

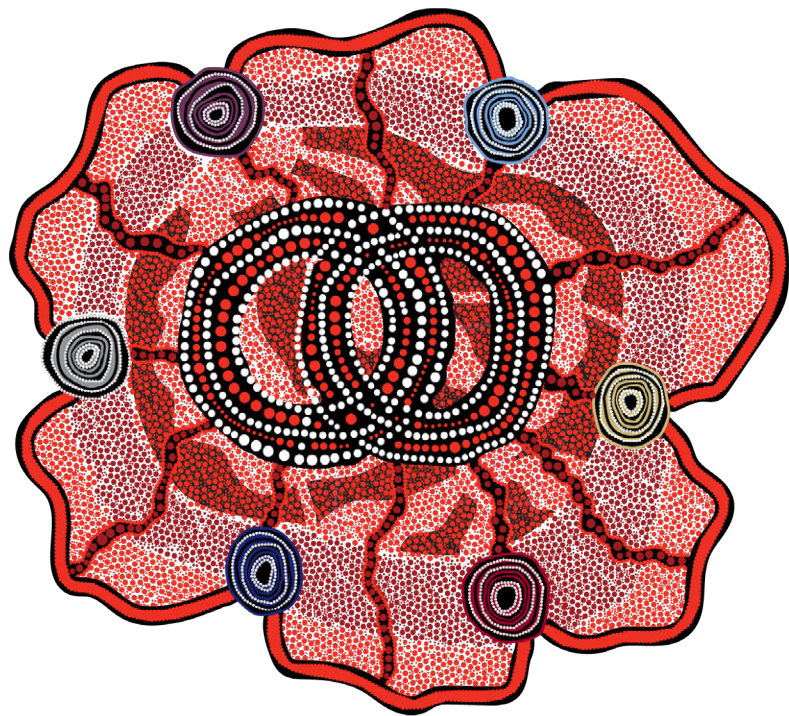
M1 Pacific Motorway Extension to Raymond Terrace:

Black Hill to Tomago



Design and Landscape Plan

Black Hill to Tomago



Acknowledgement of Country

The John Holland Gamuda Australia Joint Venture acknowledges the Worimi, Wonnarua and Awabakal Traditional Custodians of the land on which the M1 Pacific Motorway Extension to Raymond Terrace project is located and the Cammeraygal people who are the Traditional Custodians of the land on which the design office is located.

We pay our respects to Worimi, Wonnarua, Awabakal and Cammeraygal Elders past and present and celebrate the diversity of Aboriginal people and their ongoing culture and connections to the lands and waters of NSW.

Many of the transport routes we use today – from rail lines, to roads, to water crossings – follow the traditional Songlines, trade routes and ceremonial paths in Country that our nation’s First Peoples followed for tens of thousands of years.

John Holland Gamuda Australia Joint Venture are committed to honouring Aboriginal peoples’ cultural and spiritual connections to the land, waters and seas and their rich contribution to society.

Welcome statement by Saretta Fielding from Saretta Art & Design Pty Ltd, Aboriginal artist for the Project

The following is not a written Welcome to Country, however an overview of the Project commencement and continuing journey, through Welcome to Country.

Throughout the community engagement with the Worimi and Awabakal traditional custodians of lands, within the M1 Pacific Motorway Extension to Raymond Terrace footprint on Country, a warm welcome has been extended by Elders to those parties who work towards creating this infrastructure. Respectful relationships continue to be built with TfNSW and extending to joint venture partners undertaking the Project design and construction.

Workshops at Murrook at the community engagement, commenced with a Welcome to Country. Further visits to the Worimi Local Aboriginal Land Council Green Team by TfNSW and the joint venture partners and ongoing cultural tours on Country, by TfNSW, throughout the Project development and design and construction stages, has seen a continuity of the development of respectful relationships across the Project.

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

M1 Pacific Motorway Extension to Raymond Terrace:

Black Hill to Tomago

Design and Landscape Plan

Design Package Number: LA-01
Document Number: M1RTBH2T-JHGM-6003-LA-RPT-371001
Revision Number: H
Issue Date: 11 March 2024


Revision	Date	Description	By	Chk	App
A	30/06/2023	Submission to TfNSW & IC for Review	KR/ME	MV	KR
B	08/08/2023	For Consultation	KR/ME	MV	KR
C	22/08/2023	For Consultation	KR/ME	MV	KR
D	24/08/2023	For Consultation	KR/ME	MV	KR
E	06/09/2023	For Consultation	KR/ME	MV	KR
F	24/11/2023	Final DLP	KR/ME	MV	KR
G	07/02/2024	Final DLP - For Certification	KR/ME	MV	KR
H	11/03/2024	Final DLP - For Certification	KR/ME	MV	KR


Prepared for:



Transport
for NSW

By:

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Terms and abbreviations

BH2T Black Hill to Tomago	HB Heatherbrae Bypass	NSW New South Wales	TEC Threatened Ecological Communities
BR# Bridge #	HDG Hot-dipped galvanised	O and M Operations and Maintenance	TfNSW Transport for NSW
CEMP Construction Environmental Management Plan	ISC Infrastructure Sustainability Council	PCT Plant Community Type	WB Westbound
CH# Chainage #	ITS Intelligent Transport System	PHUDF Pacific Highway Urban Design Framework	WGT Worimi Green Team
CoA Conditions of Approval	JHGAJV John Holland Gamuda Australia Joint Venture	REMMs Revised Environmental Management Measures	WSUD Water Sensitive Urban Design
CPTED Crime Prevention Through Environmental Design	KPI Key Performance Indicator	RMP Rotational Moulded Panels	
CSSI Critical State Significant Infrastructure	LCZ Landscape Character Zone	RMS Roads and Maritime Services (now Transport for NSW)	Artist impression Illustrates the overall design intent shown is indicative only.
D&C Design and Construct	LEP Local Environmental Plan	RSW Reinforced Soil Wall	Landscape shown at full maturity Refers to landscape shown at 15 years.
DLP Design and Landscape Plan	LGA Local Government Area	RZM Rutile Zircon Mining	The Project M1 Pacific Motorway Extension to Raymond Terrace: Black Hill to Tomago
DPE NSW Department of Planning and Environment	LMP Landscape Management Plan	SB Southbound	
EB Eastbound	M12RT M1 Pacific Motorway Extension to Raymond Terrace	SEPP State Environmental Planning Policy	
EEC Endangered Ecological Community	Motorway M1 Pacific Motorway	SiD Safety in Design	
EIS Environmental Impact Statement	NB Northbound	SME Subject Matter Expert	
ER Environmental Representative	NTS Not to Scale	STP See-through percentage	
Gardens Hunter Region Botanic Gardens	NRAR Natural Resources Access Regulator	SWTC Scope of Works and Technical Criteria	

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.

The M12RT will be delivered as follows:

- Stage 1: Southern Package - Black Hill to Tomago (BH2T), being delivered by the John Holland Gamuda Australia Joint Venture (JHGAJV)
- Stage 2: Northern Package - Heatherbrae Bypass (HB), being delivered by Seymour Whyte.

