M1 Pacific Motorway Extension to Raymond Terrace:

Heatherbrae Bypass

Design and Landscape Plan

SEYMOUR WHYTE

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Cover: Aerial view of Heatherbrae, looking south
(Artist impression. Landscape shown at full maturity.)

M1 Pacific Motorway Extension to Raymond Terrace:

Heatherbrae Bypass

Design and Landscape Plan

Design Package Number: DU-01
Document Number: M1RTHB-SEYWC-6003-LA-PLN-000001
Revision Number: C
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A	04 August 2023	Submission to TfNSW & IC for Review	KR/ME	MV	KR
B	04 September 2023	For Consultation	KR/ME	MV	KR
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Prepared for:

NSW GOVERNMENT Transport for NSW

By:

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Terms and abbreviations

BH2T
Black Hill to Tomago

BR#
Bridge #

CEMP
Construction Environmental Management Plan

CH#
Chainage #

CoA
Conditions of Approval

CPTED
Crime Prevention Through Environmental Design

CSSI
Critical State Significant Infrastructure

D&C
Design and Construct

DLP
Design and Landscape Plan

DPE
NSW Department of Planning and Environment

EEC
Endangered Ecological Community

EIS
Environmental Impact Statement

ER
Environmental Representative

HB
Heatherbrae Bypass

HDG
Hot-dipped galvanised

ISC
Infrastructure Sustainability Council

ITS
Intelligent Transport System

JHGAJV
John Holland Gamuda Australia Joint Venture

LCZ
Landscape Character Zone

LEP
Local Environmental Plan

LGA
Local Government Area

LMP
Landscape Management Plan

M12RT
M1 Pacific Motorway Extension to Raymond Terrace

Motorway
M1 Pacific Motorway

NB
Northbound

NRAR
Natural Resources Access Regulator

NTS
Not to Scale

NSW
New South Wales

O and M
Operations and Maintenance

PCT
Plant Community Type

PHUDF
Pacific Highway Urban Design Framework

REMMs
Revised Environmental Management Measures

RMP
Rotational Moulded Panels

RMS
Roads and Maritime Services (now Transport for NSW)

SB
Southbound

SME
Subject Matter Expert

SWTC
Scope of Works and Technical Criteria

TEC
Threatened Ecological Communities

TfNSW
Transport for NSW

WGT
Worimi Green Team

WSUD
Water Sensitive Urban Design

Artist impression
Illustrates the overall design intent shown is indicative only.

Landscape shown at full maturity
Refers to landscape shown at 15 years.

The Project
M1 Pacific Motorway Extension to Raymond Terrace: Hetherbrae Bypass

Compliance matrix

Transport for NSW (TfNSW) has received approval to construct and operate a new 15 kilometre M1 Pacific Motorway Extension from Black Hill to Raymond Terrace within the Newcastle City Council and Port Stephens Council local government areas. The new extension known as the M1 Pacific Motorway Extension to Raymond Terrace (M12RT) was declared to be a Critical State Significant Infrastructure (CSSI) and received planning approval from the NSW Minister of Planning on 8 November 2022 and the Federal Minister for the Environment and Water on 13 February 2023, following the definition of the Environmental Impact Statement (EIS).

The M12RT will be delivered as follows:

– Stage 1: Southern Package - Black Hill to Tomago (BH2T), delivered by the John Holland Gamuda Australia Joint Venture (JHGAJV)

– Stage 2: Northern Package - Heatherbrae Bypass (HB), delivered by Seymour Whyte.

Seymour Whyte has been appointed by TfNSW for the Design and Construct (D&C) contract for Heatherbrae Bypass (the Project), which involves the design and construction of 5 kilometres of dual carriageway with two lanes in each direction, with an interchange at Raymond Terrace.

Stage 1 and Stage 2 will be constructed concurrently. The Staging Report has been endorsed by the Environmental Representative (ER) and has been submitted to the Planning Secretary for information.

This Design and Landscape Plan (DLP) document illustrates the Northern Package only and is referred to as the Project in this document. The Southern Package has been prepared as a separate document.

This DLP has been prepared to meet the relevant Conditions of Approval (CoA) and Revised Environmental Management Measures (REMMs) conditions outlined in the:

– Conditions of Approval for M1 Pacific Motorway Extension to Raymond Terrace SSI-7319 - Instrument of Approval 8 November 2022

– Revised Environmental Management Measures - M1 Pacific Motorway Extension to Raymond Terrace, Appendix K of Submissions Report, June 2022.

The DLP will be submitted to the Planning Secretary for approval no later than one month before the construction of permanent built surface works and/or landscaping in the area to which the DLP applies. Unless otherwise agreed with the Planning Secretary, construction of permanent built work or landscaping that are the subject of this DLP will not be commenced (in the area to which this DLP applies) until the DLP has been approved by the Planning Secretary.

The following compliance matrix tables provide a document reference for where the various CoAs and REMMs can be found in the document. The two packages have been developed to have consistent design philosophy which provides an integrated urban design outcome for both sections to deliver the objectives and principles of the approved Planning documents.

Conditions of Approval (CoA)

Table 1: CoA compliance matrix

CODE		CONDITIONS	REFERENCE IN REPORT
Evidence of Consultation			
A8		Where the terms of this approval require consultation to be undertaken, evidence of the consultation undertaken must be submitted to the Planning Secretary and ER (as relevant) with the corresponding documentation in accordance with the consultation procedures set out in the Communication Strategy required by Condition B1. The evidence must include:	
	(a)	documentation of the engagement with the identified party in the condition of approval that has occurred before submitting the document for approval;	Chapter 1.6
	(b)	a log of the dates of engagement or attempted engagement with the identified party;	Chapter 1.6
	(c)	documentation of the follow-up with the identified party where engagement has not occurred to confirm that they do not wish to engage or have not attempted to engage after repeated invitations;	Chapter 1.6
	(d)	outline of the issues raised by the identified party and how they have been addressed; and	Chapter 1.6
	(e)	a description of the outstanding issues raised by the identified party and the reasons why they have not been addressed.	Chapter 1.6
		Note: The Communication Strategy required by Condition B1 should be used in conjunction with Condition A8 to determine the level consultation and evidence required that is proportionate to the activity that will be undertaken.	
Staging			
Staging the delivery of the CSSI			
A9		The CSSI may be constructed and operated in stages (including but not limited to temporal, location or activity-based staging). Where staged construction and/or operation is proposed, a Staging Report (for either or both construction and operation as the case may be) must be prepared. The Staging Report must be endorsed by the ER and then submitted to the Planning Secretary for information no later than one month before the commencement of construction of the first of the proposed stages of construction (or if only staged operation is proposed, one month before the commencement of operation of the first of the proposed stages of operation). Note: Unless otherwise specified in this approval, early works are a stage of construction unless considered to be Low Impact Work.	Page d

CODE		CONDITIONS	REFERENCE IN REPORT
Lighting and Security			
E19		The CSSI must be constructed and operated with the objective of minimising light spillage to surrounding properties. All lighting associated with the construction and operation of the CSSI must be consistent with the requirements of AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting and relevant Australian Standards in the series AS/NZ 1158 – Lighting for Roads and Public Spaces. Additionally, the Proponent must provide mitigation measures to manage any residual night lighting impacts to protect properties adjoining or adjacent to the CSSI, in consultation with affected landowners.	Chapter 6.8
Design Outcomes			
E21		The design and landscape outcomes of the CSSI must be:	
	(a)	informed by Appendix O of the Environmental Impact Statement as listed in Condition A1(a), including but not limited to the objectives and design principles, requirements, and opportunities;	Chapter 3.2
	(b)	prepared in consultation with the community (including the landowners whose visual amenity is directly or indirectly impacted and businesses or a representative of the businesses), LALCs, RAPs and relevant council(s); and	Chapter 1.6
Design and Landscape Plan			
E23		A Design and Landscape Plan (DLP) must be prepared to document and illustrate the permanent built works and landscape design of the CSSI and how these works are to be maintained. The DLP must inform the final design of the CSSI and give effect to the outcomes and commitments documented in by Condition A1. The Plan does not apply to work which, for technical, engineering, or ecological requirements, or other requirements as agreed by the Planning Secretary, does not allow for alternative design outcomes.	M1RTHB-SEYWC-6003-LA-PLN-000001 (This document)
E24		The DLP must be:	
	(a)	prepared by a suitably qualified and experienced person(s) in urban and landscape design and (where required) bush regeneration;	Chapter 1.3
	(b)	prepared in consultation with relevant councils and the community, including affected landowners and businesses;	Chapter 1.6
	(c)	submitted to the Planning Secretary for approval no later than one month before the construction of permanent built surface works and/or landscaping in the area to which the DLP applies; and	Chapter 1.6

CODE		CONDITIONS	REFERENCE IN REPORT
	(d)	implemented during construction and operation of the CSSI unless that asset has been transferred to the relevant authority, or equivalent and they have agreed that implementation of the DLP is not required for that asset.	Chapter 1.6
		Note: The DLP may be developed and considered in stages to facilitate design progression and construction. Any such staging and associated approval would need to facilitate a cohesive final design and not limit final design outcomes	
E25		The DLP must document how the following matters have been considered in the design and landscaping of the project:	
	(a)	the requirements of Conditions E20 to E22;	Chapter 1.6 (E21) Chapter 3.2 (E21) E20 & E22 - N/A
	(b)	demonstrate compliance with Bridge Aesthetics: Design Guidelines to improve appearance of bridges in NSW (Transport for NSW, 2019);	Chapter 6.3
	(c)	demonstrated integration of Crime Prevention Through Environmental Design principles; and	Chapter 6.7
	(d)	Designing with Country and the principles and objectives of the draft Connecting with Country Framework.	Chapter 4.2
E26		The DLP must include, but not be limited to:	
	(a)	the design of the permanent built elements of the CSSI including their form, materials and detail, with a focus on high quality bridge design (for the Hunter River viaduct), and integrated art	N/A
	(b)	the design of the project landform and landscaping elements (including visual screening requirements);	Chapter 5 Chapter 6.2 Chapter 6.12 Chapter 6.13
	(c)	details of strategies to rehabilitate, regenerate or revegetate disturbed areas with priority given to the use of local native species;	Chapter 6.12 Chapter 6.13
	(d)	landscaping outcomes agreed to under Condition E20;	N/A
	(e)	details of how Aboriginal and non-Aboriginal heritage interpretation and public art are incorporated within the design of built features (such as noise barriers, viaduct), having regard to the results of any archaeological investigations;	Chapter 4.2 Chapter 6.4
	(f)	developed visualisations, cross sections and plans showing the proposed design outcome; and	Chapter 5 Chapter 6
	(g)	management and routine maintenance standards and regimes for design elements and landscaping work (including adequate watering of plants following planting depending on forecast weather conditions and including weed management) to ensure the success of the design and landscape outcomes.	Chapter 6.11
E27		Unless otherwise agreed with the Planning Secretary, construction of permanent built work or landscaping that are the subject of the DLP must not be commenced (in the area to which the DLP applies) until the DLP has been approved by the Planning Secretary.	Chapter 1.6
Operational Maintenance			
E28		The ongoing maintenance and operation costs of urban design, open space, landscaping and recreational items and work implemented as part of this approval remain the Proponent's responsibility until satisfactory arrangements have been put in place for the transfer of the asset to the relevant authority. Before the transfer of assets, the Proponent must maintain items and work to at least the design standards established in the DLP required by Condition E26.	Chapter 6.11

Revised Environmental Management Measures (REMMs)

Table 2: REMMs compliance matrix

IMPACT	REFERENCE	ENVIRONMENTAL MANAGEMENT MEASURE	REFERENCE IN REPORT
Urban design and visual amenity			
Landscape character and visual impacts including during construction	UD01	An Urban Design and Landscape Plan (UDLP) will be prepared to support the project. The plan will present an integrated urban design for the project, providing practical detail on the application of design principles and objectives identified in the EIS. The plan will include:	M1RTHB-SEYWC-6003-LA-PLN-000001 (This document)
		- Location and identification of existing vegetation and proposed landscaped areas, including species to be used	Chapter 5
		- Built elements including retaining walls, bridges and noise barriers	Chapter 6.3 Retaining walls and noise barriers - N/A
		- Walking and cyclist elements including footpath locations, paving types and pedestrian crossings	N/A
		- Fixtures such as lighting, fencing and signs	Chapter 6.8 Chapter 6.9 Chapter 6.10
		- Details on the staging of landscape work including related environmental controls such as erosion and sedimentation controls and drainage	Chapter 6.13
		- Procedures for monitoring and maintaining landscaped or rehabilitated areas	Chapter 6.13
		- The project will consider CPTED principles during detailed design to minimise safety and security risks to all users and communities in the study area. The project will carry out CPTED reviews a teach milestone by a qualified professional. Additional recommendations as a result of reviews will be implemented where reasonable and feasible	Chapter 6.7
		- Water sensitive urban design solutions.	Chapter 1.5
		The plan will be prepared in accordance with Transport urban design policy guidelines including:	
		- Beyond the Pavement – Urban design approach and procedures for road and maritime infrastructure planning, design and construction (Transport for NSW 2020a)	Chapter 1.5
		- Landscape design guideline: Design guideline to improve the quality safety and cost effectiveness of green infrastructure in road corridors (Roads and Maritime Services 2018a)	Chapter 1.5
		- Bridge Aesthetics: Design Guidelines to improve appearance of bridges in NSW (Transport for NSW 2019a)	Chapter 1.5
		- Noise wall design guideline: Design guideline to improve the appearance of noise walls in NSW (Transport for NSW 2016a)	N/A
		- Shotcrete Design Guideline: Design guidelines to avoid, minimise and improve the appearance of shotcrete in NSW (Transport for NSW 2016b)	N/A
	UD02	Disturbed areas outside the operational footprint and within the construction footprint will be revegetated following completion of construction activities.	Chapter 5
	UD03	Cut batters and fill embankments for the project will be designed to allow revegetation to assist with the integration of the project into the surrounding landscape where possible depending on site conditions.	Chapter 5
	UD04	Project construction elements such as fencing and hoardings will be designed to minimise impacts to landscape character and visual amenity where practicable	Chapter 6
Aboriginal cultural heritage	UD06	The project detailed design will incorporate relevant Aboriginal cultural heritage elements of Beyond The Pavement (Transport for NSW 2020a) and Designing With Country (GANSW 2020), where practical.	Chapter 4.2

Figure 1: Raymond Terrace Interchange - aerial view, looking south

Figure 2: BR11 Bridge over Windeyers Creek - aerial view, looking south

Figure 3: Raymond Terrace Interchange - eye level view, looking south

Figure 4: BR11 Bridge over Windeyers Creek - eye level view, looking south

Executive summary

The M1 Pacific Motorway Extension to Raymond Terrace: Heatherbrae Bypass (the Project) forms an integral part of the M1 Pacific Motorway and the A1 Pacific Highway which runs between Sydney and Brisbane, and as such is a critical part of the freight and movement network of New South Wales (NSW). The works represent the final bypass stages of the M1 Pacific Motorway which will result in reduced congestion and conflict with local traffic movements.

The Project is:

- Located 23 kilometres north of Newcastle in the City of Newcastle and Port Stephens Council LGAs.
- Located in close proximity to the Mid North Coast and the coastal regions of Newcastle and Port Stephens.
- A predominantly rural urban area that plays an important role in NSW regional economy.
- Comprises important land uses include manufacturing and industrial areas.
- Located to the east of Heatherbrae skirting the perimeter of its development.

Elements of the Project include:

- A five-kilometre motorway upgrade connecting the southern section of the M1 Pacific Motorway extension to Raymond Terrace.
- One interchange at Raymond Terrace.
- Three bridges including two overbridges (BR10 and BR12) and one creek bridge (BR11) over Windeyers Creek.

The design has been developed to achieve the Project objectives and principles as outlined in the approved Planning documents. The key initiatives include:

1. The reinstatement of the enclosed forest to the east of the alignment.
2. Provision of screening landscape to the west to reduce the visual impact of the Motorway from the community of Heatherbrae.
3. Feature landscape at the northern interchange at Raymond Terrace which provides a distinct character that separates from the adjoining forest communities whilst responding to the Windeyers Creek creekline landscape, which is in close proximity to the interchange.
4. Incorporation of fauna crossings.
5. Incorporation of interpretive elements, developed with Aboriginal artist Saretta Fielding of Saretta Art & Design on the safety screens and in the interchange. The safety screens incorporate visual motifs of objects and symbols of cultural themes identified by Saretta that respond to Country.

Figure 5: Views of BR10 and BR12

Figure 6: Existing character of the Project along Masonite Road

01

1. Introduction

1.1 Purpose

This document has been prepared to meet the relevant Minister's Conditions of Approval (CoA), provided by the Department of Planning and Environment (DPE), dated 8 November 2022. It illustrates the Project's urban design and has been compiled in a report format to provide a holistic understanding of the design and its evolution informed by the contextual analysis and responses developed on the Environmental Impact Statement (EIS) objectives and vision

Transport for NSW's (TfNSW) urban design policy *Beyond the Pavement* – Urban design approach and procedures for road and maritime infrastructure planning, design and construction (TfNSW 2020a and 2021) has been adopted to develop the Project's urban design re-enforcing good design outcomes and providing an integrated approach to this piece of transport infrastructure.

Beyond the Pavement provides an urban design approach to developing the infrastructure-related work that affects the quality of the built, natural and community environment.

1.2 Design methodology

A group of designers including architects, urban designers, landscape designers, art consultants, artist groups from the community and 3D visualisers have prepared this report, working closely with the engineering and construction teams of Seymour Whyte.

Steps included:

- Attending site visits
- Preparing site analysis
- Identifying opportunities for interpretation
- Incorporating the urban design objectives developed in the approved Planning documents
- Developing design strategies based on driver experience, wayfinding and legacy projects
- Preparing a methodology to develop an artwork strategy to incorporate the artwork into the design, as part of the co-design process to provide Connection to Country
- Attending and contributing to ongoing Safety in Design (SiD) workshops and risk workshops covering whole of life design and user interface as part of the detailed design
- Preparing presentations as required (internal and external audiences).

1.3 The team

- Seymour Whyte – Principal Contractor
- WSP – Civil and structural engineers
- Conybeare Morrison (CM^{+}) in association with Tract Consultants – Urban designers and landscape designers
- Saretta Art & Design – Aboriginal artist.

The team has developed the design with inputs and feedback from the community and Transport for NSW (TfNSW) urban design subject matter experts through interim workshop and presentations.

1.4 Document structure

The report identifies the overall design responses and strategies for the Project. Description of individual chapters are as follows:

1. Introduction – This chapter introduces the Project, design methodologies and guideline documents used to inform the design.

2. Contextual Analysis – This chapter includes the contextual analysis at the regional, and local levels and provide their relevance to informing the urban design concept.

3. Urban design objectives – This chapter illustrates the Project vision and provides a statement of objectives, and the principles to achieve the objectives, followed by the urban design strategy.

4. Design narrative – This chapter illustrates the narrative developed for the Project, derived from the findings of the existing conditions, including the methodology to incorporate Connection to Country.

5. Urban design concept plans – This chapter illustrates the urban design and concept plans and sections for the whole Project with references to other components.

6. Design elements – This chapter illustrates the urban design of the various Project components and elements including interchanges, bridges, safety screens, retaining walls, and landscape design.

7. Materials and finishes – This chapter summarises the materials and finishes proposed for the Project design elements.

8. Conclusion – This chapter reinstates the vision, theme and urban design outcomes of the Project.

1.5 Key reference documents

Key reference documents include:

- *M1 Pacific Motorway extension to Raymond Terrace, Conditions of Approval*, Department of Planning and Environment, November 2022
- *M1 Pacific Motorway extension to Raymond Terrace, Environmental Impact Statement*, Transport for NSW, July 2021
- *M1 Pacific Motorway extension to Raymond Terrace, Submissions Report - Appendix K*, Transport for NSW, June 2022
- *Pacific Highway Urban Design Framework 2013*, Roads and Maritime Services, 2013
- *Aboriginal Culture and Heritage Framework*, Transport for New South Wales
- *AS/NZS1158:2020 Lighting for roads and public spaces*, 2020
- *Australian Standard AS4282-2019, Control of the obtrusive effects of outdoor lighting (AS4282)*, 2019
- *Connecting with Country Framework, Good practice guidance on how to respond to Country in planning, design and delivery of built environment projects in NSW, Issue 2*, Government Architect New South Wales, 2023
- *Crime prevention and the assessment of development applications*, DUAP, 2010
- *Greener Places*, Government Architects Office, March 2020
- *Healthy Urban Development Checklist*, NSW Health, 2009
- *Practitioner's Guide To Movement And Place*, Government Architects Office, March 2020
- *Signposting Country, Technical Manual*, Transport for NSW, June 2021
- *Urban Green Cover in NSW*, Technical Guidelines, OEH, 2015.

The design has been developed in accordance with the following TfNSW urban design policy guidelines. References to specific chapters have been provided, where these guidelines have been incorporated. The dates of the guideline documents refer to the versions outlined in the approved planning documents of Condition A1 however updated versions of these documents have also been referred.

- *Beyond the Pavement, Urban Design Policy Procedures and Design Principles*, Centre for Urban Design, Transport for NSW, August 2020 (updated 2021)
- *Bridge Aesthetics: Design guidelines to improve appearance of bridges in NSW*, Transport for NSW, February 2019
- *Landscape Design Guideline: Design guideline to improve the quality,safety and cost effectiveness of green infrastructure in road corridors*, Transport for NSW, December 2018
- *Water sensitive urban design guideline: Applying water sensitive urban design principles to NSW transport projects*, Transport for NSW, May 2017.

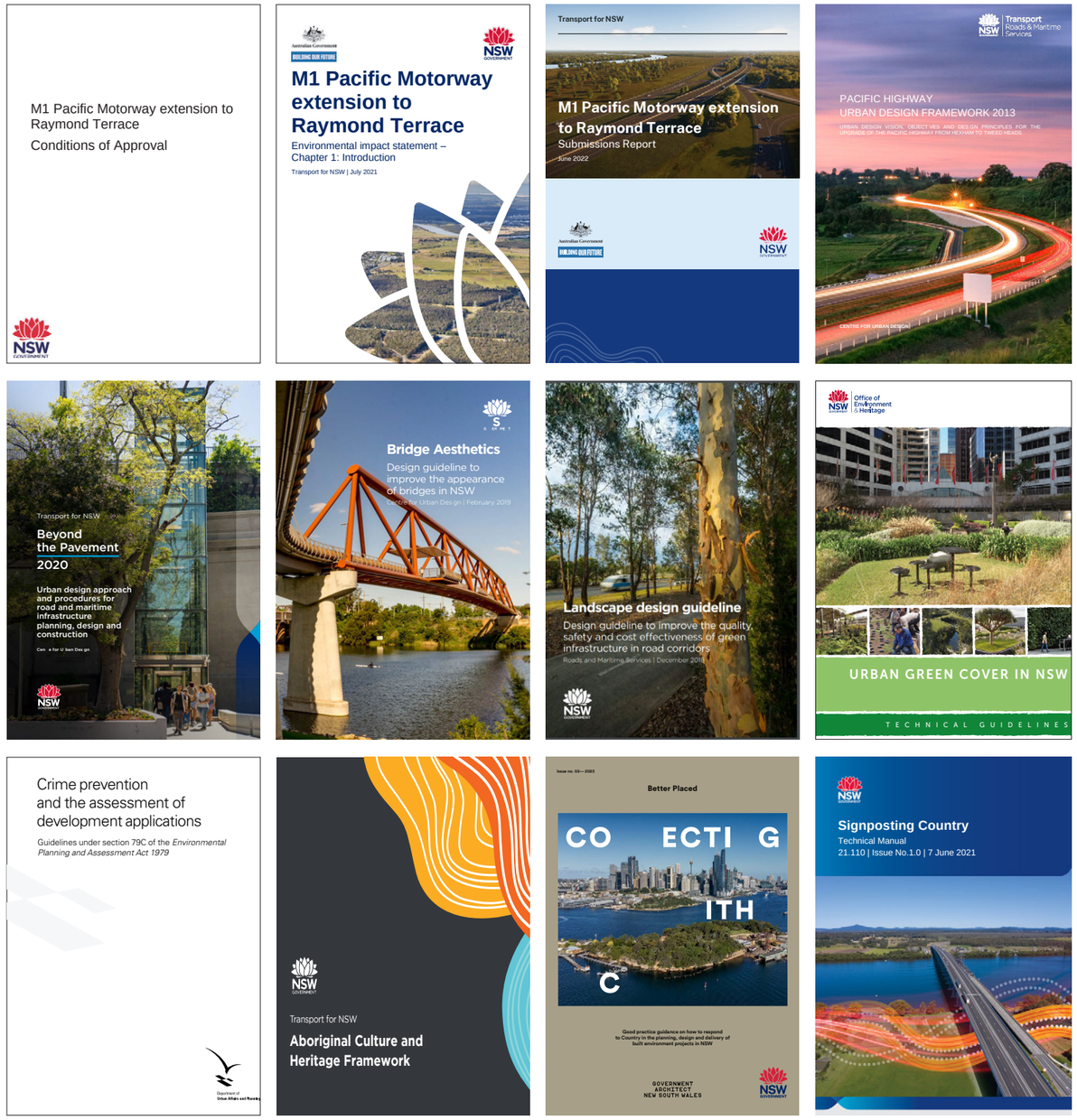


Figure 7: Key guideline documents

1.6 Consultation

Community and stakeholder consultation for the Project has been carried out in accordance with the approved Community Communications Strategy, which identifies key stakeholders, communities, and the methods through which they are consulted. A robust and sustainable consultation strategy has been established as part of the Project. This ensures appropriate levels of consultation to be undertaken to manage expectations and minimise risk as the Project is carried forward.

Seymour Whyte is committed to achieve positive, long term outcomes to work with the community and key stakeholders, including Port Stephens Council, Worimi Green Team, Subject Matter Experts (SMEs) and other agencies. This DLP will be submitted for community display and feedback will be sought from the community.

Feedback from the community and key stakeholders will be officially invited over a period of a four week public display period in September 2023. This will also include ongoing consultation with property adjustment works with affected landowners and businesses. Submissions from the consultation of this DLP will be recorded and collated through a submissions document, separately. The submissions will be assessed and responses to address the comments will be provided separate to the DLP. The responses will include documentation of the consultation details with the identified parties such as a log of the dates of consultation, follow-ups and a description of any outstanding issues and how they have been addressed. A summary of the responses and outcomes of the consultation will be included in the Final DLP, as an evidence of consultation which will be submitted to the Planning Secretary before the document is approved by the DPE.

Methods of consultation include:

- Drop in sessions with Centres in Heatherbrae and Raymond Terrace
- TfNSW's interactive portal and the Project's website and social media
- Distribution of newsletters
- Emails and general correspondence with the key stakeholders, landowners and businesses
- Media releases outlining details of consultation and providing updates
- Door to door knock ins.

The table below outlines the timeline of discussions undertaken with the community and key stakeholders.

	JAN 2023	FEB 2023	MAR 2023	APR 2023	MAY 2023	JUN 2023	JUL 2023	AUG 2023	SEPT 2023	OCT 2023	NOV 2023	DEC 2023
SME Meetings (TfNSW)			x		x		x					
Port Stephens Council			x					x				
Artist Workshops				x	x	x	x	x				

Table 3: Consultation timeline

The DLP will be implemented during construction and operation of the CSSI unless that asset has been transferred to the relevant authority, or equivalent and they have agreed that implementation of the DLP is not required for that asset.

1.7 Infrastructure Sustainability Council (ISC)

The Project is pursuing an 'Excellent' or better rating for both the Design and As-Built stages. The design has been developed in accordance with the Infrastructure Sustainability Council (ISC) technical manual and rating tool, which includes the following design principles related to people and place:

- **People**
  - Comfortability.
  - Vibrancy.
  - Safety.
  - Walkability.
- **Place**
  - Enhancing local economy, environment, and community.
  - Connecting places.
  - Facilitating diverse experiences.
  - Quality and enduring places.

The technical manual also states that good urban and landscape design can contribute to:

- Economic and socio-economic performance – encouraging local businesses and entrepreneurship.
- Attracting people to live in an area, providing affordable housing and travel and providing equitable access to job opportunities, facilities, and services.
- Physical scale, space and ambience – affecting the balance between natural ecosystems and built environments.
- Social and cultural environments – how people interact with each other, how they move around, and how they use a place for variations in rainfall as a result of climate change. This will also reduce the need for operational water requirements via maintenance and will help to ensure the aesthetic of the Project remains consistent long-term.

The main, overarching objective of the urban design ISC category is to achieve contextually appropriate infrastructure design. This is achieved through a collaborative, interdisciplinary approach that is influenced by the local context and creates infrastructure that fits its setting, whilst preserving and enhancing scenic, aesthetic, cultural, community, and environmental resources and values.

The urban design objectives in Section 3.2 of this report reflect the sustainable design principles identified above by ISC:

1. Provide a flowing road alignment that is responsive and integrated with the landscape

This is achieved via the integration of the road corridor with the existing landscape type and characters, which considers different woodland, open floodplain and rural landscapes. This design will contribute to achieving a connection with the surrounding areas and enhances the built environment.

