01. | 01 |
| F5 | PEDESTRIAN SAFETY RAIL<br>• Along bridge ST01 and ST02 maintenance access benches<br>• Around cattle underpass culvert entrances | Aluminium | Monowills rail | N/A | Monowills | Height varies - refer structural drawings:<br>• 1.0m typ for maintenance access benches<br>• 1.2m typ around cattle underpass culvert entrances | 01 |
| F6 | PEDESTRIAN AND CYCLIST SAFETY RAIL along shared path | Aluminium | Bikesafe bikeway barrier | BS20 | Moddex | • 1.2m standard height<br>• Min 150mm handlebar clearance between deflection rail and vertical fence components | 01 |

| CODE | STRUCTURE | FINISH | PROPRIETARY ITEM OR APPROVED EQUIVALENT | CODE/ COLOUR OR APPROVED EQUIVALENT | PROPRIETARY SUPPLIER OR APPROVED EQUIVALENT | NOTES | REV |
|---|---|---|---|---|---|---|---|
| F7 | GABION WALLS<br>Primary and Secondary gateway | • Locally sourced rock within galvanised wire baskets | • Rock fill: sourced locally from a single source. Rocks are to be durable and hard wearing such as basalts or granite<br>• Rock fill size range: between 75mm-150mm<br>• Wire baskets: weld mesh baskets comprised of 4mm, hard drawn steel, electrically welded, 75x75 aperture | • Rock fill: stones of neutral or warm earthy tones.<br>• Wire basket: equal or equivalent to 'Century Gabion. Refer to the landscape drawings (design lot PSAP-LD-01) for basket dimensions | Wire basket: supplied by Gabion Cages and Baskets, www.gabioncages.com.au | Stone colouring: variability is acceptable provided stones of different colours/hues are distributed evenly to ensure an even texture and consistent appearance of all wire baskets.<br>Stones must conform to the structural engineer's specifications in respect of strength and durability. For footings and compaction requirements, refer structural engineering drawings.<br>Samples: Provide a photographic sample of stones proposed to be used for urban designer approval prior to installation. Photos must clearly indicate stone sizes (or range of sizes) and colours (or range of colours) and texture. Photographic samples must include close-ups as well as images illustrating the appearance of the stones over a larger area of min 1m x 1m. | 01 |
| HARD SURFACE FINISHES | | | | | | | |
| H1 | SHARED PATH<br>along Brolgan Road | Chipseal to engineers' specification | N/A | To Council specification | N/A | N/A | 01 |
| H2 | SHARED PATH THRESHOLDS at Primary and Secondary Gateways | Chipseal to engineers' specification with applied thermoplastic artwork supplied by RGDC | N/A | N/A | Site-specific artwork procured by RGDC as part of precinct-wide art strategy | N/A | 01 |
| H3 | CONCRETE DRAINAGE CHANNELS AND BATTER CHUTES<br>with a high level of visibility including those visible from the roadway and on embankments | • Integrally coloured concrete<br>• Broom finish | Integral oxide/pigment in concrete | Grey concrete with CCS oxide @5% (min) to maximise integration with the landscape. Colour: CCS Lizard Skin | Concrete Colour Systems (CCS) Australia | • There should be no smooth margins. Finish to be as rough as possible (similar to a broom finish).<br>• Consistency of colour on the entire drain surface to be ensured. No plain concrete margins. | 01 |
| H4 | PRIMARY GATEWAY<br>Roundabout centre | • Bands of native grasses alternating with coloured bands of decomposed granite | Deco©-Gold Gravel and Deco©-Granite Pink Gravel | Gold and pink | Australian Native Landscapes (ANL) | • Cement-stabilised as per manufacturer's recommendations | 01 |

# CHAPTER 6
# LANDSCAPE DESIGN IMPLEMENTATION

## 6.1 SITE PREPARATION

Site preparation is a key factor in successfully establishing the landscape and ensure a positive long-term outcome consistent with the desired future character of the Parkes SAP.