JHGAJV has been appointed by TfNSW for the Design and Construct (D&C) contract for the Black Hill to Tomago portion (the Project), which involves the design and construction of 10 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. A 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 Southern Package only and is referred to as the Project in this document. The Northern 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) 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 the 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 a 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)

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:	Page f Chapter 1.6
	(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 f
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 6.11

Code		Conditions	Reference in Report
Visual Screening			
E20		The Proponent must consult with residents along Eastern Avenue, Tarro that have a direct line of sight to the CSSI (including elements such as an interchange or on and off ramps) for the provision of visual measures to reduce the visual impact of the of the CSSI from the property. Implementation of these measures must be delivered before operation. Note: The outcomes of this condition must be demonstrated in the Design and Landscape Plan.	Chapter 1.6 Chapter 6.7
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
	(c)	reviewed by TfNSW's Centre for Urban Design, with a focus on maximising the aesthetics of the viaduct / bridge over the Hunter River and floodplain;	Chapter 1.6
E22		Operational noise barriers must be designed to minimise visual and amenity impacts. Opportunities should be explored to incorporate aesthetics, wayfinding and public art into the design of the noise barriers.	Chapter 4.4 Chapter 6.7
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.	M12RTBH2T-JHGM-6003-LA-RPT-371001 (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	Page f 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. 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	Chapter 1.6
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 Chapter 3.2 Chapter 6.7
	(b) demonstrate compliance with Bridge Aesthetics: Design Guidelines to improve appearance of bridges in NSW (Transport for NSW, 2019);	Chapter 6.4
	(c) demonstrated integration of Crime Prevention Through Environmental Design principles; and	Chapter 6.14
	(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	Chapter 4 Chapter 6
	(b) the design of the project landform and landscaping elements (including visual screening requirements);	Chapter 5.1 Chapter 6.7
	(c) details of strategies to rehabilitate, regenerate or revegetate disturbed areas with priority given to the use of local native species;	Chapter 6.16
	(d) landscaping outcomes agreed to under Condition E20;	Chapter 5 Chapter 6.7
	(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
	(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 6.8
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.	Page f

Code	Conditions	Reference in Report
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 6.17
E30	Should plant loss occur during the maintenance period that impacts the capacity of the landscaping to achieve the design objectives (eg reduction in canopy species cover), the plants must be replaced by the same plant species and with similar growth form (i.e. a tree with an advanced juvenile tree) unless it is determined by a suitably qualified person that a different species is more suitable for that location. Any replacement plantings must use native species of local provenance from the relevant native vegetation community.	Chapter 6.17
Active Transport Network		
E31	The CSSI must not preclude the delivery of the Hexham Junction (intersection of the Minmi to Hexham rail line corridor and the pipeline corridor) to Tarro active transport link. Note: This is a council led active transport link and the Proponent must consult with the City of Newcastle to ensure the CSSI does not preclude the delivery of the cycleway.	Chapter 6.16
Construction Requirements		
E151	Proposed revegetation within riparian zones should have regard to NRARs guidelines for Vegetation Management Plans and accommodate a fully structured vegetated riparian zone using indigenous species. Note: Revegetation must include a maintenance component identified in the DLP as required by Condition E26 and the operational maintenance requirements of Conditions E28 and E30.	Chapter 6.16
E152	The realignment of Purgatory Creek must:	
	(a) mimic natural stream design by incorporating natural hydrological function and not include 90 degree sharp meanders; and	Chapter 6.16
	(b) tie into upstream and downstream sections of the watercourse and not limit any connectivity in the area.	Chapter 6.16

Revised Environmental Management Measures (REMMs)

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:	M12RTBH2T-JHGM-6003-LA-RPT-371001 (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 5 Chapter 6 Chapter 7
		- Walking and cyclist elements including footpath locations, paving types and pedestrian crossings	Chapter 6.13
		- Fixtures such as lighting, fencing and signs	Chapter 6.11 Chapter 6.12 Chapter 6.13
		- Details on the staging of landscape work including related environmental controls such as erosion and sedimentation controls and drainage	Chapter 6.17
		- Procedures for monitoring and maintaining landscaped or rehabilitated areas	Chapter 6.17
		- 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 6.14
		- Water sensitive urban design solutions.	Chapter 1.5
		The plan will be prepared in accordance with Transport urban design policy guidelines including:	Chapter 1.5
		- 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)	Chapter 1.5

Impact	Reference	Environmental management measure	Reference in Report
		- Shotcrete Design Guideline: Design guidelines to avoid, minimise and improve the appearance of shotcrete in NSW (Transport for NSW 2016b)	Shotcrete will not be visible following Project completion.
	UD01	- Water sensitive urban design guideline, Applying water sensitive urban design principles to NSW transport projects (Transport for NSW 2017b).	Chapter 1.5
	UD02	Disturbed areas outside the operational footprint and within the construction footprint will be revegetated following completion of construction activities.	Chapter 6.16
	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 5.1
	UD05	Temporary and permanent lighting will be installed and operated in accordance with AS/NZS1158 Lighting for Roads and Public Spaces.	Temporary lighting - N/A Permanent lighting - Chapter 6.11
	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 Chapter 5 Chapter 6
Aboriginal cultural heritage	UD06		

Executive summary

The M1 Pacific Motorway Extension to Raymond Terrace: Black Hill to Tomago (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 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
- In a predominantly rural urban area that plays an important role in the New South Wales (NSW) regional economy
- Comprises important land uses include mining, agriculture, defence services, manufacturing and industrial areas.

Key features of the Project include:

- A 10 kilometre motorway comprised of a four lane divided road (two lanes in each direction)
- Motorway access from the existing road network via three new interchanges at:
 - › Black Hill: connection to the M1 Pacific Motorway
 - › Tarro: connection and upgrade (six lanes) to the New England Highway between John Renshaw Drive and the existing Tarro interchange at Anderson Drive
 - › Tomago: connection to the Pacific Highway and Old Punt Road.
- Upgrades to Pacific Highway main alignment and upgrades to New England Highway between Black Hill and Tarro
- Eight bridges, including three overbridges and a 2.6 kilometre viaduct over the Hunter River floodplain, including new bridge crossings over the Hunter River, the Main North Rail Line, and the New England Highway
- Entry statement at the Hunter Region Botanic Gardens
- Retaining walls associated with the bridges and batters
- Noise walls at Black Hill and Tarro
- Headlight treatments at the tie in with the Heatherbrae Bypass
- A large cutting at Black Hill
- Connectivity to existing and future cycleway network.

The design has been developed to highlight the Project’s natural bushland and waterways setting and celebrates the floodplain and expansive views that this enables across the landscape. Six key initiatives have been established for the Project which are illustrated in the following section.

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

Key Initiatives:

1 Enhancement of the river and floodplain user experience

The design enhances the user experience of the Project’s setting within the floodplain through both its environmental and aesthetic expressions. The design celebrates views across the river and floodplain by introducing and articulating a range of elevated structures with feature safety screens that incorporate art as an important placemaking initiative. This is supported by landscape initiatives which compliment the floodplain environment.

2 Feature Interchanges

The design incorporates feature elements which provide a distinct aesthetic definition to the three interchanges at Black Hill, Tarro and Tomago, assisting with wayfinding.

2a Black Hill Interchange

The expansion of Black Hill Cutting facilitates continuation of the Prickly Paperbark Forest as the key vegetative marker of the interchange.

2b Tarro Interchange

The alignment at Tarro has been moved away from residents reducing the impact of the roadway. The interchange is also complemented with the use of landscape strategically provided with a twofold purpose - to screen residents on the western side whilst maximising floodplain views on the eastern side.