2. Provide a landscaped motorway that integrates with the adjoining natural setting

This is achieved through integrating the road into existing vegetation patterns to maintain the sense of place and help maintain ecological and biodiversity values. The use of vegetation and planting to guide motorists views contributes to the enhancing the scenic quality of the route and character of the landscape. This will enhance, sustain, and improve connectivity with the natural environment.

3. Provide an enjoyable, interesting motorway

Via the use of the elements such as bridges, the Project can provide interesting views of the surrounding landscape for motorists. There are also several opportunities for art and/or interpretive elements to be included in the project which will contribute to celebrating the culture and community of the local area and create a sense of place and identity.

4. Value the communities and towns along the road

Provision of an alignment that will enhance current and future residential, commercial, and industrial development whilst maintaining connectivity of the surrounding communities. Ensuring the connections are safe, convenient, logical via the integration of the principles of Crime Prevention Through Environmental Design (CPTED). The Project will enhance the connectivity of local communities whilst ensuring people feel safe and secure.

5. Provide a simplified and unobtrusive road design

Through the use of simplified elegant design without the visual clutter of the road furniture, the Project will be able to maximise consistency without affecting aesthetic and views of the local area. Measures will also be taken to avoid lighting impact on adjacent land use and natural environment.

This DLP meets the requirements of Urb 1 – Urban design criteria in the ISC IS Version 1.2 Technical Manual with the inclusion of the following items:

- Site analysis and planning – refer to Chapter 2.0
- Vision and objectives – refer to Chapters 3.0, 5.0 and 6.0.

The requirements for Urb 2 – Implementation criteria in the ISC IS Version 1.2 Technical Manual is achieved through the delivery of detailed design and documentation of the design elements illustrated in this DLP. The detailed design process provides documentation until the 'Issued for Construction' stage. The design will then be implemented in construction.

1.8 Climate change

This DLP has incorporated design elements which consider certain aspects of climate change. The design has considered both, the consequences of sea level rise and extended dry periods. The lowland wetland areas are likely to be impacted on sea level rise and have adopted sedgeland species, a key element of the vegetation community. In addition, drought resistant vegetation has been incorporated to accommodate variations in rainfall as a result of climate change. This will also reduce the need for operational water requirements via maintenance and will help to ensure long term consistency of the Project aesthetic.

2. Contextual analysis

2.1 Regional context

The M1 Pacific Motorway Extension to Raymond Terrace: Heatherbrae Bypass (the Project) along with the upgrade from Black Hill to Tomago (delivered by John Holland Gamuda Joint Venture) will form the last missing link of the Pacific Highway upgrade works from Hexham to Tweed Heads. This vision was established as part of the *Pacific Highway Upgrade Framework* prepared in 2004 to provide a seamless high speed roadway between Hexham and Tweeds Heads.

The Project will:

- Provide enhanced access and connectivity.
- Improve flood immunity.
- Reduce congestion and improve freight movement across existing roads and urban centres.
- Complement the visual amenity, character and quality of surrounding environment.
- Improve accessibility and connectivity between communities.
- Enhance visual amenity.

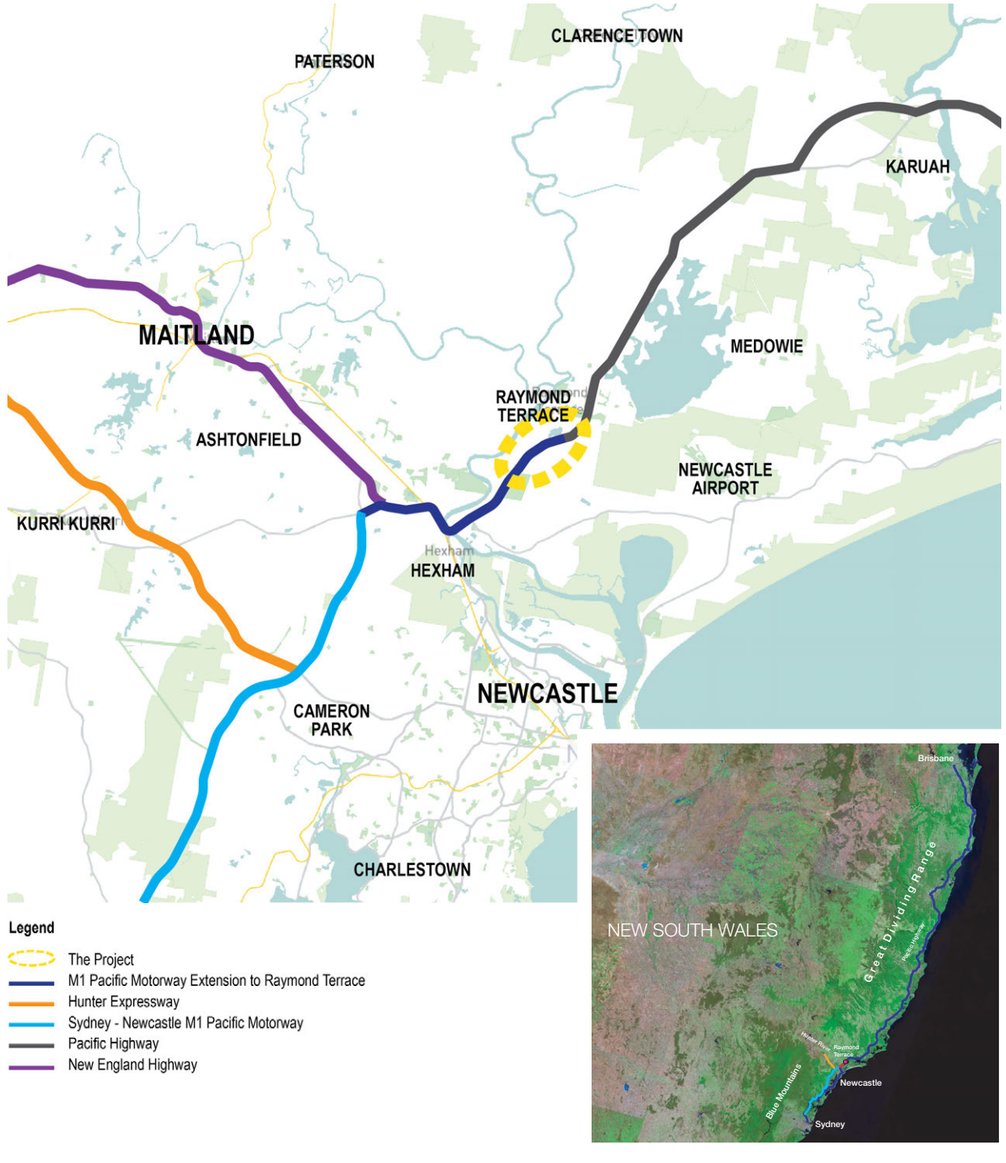


Figure 8: Regional context

2.2 Project context

The Project forms an integral part of the M1 Pacific Motorway which runs between Sydney and Brisbane, and as such is a critical part of the freight and movement network of the state. The works represent one of the final bypass stages of the M1 Pacific Motorway which will result in reduced congestion and conflict with local traffic movements.

The Project is:

- Located 23 kilometres north of Newcastle in the Port Stephens Council LGAs.
- Located in close proximity to the coastal regions of Newcastle, Port Stephens and Hunter Valley region.
- Located in a predominantly rural urban area that plays an important role in NSW regional economy.
- Comprises important land uses include manufacturing and industrial areas.
- Located to the east of Heatherbrae skirting the perimeter of its development.

Elements of the Project include:

- A five-kilometre motorway upgrade connecting the southern section of the M1 Pacific Motorway extension to Raymond Terrace.
- One interchange at Raymond Terrace.
- Three bridges including two overbridges (BR10 and BR12) and one creek bridge over Windeyers Creek (BR11).

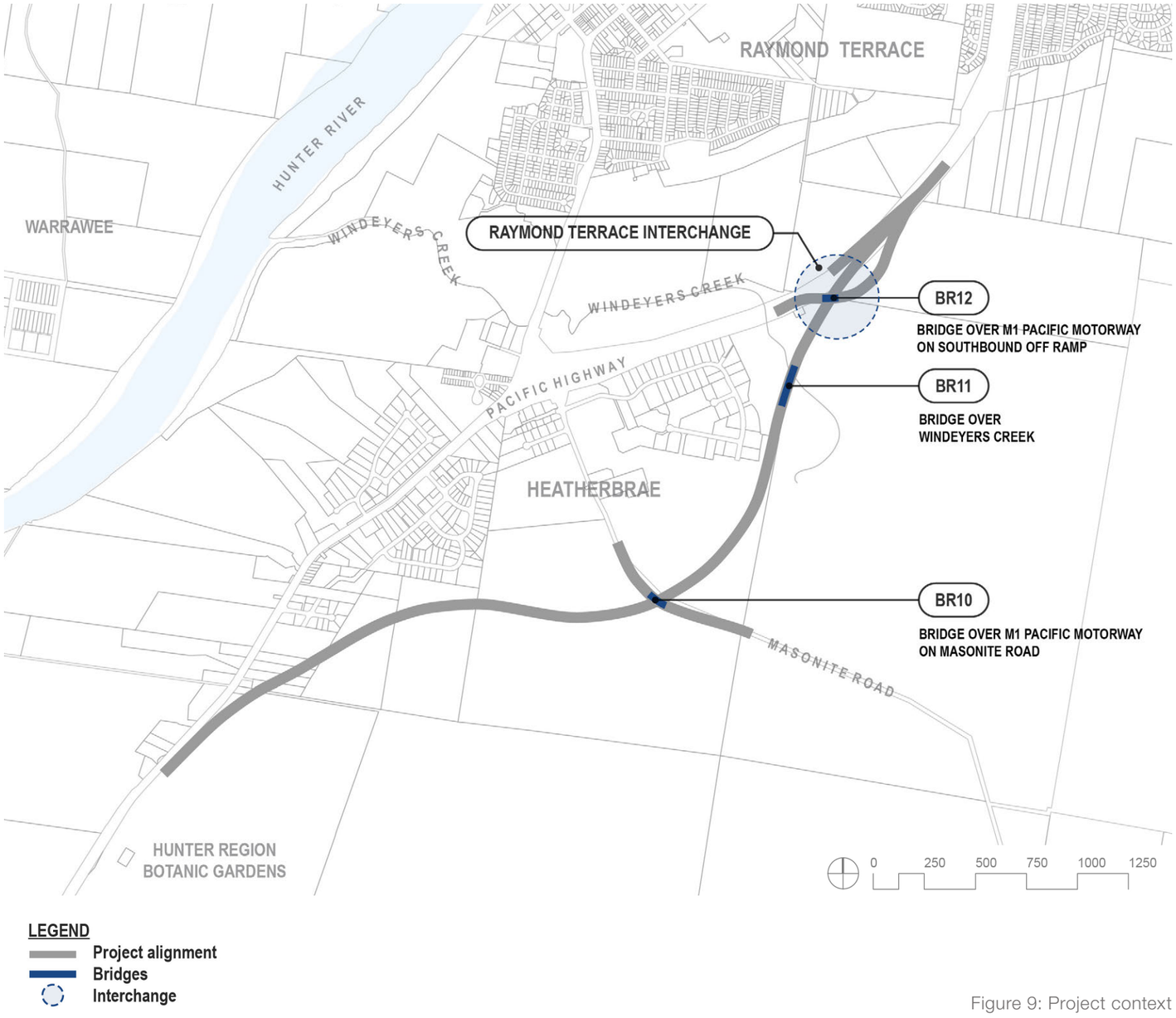


Figure 9: Project context

2.3 Local context

2.3.1 Landform and views

The alignment is strongly influenced by the landform within the landscape. Key to this is both the visibility of the alignment and its structures and their relationship to the landscape that adjoins it.

The site is located in the following NSW Landscape Region:

– **Sydney–Newcastle Barriers and Beaches:** spanning from the Hunter River across the eastern and northern areas of the construction footprint including Raymond Terrace across to the coastal fringe.

Existing characteristics are:

– Hunter River and flat landscape of its wide floodplain dictates landform character.
– Long distance views across landscape due to low-lying floodplain.
– Rising topography at edge of floodplain resulting in views over low-lying areas from, Tomago and Heatherbrae.
– High voltage power lines and Hexham Bridge are visible across low lying and open landscape.
– Views are contained by vegetation cover and built form of Heatherbrae.

Design implications:

– Maintain open views or vantage points over landscape.
– Incorporate low growing vegetation to allow for long distance views in view corridors.

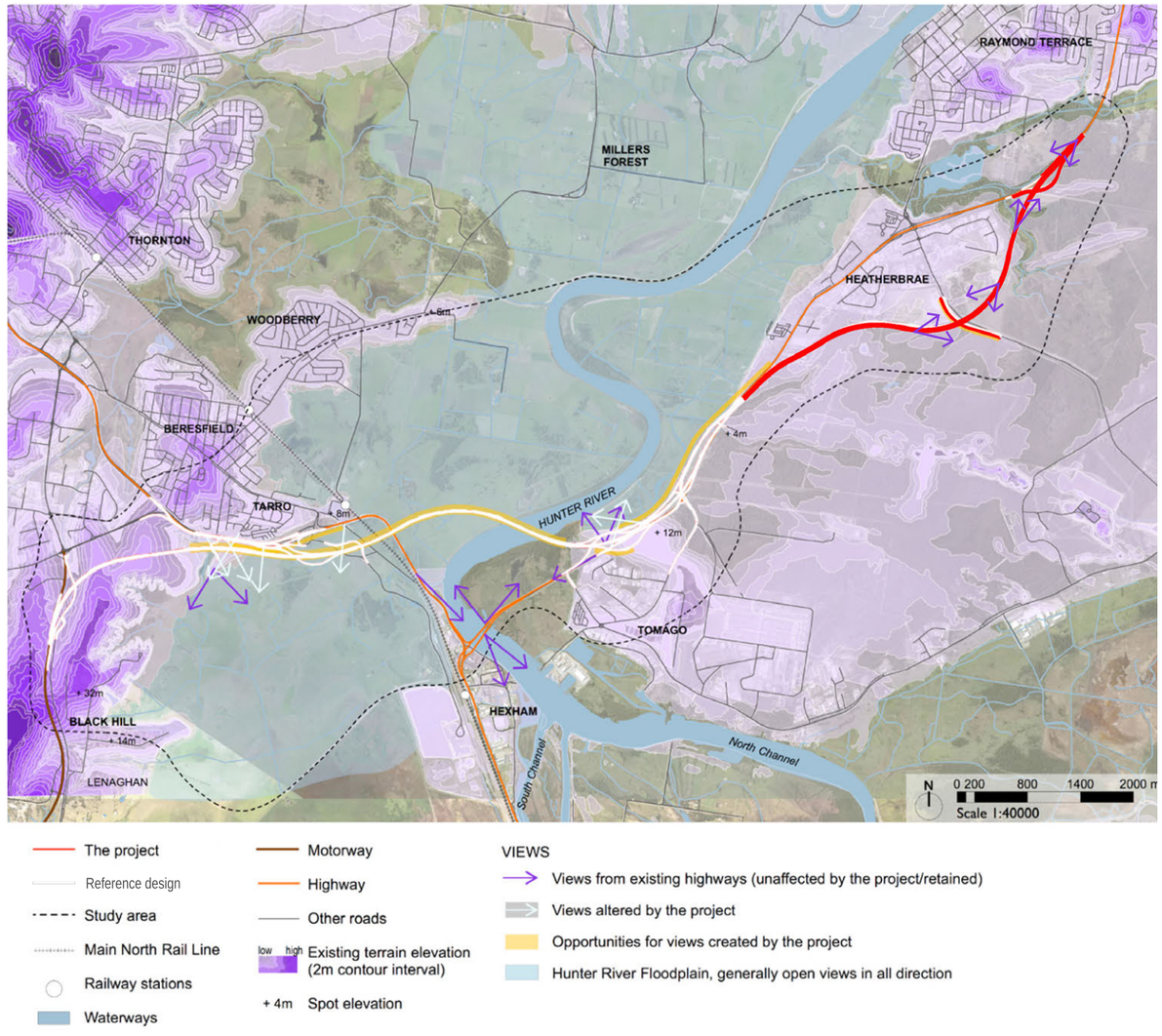


Figure 10: Landform and views (base image from M12RT EIS - Appendix O, June 2021)

2.3.2 Surface water, ground water and flooding

The floodplain has a significant influence in defining the landscape in this region. As a result, surface water and flooding become an integral part of the landscape setting.

Key existing characteristics are:

- The Hunter River catchment is the largest coastal catchment in NSW spans an area of approximately 22,000 square kilometres.
- The Hunter River, Paterson River and Williams River discharge into the Hunter River estuary.
- The catchment is mainly agriculture upstream of Hexham, interspersed by several urban and industrial centres.
- Lower areas of the of the Hunter River are tidal, forming the Hunter River estuary.
- The Hunter River provides year-round fishing aquaculture industries such as oyster farming (Oyster leases are located near Stockton Bridge 13 kilometres downstream from the Project) and prawn trawling (October to May).
- The Hunter River floodplain is a source of importance as its wetlands maintain water quality for rivers and streams.
- Windeyers Creek is an important creekline which bisects the corridor at its northern end.
- The waterways within the study area have been modified to allow for agricultural land and to regulate flooding, including bank stabilisation, bank levees, excavation, channel straightening, and installation of waterway crossings and floodgates.
- Flooding results in road closures, disrupting connectivity between communities and regions.
- Tomago Sandbeds are an important ground and drinking water resource.

Design implications:

- Improve connectivity during flooding is a key driver for the Project.
- Protect existing aquatic systems from pollution and contaminants.
- Provide a flood immunity solution that enhances the experience of the floodplain environment.

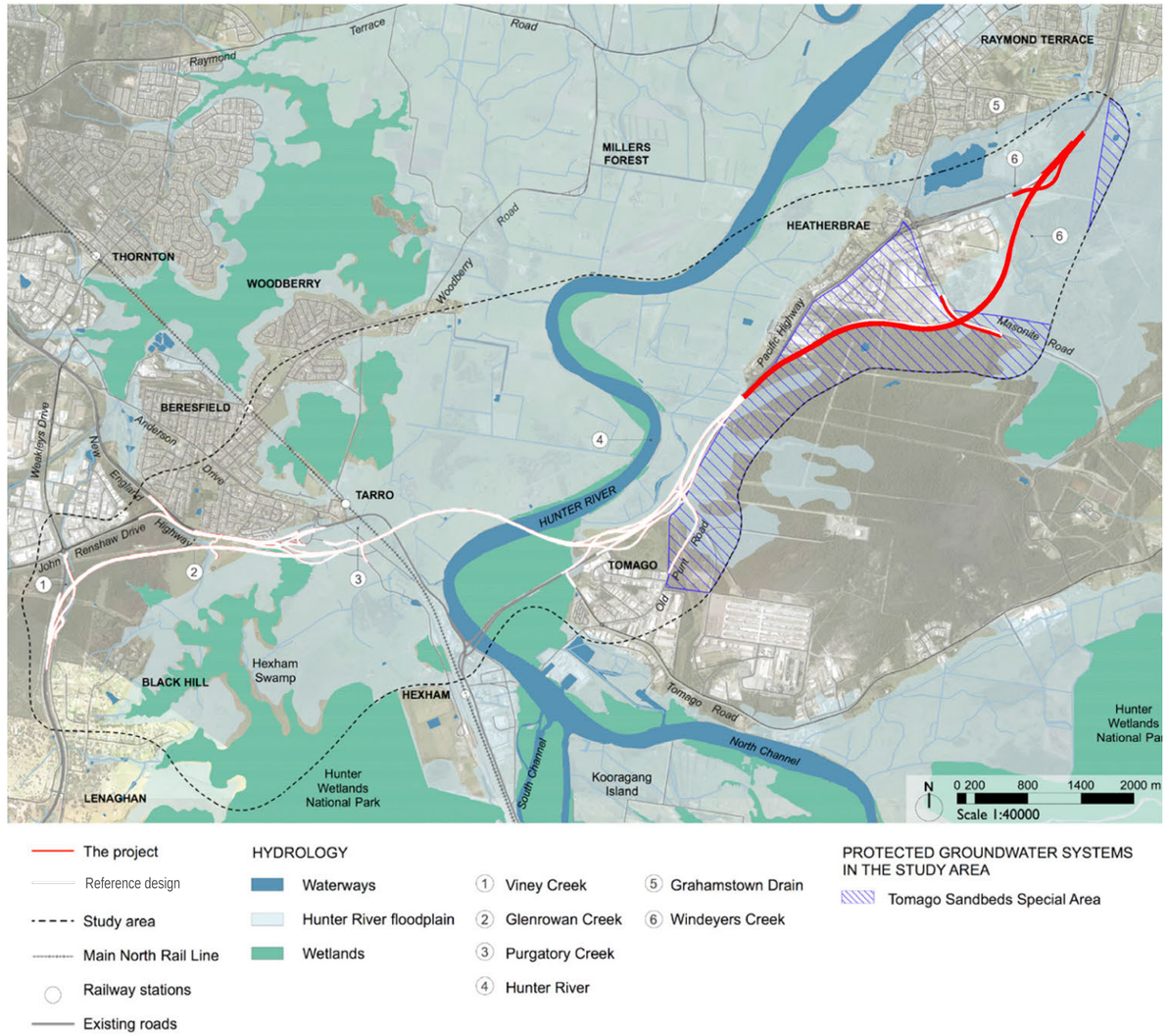


Figure 11: Surface water, ground water and flooding (base image from M12RT EIS - Appendix O, June 2021)

2.3.3 Vegetation

Vegetation is an important defining element of the landscape, distinguishing both land use and landform. Key elements of the vegetation community include the following:

- Higher grounds typically have open forests and woodlands.
- Mangroves, salt marsh and freshwater wetlands are located near the Hunter River.
- Agricultural lands within the floodplain include pasture grasses.

The following key communities have been identified as having a significant interface with the corridor and as a result play an important role in defining its character:

1. Smooth-barked Apple - Blackbutt – Old Man Banksia woodland on coastal sands of the Central and Lower North Coast (Plant Community Type (PCT) 1646).
2. Smooth-barked Apple - Red Mahogany – Swamp Mahogany - Melaleuca sieberi healthy swamp woodlands of coastal lowlands (PCT1649).
3. Jointed Twig-rush sedgeland (PCT 1742).
4. Broadleaved paperbark, swamp mahogany – swamp oak, saw sedge swamp forest of the Central Coast and Lower North Coast (PCT 1717).

In addition to these natural communities the presence of pine plantations through the area through which the corridor passes also plays a significant role.

Biodiversity and plant communities:

- Fourteen plant communities have been noted in the overall M1 Pacific Motorway Extension to Raymond Terrace project's footprint including some Threatened Ecological Communities (TEC) (found across forest/ woodland and wetland areas).

Design implication:

- Maximise the integration of the landscape design with existing PCT enhancing biodiversity.

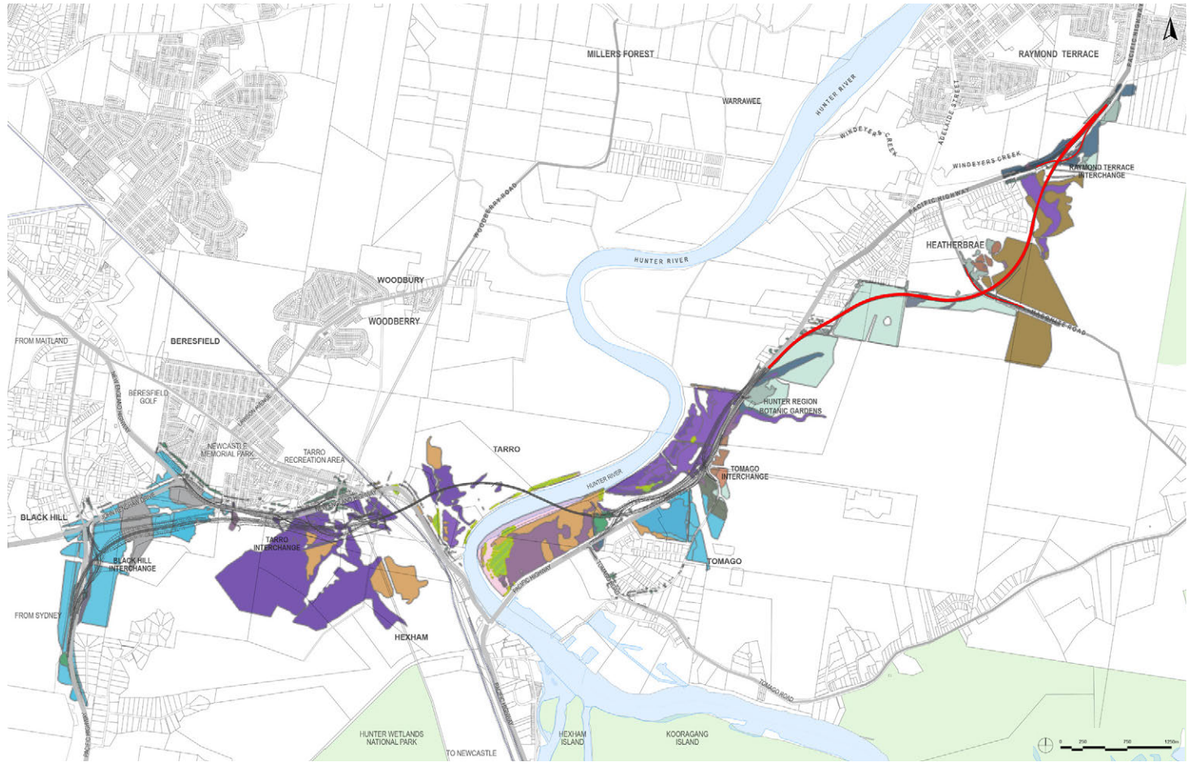


Figure 12: Vegetation (source: GIS)

2.3.4 Fauna

The fauna present reflect the vegetation and aquatic communities present.

Key existing characteristics area

- The wetlands provide homes for many land and water based mammals, birds, reptiles, amphibians and fish.
- The Project houses many threatened species including bats, flying foxes, gliders, and owls.

Design implications:

- Establish an understanding of animal movement throughout the site.
- Provide foraging areas and complement habitats to support existing habitat.
- Provide structures to facilitate and manage movement of various animal via provision of crossing and fencing.

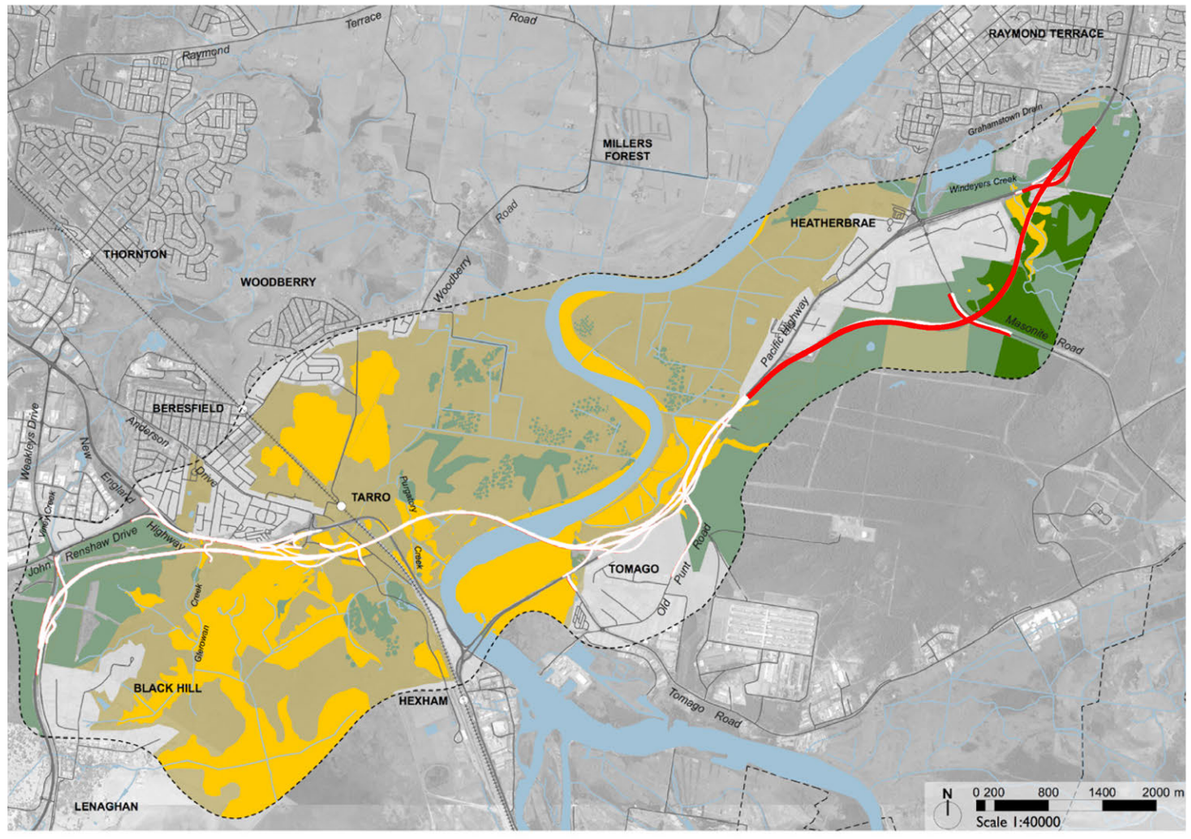


Figure 13: Fauna (base image from M12RT EIS - Appendix O, June 2021)

2.3.5 Existing land use

The existing land use has a significant influence on the overall character of the place. Current land uses within and adjoining the Project's site include:

- Grazing
- Plantation forestry
- Irrigated cropping
- Animal production
- Horse management.