### 6.1.1. SOIL TESTING

Soil testing will be integral to the implementation of the landscape works and will involve soil pedology survey and analysis within each soil landscape and vegetation community type. Soil testing will provide recommendations for soil amelioration, conditioning and improvement that will be integrated with the detailing for landscape planting and revegetation works. In this way, the soil testing program will ensure growing media supports the landscape design intent and successful vegetation establishment, consistent with the vision for the Parkes SAP.

### 6.1.2. CULTIVATION OF SUBGRADE

After the ripping of the subgrade to a depth of 100 to 200mm, the existing site soil would be ameliorated with additives consistent with the recommendations established by soil testing. Ripping will occur along the contours using a chain drag with spikes to break up the surface of non-traversable batter slopes. On flatter slopes a harrow plough or similar will be used. The combination of the ripping and ameliorants will reduce erosion risk.

### 6.1.3. TOPSOILING

Topsoil will comprise ameliorated site soils, generally spread at the following depths:

- Direct seeding (drill or other broadcast) on fill batter 1v:4h and flatter - 100mm
- Hydromulch on fill batter 1v:3h and 1v:4h - 100mm
- Hydromulch on fill batter between 1v:3h and 1v:2h - 75mm
- Hydromulch to 1v:2h cut batter slopes - 75mm topsoil
- Hydromulch with organic fibre mesh to Channel / Catch drain. - 75mm
- Detention Basins - 100mm.
- Planting to centre of the roundabout - 200mm
- Planting to Garden Beds (surrounding roundabout and 1m wide strip for feature planting to Boulevard) -100mm
- 100L tree planting to include 1,000 x 1,000 x 300mm depth topsoil
- 25L tree planting to include 600 x 600 x 300mm depth topsoil

Note SWTC identifies topsoil to be overlaid with a minimum 150mm layer of topsoil, current TfNSW standard details recommend thinner applications of topsoil especially on steeper embankments and for seeding. For stage 1 enabling works we have adopted the above recommendations which have been developed through close working relationship with TfNSW technical advisers.

Imported topsoil may be required to make up any shortfall in site soils and will be spread at the same rates. Generally, it is preferable to ameliorate the site soils rather than to import, in order to reduce environmental impacts and enhance the retention of a native seed bank. Any surplus unsuitable material will be reviewed for suitability and amelioration to facilitate sustainable development. Testing of soil stockpiles and soils on embankments will be undertaken prior to re-vegetation to ensure soil condition is optimised for plant growth.

## 6.2 STABILISATION METHODS

The methods of seeding adopted will include the following:

**Direct Seeding**

Direct seeding is proposed for the median environment due to its flat batter profile. This is a traditional seeding method of ploughing and seeding of the prepared bed, as used in agricultural production. It is suited to flatter slopes. This method provides the benefit of having appropriate contact of the seed within the soil bed. Its use will be dictated by the availability of large continuous areas which meet the access requirements for this method.

**Hydromulching**

Hydromulch will be the dominant revegetation technique used for the Project where slopes are not traversable by machines i.e. Slopes steeper than 4h:1v. This technique provides a means of seed application that can work with the dominant slopes of the Project. It is an efficient means of distributing seed, ameliorating topsoil and provides a degree of initial soil protection prior to the establishment of a cover crop. Depending on availability and compatibility of machines either sugar cane or wood pulp will be used as the main mulch material. Refer to **Figure 57**.

*Figure 57. Hydromulch after 6 months*

**Temporary Vegetation Cover**

Cover crops, vegetation used to provide temporary batter surface stabilisation, will be used as a temporary stand-alone treatment during the temporary enabling works. They will also be used in association with native seed mixes as part of the permanent landscape outcome.

Cover crops will comprise approved species from TfNSW specification R178 and take into consideration the seasonal nature of the species. The cover crop and native seed mix percentages will be calculated to ensure native seed germination and growth is not hindered.

## 6.3 STAKES AND TIES

Staking and self-watering plant guards will be provided for initial support and for protection from grazing by wildlife. They will be removed at completion of the maintenance period.

Stakes installed as a marker for locating plants and indicating performance may be provided as part of the ongoing maintenance strategy

## 6.4 MULCHING

**Organic hardwood woodchip overlay**

Mulch is valuable resource for the project and will have various uses. Securing a source of mulch is therefore critical to this outcome. Mulch is to be sourced from site felled trees or local plantations (by arrangement with asset owners) and stockpiled for 6 months prior to use. Mulch will be used in the following applications:

- All planted areas are to be mulched with woodchip mulch to a depth of 75 millimetres
- 1m radius to all planted trees to a depth of 75 millimetres
- 1m wide continuous strip to shrub feature planting - Refer to Boulevard treatment Table 3.