2c Tomago Interchange

The design for the Tomago interchange has been simplified with a reduced footprint and has eliminated a bridge structure, with feature landscape provided to define this interchange.

3 Entry statement at the Hunter Region Botanic Gardens

The Project celebrates ‘botanica’ and the river as the main feature to provide an extended arrival experience at the Hunter Region Botanic Gardens (HRBG). The underpass structure capitalises on the opportunity to incorporate art that ties in with distinctive planting treatments, as a ribbon linking through the structure. The design provides a new identity to HRBG, enhancing this ‘jewel’ in the landscape to create a sense of place.

4 Celebration of Connection to Country

The design provides a clear expression of Country and the relationship to the Hunter River. This is achieved through the integration of artwork provided on safety screens, and the entry to the HRBG, along with landscape elements at the interchanges and signposting of Country. The artwork has been developed with Saretta Art & Design who have created the artwork design to incorporate Country.

5 Landscape screening

Landscape has been used to encapsulate the road corridor and integrate with its surrounding context. Where an urban interface exists, such as the Tarro Interchange, the landscape has been used to screen and mitigate visual impacts arising from the works. Landscape is also used to screen and control headlight glare. This is achieved through dense shrub planting and is also used at the northern termination of the project where it adjoins the Heatherbrae bypass section.

6 Decarbonisation

As part of decarbonisation strategy, Rotationally Moulded Plastic (RMP) noise panels have been incorporated in the wall design, instead of concrete. This will help to divert plastic from landfill and reduce the carbon footprint and CO₂ emissions, without compromising on structural or aesthetic efficiencies; providing long term environmental sustainability. The landscape treatments incorporated in the design also contribute to the decarbonisation strategy.

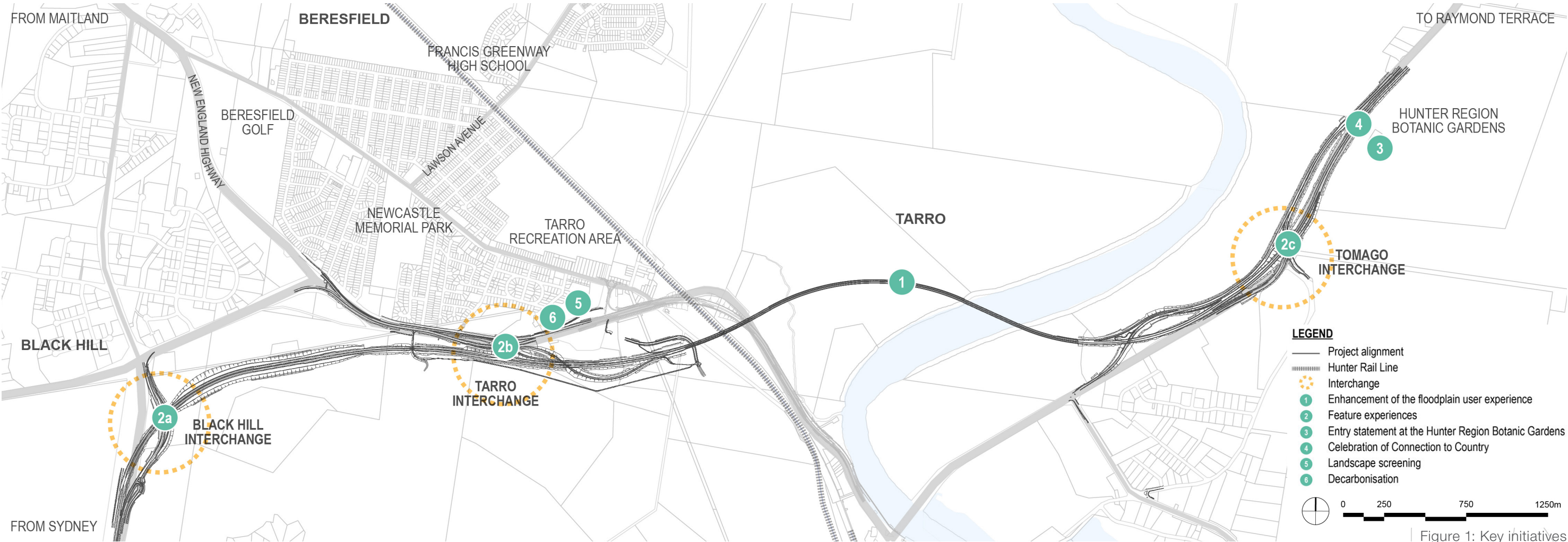


Figure 1: Key initiatives





Figure 2: Existing character near Woodlands Close

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, 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 in 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, artists from the community and 3D visualisers have prepared this report, working closely with the engineering and construction teams of John Holland Gamuda Australia Joint Venture (JHGJV).

Steps included:

- Attending site visits
- Preparing site analysis
- Identifying opportunities for interpretation
- Incorporating the urban design objectives and principles 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

- John Holland Gamuda Australia Joint Venture (JHGJV) – Principal Contractor
- Jacobs and BG&E Joint Venture (JB JV) – Civil and structural engineers
- Resonate – Acoustic engineers
- Conybeare Morrison (CM⁺) in association with Tract Consultants – Urban and landscape designers
- Saretta Art & Design – Aboriginal artists.

The team has developed the design with inputs and feedback from the community and TfNSW urban design Subject Matter Experts (SMEs) through workshops 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 includes the contextual analysis at the regional and local levels and provides their relevance to informing the urban design concept.
- 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 a Connection to Country.
- 5. Urban design concept plans** – This chapter illustrates the urban design and concept plans for the Project with references to other components.
- 6. Design elements** – This chapter illustrates the urban and landscape design of the various components and Project elements including interchanges, bridges, safety screens, retaining walls, noise walls and landscape design.
- 7. Materials and finishes** – This chapter summarises the materials and finishes for each design element.
- 8. Conclusion** – This chapter provides the design outcome that has been developed for 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
- Noise wall design guideline: Design guideline to improve the appearance of noise walls in NSW, Transport for NSW, 2016 (updated March 2021)
- Water sensitive urban design guideline: Applying water sensitive urban design principles to NSW transport projects, Transport for NSW, May 2017.