Urban residential uses include:

- Low density residential
- Community uses such as schools, places of worship and recreation
- Commercial
- Manufacturing and industrial
- Aquaculture industries (fishing, oyster farming, prawn trawling).

Design implications:

- Implement revegetation or screening between sensitive users and the Project in developed areas to mitigate impacts.
- Maintain access and connections between urban areas.

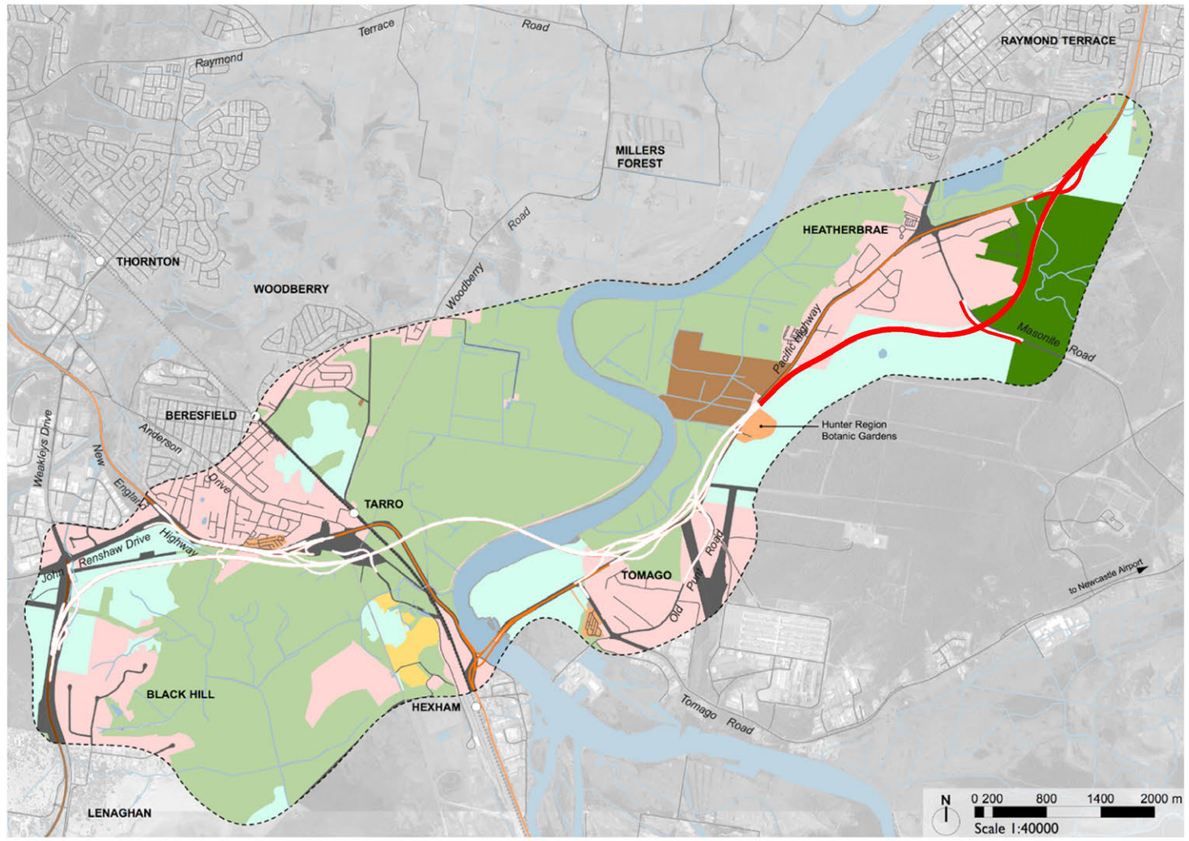


Figure 14: Land use (base image from M12RT EIS - Appendix O, June 2021)

2.3.6 Heritage

Heritage is both a constraint to development but also can be an inspiration. An understanding of heritage influences will be important to integrating the proposal.

Existing characteristics include:

- 26 Aboriginal archaeological sites or potential archaeological deposits within the greater site – five of which fall within the general area of the proposed section of upgrade.
- No non-Aboriginal heritage items are located within or in proximity to this section of the upgrade.
- An understanding of the Aboriginal Cultural and Historical Study undertaken by Saretta Art & Design.
- An understanding of preliminary consultation with the community and feedback on the oral history, undertaken by Saretta Art & Design.

Design implications:

- Be attentive to physical and visual impacts on heritage items.
- Maintain interesting vistas to heritage areas.
- Draw on inspiration on heritage design elements and apply to elements of the Project.
- Provide for heritage and cultural interpretation, based on the findings from the studies undertaken and identification of opportunities.

It is understood that there are no Aboriginal places within the Project that meet the definition under the National Parks and Wildlife Services Act 1974 with the closest Aboriginal place located at Anna Bay, which will not be impacted by the Project.

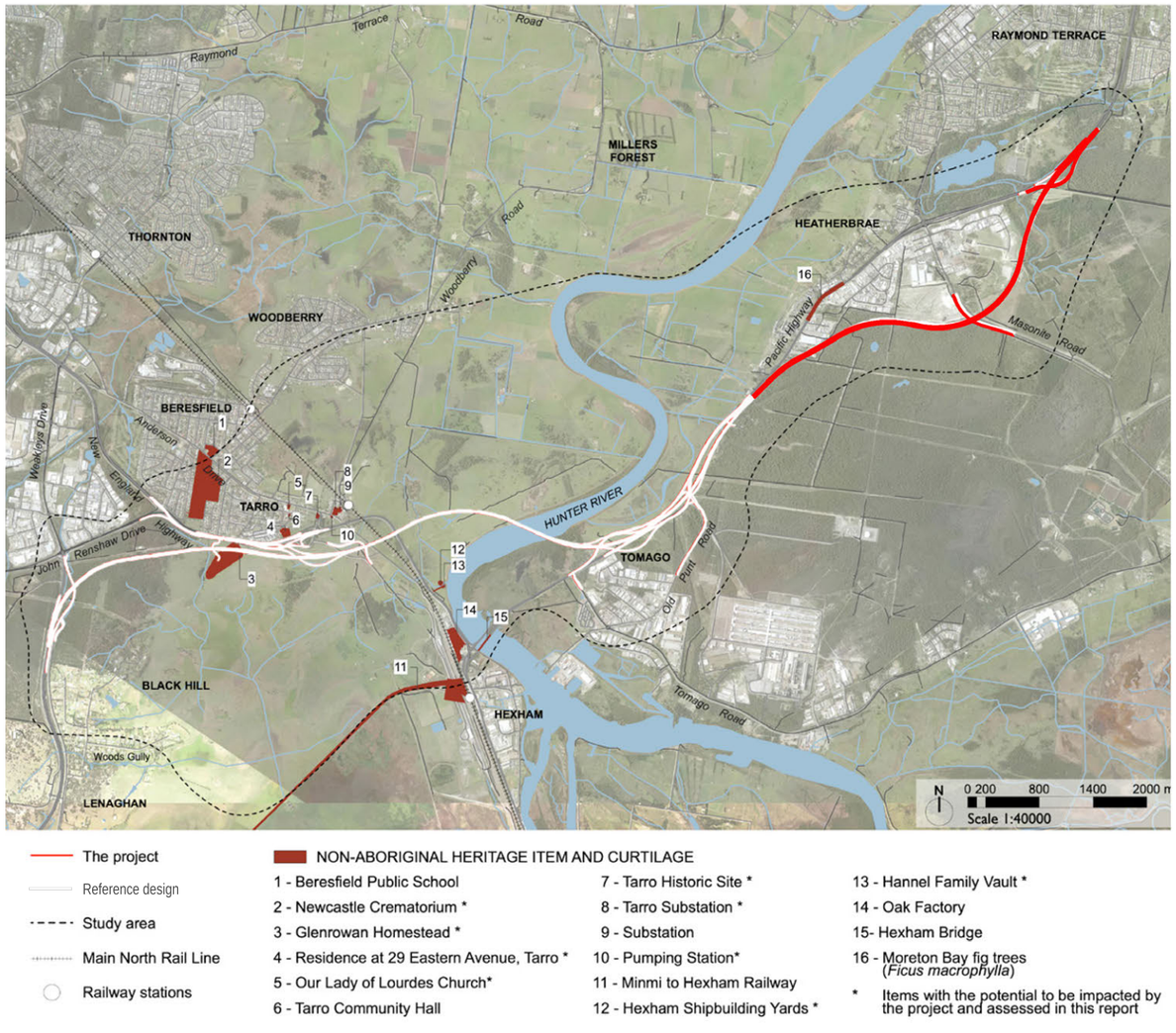


Figure 15: Heritage (base image from M12RT EIS - Appendix O, June 2021)

2.3.7 Transportation networks

The integration with the existing transport network is a critical element in gaining the efficiency and productivity benefits of the proposal.

Existing characteristics are:

- The M1 Pacific Motorway, New England Highway and Pacific Highway are the major road corridors within the Project area.
- Major flooding occurs where major roads follow the natural landform.
- Minimal pedestrian and cycle infrastructure is present.

Design implication:

- Facilitate in the legibility of the M1 Pacific Motorway, New England Highway and Pacific Highway that will connect both sides of the Hunter River floodplain.

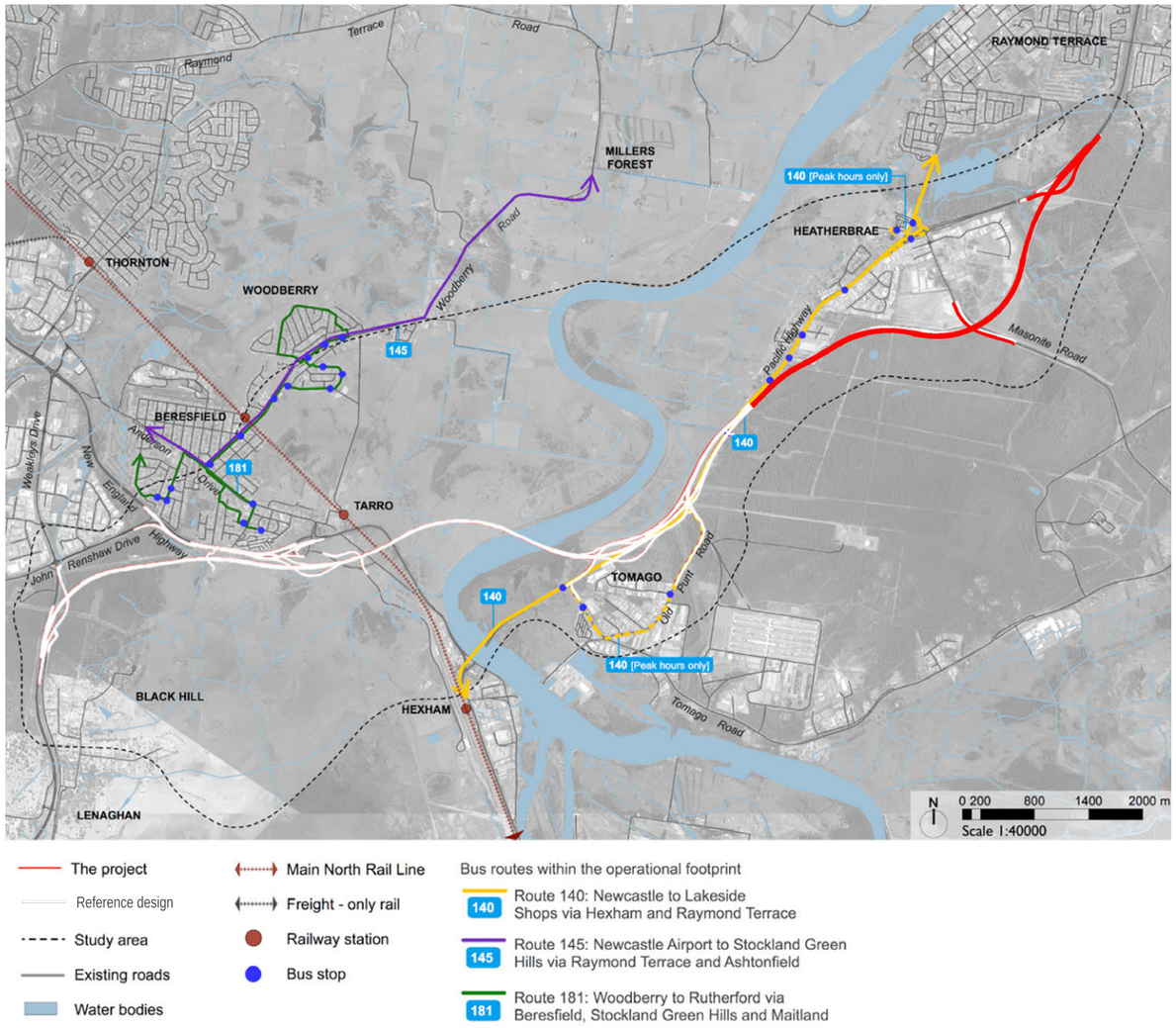


Figure 16: Public transportation network (base image from M12RT EIS - Appendix O, June 2021)

2.3.8 Utility services

The presence of major services within or across the corridor are significant impediments or costs impacts on the overall construction. Designing in response to these constraints is important both for safety and ongoing maintenance. A number of major utilities are located within the study area:

- Electricity supply and infrastructure (transmission towers and street lights).
- Telecommunications (optic fibres and telephone cables).
- Water and sewer services and infrastructure.

Design implications:

- Relocate utilities, adjust or protect in the Project area.
- Understand the constraints of the vertical and lateral requirements of power infrastructure, as well as above and below ground utilities.
- Integrate operational and maintenance access requirements into the Project.

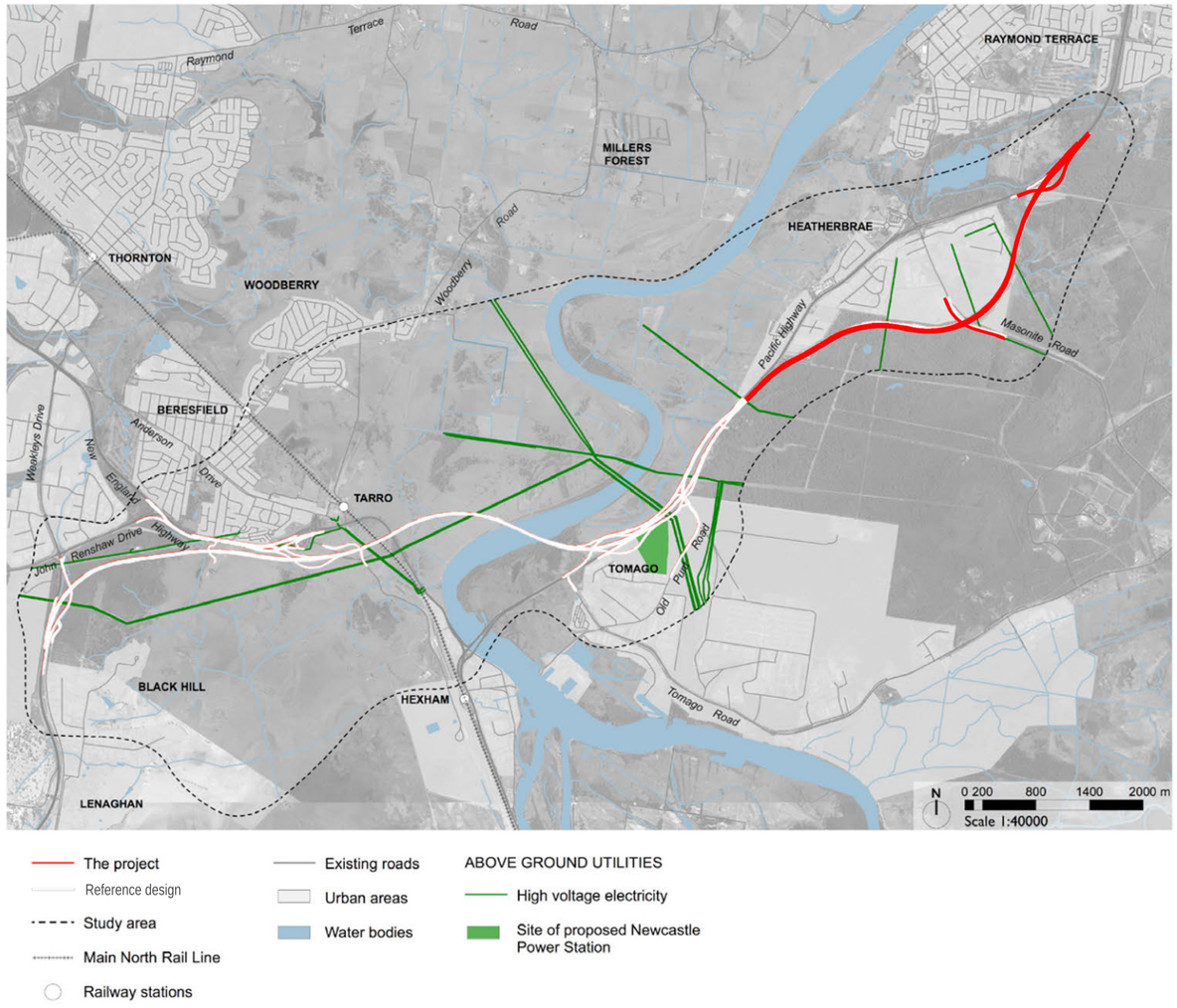


Figure 17: Utilities (base image from M12RT EIS - Appendix O, June 2021)

2.3.9 Character zones

Character zones

As part of the environmental assessment seven character zones were identified four of which relate to this section of the corridor. The following defines the key attributes of the zones:

- **Hunter River Floodplain:** while beyond the immediate environs of this section of the upgrade it is the dominant influence on the setting of the corridor. It is characterised by low lying and flat topography, grazing land, large wetlands, natural swamps and the Hunter River.
- **Tomago Sandbeds:** Located to the east of the corridor, the landscape is flat and low lying and dominated by native forest/woodlands. The vegetation restricts visibility and views providing strong definition to the existing corridor.
- **Heatherbrae:** Located the west of this section of the corridor, Heatherbrae consists of both industrial and warehouse uses along the eastern edge of the Pacific Highway and residential and tourism services along the western edge of the corridor on slightly elevated lands above the floodplain. Pacific Highway backs onto the alignment and interfaces with the Motorway corridor.
- **Windeyers Creek:** Located to the north of Heatherbrae its alignment encapsulates the main town of Heatherbrae separating the centres of Heatherbrae and Raymond Terrace. It is a low lying area associated with wetlands and tributaries. Highly disturbed its character ranges from a mix of native vegetation, wetlands, pastures and pine plantations. The presence of plantation forestry (pine plantations) provides a significant visual contrast with the broader landscape character.

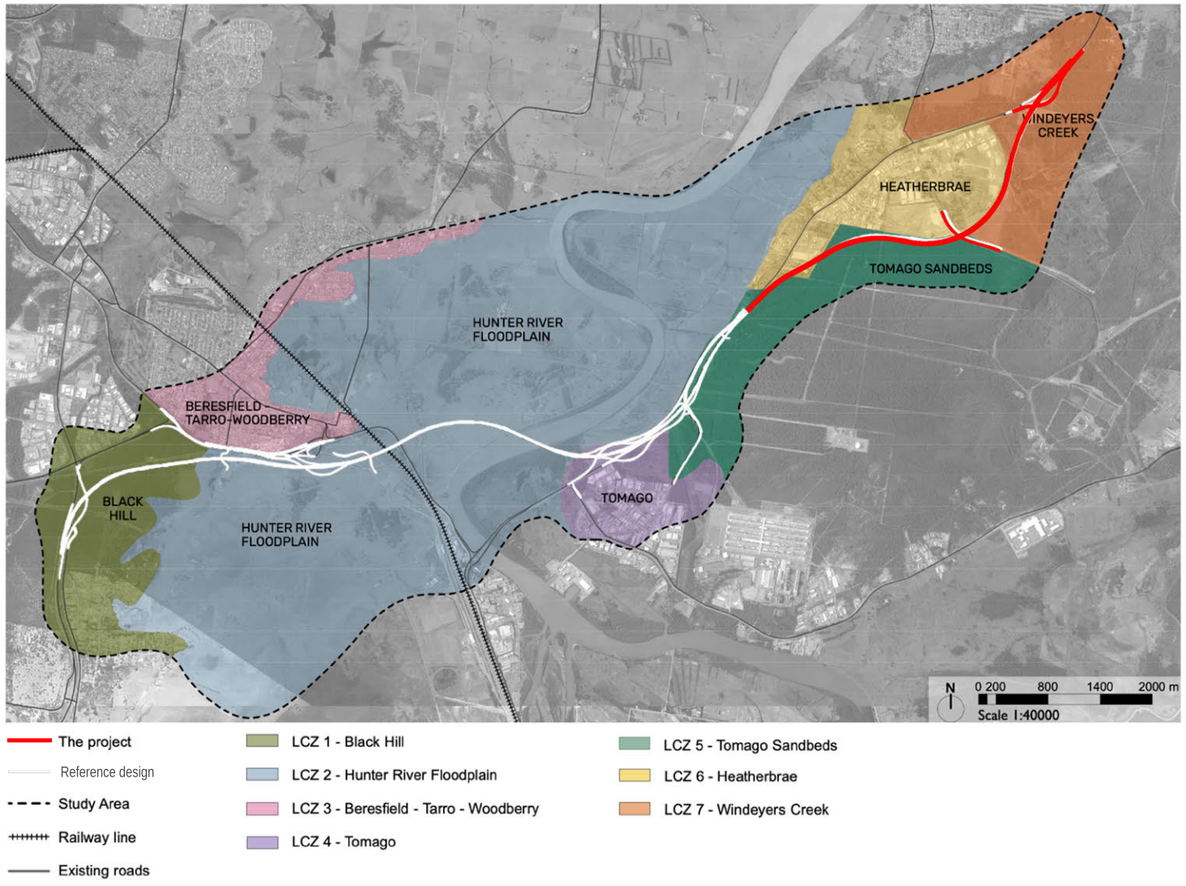


Figure 18: Landscape character zones (base image from M12RT EIS - Appendix O, June 2021)

PACIFIC HIGHWAY, SOUTH OF HEATHERBRAE

PACIFIC HIGHWAY, SOUTH OF HEATHERBRAE

MASONITE ROAD

MASONITE ROAD

HEATHERBRAE INDUSTRIAL PRECINCT

RAYMOND TERRACE

Figure 19: Existing road character - Heatherbrae

3. Urban design objectives

3.1 Vision

The Project urban design vision as outlined in the Environmental Impact Statement (EIS) is to:

> Provide a flowing green corridor that integrates sensitively with the natural environment and community setting of the area. The Project will capitalise on its setting with expansive views over the Hunter River floodplain with simple and well-designed Project elements. The Project will provide a clear and legible junction integrating the Pacific Motorway and the New England Highway that improves local, regional and interstate connectivity while contributing to the sense of place for communities along the corridor.

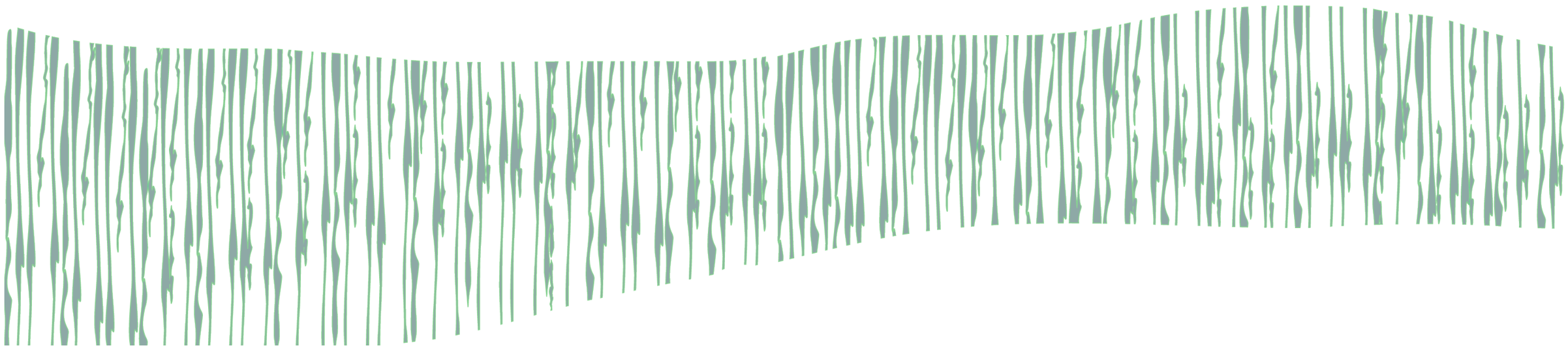


Figure 20: M12RT Wetlands Bush artwork, Saretta Art & Design

3.2 Urban design objectives and principles

The urban design objectives and principles noted below are as outlined in Appendix O of the EIS and relate to both Stage 1 and Stage 2. The last column describes the application of the principles implemented for the Project to achieve the respective objectives.

Table 4: Urban design objectives and principles

OBJECTIVES	EIS URBAN DESIGN PRINCIPLES (STAGE 1 AND STAGE 2)	APPLICATION TO HEATHERBRAE BYPASS (STAGE 2)
1 Provide a flowing road alignment that is responsive and integrated with the landscape	– Maintain and integrate the road corridor with existing landscape types and characters, considering different woodland, open floodplain and rural landscapes	– The design has integrated the road corridor with the existing enclosed forest environment through the incorporation of landscape treatments that enhance the visual character of this region.
2 Provide a landscaped motorway that integrates with the adjoining natural setting	– Integrate the road into existing vegetation patterns to maintain the sense of place and help maintain ecological and biodiversity values. – Use vegetation strategically to guide motorists' views to contribute to and maintain the scenic quality of the route. – Use planting to visually separate adjoining roadways and to maximise the character of the M1 Pacific Motorway through the coastal hinterland landscape setting. – Design cuttings and embankments to maximise opportunities for vegetation to be established.	– The road has been integrated into the existing vegetation patterns of the forest and creekline landscape environments, maximising opportunities to provide a well vegetated corridor. – Screening landscape has been provided on the western side of the roadway as a visual buffer for adjoining roads to reduce the visual impact on Heatherbrae township.
3 Provide an enjoyable, interesting motorway	– Use tree cover and other landscape treatments to provide an interesting sequence of open views and sections of motorway enclosed by vegetation, drawing on existing views, vistas and spatial patterns. – Take advantage of the opportunities provided by the viaduct and other elevated road infrastructure to provide views of the surrounding landscape. – Retain and where possible strengthen views to local landmarks including heritage items. – Design the motorway, interchanges and local road connections to be self-explanatory, legible and easy to navigate. – Identify opportunities for art and/ or interpretive elements to contribute to place-making, and strengthen local and cultural identities. – Capitalise on the opportunities offered by the Hunter River bridge and viaduct that provides a positive legacy and a new landmark for both local communities and motorists travelling the length of the M1 Pacific Motorway.	– The Raymond Terrace Interchange has incorporated feature landscape that will provide a distinct character and enhance the sense of arrival to Raymond Terrace and Heatherbrae. The design also provides legibility to the interchange and mark the northern end of the Project. – Vegetation has been provided along the edge of the corridor to enhance the linear identity of the corridor.

OBJECTIVES	EIS URBAN DESIGN PRINCIPLES (STAGE 1 AND STAGE 2)	APPLICATION TO HEATHERBRAE BYPASS (STAGE 2)
4 Value the communities and towns along the road	– Provide an alignment that avoids community severance by skirting the edges of existing townships or settlements. – Design the project to provide connectivity between the motorway and key populated areas and for ease of access to current and future residential,community, industrial and employment areas. – Maintain the accessibility and connectivity of surrounding communities for all users including motorists, public transport users, cyclists and pedestrians and ensure connections are safe, convenient, logical and integrate the principles of Crime Prevention Through Environmental Design (CPTED). – Support the area's tourism industry by maintaining cultural and landscape values. – Provide visual buffers to sensitive receivers to enhance the sense of privacy through landscaped areas. – Design interchanges as attractive decision-making points that highlight the towns and other destinations along and beyond the route. Consider the potential of major project elements to integrate art, interpretation and other placemaking features to celebrate local communities and provide contextual interest.	– Screening landscape has been provided on the western side of the roadway as a visual buffer for the adjoining roads and to reduce the visual impact on Heatherbrae township. – The Raymond Terrace Interchange has incorporated feature landscape that will provide a distinct character and enhance the sense of arrival to Raymond Terrace and Heatherbrae. The design also provides legibility to the interchange and mark the northern end of the Project.
5 Provide a simplified and unobtrusive road design	– Endeavour to avoid placing road furniture in areas that may affect key views and vistas. – Take measures to reduce lighting impacts to adjoining land use and the natural environment. – Design bridges as simple and elegant structures of contemporary form. – Maximise consistency of design and detailing for similar types of bridges.	– A consistent family of built forms has been adopted in the design of structures incorporating circular profiles for the bridge piers and integrating or articulating the headstocks where they occur. The structural bridge types have been optimised to provide a consistent aesthetic. Consistent detailing has been provided for the design of the bridge elements including parapet profiles, abutment treatments and safety screen elements to provide design continuity and user experience. – Interpretation of heritage and cultural significance has been incorporated through art as an expression of the urban design on the bridge safety screens to provide for Connection to Country.