## 6.5 MAINTENANCE

In accordance with the SWTC the landscape maintenance period will be a minimum of 12 Months. The landscape management requirements will be identified in the Landscape Management Plan and be prepared as per the TfNSW standard specification R179/D in accordance with PSC guidelines and strategies. The maintenance plan is to be submitted 90 days from the date of contract and resubmitted annually until the Last Actual Completion Date.

## 6.6 LANDSCAPE MANAGEMENT AND MONITORING

A key component of the proposal is the creation of a high quality, robust and sustainable landscape that is integrated with the different landscape types through which Brolgan Road passes. The required urban and landscape outcomes are described in the Delivery Plan, the proposal REF and the BC (refer **section 1.2**). This chapter describes how the landscape management will contribute to achieving the desired urban and landscape outcomes.

The landscape works to be carried out as part of the proposal will take years and possibly decades to fully develop as the new vegetation becomes established and matures. Consequently, the landscape will need to be monitored and managed throughout the establishment period as well as over the longer term in order to realise the landscape vision for the Parkes SAP.

The Brolgan Road corridor is to be managed in a manner that promotes the most cost effective and consistent maintenance of the roadside landscape elements and vegetation installed as part of the proposal. The primary approach is to encourage the establishment of local native plant species and focus on the more dominant and important species within the project. This has the intended outcome of maximising the performance and appearance of the upgrade works, particularly at interchanges (gateways) and major structures such as the eastern and western bridges.

Landscape management covers the period commencing from completion of construction works, and includes the initial landscape management by the construction contractor as well as long term landscape management after responsibility is transferred to PSC. A Landscape Management Plan (LMP) will be prepared and will outline the management actions required to be undertaken. Typical maintenance activities are outlined in **section 6.6.1**.

The landscape management for the project needs to be developed in response to the strategies and principles for site clearing and revegetation strategies which form a key part of this UDLP and informs the Construction Environmental Management Plan (CEMP). This ensures a complete system of revegetation focused on long-term outcomes and minimal maintenance inputs.

### 6.6.1. LANDSCAPE MAINTENANCE

Maintenance activities will be required for all landscaped areas, including the roadside, embankments, intersections including the Primary Gateway roundabout island and shared paths, where visibility and safety for all users (vehicles, cyclists and pedestrians) needs to be ensured. Maintenance activities are also important for less accessible areas such as drainage swales, culverts and detention basins to ensure a high quality address for the entire Parkes SAP.

Landscape management will take account of the different treatments used to implement the landscape works, which include:

- Revegetation by application of site specific seed mixes
- Planting.

In addition, landscape management must respond to the requirements resulting from the different design treatments applied to:

- Cut batters
- Fill embankments
- Detention basins
- Swales.

Maintenance activities include:

- Management and removal of non-frangible vegetation (trees within clear zones)
- Pruning of vegetation for safety (sight lines, overhanging branches, clearance to fencing etc)
- Control of weeds
- Rubbish removal
- Pest and disease control
- Watering during establishment
- Replacement planting and /or reseeding due to failure.

Thinning operations will be carried out where necessary to reduce the density of vegetation or restore the required balance of plant species in particular areas of revegetation.

### 6.6.2. WEED MANAGEMENT

Invasive weeds are required to be removed in accordance with the *Biosecurity Act 2015*. In NSW all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. As part of this process invasive weeds may be listed as one of the following:

- Weeds of national significance
- National environmental alert list weeds
- Water weeds
- Native plants considered weeds
- Plants not to be sold in all or parts of NSW.

The various listings have different requirements on the management of the plant. Once identified within the corridor the management of an invasive weed should be undertaken in accordance with the requirements.