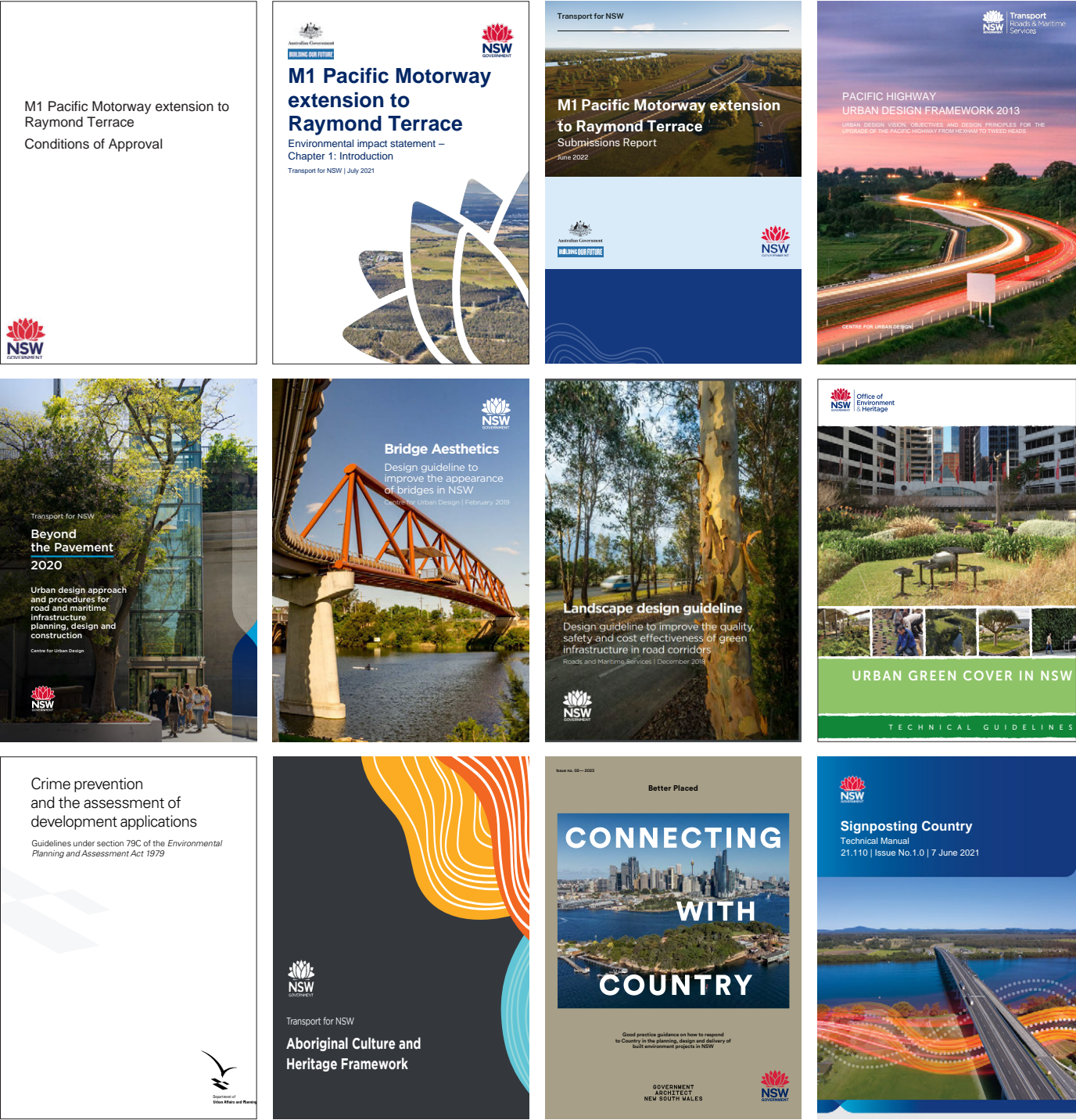


Figure 3: Key guideline documents

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 consultation strategy was established for the Project, ensuring effective engagement to manage expectations and mitigate risks.

JHGAJV is committed to achieve positive, long-term outcomes to work with the community and key stakeholders, including Newcastle City Council, Port Stephens Council, Eastern Avenue Tarro residents, Hunter Region Botanic Gardens (HRBG), Worimi Green Team, SMEs and other agencies. This DLP has been submitted for community display and feedback has been received.

Feedback was officially invited over a period of a four week public display period from 7 September to 5 October 2023. This has included consultation with affected landowners and businesses. Submissions from the consultation of this DLP have been recorded and collated through a separate submissions document. The responses included documentation of 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. The submissions have been assessed and responses to address the comments have been provided. A summary of the responses and outcomes of the consultation has been included in the final DLP which will be submitted to the Planning Secretary for approval.

Methods of consultation included:

- Drop in sessions at centres in Tarro
- 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 knocking.

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

	Mar 2023	Apr 2023	May 2023	Jun 2023	Jul 2023	Aug 2023	Sept 2023	Oct 2023
SMEs meetings	x	x	x	x				
HRBG	x		x	x				
Worimi Green Team		x						
Newcastle City Council	x			x	x			
Port Stephens Council	x							
Eastern Ave Residents				x				
Artist workshops		x	x	x	x	x		
Community and stakeholder consultation							x	x

Table 1: Consultations

The design outcomes have been reviewed by the TfNSW Centre for Urban Design, with a focus on maximising the aesthetics of the viaduct over the Hunter River and the floodplain.

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.

1.6.1 Feedback and responses

The Project team received a total of 34 individual submissions on the DLP. This included 16 via the interactive portal, four (4) in-person event submission forms and 14 via email to either TfNSW or the Project teams directly.

The submissions raised were then categorised into key themes including: landscaping, road design, active transport, heritage, fauna, signage, urban design, road operation, noise, construction, consultation and flooding.

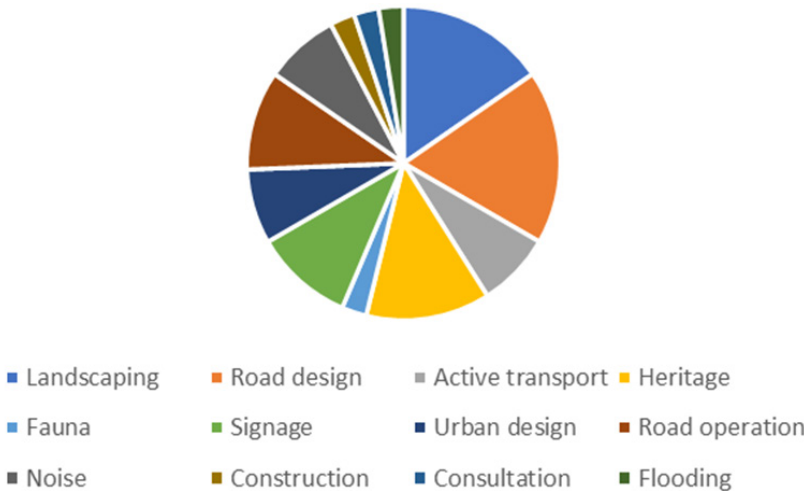


Figure 4: Submission categories

Many submissions received referred to areas outside the scope of the DLP and Project team. Feedback received that was within the scope of the DLP, and the Project teams’ responses, are summarised in the table below.

Topic	Submissions	Submissions summary response
Landscaping	Feedback on landscaping included queries about plant species and requests for diversity and habitat plants. There were also specific requests from impacted residents to mitigate views of road infrastructure through landscaping, as well as for regular maintenance.	The DLP utilises endemic species which are designed to tie into the existing landscape. The team has incorporated requests for additional screen planting into the updated DLP. Maintenance measures are being developed as part of the detailed design to manage and operate the landscape design and will be included in an Operations and Maintenance Manual provided to TfNSW.
Active transport	The stakeholders requested additional information about proposed active transport connections ,as well as facilities along these corridors.	Please refer to Chapter 6.15 of the DLP which illustrates the various Active Transport Links related to the Project.
Urban Design	Requests to reconsider use of noise walls at the rear of private property as well as a proposed alternative for safety screens on bridges. Also positive feedback regarding the overall urban design approach.	The incorporation of noise walls will provide a reduction in noise and provide a greater benefit if they are provided as a continuous element. Maintenance for these areas will be developed as part of the detailed design, to include measures to reduce overgrowth. The planting species have also been selected from a robust palette which are suited to these tight conditions, which would reduce the amount of overgrowth; thereby reducing the potential to house snakes and rodents, whilst allowing southerly winds to prevail. With regard to the safety screens, alternative designs were considered (included those used on other projects along the Pacific Highway) however the ones included in this DLP allow the artwork to be highly visible while maintaining transparency.