3.3 Urban design strategy

The overall design strategy for the Project is responsive to its environmental context. While relatively low lying it is removed substantially from the impacts and dominance of the Hunter Floodplain which defines the section of the corridor to the south.

Three specific landscape characters have been identified.

1. Enclosed forest landscape – a response to the enclosed forest typology, east of the alignment dominated by the Smooth Bark Apple community of the Tomago Sandbeds. This landscape type will replace sections of plantation forest which fall within the corridor.
2. Screening landscape – a response to the adjoining land users to the west of the alignment to provide buffer to the township of Heatherbrae that adjoins the Motorway. Screening landscape comprises vegetation selected from the natural community which provides a continuation of the sense of enclosure.
3. Creekline landscape – a response to the Windeyers Creek landscape which is incorporated in the interchange. Its incorporation provides a distinct character as a sense of arrival to Raymond Terrace that separates it from the adjoining forest communities. It also acts as an introduction to the swampland landscape of the creekline itself.

In addition to these responses to the natural environment, the design responds to the structure of the road network. Two areas have been identified where a specific intervention in the natural revegetation strategy has been introduced:

– Masonite Road – this is an overbridge providing east west access. The landscape response incorporates an informal cluster of native trees which respond to the local road with garden beds provided to intensify the use of native landscape on the approach to the bridge along the M1 Pacific Motorway.

– Raymond Terrace Interchange – located at the northern end of the Project this facilitates the connections to and from Heatherbrae and Raymond Terrace. The connection is in the form of an overbridge. The landscape response provides the connection to the local community - lining the road with an informal cluster of natives which create a distinctive and leading element within the landscape. The broader interchange is embedded within the place and provides a link between the creekline landscape and the community beyond.

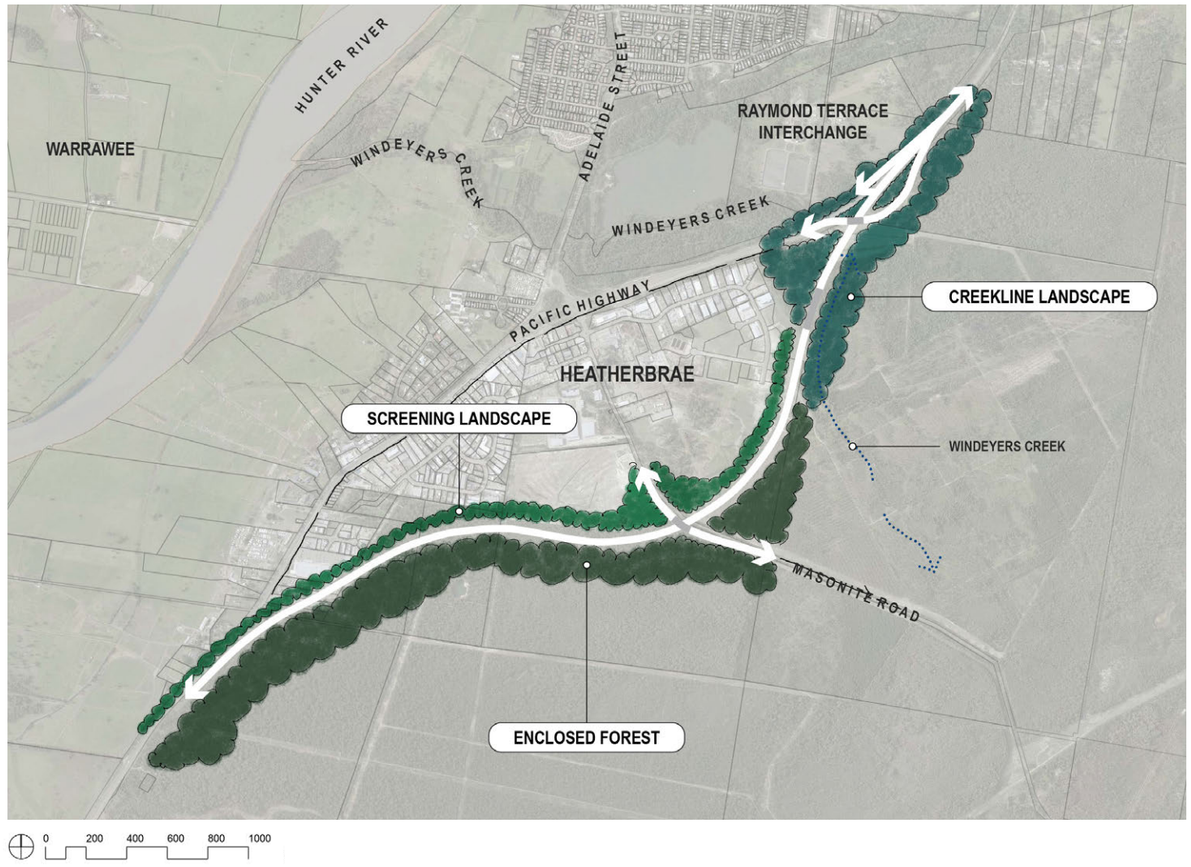


Figure 21: Urban design strategy plan

4. Design narrative

4.1 Urban design narrative

The urban design narrative has been developed as a direct response to the Project vision to provide a green flowing corridor with well designed Project elements. This design approach adopted enhances the linear identity of the corridor, whilst also providing for lateral integration with its immediate context. Connection to Country is a key driver for the Project and has been integrated into the design elements to provide a unique sense of place and identity to the Project.

The design has been developed to seamlessly integrate with the adjoining sections of the M1 Pacific Motorway whilst recognising its unique setting in a waterways and wetlands environment. The existing character of the corridor which traverses predominantly through closed views within a beautiful natural bushland and wetland setting has influenced the development of the design. A 'tie into the environment' approach has been adopted to integrate the design into its natural context.

This is essentially achieved through a combination of landscape interventions to provide screen planting on the western side of the alignment to reduce the visual impact of the Project on Heatherbrae township, and the continuation of the enclosed forest treatments on the eastern side that ties into the existing forests; together transitioning into the creek landscape at Raymond Terrace Interchange to enhance the riparian character, whilst providing a distinct character and a sense of arrival at the interchange.

A key component in developing the design is developing an interpretation strategy which is illustrated in the following section.

4.2 Interpretation strategy

The interpretation strategy is underpinned by the response to Country and has been based on using the principles and objectives outlined in the following government guideline documents:

– *Aboriginal Culture and Heritage Framework*, TfNSW

– *Designing with Country*, GANSW.

The strategy has been developed through the incorporation of art themes on the design elements as an expression of the urban design, referencing the Aboriginal and cultural heritage. The art themes have been developed in collaboration with Aboriginal Artist, Saretta Fielding, from Saretta Art & Design. The art themes are based on the understanding of the Aboriginal communities that have the connection to this area and the existing ethno-historic record, language and interpretive themes identified in earlier engagements with knowledge holders in the Lower Hunter.

According to the historic records, there were on two distinct Aboriginal clan groups being the Pambalong clan of Awabakal on the southern side of the Coquon (Hunter River) and the Garuagal clan of the Worimi located on the Northern side. The Project also has a connection to the Wonnarua people, who are connected to Country through traditional lifestyle and social interaction linked by the Hunter River. The Project is located predominantly within the traditional lands of the Garuagal clan of the Worimi people who were associated with the northern side of the river.

Consultation has included visits to community, workshops and meetings, working to define how best to share local culture through visual representation, giving the optimum opportunities for the public to view Aboriginal culture and heritage interpretation, incorporated into the urban design elements of the M1 Pacific Motorway Extension to Raymond Terrace.

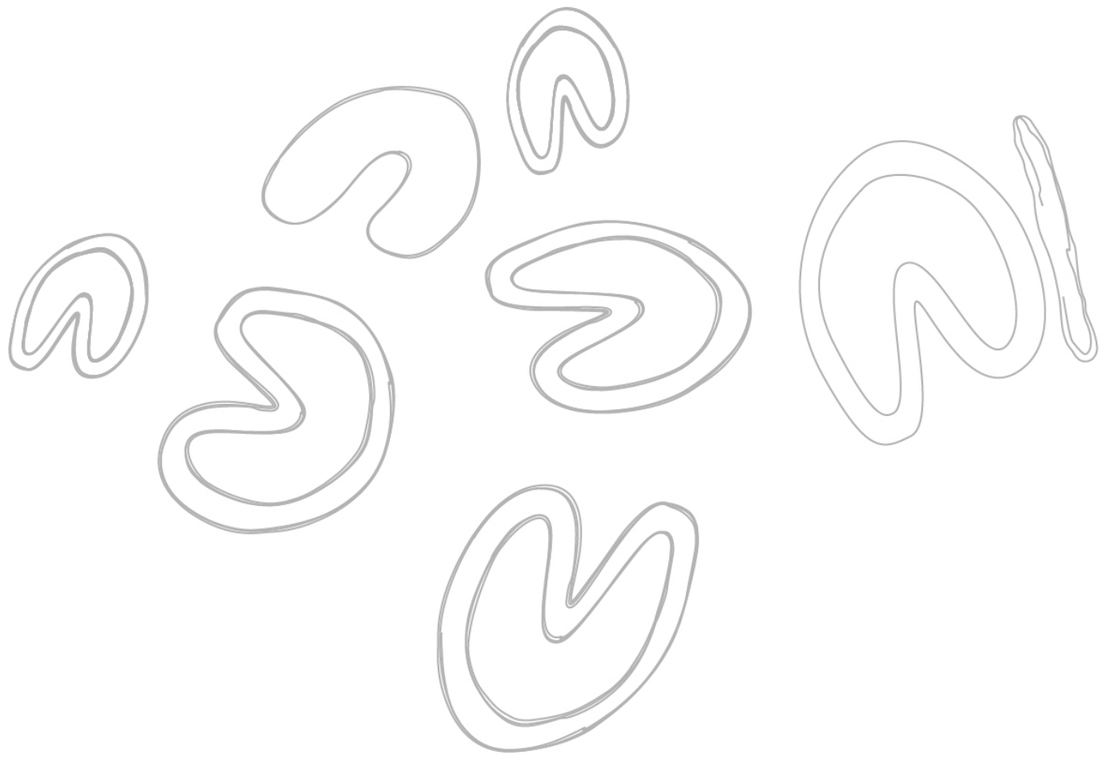


Figure 22: M12RT People Gather artwork, Saretta Art & Design

4.3 Application of the artwork

The strategy adopted to incorporate the artwork is to develop a visual motif that is an abstraction of the objects and symbols identified by Saretta that have heritage values and are of cultural significance. The visual motif is integrated into the urban design elements. A consistent theme has been established that can be applied to the various Project elements though multiple expressions.

The wetlands theme has been identified as the primary theme for the Project to integrate the artwork into the Project elements. They are overlaid with the people and community themes such as the symbols and objects related to the gathering places for men and women. The wetlands, together with people elements bring together one large theme of the life on Country and acknowledges the traditional custodians of the land.

The artwork has been incorporated on the overbridge safety screens on BR10 and BR12 as the main feature, providing linear continuity to the Motorway experience whilst also providing for lateral integration. These overbridge safety screens will be prominent elements that will be seen and experienced by the users. They also serve as wayfinding elements and give the users a sense of orientation in the journey. The landscape treatments incorporate indigenous plant species that have a Connection to Country at Raymond Terrace Interchange.

Colour has been incorporated in the design of the artwork on the mainline of the M1 Pacific Motorway to reflect the Wetlands theme. These selected cultural design themes will bring a wonderful representation of endorsed community designs to the space.

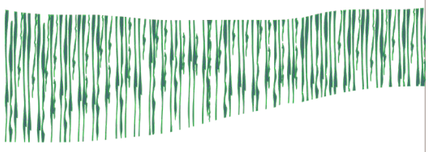
PRIMARY ELEMENT - WETLANDS THEME	
	**WETLANDS** References the Hexham Swamp, a dominant feature in the southern portion of the Project, being over 2,400 hectares in size and representing almost half of the remaining swampland in the Hunter.
SECONDARY ELEMENT - COMMUNITY SYMBOLS	
	**THE GATHERING** Community element such as gathering of men and women.

Table 5: Artwork application

Figure 23: Artwork application

5. Urban design concept plans

5.1 Design response

The design of the alignment has been categorised into five areas traversing from south to north:

- South of Masonite Road
- Masonite Road
- Masonite Road to Raymond Terrace Interchange
- Creekline landscape
- Raymond Terrace Interchange.

5.1.1 South of Masonite Road

The alignment of the M1 Pacific Motorway moves into greenfield site at the southern limits of Heatherbrae as it moves north. Its cross section comprises a paved median with barrier which is generally adopted throughout this northern portion of the Project before it transitions to a wider grassed median at the Raymond Terrace Interchange.

This section has been broken into two strategic zones:

- **Screening**

Screening defines the zone of landscape which creates the interface between the industrial precinct of Heatherbrae and the M1 Pacific Motorway. Its design intent is to provide a sense of enclosure and separation from the large-scale light industrial sheds of the adjoining precinct. This approach extends the overall natural corridor experience of M1 Pacific Motorway north of Heatherbrae through to the southern limits of the Bypass just south of the township of Heatherbrae. Screening will comprise the establishment of the natural community of the Smooth Bark Apple.

- **Enclosed**

Enclosed forest defines the natural landscape interface to the east of the alignment. The works seek to re-establish the natural community and identity of these Tomago Sandbeds through reinstatement of the Smooth Bark Apple forest.

5.1.2 Masonite Road

Masonite Road marks the interface between local road and the M1 Pacific Motorway. While access is not provided between the two the opportunity to heighten the experience of users on both the local road (Masonite Road) and M1 Pacific Motorway is provided through the use of informal clustered planting and garden beds utilising native species to provide a sense of progression and the transition to more urban forms.

5.1.3 Masonite Road to Raymond Terrace Interchange

The sequence of spaces through this zone are through lands which have experienced a higher level of disturbance being located both at the edge of the industrial precinct but also within former pine plantation lands. Pine plantations continue to the east however the alignment has been logged in anticipation of the Project and proposed future subdivision works and so presents as a more open and disturbed landscape.

The landscape response initially continues the combination of screening and enclosed landscape treatments as occurred south of Masonite Road before transitioning to a landscape dominated by the landform and hydrology of Windeyers Creek.

5.1.4 Creekline landscape

The landscape of Windeyers Creek is clearly defined, and its corridor is dominated by the open character of the jointed twig-rush sedgeland. This is a low-lying vegetation community with limited canopy enable broadscale views along the creek corridor. Adjacent to this has been cleared and cropped as part of the former forestry use of pine plantations. Its former vegetation community however has been interpreted as being Broadleaved paperbark, swamp mahogany – swamp oak, saw sedge swamp forest of the Central Coast and Lower North Coast.

In both instances they represent a distinctive vegetation community associated with the presence of water. The later providing a sculptural landscape element with the presence of the white trunks of the paperbark Melaleuca quinquinervia contrasting the form of the swamp oak (*Casuarina glauca*) and a ground plain of sedges and ferns with limited midstorey.

5.1.5 Raymond Terrace Interchange

The Raymond Terrace Interchange represents a continuation of the creek landscape creating a structured and stylised version of this landscape setting as a gateway to both the floodplain towns of Raymond Terrace and Heatherbrae and a key marker on the highway in terms of progress and proximity to Newcastle.

The landscape design has been used to reinforce and define vehicle movements through the landscape while addressing environmental fit in terms of vegetation communities and the management of water.

The use of a plant palette derived from the Broadleaved paperbark, swamp mahogany – swamp oak, saw sedge swamp forest provides a strong and distinctive landscape befitting the scale and nature of the interchange and is responsive to its relationship to Windeyers Creek.

LEGEND

- PROJECT BOUNDARY
- CONCRETE CHANNEL
- VEGETATED CHANNEL
- FAUNA CROSSING
- CONCRETE BASIN
- VEGETATED BASIN
- RETAINED VEGETATION
- AREA CLEARED BY WEATHERTEX

SEEDING TREATMENTS

DIRECT SEEDING

- GRASSED MEDIAN / VERGE / BOUNDARY

HYDROMULCH

- SCREENING
- SMOOTH BARKED APPLE
- RIPARIAN
- INTERCHANGE
- ANCILLARY SITE
  Final resolution of the use of ancillary sites is subject to finalisation of the construction methodology
- VEGETATED CHANNEL

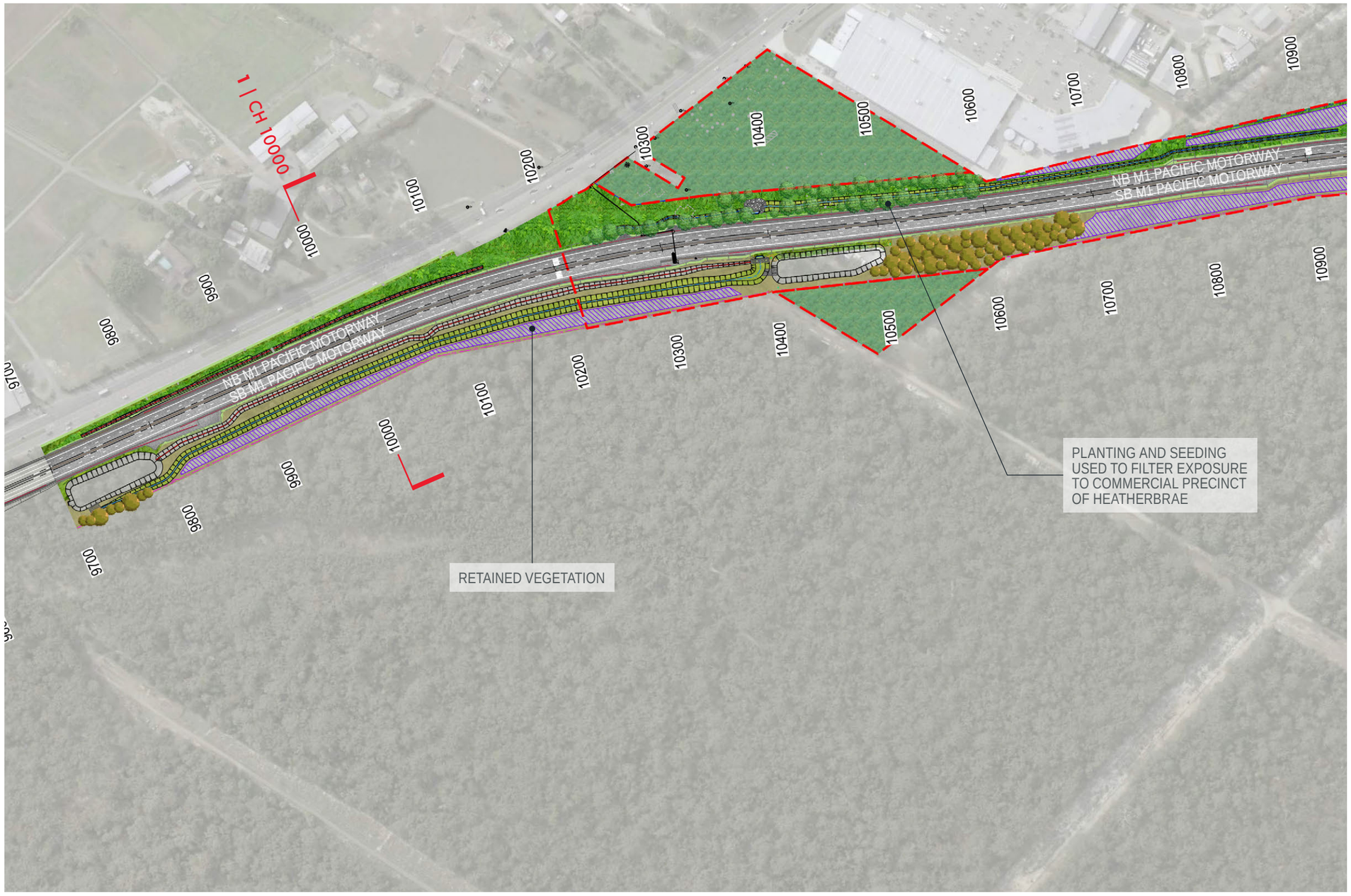
PLANTING

- GARDEN BED
- VEGETATED BASIN - JUTE MATTING OVER NATURAL GROUND
- WINDEYERS CREEK PLANTING JUTE MATTING OVER NATURAL GROUND

TREE PLANTING

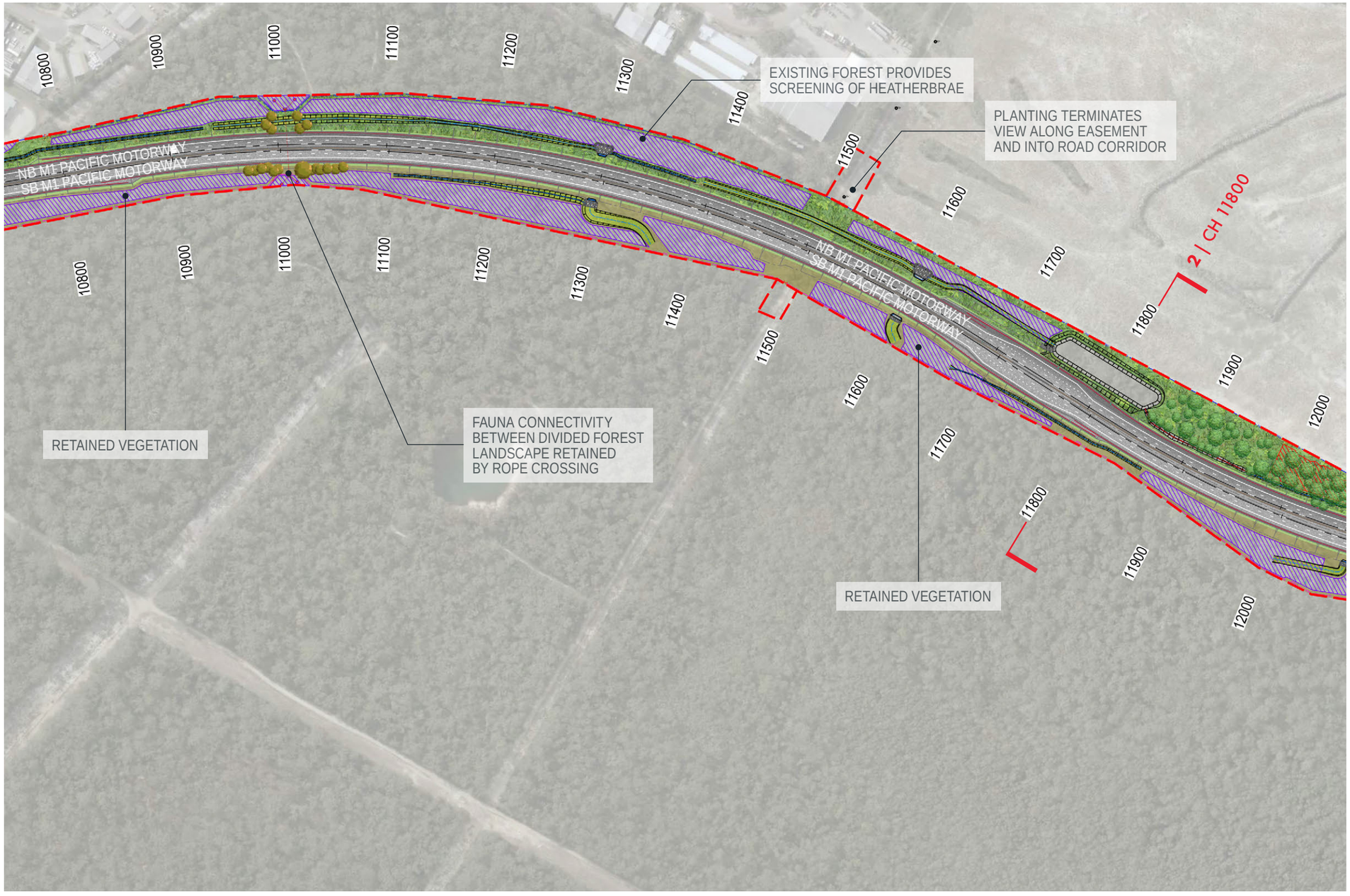
- FEATURE INTERCHANGE IN ASSOCIATION WITH GARDEN BEDS
- BROADSCALE INTERCHANGE
- SMOOTH BARKED APPLE
- RIPARIAN
- SCREENING

0 40 80 200m



CONCEPT PLAN - 1

Figure 24: Concept plan 1 of 5



LEGEND

- PROJECT BOUNDARY
- CONCRETE CHANNEL
- VEGETATED CHANNEL
- FAUNA CROSSING
- CONCRETE BASIN
- VEGETATED BASIN
- RETAINED VEGETATION
- AREA CLEARED BY WEATHERTEX

SEEDING TREATMENTS

DIRECT SEEDING

- GRASSED MEDIAN / VERGE / BOUNDARY

HYDROMULCH

- SCREENING
- SMOOTH BARKED APPLE
- RIPARIAN
- INTERCHANGE
- ANCILLARY SITE
  Final resolution of the use of ancillary sites is subject to finalisation of the construction methodology
- VEGETATED CHANNEL

PLANTING

- GARDEN BED
- VEGETATED BASIN - JUTE MATTING OVER NATURAL GROUND
- WINDEYERS CREEK PLANTING
  JUTE MATTING OVER NATURAL GROUND

TREE PLANTING

- FEATURE INTERCHANGE IN ASSOCIATION WITH GARDEN BEDS
- BROADSCALE INTERCHANGE
- SMOOTH BARKED APPLE
- RIPARIAN
- SCREENING

0 40 80 200m

Figure 25: Concept plan 2 of 5

CONCEPT PLAN - 2

LEGEND

- PROJECT BOUNDARY
- CONCRETE CHANNEL
- VEGETATED CHANNEL
- FAUNA CROSSING
- CONCRETE BASIN
- VEGETATED BASIN
- RETAINED VEGETATION
- AREA CLEARED BY WEATHERTEX

SEEDING TREATMENTS

DIRECT SEEDING

- GRASSED MEDIAN / VERGE / BOUNDARY

HYDROMULCH

- SCREENING
- SMOOTH BARKED APPLE
- RIPARIAN
- INTERCHANGE
- ANCILLARY SITE
  Final resolution of the use of ancillary sites is subject to finalisation of the construction methodology
- VEGETATED CHANNEL