### 6.6.3. MANAGEMENT OF REHABILITATED AREAS

**Existing Natural Plant Communities**

Several native PCTs are found in the proposal area (refer **section 2.1.4**). Ongoing management of natural areas undergoing rehabilitation shall include:

- Inspections for damage or die-back of previously undisturbed existing natural vegetation
- Monitoring for damage and erosion of previously undisturbed topsoil

- Remediation measures shall include replacement of native plant losses.

The remediation measures will be effectively monitored to confirm die-back losses have been minimised and managed and erosion control of rehabilitation areas has been achieved.

### 6.6.4. SOIL CONDITIONS

Unsatisfactory vegetation growth and plant death may result from poor soil conditions that may include nutrient deficiencies or physical condition of the soil i.e compaction. Testing of soil and plant material will be required to determine the cause of the problem and identify appropriate remediation measures to be implemented (refer **section 6.1.1**).

Acid-sulphate soils may be encountered as part of the construction process. This will be managed as part of an acid sulphate soil management plan in accordance with legislative requirements. It is not anticipated that this would have an ongoing impact on the forming landscape.

**Disease and Fungal Issues**

In some situations plant die back may result from the spread of root pathogens such as *Phytophthora cinnamomi*. If testing confirms the presence of this pathogen then a Threat Management Plan is to be prepared to protect threatened species and ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the NSW *Biodiversity Conservation Act 2016* (BSC Act) and other native PCTs.

A Threat Management Plan would include:

- Strategies to prevent the pathogen from spreading into areas that are not infected
- Strategies to reduce the impacts in infested areas
- Recovery actions for the conservation of biodiversity assets currently being affected

The management activities will be monitored to confirm that effective control has been achieved.

### 6.6.5. BUSHFIRE MANAGEMENT

Bushfire management within the corridor is to be coordinated with the relevant Rural Fire Services (RFS). Access tracks used by fire fighting vehicles will be maintained to ensure they are trafficable at all times. Where necessary the level of fuel will be reduced in collaboration with the RFS.

## 6.7 PROCEDURES FOR REMEDIATION OF DAMAGE AND FAILURES

### 6.7.1. FLOOD DAMAGE

Landscape works may be subject to damage by flooding, particularly scouring on cut slopes and fill embankments, within swales and detention basins and near culvert inlets and outlets. Landscape management will include a procedure for inspections following flooding to identify areas of landscape damage, with particular attention given these high risk areas.

Remediation works are to be carried out immediately in order to avoid further damage and to restore the ecological and visual function of the area. Planning and implementation of the remediation works will aim to ensure the landscape outcomes are in accordance with the relevant BC and as described throughout this UDLP.

### 6.7.2. SLOPE FAILURE

In situations where vegetated slopes fail and surface soil and vegetation are damaged, the remediation works are to include revegetation with the same species mix as applied in the initial landscape works. Details of the slope treatment, including subsoil preparation, top soil depths, surface treatment, seed application method and drainage are to be reviewed and modified if necessary to avoid the risk of future slope failure.

### 6.7.3. VEGETATION PESTS & DISEASE MANAGEMENT

Regular inspections of the landscape works are to include identification of any outbreaks of pests or disease. Where necessary samples are to be collected and sent for testing to confirm the pest species or type of disease. A program of control based on recommendations of the testing organisation is to be implemented and monitored to confirm effective control has been achieved.

### 6.7.4. CLIMATE CHANGE

Climatic conditions are expected to change over the establishment period and throughout the subsequent decades over which the landscape matures. The combination of changing rainfall patters and temperature regimes together with changes in storm event frequency and severity may have implications for the suitability of some plant species and vegetation communities within the proposal.

The implications of climate change for the health and viability of vegetation communities and their habitat function will need to be monitored and reviewed over time. This may benefit from the involvement of a qualified ecologist who has local knowledge and relevant expertise in this field.

Severe drought conditions have the potential to result in a substantial number of plant deaths, particularly during the establishment period. A comprehensive assessment is to be carried out during periods of severe drought to identify dead or dying vegetation. If it is apparent that a particular species has suffered significantly higher death rates then the option of replacing the species is to be discussed with an ecologist to ensure there will be no significant impact on habitat values of site. Revegetation will generally be carried out with the same mix of species as the original landscape works.