Consultation had previously occurred with the following key community members and organisations through presentations. Feedback and responses have been included in this report as noted below:

Hunter Region Botanic Gardens (HRBG)

Feedback:
To provide a sense of identity to the facility and incorporate signage and wayfinding. Ensure an appropriate maintenance regime is developed which outlines the responsibilities of multiple stakeholders including Council, HRBG and TfNSW.

Response:
Measures such as feature artwork and landscape treatments have been incorporated to provide a sense of identity. Signage strategy is currently under design development.

Eastern Avenue residents

Feedback:
To provide a sufficient green buffer with the maximisation of the retention of existing vegetation.

Response:
The concept of adopting a recessive approach to the appearance of the noise wall and maximising vegetation has been well received and supported.

Worimi Green Team (WGT)

Feedback:
The WGT welcomed the opportunity to use the WGT site premises as a place for storage for seed collection and proposed trees.

Response:
The design team has been consulting with the WGT to develop a methodology for storage of proposed trees and seed collection and encourage community participation as part of this process.

Table 2: Submissions within the scope

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 by ISC:

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

This is achieved via 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

The Project can provide interesting views of the surrounding landscape for motorists via the use of the elevated nature of the viaduct. 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 a simplified elegant design without the visual clutter of 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 impacting on adjacent land use and natural environment.

Table 3: Urban design objectives

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 delivery of the 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 that 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 by sea level rise and sedgeland species have been adopted as a key element of their 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.

2.2 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 state’s freight and movement network. 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 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
- In a predominantly rural urban area that plays an important role in NSW regional economy
- Comprises important land uses including mining, defence services, manufacturing, agriculture, and industrial areas.

Key elements of the Project include:

- A 10 kilometre M1 Pacific Motorway extension that ties into the northern package, connecting the existing Pacific Highway, north of Heatherbrae
- Upgrades to Pacific Highway main alignment and upgrades to New England Highway between Black Hill and Tarro
- Three interchanges at Black Hill, Tarro and Tomago
- Eight bridges, including three overbridges and the main viaduct over the Hunter River and Main Northern Railway
- Entry statement at the Hunter Region Botanic Gardens (HRBG)
- Retaining walls associated with the bridges and batters
- Noise walls at Black Hill and Tarro
- Headlight treatments at the tie in with the Heatherbrae Bypass
- A large cutting at Black Hill
- Provision of pedestrian and cyclist access.

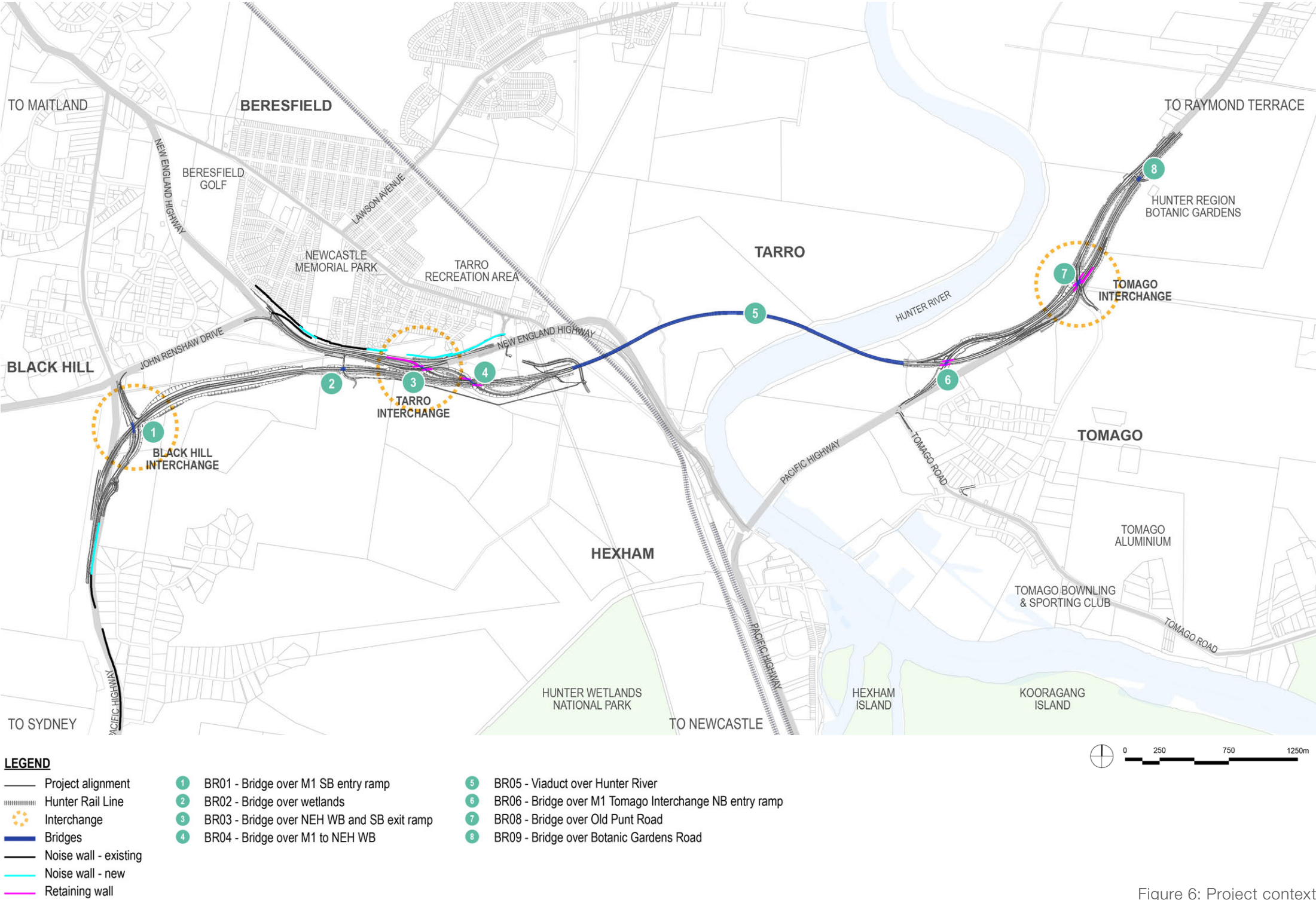


Figure 6: Project context

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.

Three NSW Landscape Regions are located within the sites construction footprint. These are the:

- **Newcastle Coastal Ramp:** placed at the western side of the construction footprint around Black Hill, entailing the south eastern limit of the Newcastle Coastal Ramp which extends further west and north across the lower Hunter region
- **Lower Hunter Channels and Floodplains:** located between Tarro and Hunter River at the western extent of the construction footprint
- **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
- Low rolling hills and wide valleys typical of the surrounding floodplain
- Long distance views across the landscape due to low-lying floodplain
- Rising topography at edge of floodplain resulting in views to low-lying areas such as Black Hill, Beresfield, Tarro, Woodberry and Tomago
- High voltage power lines and Hexham Bridge are visible across low lying and open landscape.