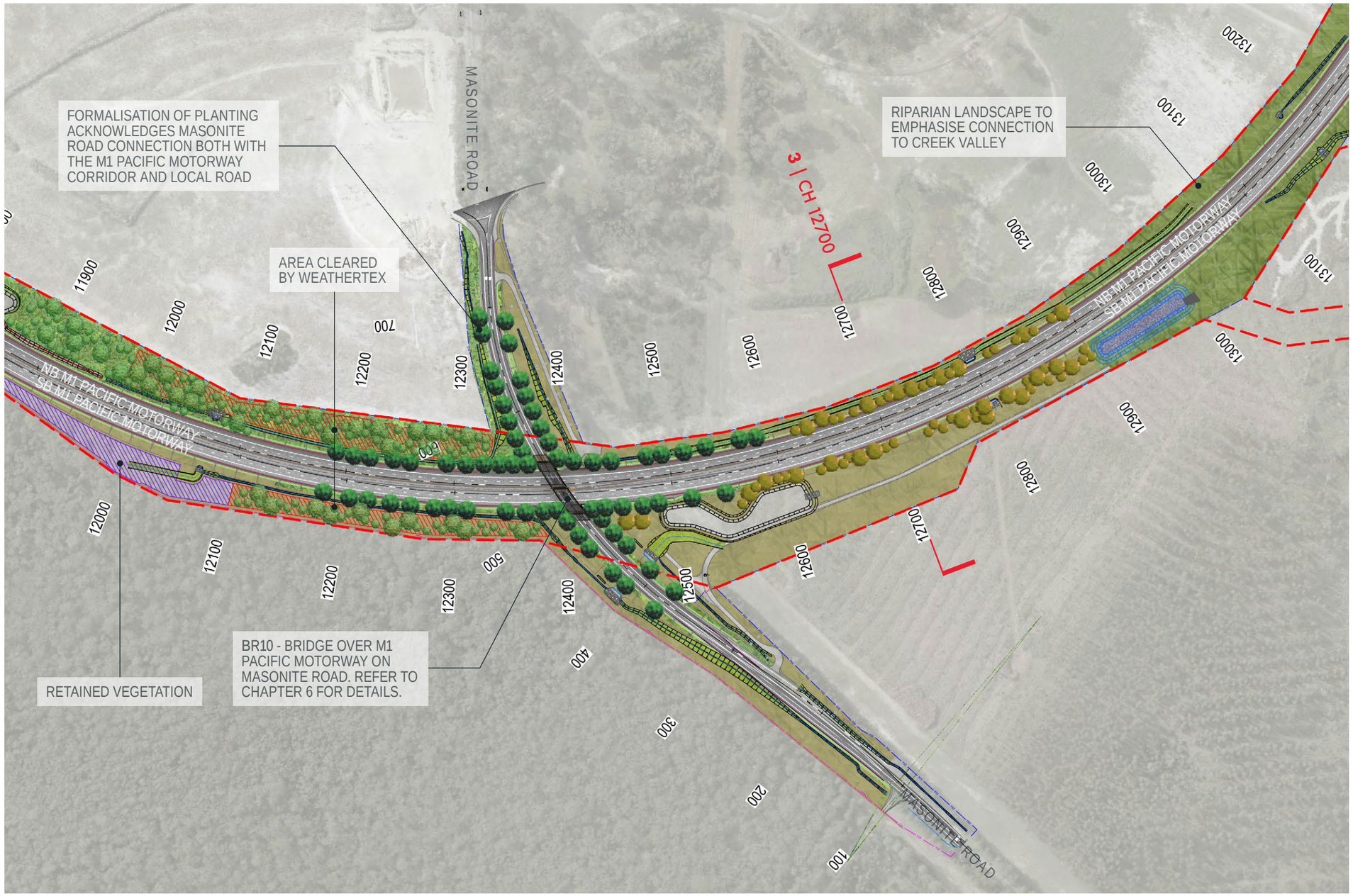
PLANTING

- GARDEN BED
- VEGETATED BASIN - JUTE MATTING OVER NATURAL GROUND
- WINDEYERS CREEK PLANTING
  JUTE MATTING OVER NATURAL GROUND

TREE PLANTING

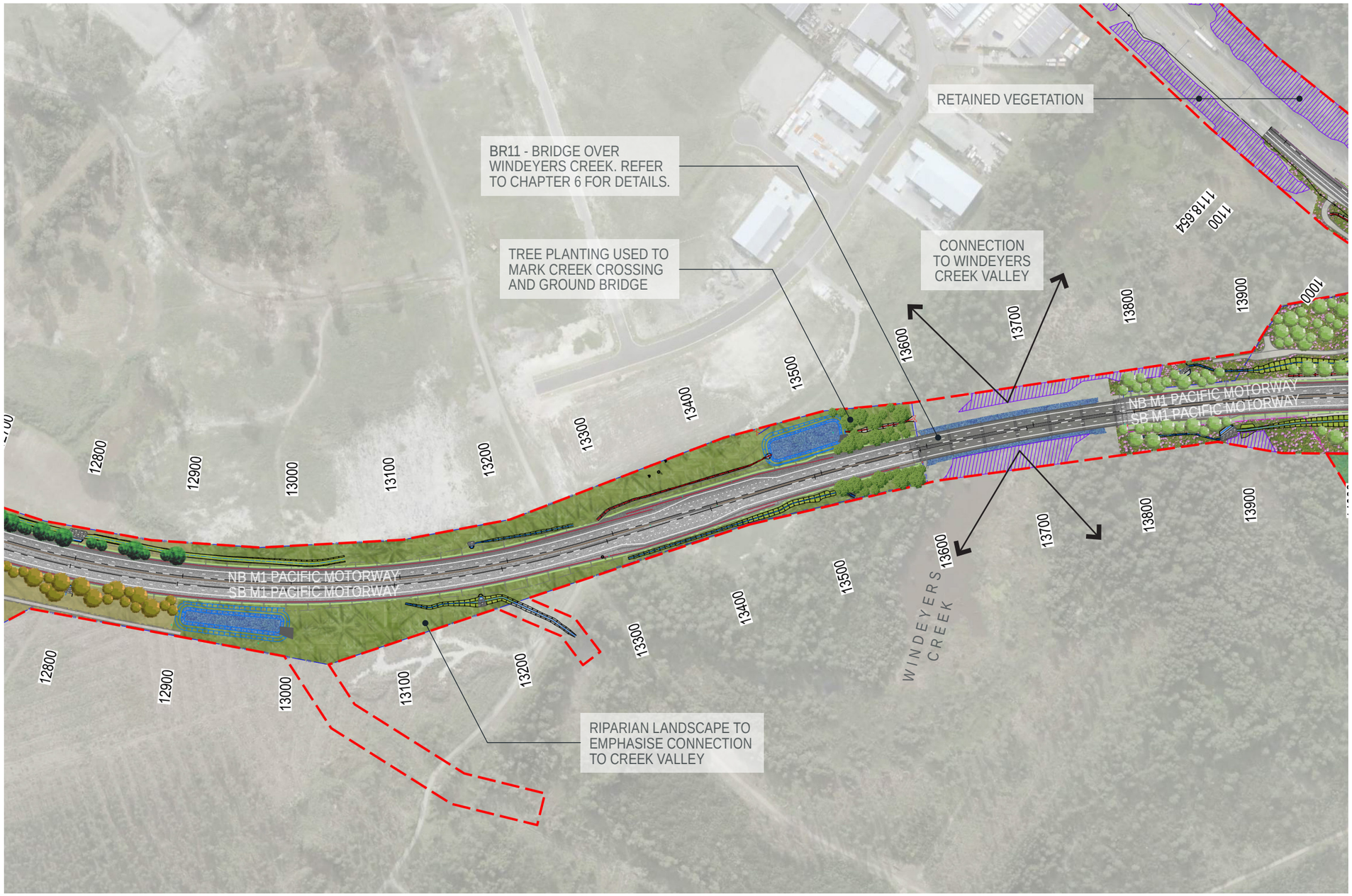
- FEATURE INTERCHANGE IN ASSOCIATION WITH GARDEN BEDS
- BROADSCALE INTERCHANGE
- SMOOTH BARKED APPLE
- RIPARIAN
- SCREENING

0 40 80 200m



CONCEPT PLAN - 3

Figure 26: Concept plan 3 of 5



LEGEND

- PROJECT BOUNDARY
- CONCRETE CHANNEL
- VEGETATED CHANNEL
- FAUNA CROSSING
- CONCRETE BASIN
- VEGETATED BASIN
- RETAINED VEGETATION
- AREA CLEARED BY WEATHERTEX

SEEDING TREATMENTS

DIRECT SEEDING

- GRASSED MEDIAN / VERGE / BOUNDARY

HYDROMULCH

- SCREENING
- SMOOTH BARKED APPLE
- RIPARIAN
- INTERCHANGE
- ANCILLARY SITE
  Final resolution of the use of ancillary sites is subject to finalisation of the construction methodology
- VEGETATED CHANNEL

PLANTING

- GARDEN BED
- VEGETATED BASIN - JUTE MATTING OVER NATURAL GROUND
- WINDEYERS CREEK PLANTING JUTE MATTING OVER NATURAL GROUND

TREE PLANTING

- FEATURE INTERCHANGE IN ASSOCIATION WITH GARDEN BEDS
- BROADSCALE INTERCHANGE
- SMOOTH BARKED APPLE
- RIPARIAN
- SCREENING

0 40 80 200m

Figure 27: Concept plan 4 of 5

CONCEPT PLAN - 4

LEGEND

- PROJECT BOUNDARY
- CONCRETE CHANNEL
- VEGETATED CHANNEL
- FAUNA CROSSING
- CONCRETE BASIN
- VEGETATED BASIN
- RETAINED VEGETATION
- AREA CLEARED BY WEATHERTEX

SEEDING TREATMENTS

DIRECT SEEDING

- GRASSED MEDIAN / VERGE / BOUNDARY

HYDROMULCH

- SCREENING
- SMOOTH BARKED APPLE
- RIPARIAN
- INTERCHANGE
- ANCILLARY SITE
  Final resolution of the use of ancillary sites is subject to finalisation of the construction methodology
- VEGETATED CHANNEL

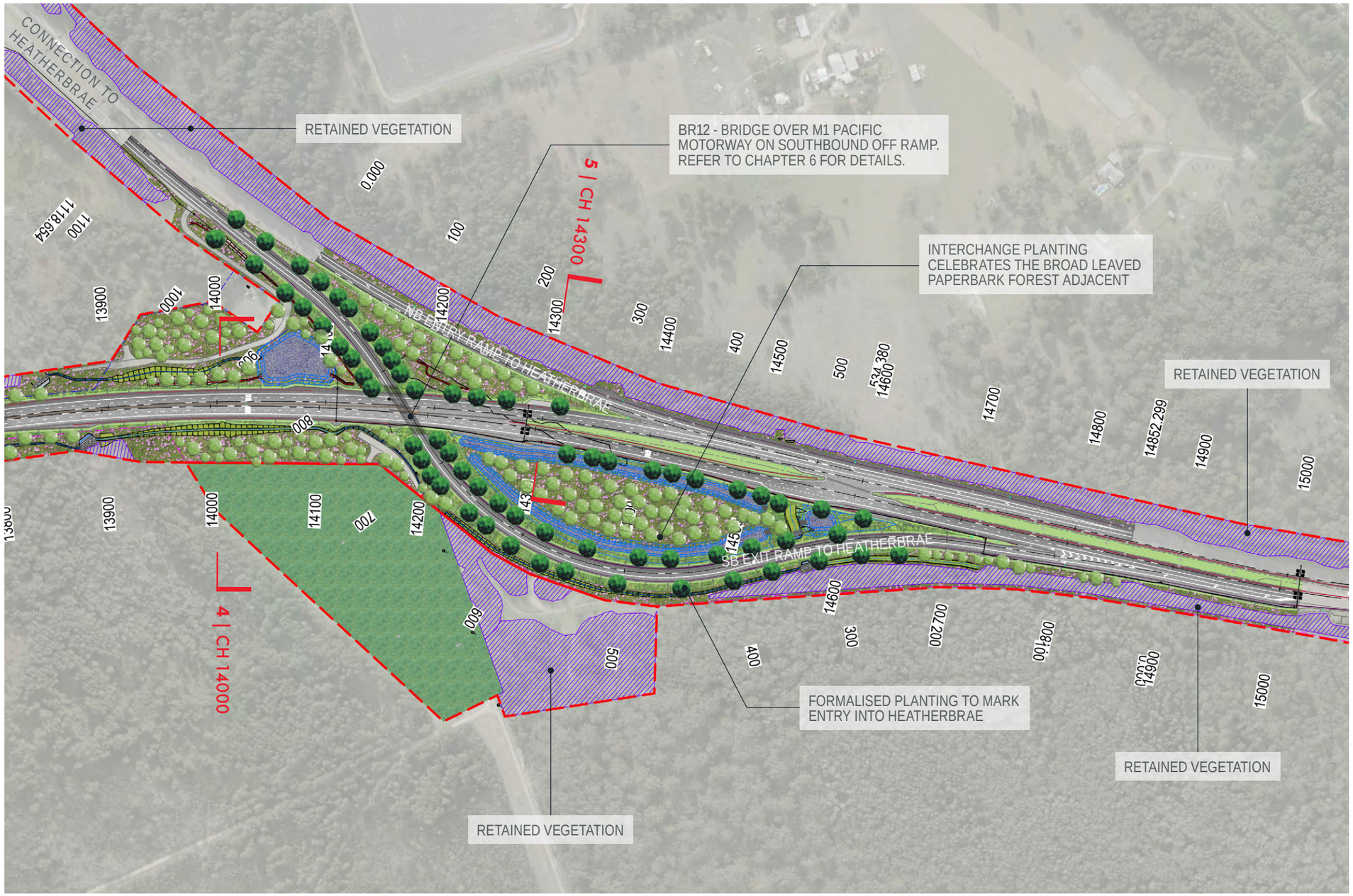
PLANTING

- GARDEN BED
- VEGETATED BASIN - JUTE MATTING OVER NATURAL GROUND
- WINDEYERS CREEK PLANTING JUTE MATTING OVER NATURAL GROUND

TREE PLANTING

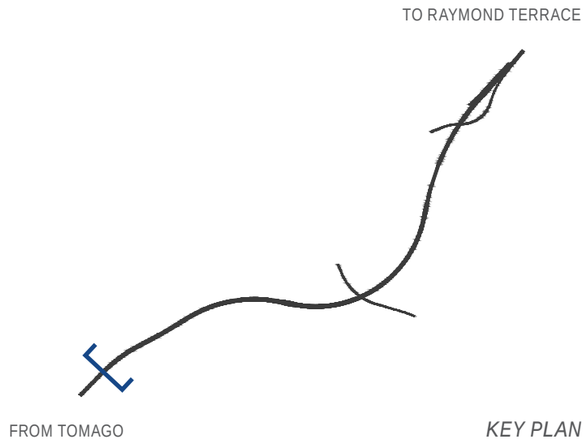
- FEATURE INTERCHANGE IN ASSOCIATION WITH GARDEN BEDS
- BROADSCALE INTERCHANGE
- SMOOTH BARKED APPLE
- RIPARIAN
- SCREENING

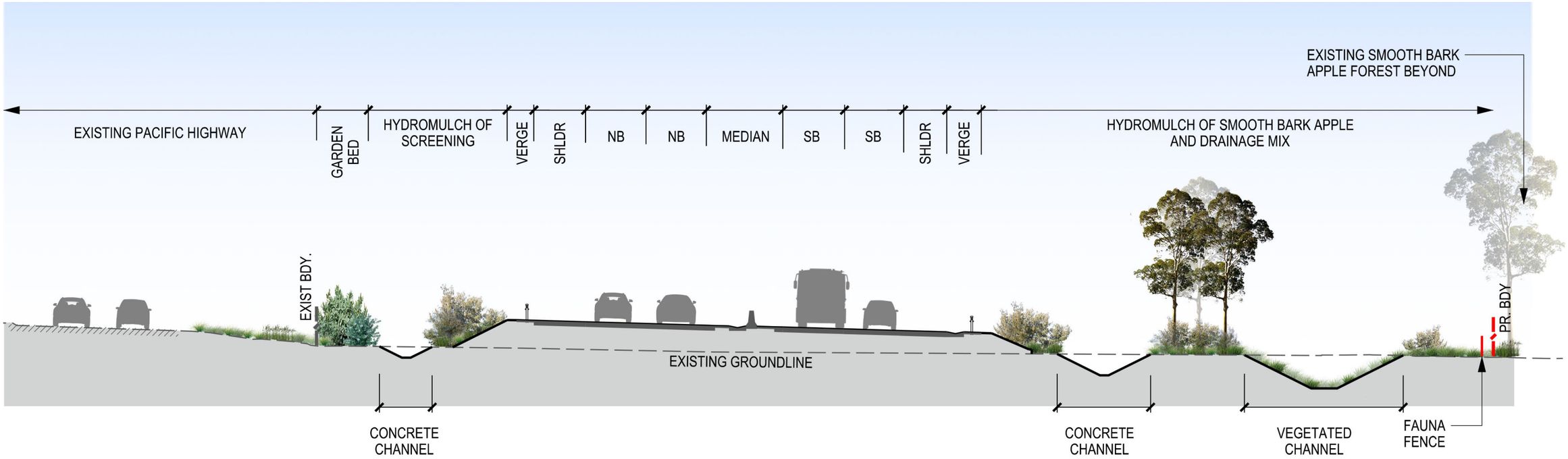
0 40 80 200m



CONCEPT PLAN - 5

Figure 28: Concept plan 5 of 5

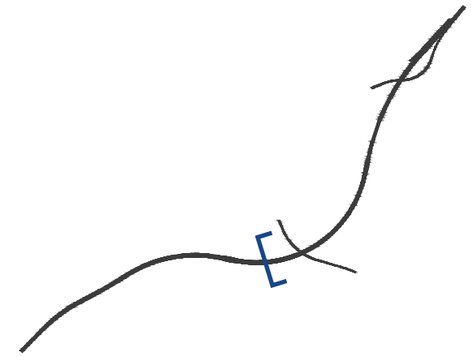




SECTION 1 - CH 10000

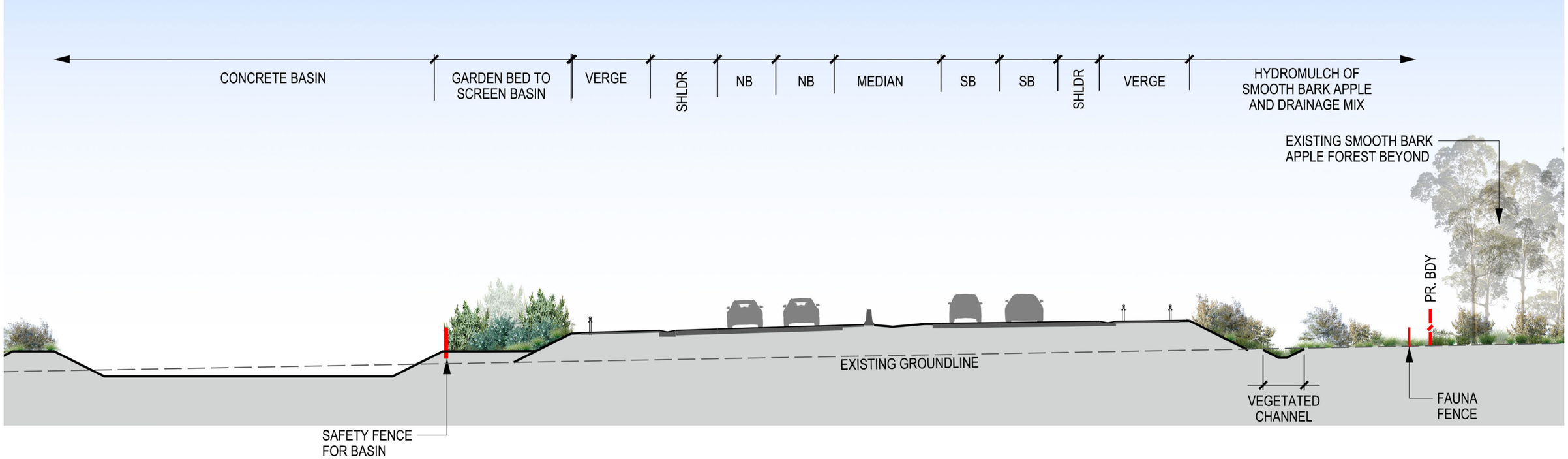
Figure 29: Section 1 - CH 10000

TO RAYMOND TERRACE



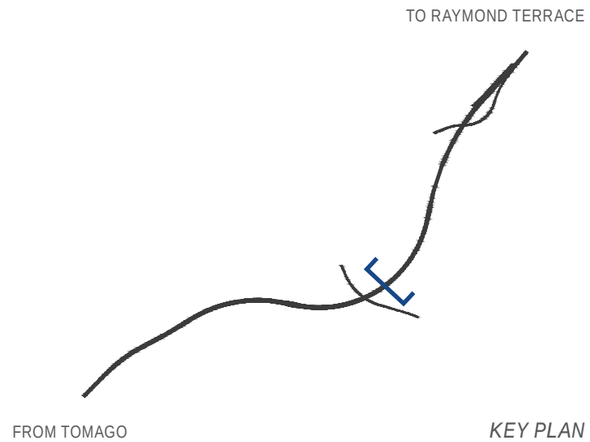
FROM TOMAGO

KEY PLAN



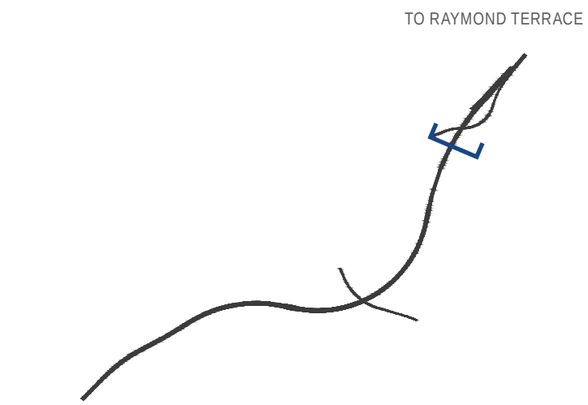
SECTION 2 - CH 11800

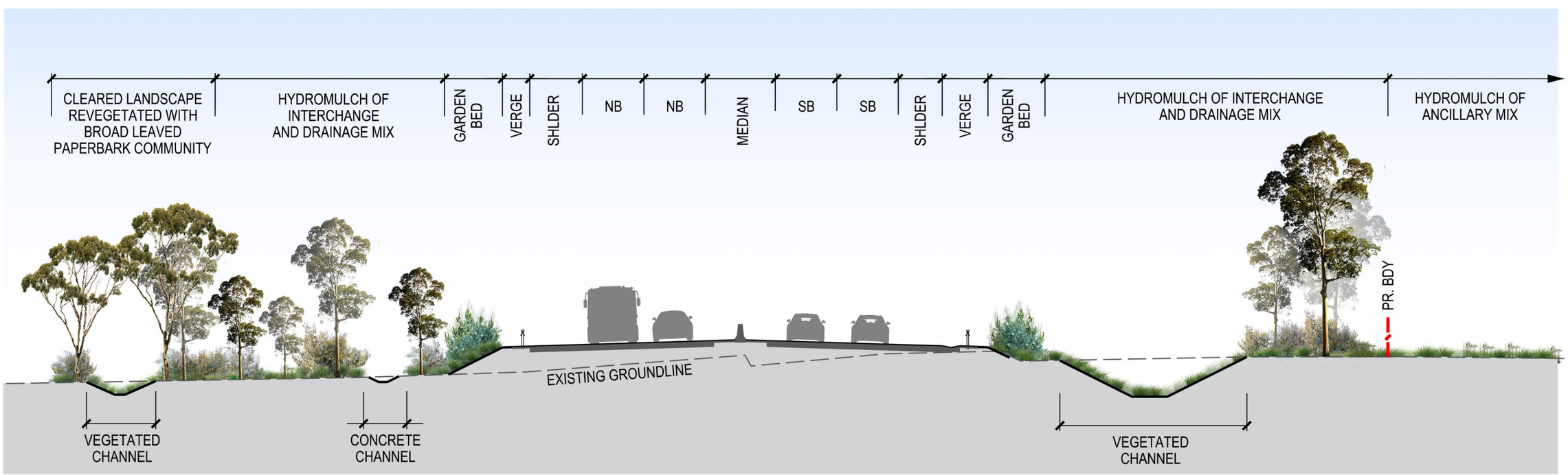
Figure 30: Section 2 - CH 11800



SECTION 3 - CH 12700

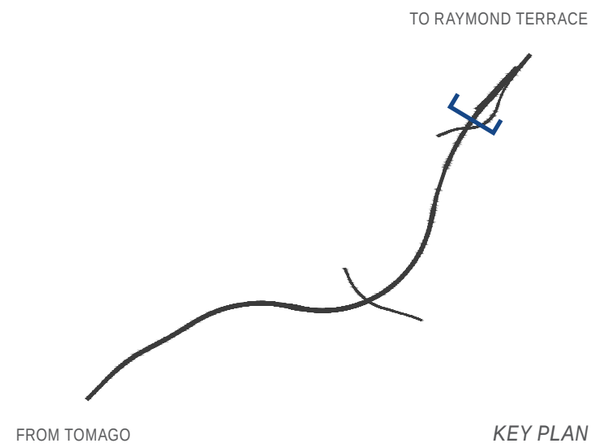
Figure 31: Section 3 - CH 12700

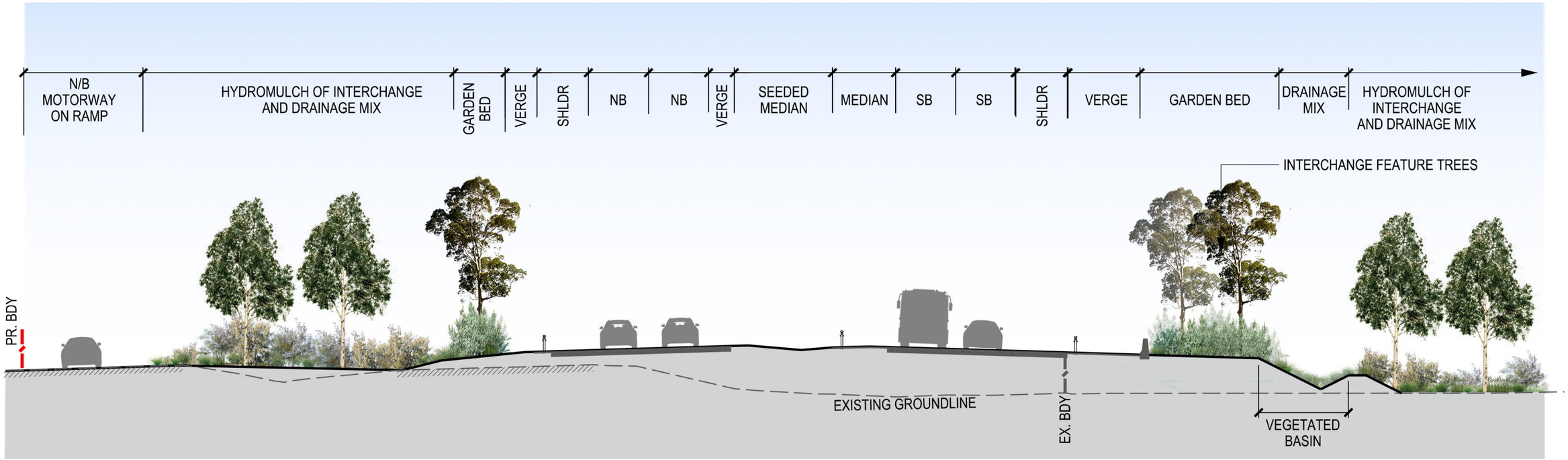




SECTION 4 - CH 14000

Figure 32: Section 4 - CH 14000





SECTION 5 - CH 14300

Figure 33: Section 5 - CH 14300

Figure 34: Artist impression of BR10 and Masonite Road in the foreground, looking north

6. Design elements

6.1 Overview

This chapter includes the description of the various Project components and elements for the following items:

- Interchange
- Bridges
- Signposting Country
- Anti-graffiti strategy
- Landscape implementation
- Landscape management.

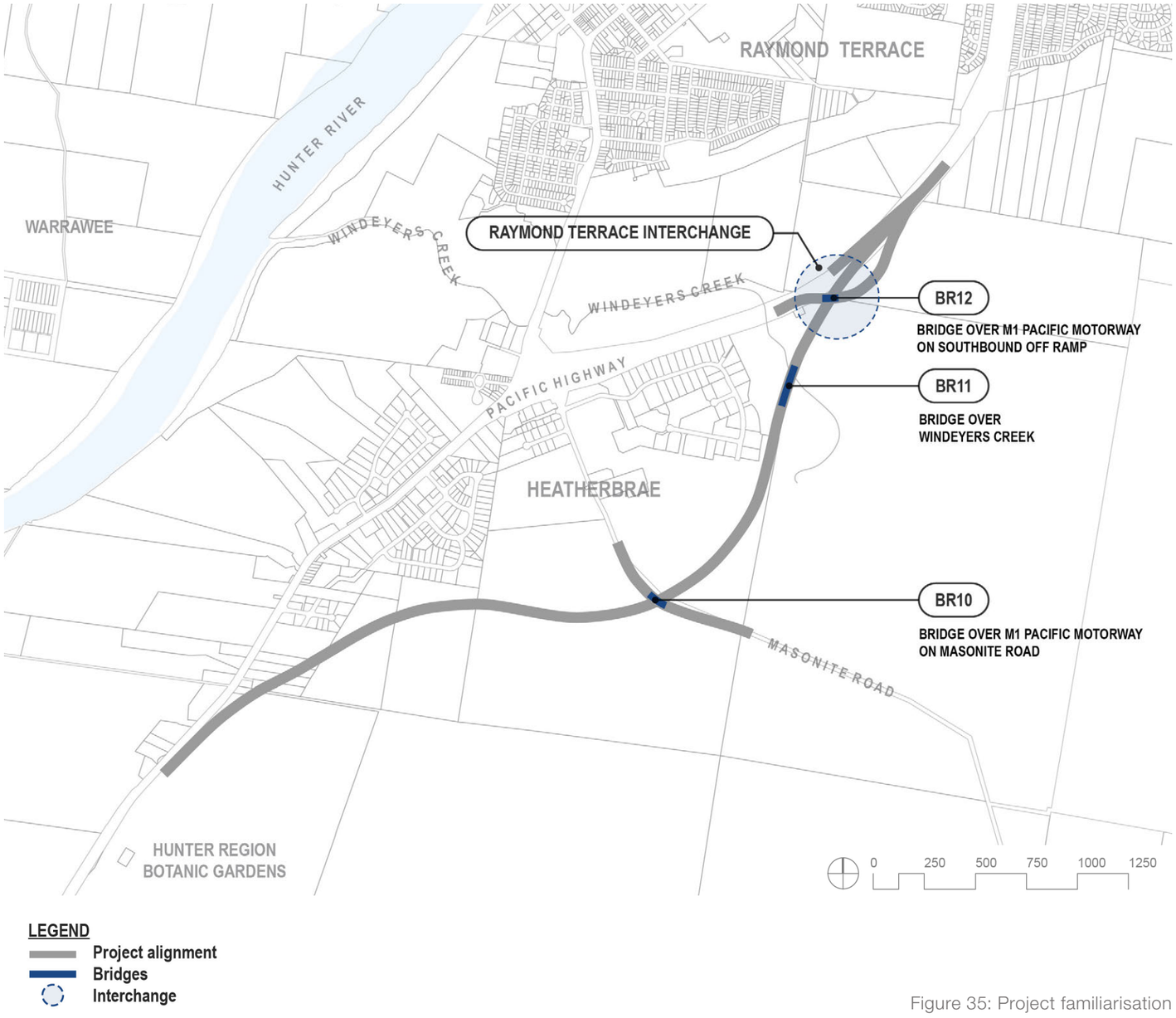


Figure 35: Project familiarisation

Artist impression
Drawing is illustrative only and landscape shown at full maturity

6.2 Raymond Terrace Interchange

The Raymond Terrace Interchange represents a continuation of the creek landscape creating a structured and stylised version of this landscape setting as a gateway to both the floodplain towns of Raymond Terrace and Heatherbrae and a key marker on the highway in terms of progress and proximity to Newcastle.