## 6.8 BUILT ELEMENTS MAINTENANCE

Policy regarding maintenance of built elements (bridges, retaining walls and such elements) is provided by the TfNSW (Roads and Maritime) Infrastructure Maintenance Program. Information about the Policy is available online at:

*http://www.rms.nsw.gov.au/projects/key-build-program/maintenance/index.html*

Maintenance of built elements that are specific to the proposal is dealt with in the Maintenance Access Strategy for the project and will be monitored by RGDC in conjunction with PSC.

Specific durability requirements and respective maintenance and monitoring actions for built elements will be summarised by the structural designers, in accordance with the current structural design approach and outcomes.

## 6.9 MONITORING PROCEDURES

### 6.9.1. MONITORING PHASES

Monitoring of the landscape works will commence from the time of installation and extend until maintenance responsibilities for various portions of the proposal are handed over to PSC.

Monitoring will be carried out in two phases:

- Initial maintenance period – monitoring to assess the trajectory of the outcomes after approval of the work until practical completion; the purpose is to enable timely intervention or corrective actions if required to ensure vegetation growth
- Post-completion and pre-handover period – monitoring will continues for a period of three years from practical completion; the purpose is to ensure that each landscape area has reached a condition that indicates a high probability that the intended mature outcome will be achieved in the longer term and the area is in a condition to be handed over to Roads and Maritime or to a the relevant Council, even if the landscape is semi-mature.

Further details of the monitoring requirements will be included in the LMP prepared for the proposal.

### 6.9.2. MONITORING PROGRAM

The monitoring program will include:

- Monthly audit using Score Card Method
- Quarterly (3 monthly) assessments using a Landscape Functional Analysis process involving a series of transects
- Annual reporting on the monitoring program outcomes together with recommendations for any required actions.

Monitoring will be carried out by an Assessment Group at predetermined locations. The timing of the assessments will take into account the period since completion of the works and the landscape type. It is expected that some areas will need longer monitoring periods due to the vegetation type and method of establishment.

**Monitoring Procedures and Performance Indicators**

Monitoring procedures will be adopted to assess if the revegetation has achieved an acceptable standard as measured against defined benchmarks. These benchmarks essentially link to the design intent as outlined in this report, the precinct planning documents (including the Delivery Plan) and planning approvals (including the REF) and will be assessed at regular intervals throughout the management of the road corridor.

The indicators will include the answers to questions such as:

- Is the landscape stable: has it achieved full vegetative cover?
- Is the landscape structure consistent with the expectations of the design intent, commensurate to the period of growth?
- Does weed growth represent a risk to the achievement of the design intent?

Areas of landscape that have failed will be clearly identified and the nature of the failure documented, followed by the development and adoption of a remediation strategy.

Based on the results of the monitoring program, appropriate remedial action will be determined and implemented until vegetation has stabilised and the required standard of landscape finish is achieved.

## 6.10 MANAGEMENT RESPONSIBILITIES

### 6.10.1. LANDSCAPE MANAGEMENT RESPONSIBILITIES

The construction contractor will be responsible for the initial management period that will extend for one year after completion of the proposal works. At the end of the initial management period responsibility for various components of the proposal will be transferred to following organisations:

PSC:

- Main alignment corridor
- Local roads and roundabouts
- Shared paths and associated margins
- Rest stops
- Swales and detention basins.

Service/utility providers:

- Corridors and easements for access to power, water and communications infrastructure that may have vegetation clearance requirements will be coordinated with landscape management along the road corridor.

**LANDSCAPE MANAGEMENT STAFF**

A landscape management team will be established and led by a suitably experienced manager. All members of the team will be required to have the necessary knowledge and skills to effectively carry out the various landscape management tasks for which they are responsible.

Training will be carried out where necessary to ensure all members of the landscape management team have a clear understanding of the intended outcome of the landscape revegetation program. In addition, all field staff will receive training as necessary to ensure they can recognise weed species as well as native species that form part of the revegetation program.

The landscape management team will seek advice from a revegetation specialist as necessary to address specific issues. The landscape management team will also obtain advice from suitably qualified ecologists who will provide specific advice on the coordination of landscape management activities with the various Threatened Ecological Communities (refer **section 2.1.4**).

# CHAPTER 7
## REFERENCES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Baseline Conditions