Design implications

- Maintain open views or vantage points over landscape
- Impact on views from residential areas and hilly areas at edges of floodplain
- Incorporate low growing vegetation to allow for long distance views in view corridors.

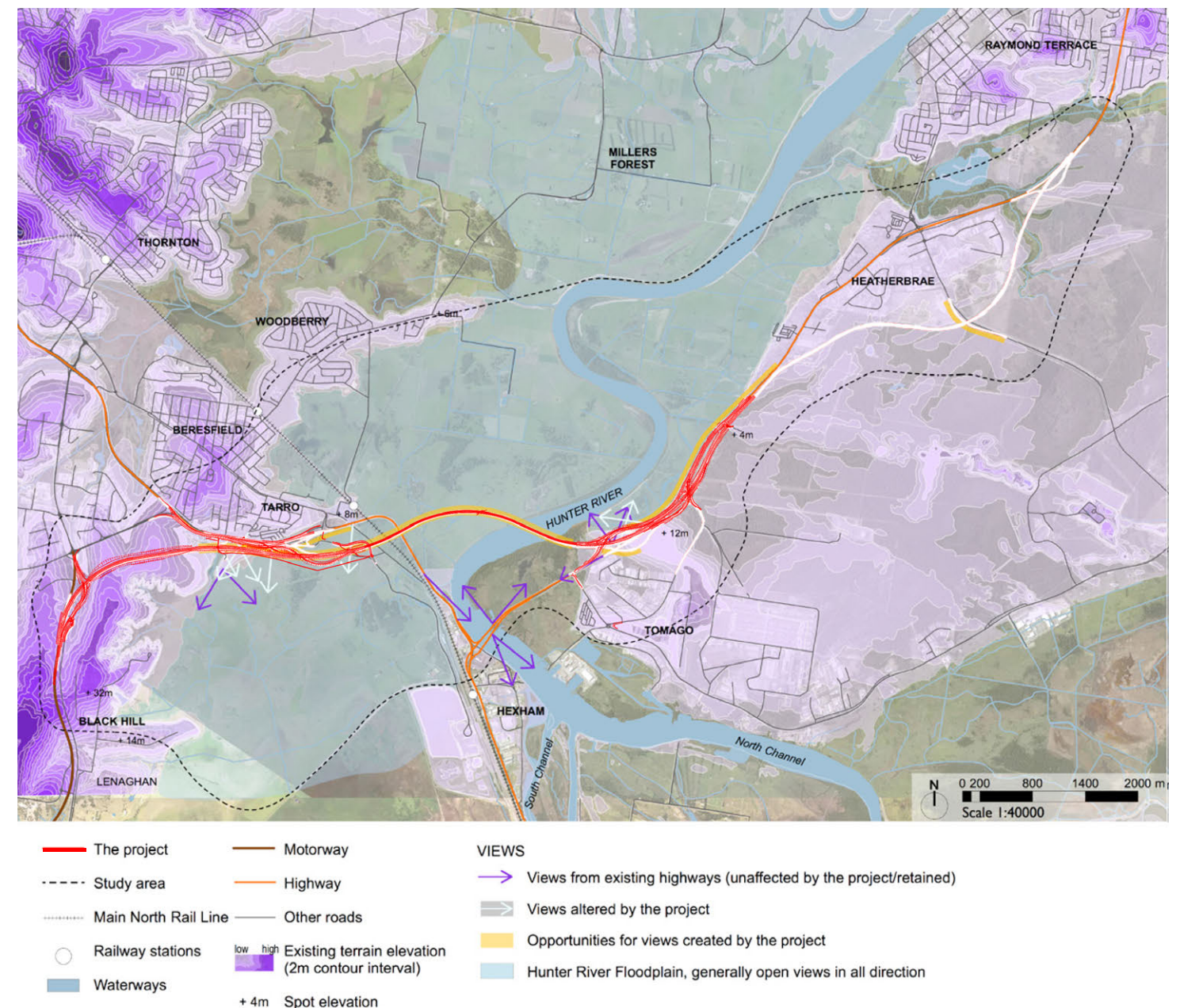


Figure 7: Landform and views (base image from M12RT, EIS - Appendix O, TfNSW, June 2021)

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 spanning 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
- 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
- Hexham Swamp Nature reserve is located two kilometres from the site boundary, south of the Hunter River and is classified as Coastal Wetland under the Coastal Management State Environmental Planning Policy (SEPP)
- Flooding results in road closures, disrupting connectivity between communities and regions
- Tomago Sandbeds are an important ground and drinking water resource, however, will not be impacted by the Project.

Design implications

- Provision of enhanced connectivity during flooding through enhanced immunity
- Protect existing aquatic systems from pollution and contaminants
- Provide a flood immunity solution that enhances the experience of the floodplain environment.