Figure 36: Aerial view of Heatherbrae, looking south

6.3 Bridges

Bridges are a key visual element on the Project. They are also a key driver to incorporate placemaking initiatives and enhance the identity on the Project.

The design, form, materials and finishes have been developed from a kit of parts which are complementary to each other and have a consistent aesthetic. This provides for linear continuity of the corridor, whilst allowing for variety.

The bridges are grouped into two categories:

Overbridges:

– **BR10** – Bridge over M1 Pacific Motorway on Masonite Road.

– **BR12** – Bridge over M1 Pacific Motorway on southbound off ramp.

Underbridge:

– **BR11** – Bridge over Windeyers Creek.

The overbridges (BR10 and BR12) will be highly visible from the M1 Pacific Motorway and can be seen from various locations and distances due to its elevated geometry. They incorporate interpretive elements expressed through art to reflect and acknowledge Aboriginal heritage and cultural values.

The underbridge (BR11) will not be highly visible as it is a low-lying element in an enclosed landscape environment. BR11 spans over Windeyers Creek and is integrated with Windeyers Creek's bushland setting.

The bridges are designed in accordance with the principles outlined in the *Bridge Aesthetics: Design Guidelines to improve appearance of bridges in NSW* document, prepared by TfNSW for all elements including superstructure, substructure, form, materials, colours and consistency in design aesthetic.

Key features of the bridges in general include:

– Consistent family of forms for overpasses and underpasses – reducing the number of structural types.

– Consistent profiles for abutments – spill through type.

– Safety screens incorporate interpretive elements expressed through art that is integrated into the safety screens design.

– Consistent pier shapes adopted for all bridges – circular forms with portal frames or integrated headstocks.

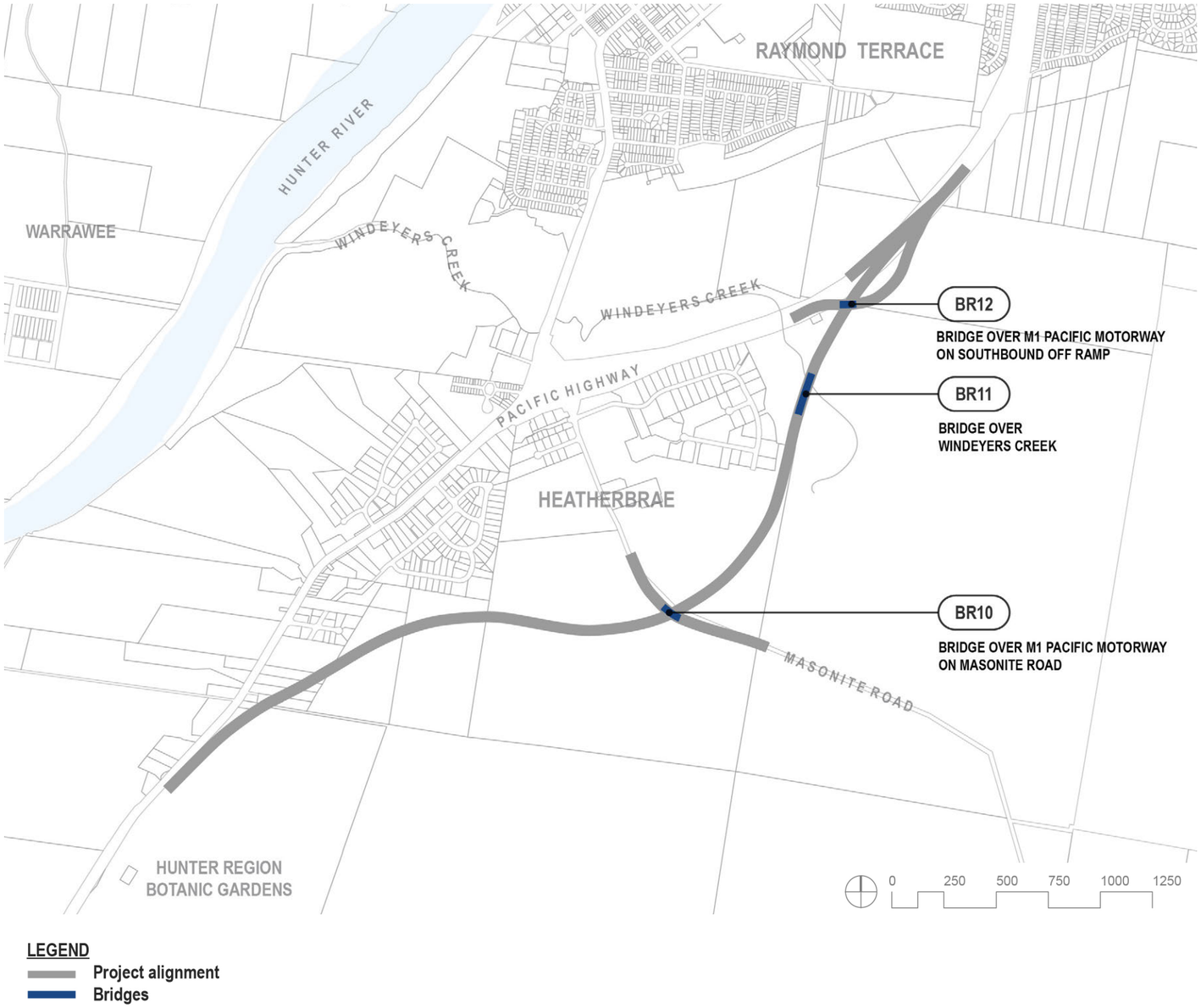


Figure 37: Bridges - key plan

6.3.1 Family of forms - kit of parts

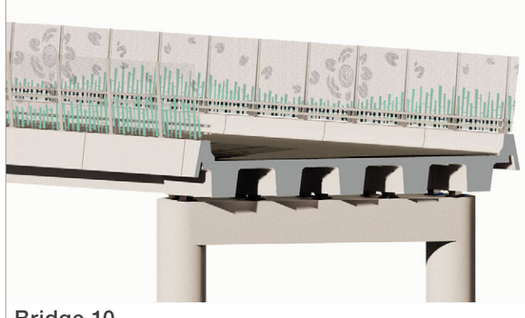
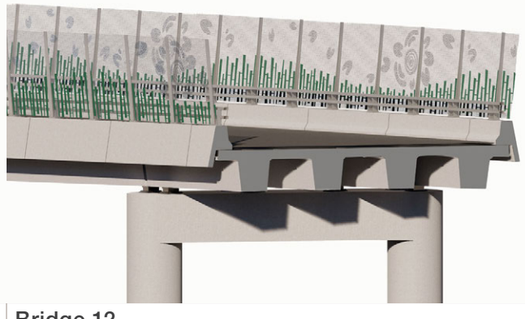
	OVERBRIDGES		UNDERBRIDGE
	The design, form, materials and finishes of these bridges (BR10 and BR12) (over the M1 Pacific Motorway) provide a consistent aesthetic to ensure visual continuity. Key attributes include: - Integration of interpretive elements incorporated in the safety screen design through art to reflect Aboriginal and cultural heritage - Sympathetic to the structural forms: » Spill through abutments » Integration with piers - Consistent pier shapes adopted – circular forms with integrated headstocks.		The underbridge (BR11) is experienced as part of the local environment of Windeyers Creek. Key attributes include: - Simple visual aesthetic to the structural forms: » Spill through abutments » Integration with piers - Consistent pier shapes adopted – integrated and a visually pleasant pier, headstock profile.
BRIDGE FORM AND STRUCTURE			
PARAPETS AND PIERS			
	Bridge 10 Bridge over M1 Pacific Motorway on Masonite Road	**Bridge 12** Bridge over M1 Pacific Motorway on southbound off ramp	**Bridge 11** Bridge over Windeyers Creek

Table 6: Family of forms - kit of parts

6.3.2 BR10 - Bridge over M1 Pacific Motorway on Masonite Road

BR10 is an overbridge over the M1 Pacific Motorway located on Masonite Road, which serves as the main local access connection to Pacific Highway and the townships of Heatherbrae and Raymond Terrace.

SUPERSTRUCTURE		
Structure	**Parapets**	**Safety screens**
Two-span bridge with Super-T girders	Simple tapered parapets with twin steel railing inclined at 10 degrees	Provided on both sides of the bridge along the full length of the bridge
SUBSTRUCTURE		
Abutments	**Piers and headstocks**	
Spill through abutments with concrete unit pavers under the bridge in a recessive appearance	Integrated headstock with circular pier to provide a single portal frame	
INTERPRETIVE ELEMENTS		
Interpretive elements incorporated in the safety screen design through art that responds to Country		
LANDSCAPE		
Feature landscape on approaches		

Table 7: BR10 - bridge summary

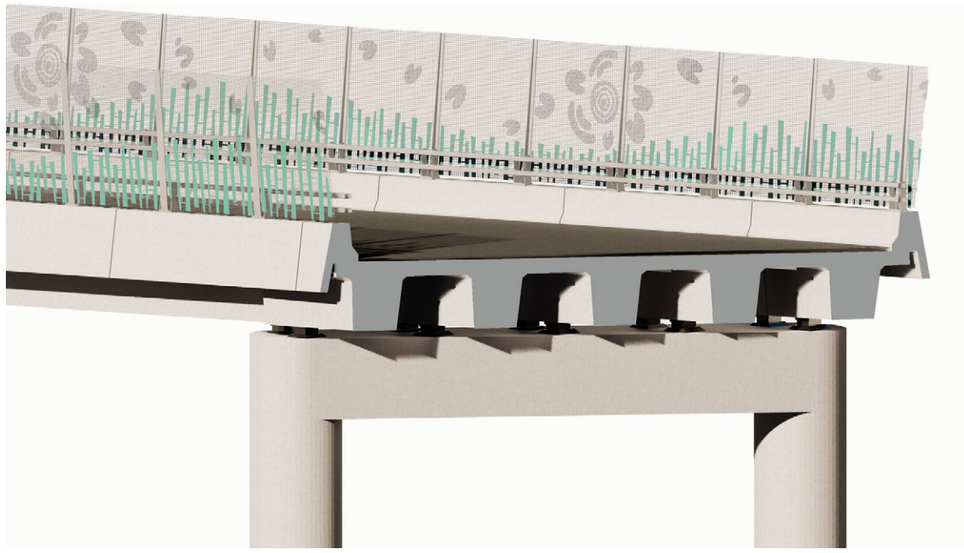
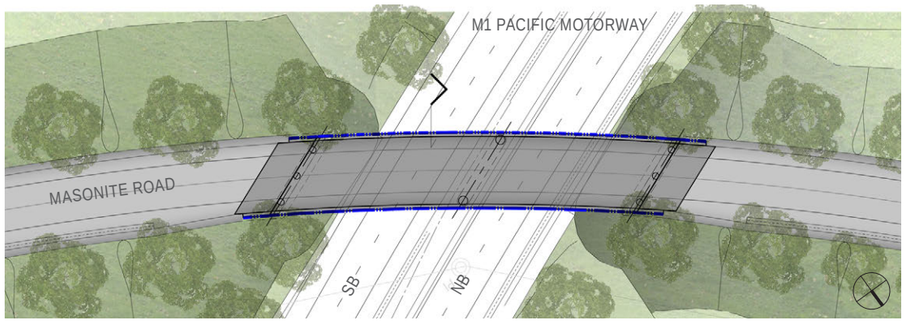
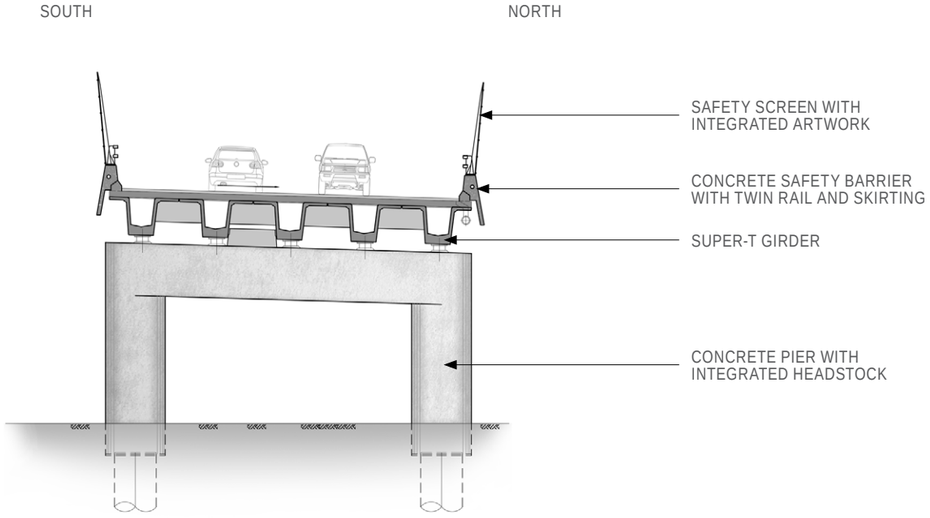


Figure 38: BR10 - section

Figure 39: BR10, looking north



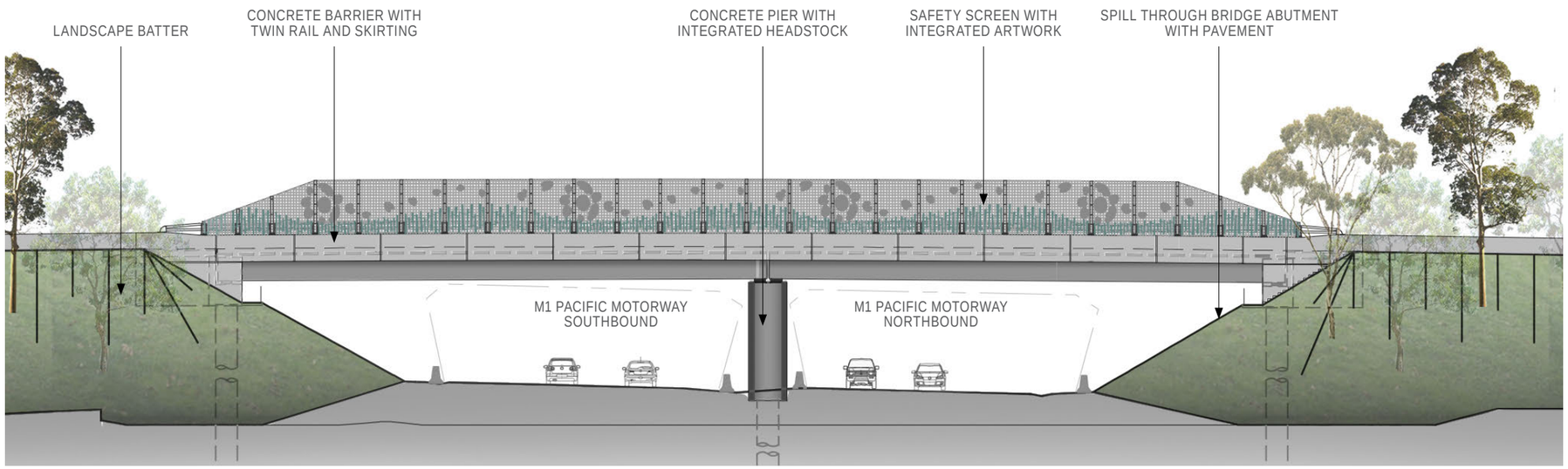
BR10 - PLAN



BR10 - SECTION

FROM TOMAGO ROAD

TO PACIFIC HIGHWAY



BR10 - ELEVATION

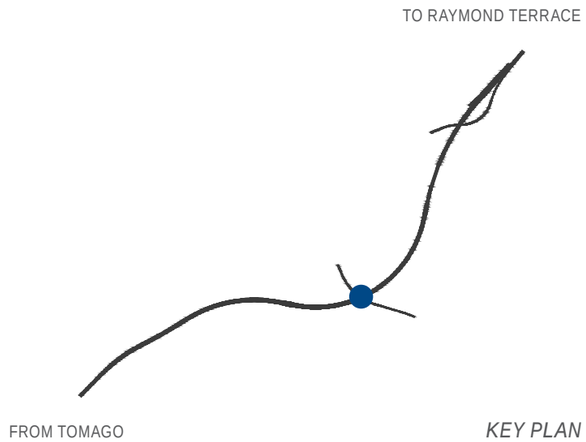


Figure 40: BR10 - plan, section and elevation

6.3.2 BR11 - Bridge over Windeyers Creek

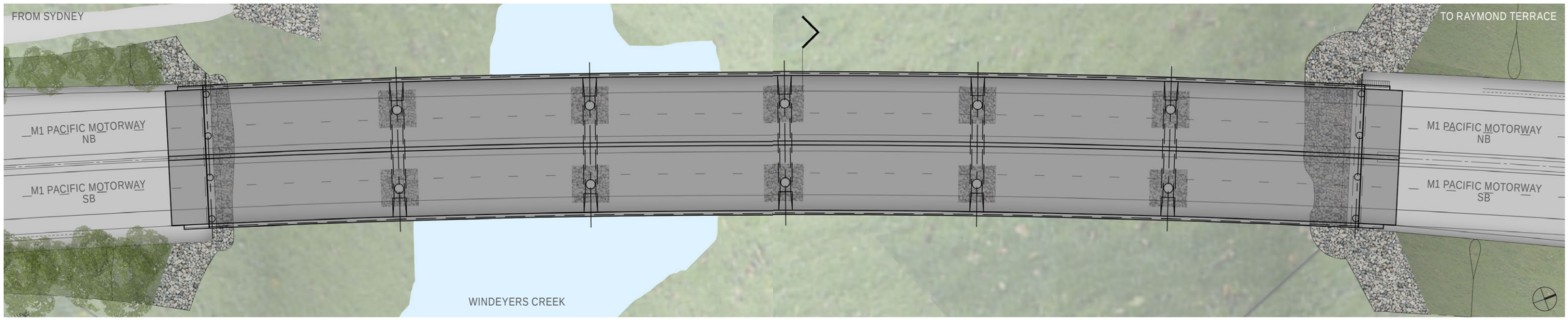
BR11 is an underbridge located over Windeyers Creek provided to meet the flood immunity requirements of the creek. The bridge is low lying and is mostly surrounded by dense vegetation of the creekline landscape within the enclosed forest environment and therefore will not be a visual element.

SUPERSTRUCTURE		
Structure	**Parapets**	**Safety screens**
Six-span bridge spaced evenly with Super-T girders	Simple tapered parapets with twin steel railing inclined at 10 degrees, deep enough to conceal drainage pipes	N/A
SUBSTRUCTURE		
Abutments	**Piers and headstocks**	
Spill through abutments with rock rubble to complement the creek environment	Articulated headstock with tapered profile when viewed in the traverse direction of the bridge deck, providing an integrated pier-headstock profile	
INTERPRETIVE ELEMENTS		
N/A		
LANDSCAPE		
Landscape provided under the bridge to complement the riparian creekline environment		

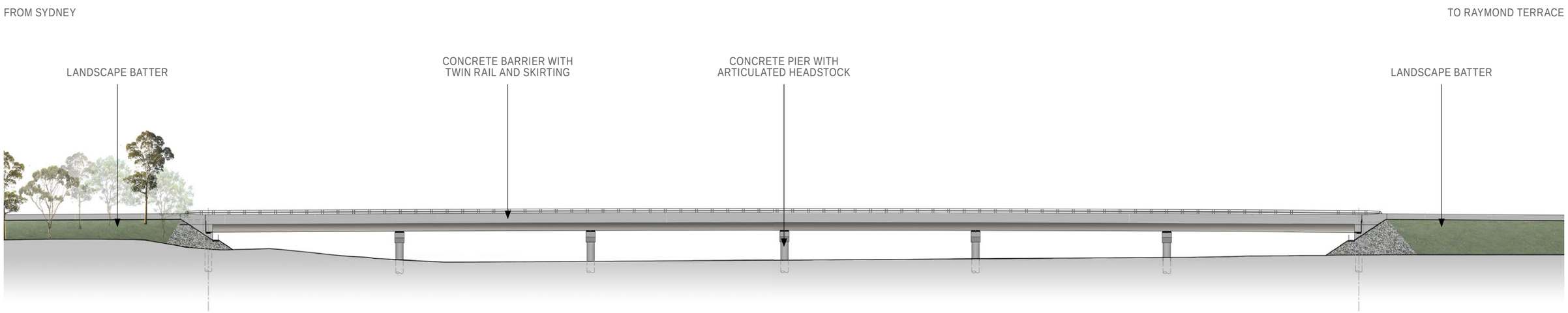
Table 8: BR11 - bridge summary

Figure 41: BR11 - section

Figure 42: BR11 - aerial view, looking north



BR11 - PLAN

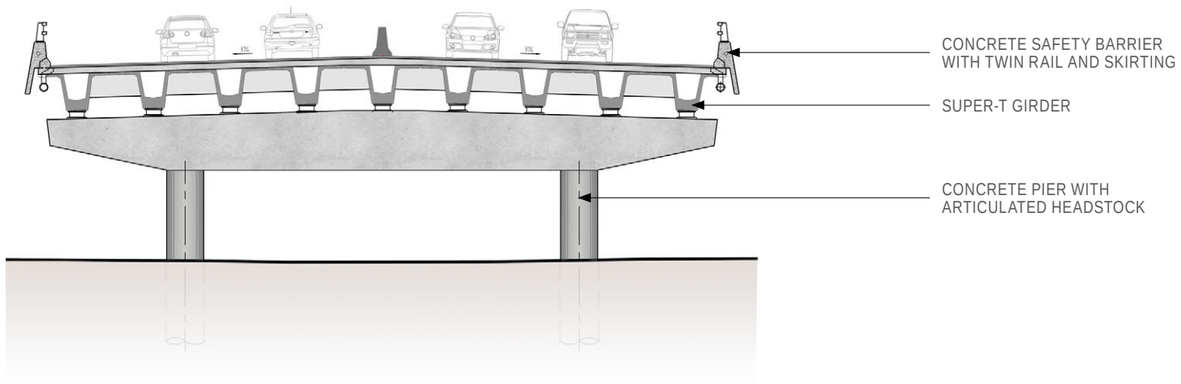


BR11 - ELEVATION

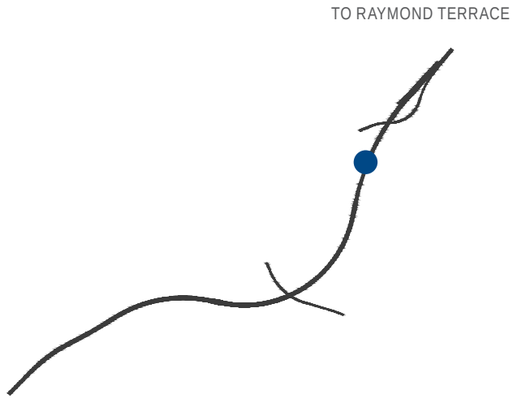
Figure 43: BR11 - plan and elevation

NORTH

SOUTH



BR11 - SECTION



KEY PLAN

Figure 44: BR11 - section

Artist impression
Drawing is illustrative only and landscape shown at full maturity

Figure 45: BR11 - northbound lanes

6.3.3 BR12 - Bridge over M1 Pacific Motorway on southbound off ramp

BR12 is an overbridge over the M1 Pacific Motorway southbound off ramp to Pacific Highway. It serves as the main direct access off the M1 Pacific Motorway to Pacific Highway and the townships of Heatherbrae and Raymond Terrace.

SUPERSTRUCTURE		
Structure	**Parapets**	**Safety screens**
Two-span bridge with Super-T girders	Simple tapered parapets with twin steel railing inclined at 10 degrees	Provided on both sides of the bridge along the full length of the bridge
SUBSTRUCTURE		
Abutments	**Piers and headstocks**	
Spill through abutments with concrete unit pavers under the bridge in a recessive appearance	Integrated headstock with circular pier to provide a single portal	
INTERPRETIVE ELEMENTS		
Interpretive elements incorporated in the safety screen design through art that responds to Country		
LANDSCAPE		
Feature landscape on approaches		

Table 9: BR12 - bridge summary

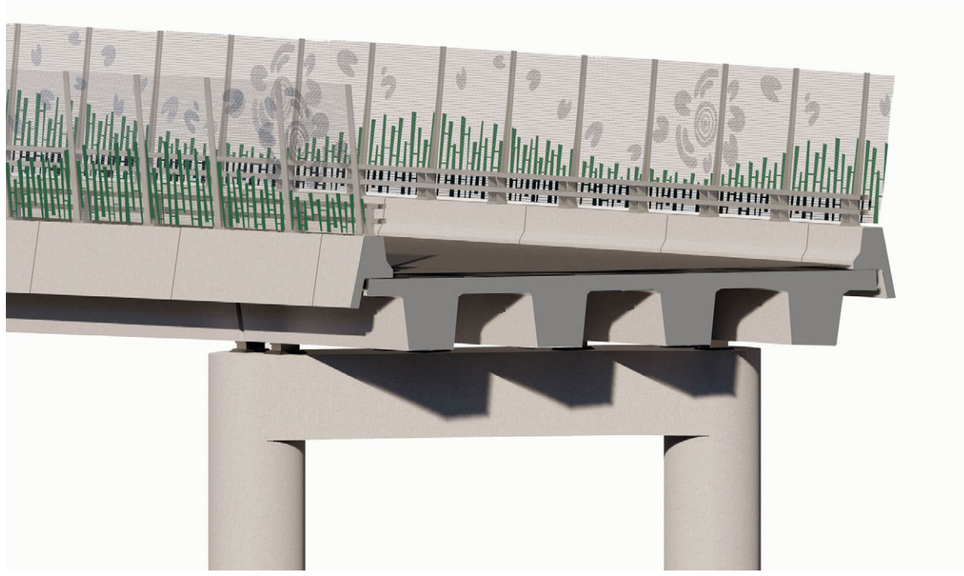
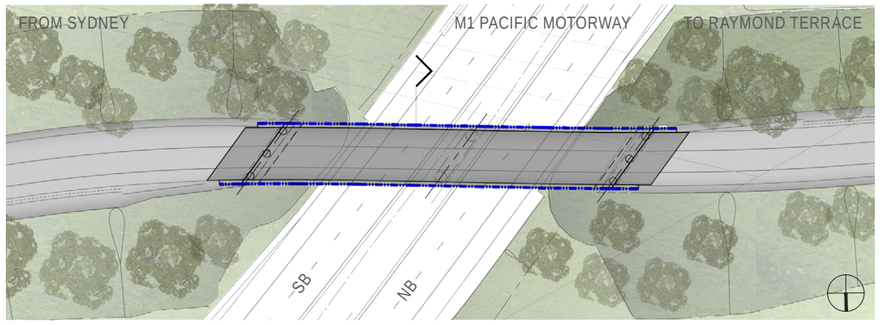
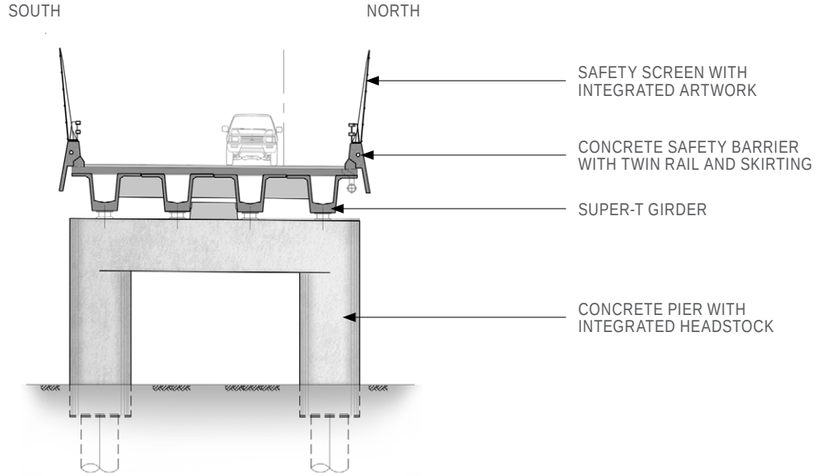