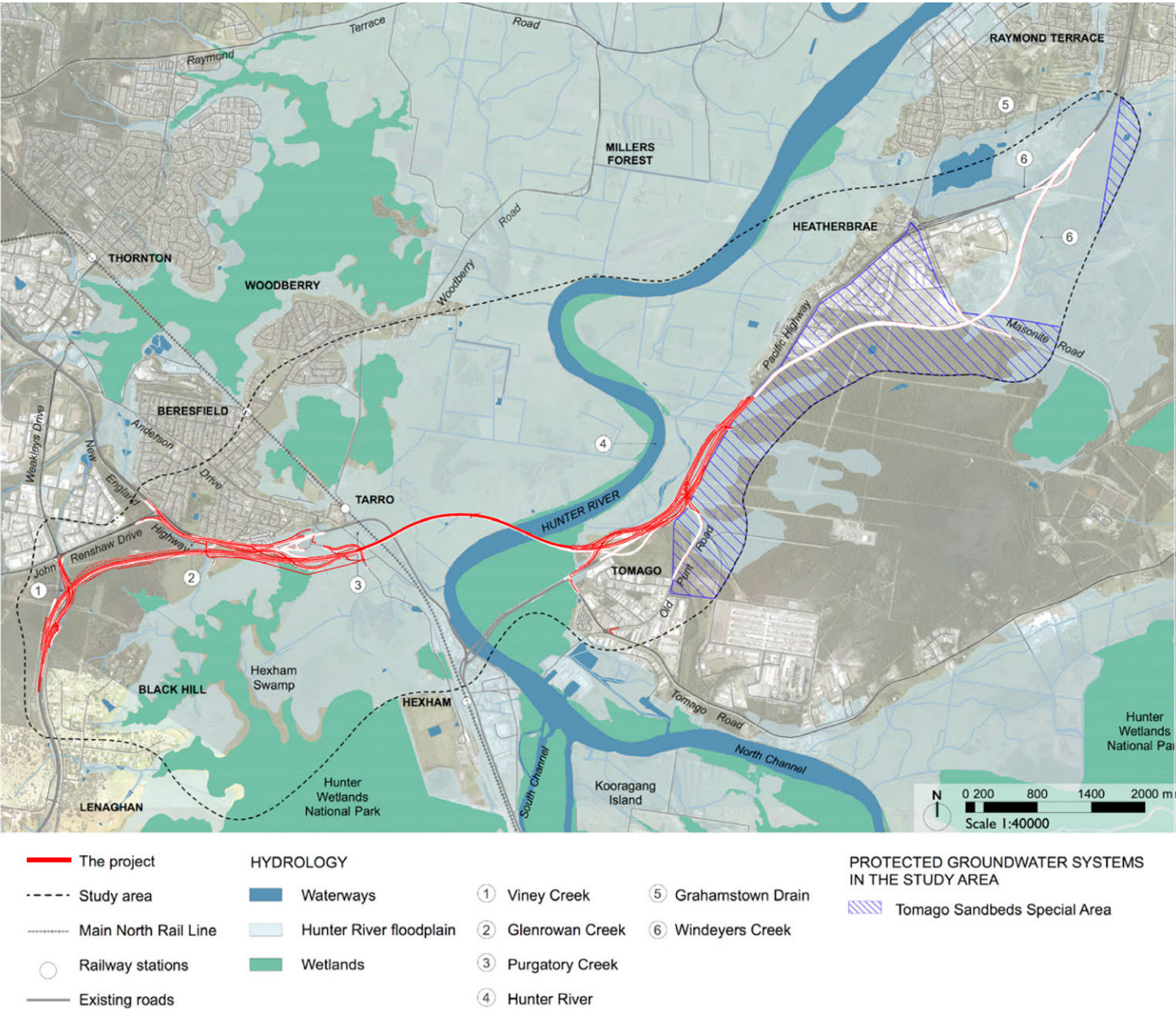


Figure 8: Surface water, ground water and flooding (base image from M12RT, EIS - Appendix O, TfNSW, June 2021)

2.3.3 Vegetation

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

- Higher ground typically has 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. Spotted Gum – Broad-leaved Mahogany - Red Ironbark shrubby open forest (Plant Community Type (PCT) 1590)
2. Grey Ironbark – Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast (PCT 1588)
3. Smooth-barked Apple – Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast (PCT 1646)
4. Prickly-leaved Paperbark forest on coastal lowlands of the Central Coast and Lower North Coast (PCT 1716)
5. Swamp Oak – Sea Rush - *Baumea juncea* swamp forest on coastal lowlands of the Central Coast and Lower North Coast (PCT 1727)
6. Water Couch – Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter (PCT 1736)
7. Grey Mangrove closed forest (PCT 1747)
8. Saltmarsh estuarine complex (PCT 1746)

Design implication

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

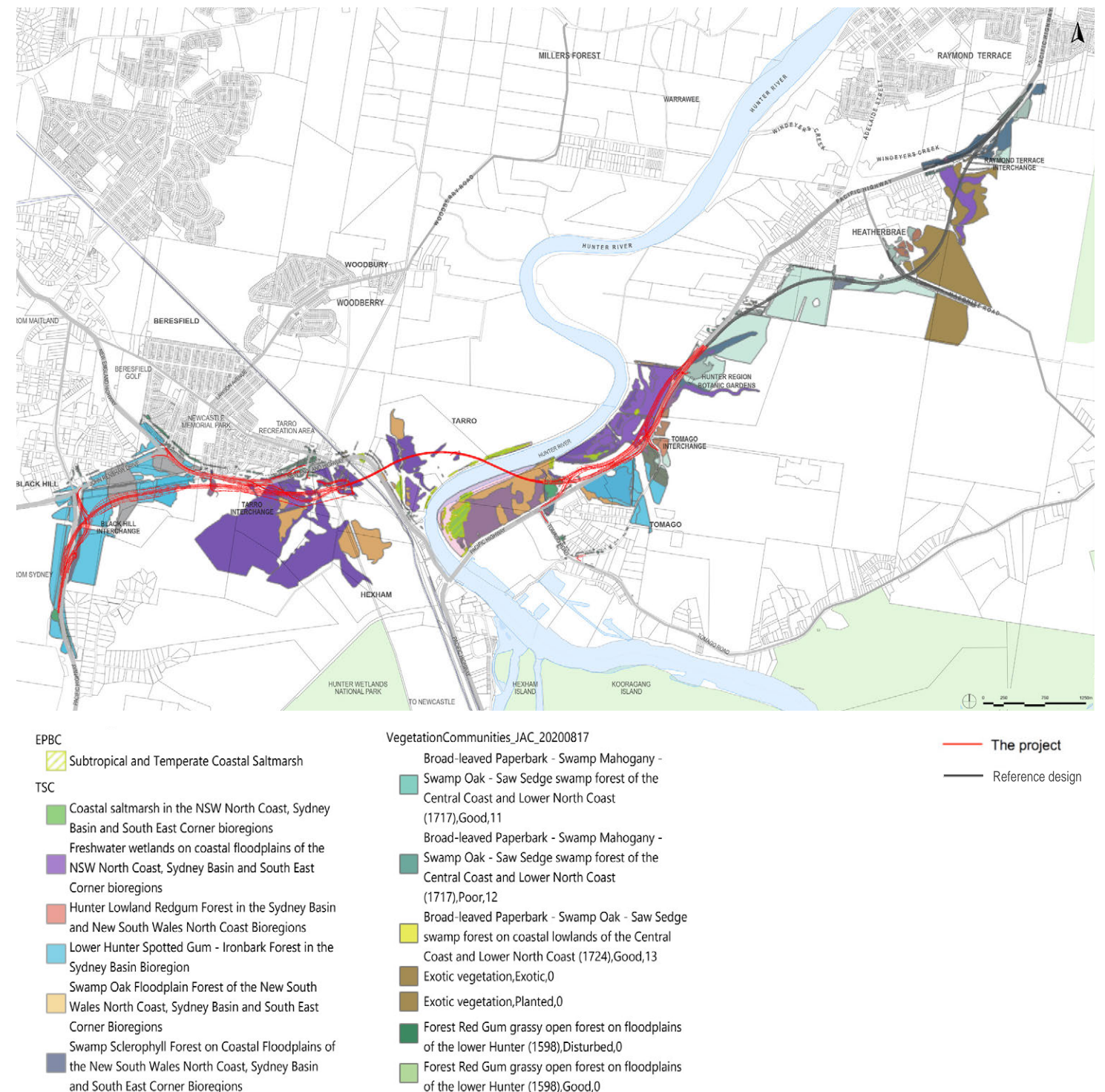


Figure 9: Vegetation (Source: GIS)

2.3.4 Biodiversity

The corridor is a mix of native habitats and cleared agricultural lands. The native and endemic fauna species present consist of species which reflect vegetation and aquatic communities present.