Figure 46: BR12 - section

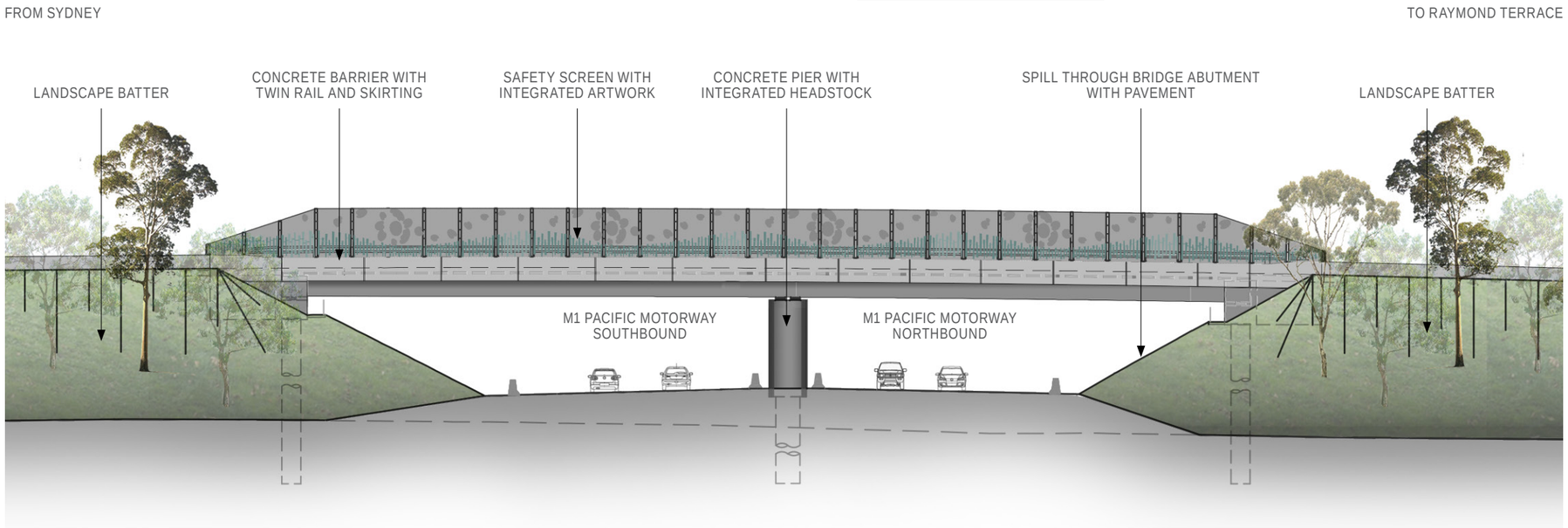
Figure 47: BR12, looking north



BR12 - PLAN



BR12 - SECTION



BR12 - ELEVATION

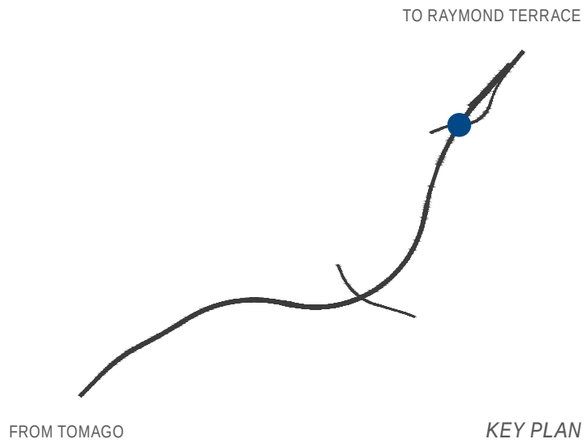


Figure 48: BR12 - plan, section and elevation

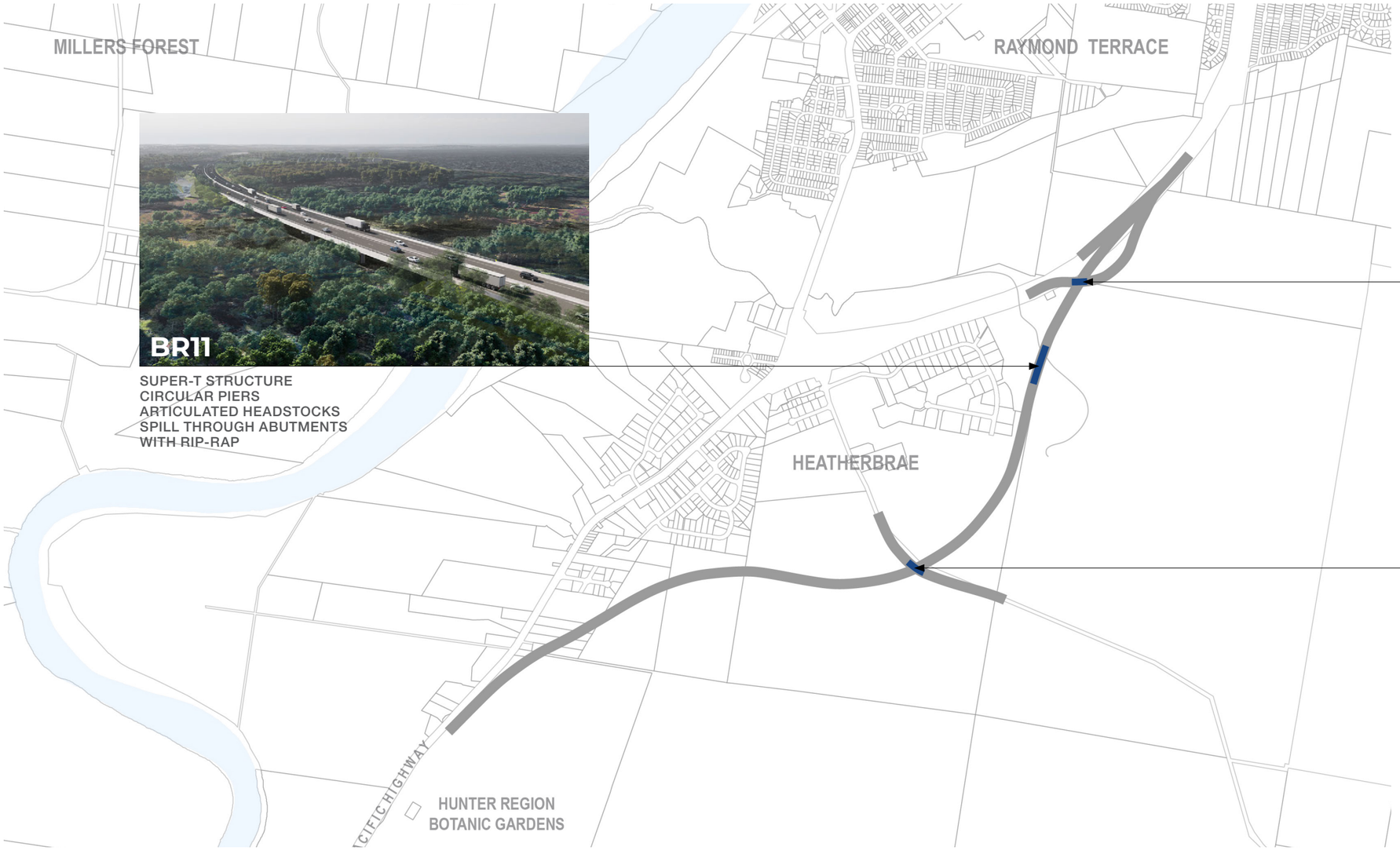


Figure 49: Bridges summary

6.3.4 Bridge type summary

This table provides a summary of all the bridge types, their hierarchy and the key urban design features. The design has been developed to minimise the number of structural types so that a consistent visual aesthetic can be adopted.

BRIDGE NO.	DESCRIPTION	HIERARCHY	STRUCTURAL TYPE	URBAN DESIGN ELEMENTS / FEATURES
BR10	Bridge over M1 Pacific Motorway on Masonite Road	Overbridge	Super-T girders	– Feature art screen reflecting the wetlands theme to reference Country. – Integrated headstock with circular pier to provide a single portal frame.
BR11	Bridge over Windeyers Creek	Underbridge	Super-T girders	– Spill through abutment with rock rubble to complement the creek environment – Articulated headstocks with an integrated pier-headstock profile consistent for all piers
BR12	Bridge over M1 Pacific Motorway on southbound off ramp	Overbridge	Super-T girders	– Feature art screen reflecting the wetlands theme to reference Country. – Integrated headstock with circular pier to provide a single portal frame.

Table 10: Bridge type summary

6.4 Safety screens

Safety screens are a major visual feature and an integral part of the overall bridge aesthetics, designed to prevent objects being thrown from the bridge and damaging vehicles or injuring people below. The safety screen design builds upon visual references from the site and the opportunity to provide for heritage interpretation.

The safety screen comprise of two main components:

– Articulated tapered and pointed T-posts.

– Mesh or similar infill panels which provide the opportunity to integrate art to depict the primary theme of wetlands.

The safety screen design has been developed to adopt a layered approach with a kit of parts that can be used with various combinations and configurations.

The design has two layers:

– Base layer comprises the standard mesh

– Accent layer comprises of two sub-layers:

  » The primary layer comprising a laser cut metal feature element which references the main theme of wetlands

  » The secondary layer comprises an articulated mesh on mesh which expresses the people and community elements.

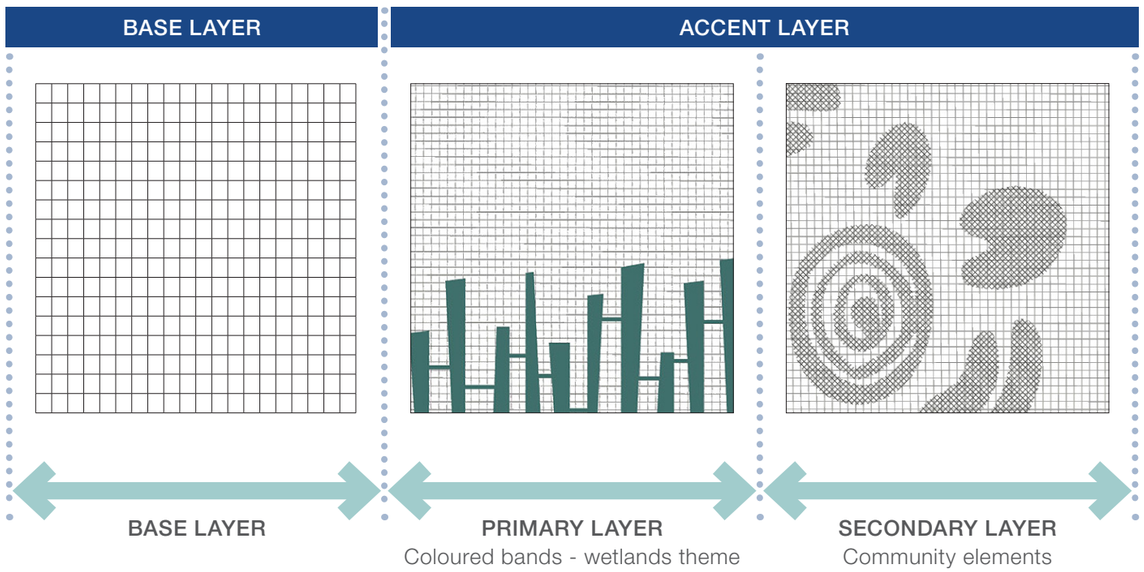


Figure 50: Safety screens - kit of parts

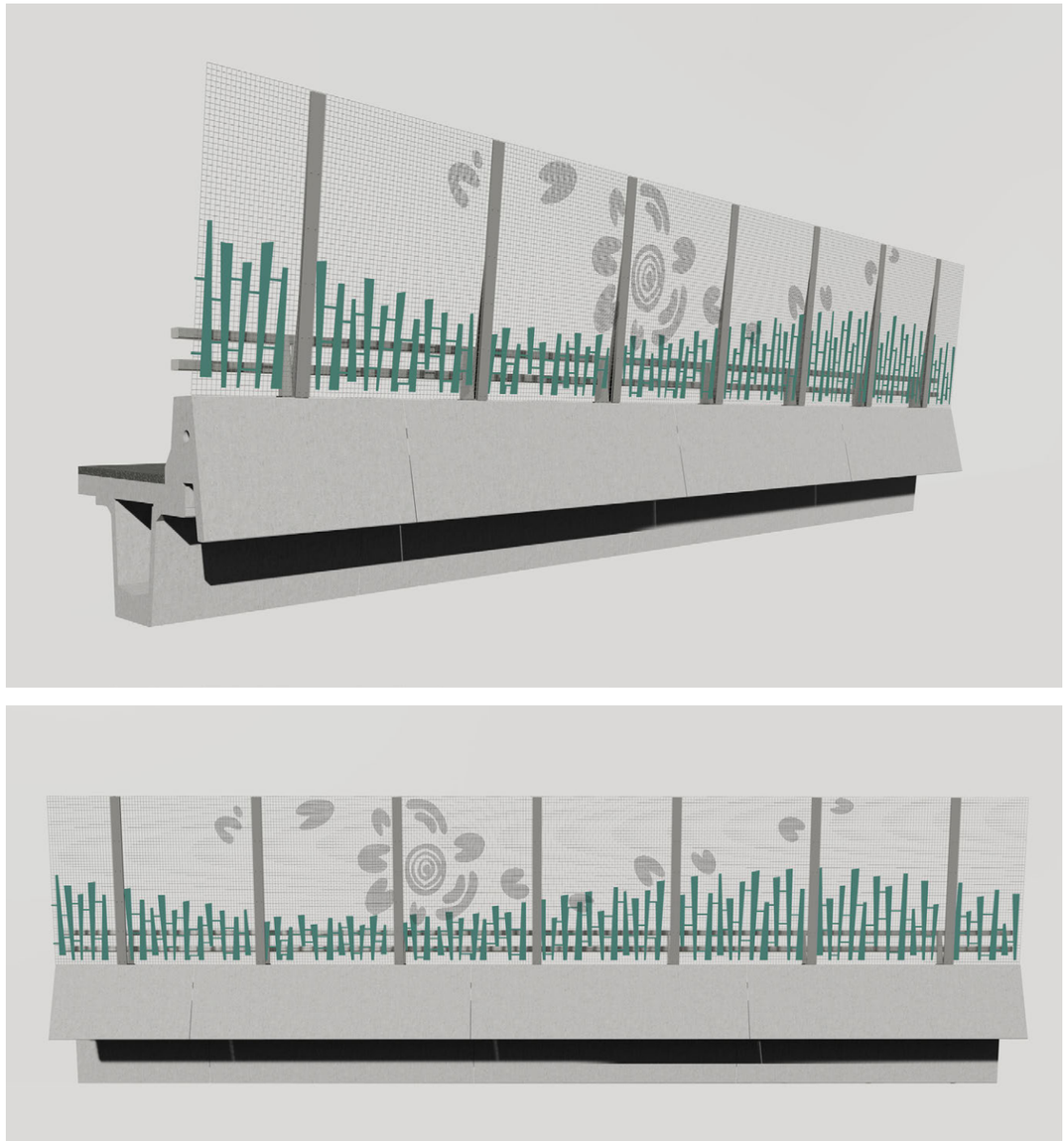
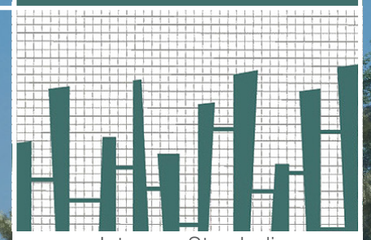


Figure 51: Safety screens - wetlands theme with community elements

Artist impression
Drawing is illustrative only and landscape shown at full maturity

PRIMARY LAYER
WETLANDS THEME
laser cut metal
4mm th nominal



Interpon Stomboli
GK148A or equivalent

SECONDARY LAYER
COMMUNITY ELEMENTS
articulated mesh
25 x 25 x 4 or lesser
powdercoated or painted

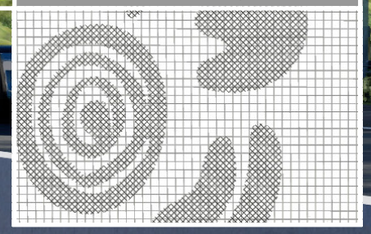
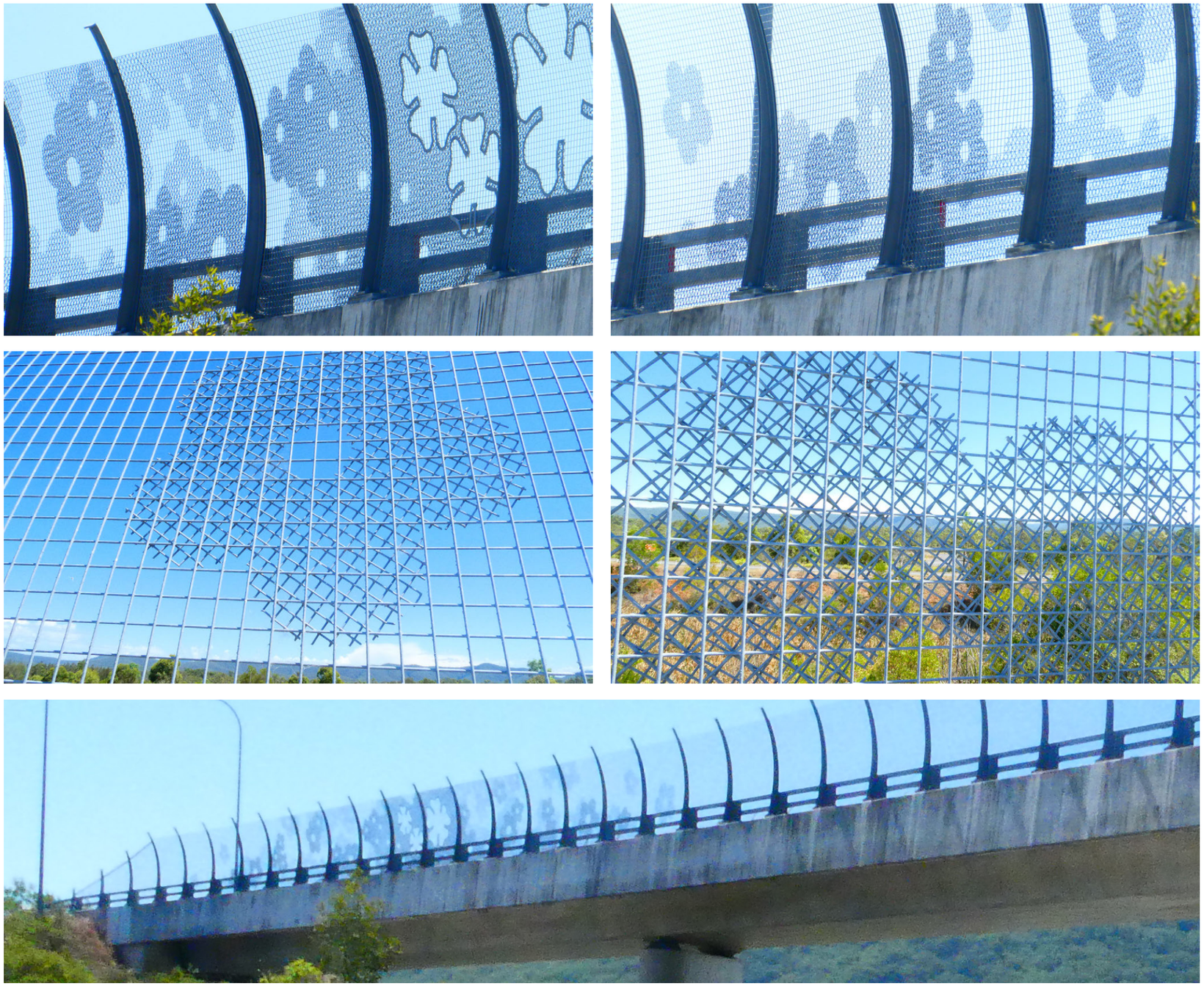
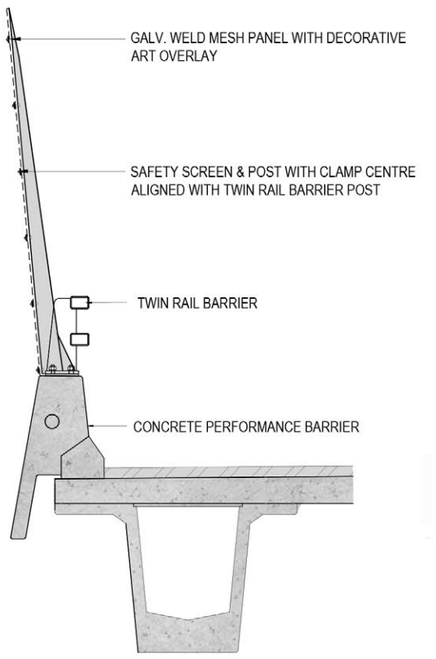


Figure 52: Safety screens - materials



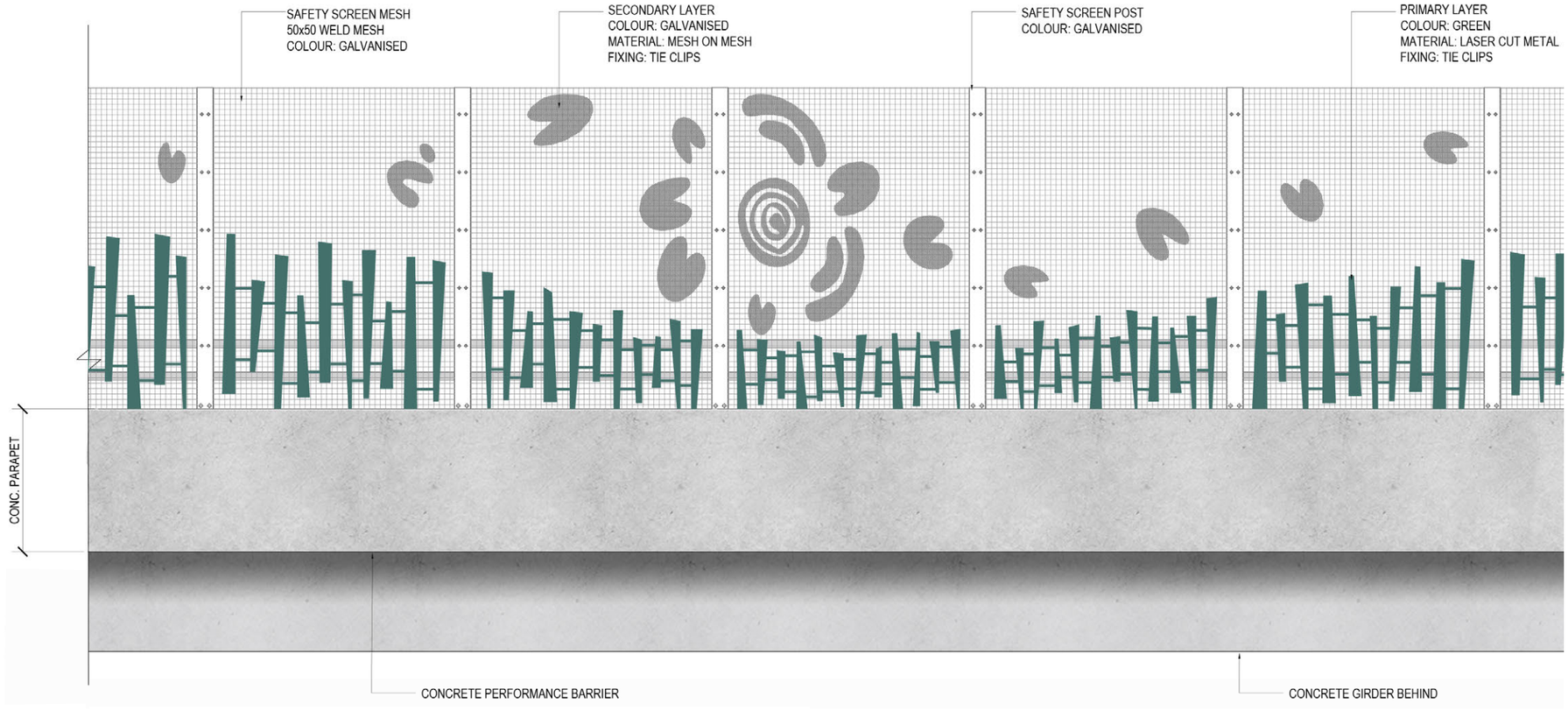
SECTION

Figure 53: Safety screens - precedents (Bulahdelah)



TYPICAL BRIDGE EDGE - SECTION

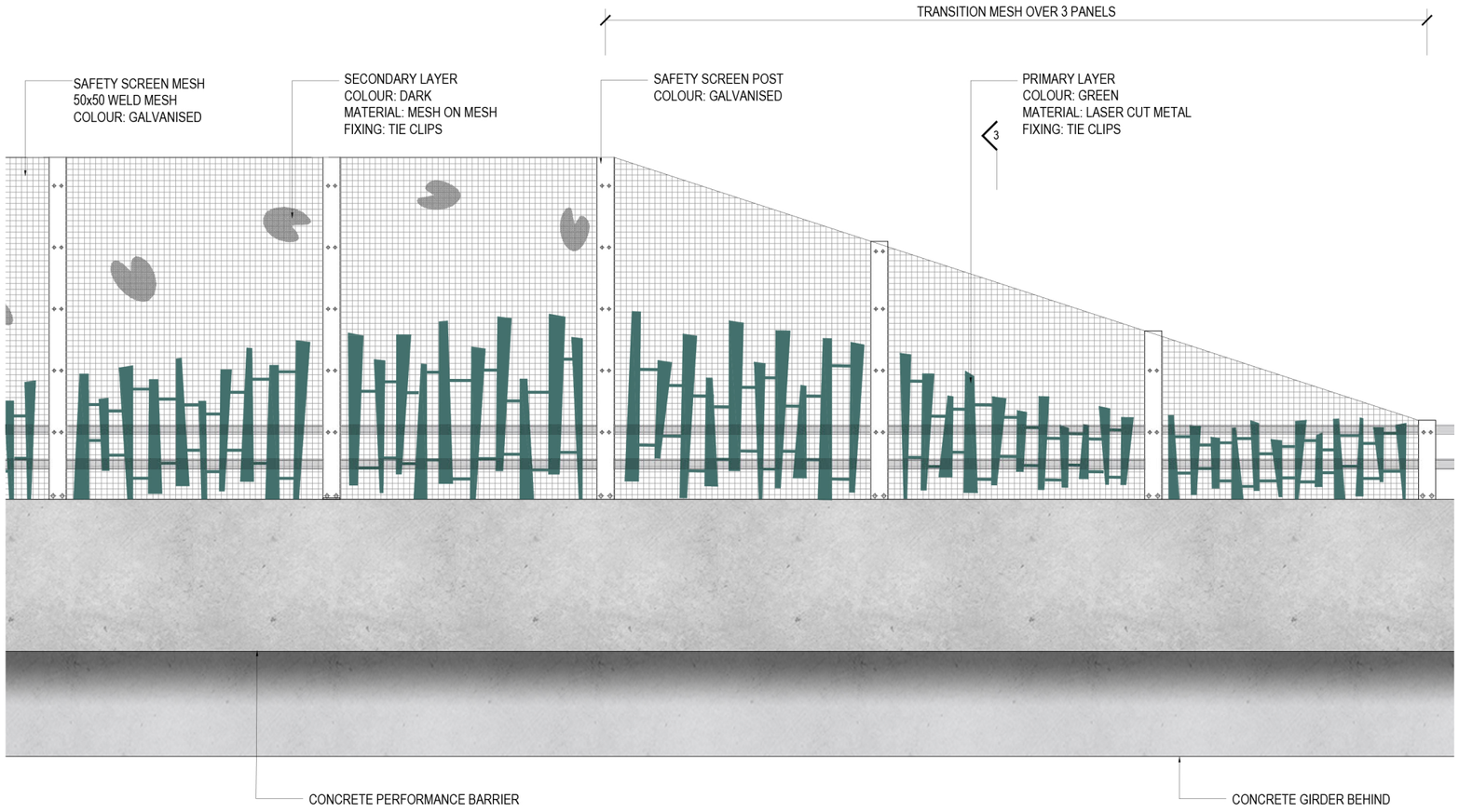
SCALE: 1:25



SAFETY SCREEN - TYPICAL ELEVATION

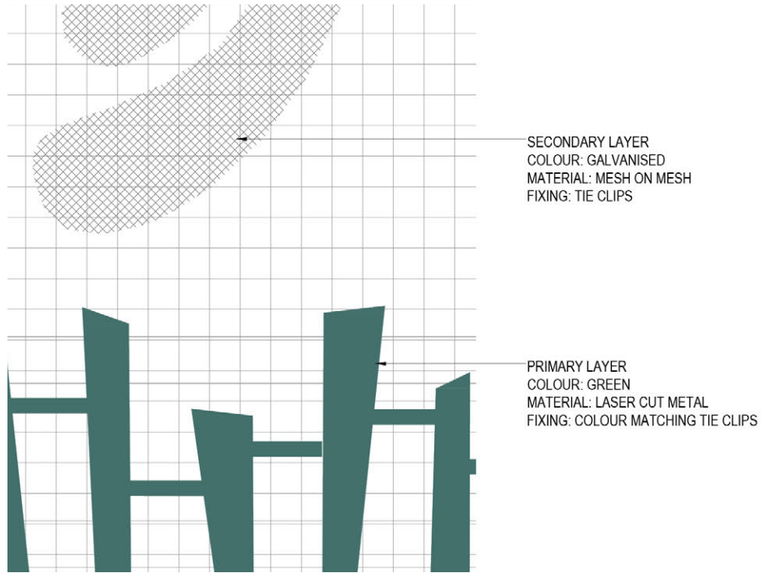
SCALE: 1:25

Figure 54: Safety screens - details 1



SAFETY SCREEN - TYPICAL TRANSITION

SCALE: 1:25



TYPICAL SAFETY SCREEN MESH

NTS

Figure 55: Safety screens - details 2

6.5 Signposting Country

Signposting Country has been developed with Aboriginal Artist Saretta Fielding, in accordance with the guidelines provided in the TfNSW *Signposting Country Technical Manual*.

Two types of signage have been investigated for Signposting Country:

– TYPE 1: Acknowledgement of Country signage

– TYPE 2: Place series signage.

Acknowledgement of Country signage has been provided in the Stage 1 Project.

Place series signage provides the ability to use the linguistically correct Aboriginal name for a place or locality, creek or stream or geographic feature, or acknowledge the Country of Aboriginal people or language group where the sign is located. Place series signage has been provided by acknowledging the Worimi people with the locality name of Heatherbrae.

Place series signage is comprised of:

– TYPE 2: Aboriginal Country name - Worimi Country with the locality name of Heatherbrae

Signage will be placed adjacent to the carriageway.

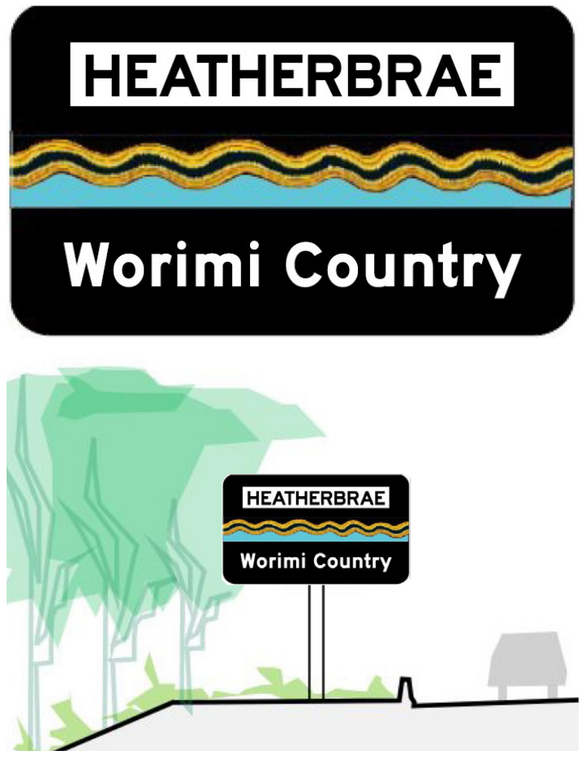


Figure 56: Type 2 - Place series signage - Worimi Country

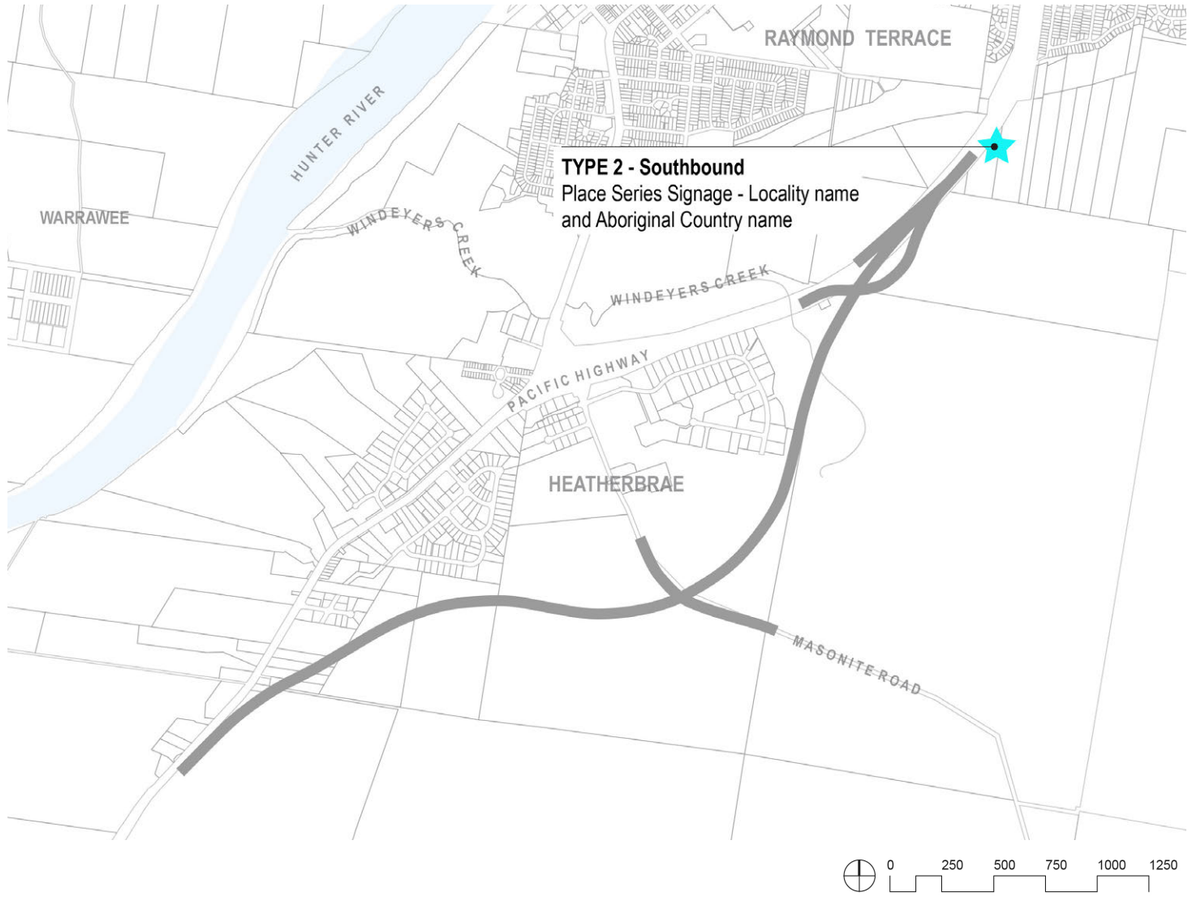


Figure 57: Signposting strategy - key plan

6.6 Anti-graffiti strategy

The application of a future paint over method has been adopted as part of the anti-graffiti strategy. This will be applicable to BR10 and BR12.

6.7 Crime Prevention Through Environmental Design (CPTED)

Crime Prevention Through Environmental Design (CPTED) is focused on achieving safe spaces for people (pedestrians and cyclists) to pass and move through. The greater M1 Pacific Motorway has limited pedestrian activity associated with it and also has limited opportunity for people to stop or gather.

A key element of CPTED is the achievement of surveillance. This Project is traversable only by a motor vehicle as a result of which there are no areas where pedestrians and cyclists can access the Motorway. However adequate measures such as the provision of lighting and maintaining long distance visibility and avoiding abrupt transitions in the alignment have been incorporated to ensure the safety of people.

6.8 Lighting strategy

The provision of lighting is focused on key areas that need to be illuminated to improve road safety at Raymond Terrace Interchange.

The lighting design has been developed to minimise light spillage to surrounding properties and natural habitats and is in accordance with the applicable standards (AS/NZS 4282:2019 and AS/NZ 1158).

Advanced LED luminaires and low-loss energy efficient control gear are included in the design which will achieve a Category V3 standard. The LED luminaires will also provide better distribution of light and higher colour rendering which will improve the visibility of colours and helps increase the safety of the Motorway.

6.9 Fencing

Fencing has been provided to prevent unauthorised access to the Motorway, utility exclusion zones and other dangerous areas. They have been located and designed carefully to be sympathetic to their surrounding and have a recessive appearance, which will reduce their visual impact.

Types of fencing include:

- Security fencing
- Fauna fencing.

6.10 Signage and Intelligent Transport Systems (ITS)

Signage and ITS design has been developed to provide a simple and intuitive signposting scheme for drivers. To achieve this and ensure the roadside environment is not cluttered, signs have been colocated onto one pole where possible and provide the required longitudinal spacing. In turn, this longitudinal spacing also improves safety by allowing drivers sufficient time to read and respond to the signs. Signage is located to comply with the clear zone requirements. Types of signage and ITS include:

- Directional signage
- Guide, regulatory and warning signage
- Speed limit signage
- Names of creeks, and bridges signage
- Emergency cross overs, emergency U-turn facilities and heavy vehicle stopping bays signage
- Tourist Signage
- Country signage
- Variable message sign.

6.11 Maintenance and management of Project elements

6.11.1 Maintenance strategy

A robust maintenance strategy has been developed for the Project elements such as safety screens, noise walls and retaining walls through the preparation of an Operations and Maintenance (O and M). The O and M manual outlines the management and maintenance regimes incorporated for the Project and includes, but not limited to:

- Maintenance procedures for the various design elements and assets.
- Timing and routines for the maintenance activities.
- Record of assets with asset IDs etc.
- Maintenance paths or other appropriate arrangements incorporated to allow access to these elements to undertake maintenance.
- Methodologies for repair and replacement of the design elements.

The maintenance and management of landscape elements has been described in Chapter 6.13.

6.11.2 Maintenance access

Maintenance access is required for overbridges and underbridges to access the maintenance platform to inspect the bearings and other structural equipment.

Maintenance access will be provided through the incorporation of stairs. Maintenance access to other elements such as basins, fences, service easements and other road furniture is provided with the incorporation of maintenance access paths using existing or new pathways. Access to these paths will be controlled through the use of barriers in order to prevent uncontrolled access within the land adjacent the corridor and to avoid undesirable activities such as dumping of materials etc.

Figure 58: Maintenance access to bridges - underbridges

6.12 Landscape implementation strategy

The landscape design has been prepared in accordance with TfNSW's urban design policy guideline - *Landscape design guideline: Design guideline to improve the quality safety and cost effectiveness of green infrastructure in road corridors*, Roads and Maritime Services 2018.

The following sections describe the various strategies adopted for the implementation of the landscape design.

6.12.1 Strategies and principles for site clearing

Site clearance impacts the areas of vegetation and soil management, both of which are strongly interrelated. These activities are informed by TfNSW *Biodiversity Policy* and *Guidelines*. Despite the interrelationships, the two processes have been separated to allow the issues to be understood in terms of the two separate works contracts, i.e. site clearance and topsoil stripping.

Elements considered in the site clearing process are:

- The extent of clearance is minimised.
- Environmentally significant vegetation is protected.
- Weed management is undertaken to ensure that landscape outcomes are optimised.
- Local provenance material is collected.
- Details of the site clearance protocols are addressed in the Construction Environmental Management Plan.

6.12.2 Soil management

The reuse strategy for the project will be informed by a soil assessment of the route. This will establish the nature, depth and potential for reuse of topsoils throughout the corridor. This testing is to occur as part of the design stage of the Project before stripping to aid in the establishment of sizing of stockpiling and their distribution so differing soil types can be separated.

TOPSOILING

Topsoil will comprise ameliorated site soils (final requirements yet to be determined by route assessment and testing of stockpiles), during major work imported topsoil may be required to make up any shortfall in site soils.

Testing will be undertaken in accordance with specifications.

ORGANIC FERTILISER

Application of fertiliser will be undertaken to all areas and will be included as part of the hydromulching or seeding application or as part of soil amelioration.

MANAGEMENT

Soil management will be subject to the staging requirements of the Project.

6.12.3 Revegetation strategy

The revegetation of the corridor and its intersections will be comprised of both broadscale landscape treatment such as hydromulching or other seeding methods and detailed treatments in the form of plantings.

SEED COLLECTION STRATEGY

Seed collection will be carried out by experienced seed collectors and suppliers in a manner that preserves the parent plant and that removes only a small percentage of reproductive material from the overall population in a particular area. The seed will be sourced from local vegetation sources where possible. Where the time of year does not permit or if the season is poor, the seed may need to be reinforced by the use of regionally sourced seed procured from stocks not collected specifically as part of the Project.

SEED APPLICATION AND ESTABLISHMENT

The seeding and plants methods listed below will be adopted as part of the revegetation work:

- Seeding Mixes are consistent with TfNSW L*andscape Design Guidelines* for the region
- Seed mixes reflect either a broadscale grassland/Sedgeland mix or an understorey mix of the respective vegetation communities.
- Seeding methods to be used are hydromulching - hydraulically applied seed and mulch matrix, utilising sugarcane as a mulch.

PLANTING

Trees are only to be planted to ensure appropriate distribution and cover as required in response to vegetation communities and compliance with sightlines and clear zones.

All plant species have been selected from plants known to grow well within the Project area. Plant selection has sought to use species based on their suitability to the climatic and site conditions but also their contribution to biodiversity.

RIPARIAN AND DRAINAGE REVEGETATION

Drainage and riparian vegetation will adopt a site responsive design approach which maximises Water Sensitive Urban Design (WSUD) initiatives and the regeneration of native vegetation communities associated with riparian environments.

The revegetation within riparian zones have been designed in accordance with the Natural Resources Access Regulator (NRAR) guidelines for Vegetation Management Plans and accommodate a fully structured vegetated riparian zone using indigenous species, this approach is applied to Windeyers Creek.

SWALES AND BASINS

Swales have been incorporated as a key element of the site's water quality management system. Due to the presence of the Tomago Sandbed and its role in the water supply the swales and basins collecting water from within this catchment will be lined to separate these waters from the water supply stream.

Where water is collected from the broader landscape swales will be revegetated with native sedges providing both environmental and water quality benefits. The margins of basins outside of the water catchment at the northern end of the Project are treated in a similar manner.

6.12.4 Ancillary sites

Ancillary sites are sites required for construction but to be returned to previous use to TfNSW at the completion of the Project. The landscape treatment for this zone is one of stabilisation in which a temporary grass cover is established to stabilise and protect the surface without changing or restricting the future use of the land. No planting is proposed for these lands given the potential to restrict future uses. Final resolution of the use of ancillary sites is subject to finalisation of the construction methodology.

6.12.5 Fauna access strategy

The environmental assessment undertaken as part of the Project EIS identified a number of threatened fauna species including the following:

- Squirrel glider – south of Masonite Road
- Masked owl – south of Masonite Road
- Grey headed flying fox – in the vicinity of Windeyers Creek.

And outside of the alignment but adjoining:

- Little bent winged bat
- Eastern freetail bat
- White bellied sea eagle
- Wallum froglet.

In addition to fauna recordings during analysis, a fauna corridor has been identified in the past by Scotts, D. (2003). Key habitats and corridors for forest fauna: a landscape framework for conservation in northeast NSW, which occurs at largely the southern extent of the Project. This corridor veers to the east where the M1 Pacific Motorway peels away from the existing highway at the commencement of this section of the Motorway corridor. The fauna corridor has been assessed as potential habitat for koala, New Holland mouse and the squirrel glider and so requires consideration as to what type of interaction may occur with the road corridor and how this is to be managed.

The approach to management adopted for these species has been the incorporation of fauna fencing to limit the access to the corridor, and restrict fauna movement into Heatherbrae.

Two fauna crossings are provided within the corridor:

- A rope crossing at approximately CH 11000
- Underpass as part of the construction of BR11 – bridge over Windeyers Creek.

Windeyers Creek also serves an important fauna role, the bridging of which limits the direct impact on the community enabling it to pass beneath the corridor.

6.13 Landscape management

6.13.1 Maintenance

Maintenance is a critical consideration in terms of design treatments and the need for ongoing management. Decisions made during the design phase and construction phase will have ongoing impacts on maintenance and will affect the viability of the landscape scheme. The following outlines some of the key strategies to address the ongoing management concerns.

WEED MANAGEMENT

A Landscape Management Plan will be prepared separately to the DLP which covers issues such as the management of weed outbreaks during both the construction and maintenance phases of the Project.

Weed control will be carried out in all areas of the corridor including revegetated and planted areas for a period of 12 months commencing on the date of final construction completion. At which time management will revert to TfNSW. The ongoing maintenance will be the responsibility of TfNSW, until satisfactory arrangements have been put in place for the transfer of the asset to the relevant authority. Until the transfer of responsibility, the works will be funded and maintained consistent with the requirements outlined within this DLP.

Weed management strategies include:

- Restriction of the area of native vegetation disturbed during construction works.
- Restriction of stockpiling to areas already cleared of vegetation.
- Use of weed-free topsoil in landscaping works,
- Revegetation using stockpiled soil will also include planting local native species to stabilise the soil as well as ongoing weed control.
- Comprehensive implementation and enforcement of the landscape design during the construction phase will ensure batter slopes are constructed as designed, are accessible for ongoing maintenance, and can establish vegetation cover.
- Appropriate construction techniques for subsoil and topsoil preparation and placement will be implemented to encourage plant establishment.
- Appropriate densities of ground, shrub and tree cover, and mulch will be installed to ensure maximum coverage and weed suppression.
- Maintenance phase works will not only include weed removal but also the replacement of failed stock and re-hydromulching, to ensure proper establishment of vegetation cover with the topping up of mulch layers to ensure maximum weed suppression.
- Weed invasions will be monitored and controlled by personnel experienced in weed management.

SUPPLEMENTARY WATERING AND MULCHING

Planting will be watered and maintained until plants have become established. If extended periods without rain are experienced during the establishment period then watering will be required to supplement natural rainfall. Establishment rates of watering are defined in specifications R178 and R179.

FERTILISER

Fertilising post-planting may be required where specific nutrient deficiencies are identified. The need for additional fertiliser has been minimised using a slow-release fertiliser. Fertiliser may be required to address specific soil and vegetation responses of the build process. This may include nitrogen drawdown because of mulch in soil media etc.

PRUNING AND THINNING

Pruning and thinning are likely to form a minor component of maintenance. Incidental pruning may be required to ensure retention of sightlines where self-seeded shrubs and trees have grown obscuring signage or views around bends.

PESTS AND DISEASES

Generally, pest and disease management is not viable for large areas. Planting will rely on developing an environmental balance through the establishment of improved habitat conditions. If an outbreak is identified which will impact the establishment of landscape outcomes an appropriate action plan will be determined.

PLANT REPLACEMENTS

Dead, diseased or dying plants are to be replaced to ensure planting has been established after 12 months. Planting will be replaced with the same plant species and scale unless it is determined by a suitably qualified person that a different species is more suitable to the location and conditions. Replacement plantings must use local provenance material consistent with the community in which they occur.

Consideration has been given to develop a methodology that allows for progressive stabilisation of the landscape works to occur, which will ensure whole-of-life cost benefits through reduced construction time frames, reduced re-work, reduced environmental risk, and reduced maintenance.

Figure 59: Aerial view of BR10 and Masonite Road

7. Materials and finishes

The materials concept features a consistent and robust palette of complementary materials. Their application is based on functionality, durability and the visual prominence of elements within the urban context.

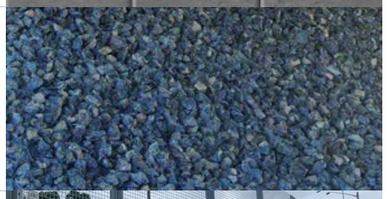
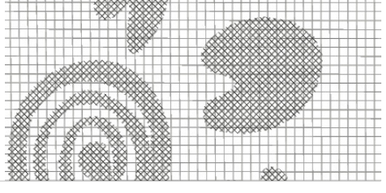
ELEMENT		MATERIAL	COLOUR / FINISHES	SPECIFICATION	DESCRIPTION	IMAGE
Bridges	Piers / headstock	Concrete	- Natural concrete / Class 2	AS 3610	Cast-in-situ	
	Girders	Concrete	- Natural concrete / Class 2	AS 3610	Precast	
	Parapets + skirtings	Concrete	- Natural concrete / Class 2	AS 3610	Precast	
Bridge undercrofts	Road bridges	Unit concrete pavers	- Charcoal, matt finish	- 300 X 150 X 60mm, tested as per AS/NZA 4456	Austral masonry Broadway 150 charcoal paver laid in stretcher bond pattern aligned parallel to abutment with a 300mm wide edging strip	
	Creek bridges	Informal rubble / crushed stone	- Recessive dark colour	- Varied sizes between 200-300mm	Stone rubble normally laid over the abutment batter under the bridge to provide a natural visual aesthetic.	
Safety Screens	Base layer: Standard screen and posts	Hot-dipped galvanised (HDG)	- Galvanised steel	- Structure: HDG structural steel T-post - Infill: 50 x 50 x 4mm weldmesh panel	Safety screen system	
	Primary layer	4mm th laser cut metal	- Interpon Stomboli GK148A or equivalent - Powdercoated	- Laser cut with joining tabs	Aboriginal artwork overlay	
	Secondary layer	Mesh (sizes varies): - Weldmesh - 25 x 25 x 4mm - Weldmesh - 12.5 x 12.5 x 4mm	- Interpon Black Satin GN150A or equivalent - Powdercoated - OR galvanised	- 25 x 25 x 4mm or lesser	Aboriginal artwork overlay	

Table 11: Materials and finishes

Figure 60: M12RT Gathering artwork, Saretta Art & Design

8. Conclusion

8.1 Integration between northern and southern packages

The two packages have been developed to have a consistent design philosophy which provides an integrated visual outcome for both sections to deliver the objectives and principles of the approved Planning documents.

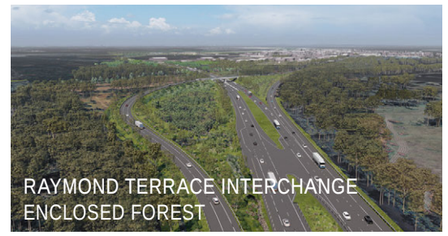
The urban design strategy responds to their context, providing both a sense of enclosure (Black Hill, and Raymond Terrace Interchange) and openness (Tarro and Tomago Interchanges) to tie in with the landscape setting of its surrounding environment, enhancing the linear identity of the Motorway and providing lateral integration. The aesthetic of all the overbridges which are experienced sequentially, have a similar appearance with same treatments provided for the spill through abutments and the blade wall abutments, piers and headstocks. The interpretive elements adopt the same overarching themes of the wetlands and waterways concept, developed from a common palette which is used in both packages. The Hunter Region Botanic Gardens explores the 'botanica' concept and enhances its connection to the Hunter River and provides a transition point to move from the enclosed forest experience to the open floodplain experience.

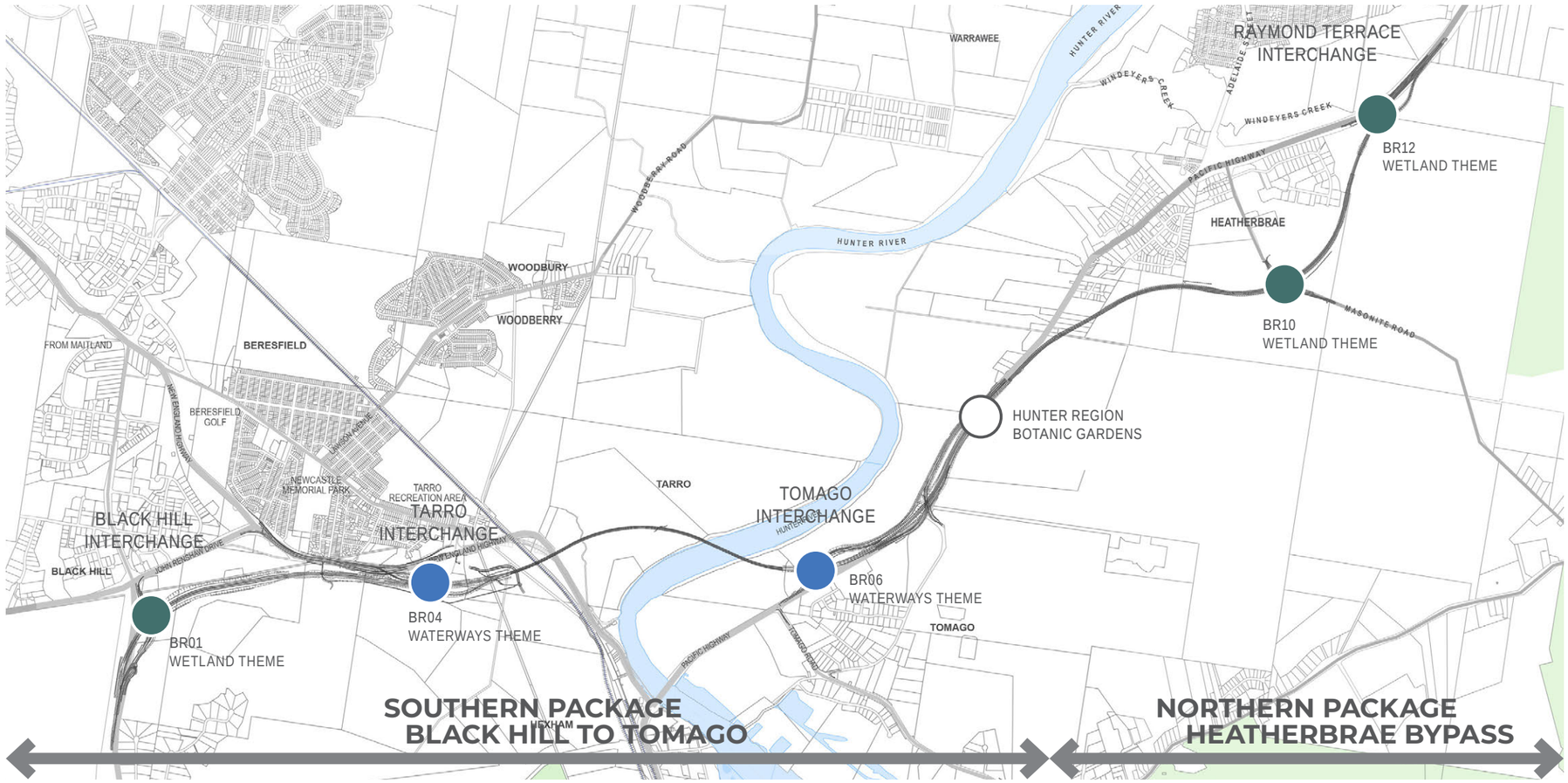
The user experience is enhanced by the design outcomes that respond to the alternating open floodplain and enclosed forest environments, reflecting the contrasting open and closed landscape setting.


BLACK HILL INTERCHANGE
ENCLOSED FOREST


TARRO INTERCHANGE
OPEN FLOODPLAIN


TOMAGO INTERCHANGE
OPEN FLOODPLAIN


RAYMOND TERRACE INTERCHANGE
ENCLOSED FOREST




BR01


BR06, BR04 (SIMILAR)


BR10


BR12

Artist impression
Drawing is illustrative only and landscape shown at full maturity

Figure 61: M1 Pacific Motorway Extension to Raymond Terrace - northern and southern packages integration

8.2 Design outcome

The design outcomes illustrated in this document have been informed by Appendix O of the Environmental Impact Statement as listed in Condition A1(a). The objectives and design principles, requirements, and opportunities outlined in Condition A1(a) have been developed and incorporated in the design.

The Project achieves a balanced urban design and engineering outcome through collaboration with a multi-disciplinary team of contractors, engineers, artists, and urban and landscape designers.

The urban design has been developed to enhance and celebrate the unique setting of the Project and the contrasting nature of the open and closed views along the corridor. Artwork has been developed in coordination with Saretta Art & Design to enhance Connection to Country and has been incorporated into the safety screens. Opportunities for fauna crossings have been also explored and incorporated to enhance biodiversity.

The outcomes illustrated in this DLP demonstrate how the design is complementary and ties in with the three types of landscape character through:

1. The reinstatement of the enclosed forest to the east of the alignment.
2. The provision of screening landscape to the west to reduce the visual impact of the M1 Pacific Motorway from the community of Heatherbrae.
3. The incorporation of feature landscape at Raymond Terrace Interchange which provides a distinct character that separates from the adjoining forest communities whilst responding to the Windeyers Creek creekline landscape, which is in close proximity to the interchange.

The Project will achieve the functional objectives of improving connectivity and enhancing the legibility to the M1 Pacific Motorway and New England Highway corridors; whilst also achieving a design that considers the natural environment, reinforces the wetlands theme and captures the essence of the existing character of the region.

Figure 62: M12RT Gathering artwork, Saretta Art & Design

Figure 63: BR12, looking south

NSW GOVERNMENT Transport for NSW

SEYMOUR WHYTE

CM+ Tract

Saretta art & design Pty. Ltd.