Key existing characteristics are:

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

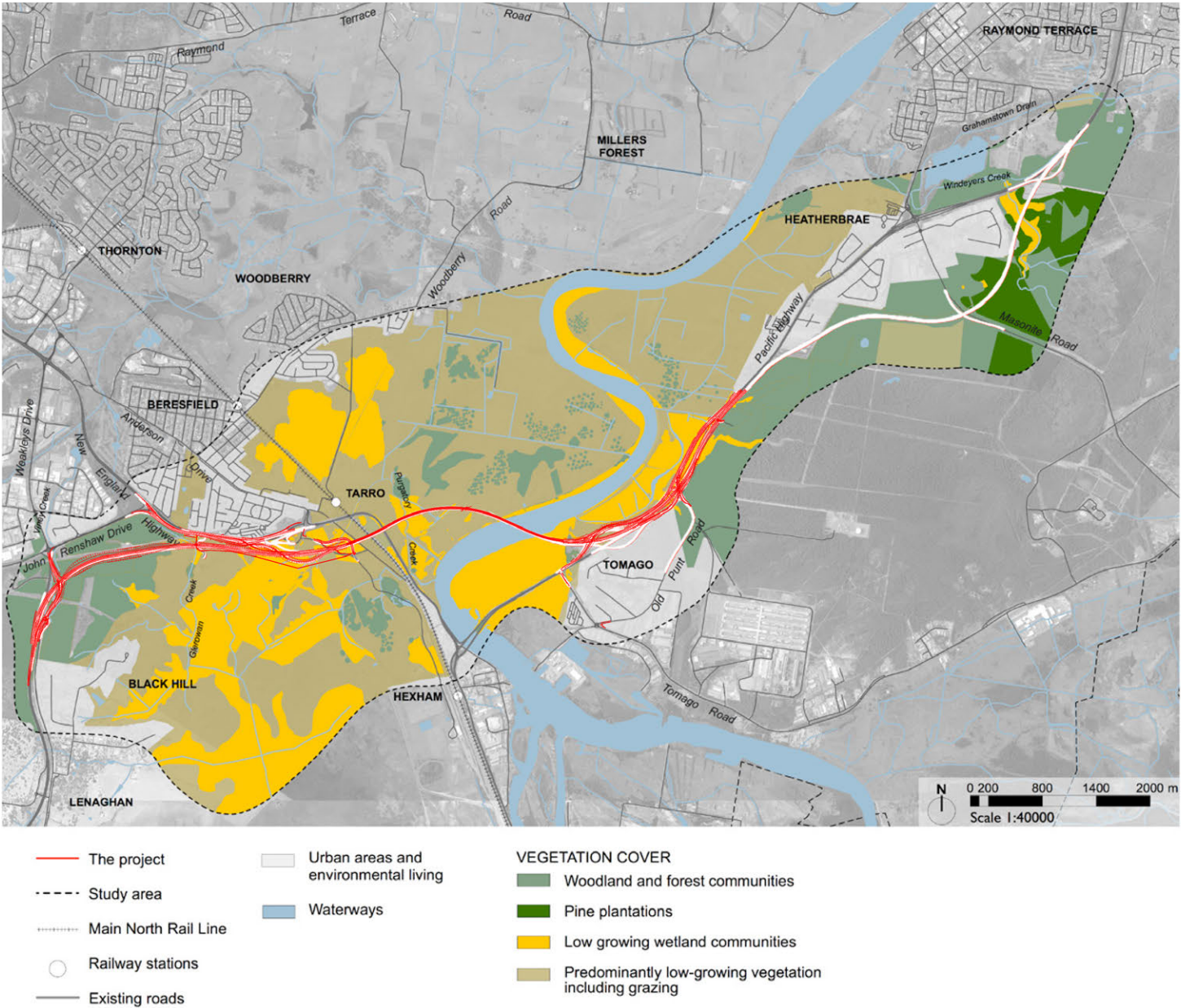


Figure 10: Biodiversity (base image from M12RT, EIS - Appendix O, TfNSW, June 2021)

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
- Mining and resources
- Aquaculture industries (fishing, oyster farming, prawn trawling)
- Tourism.

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.

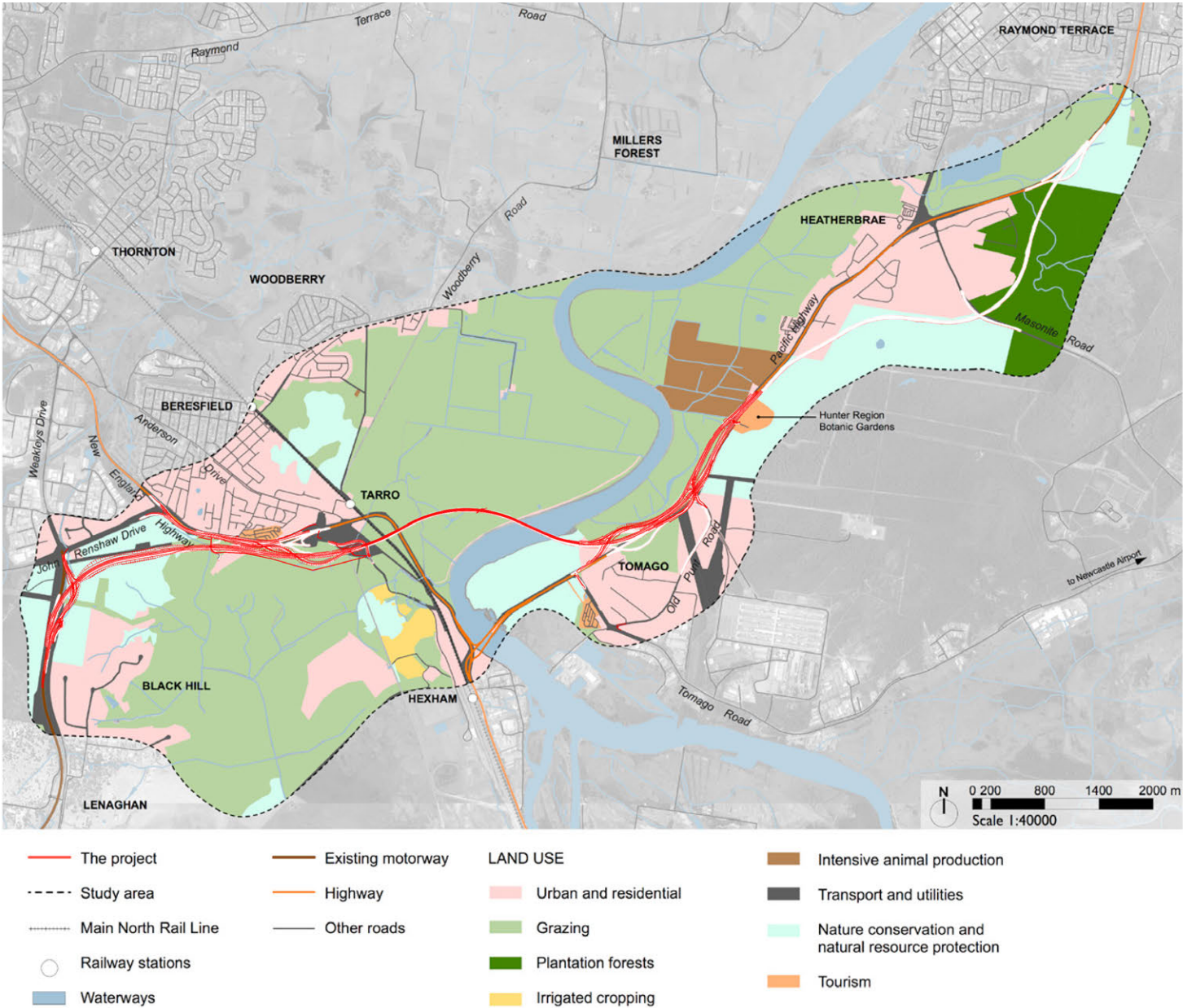


Figure 11: Land use (base image from M12RT, EIS - Appendix O, TfNSW, June 2021)

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 were located within the 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 Act 1974*, with the closest Aboriginal place located at Anna Bay, which will not be impacted by the Project.

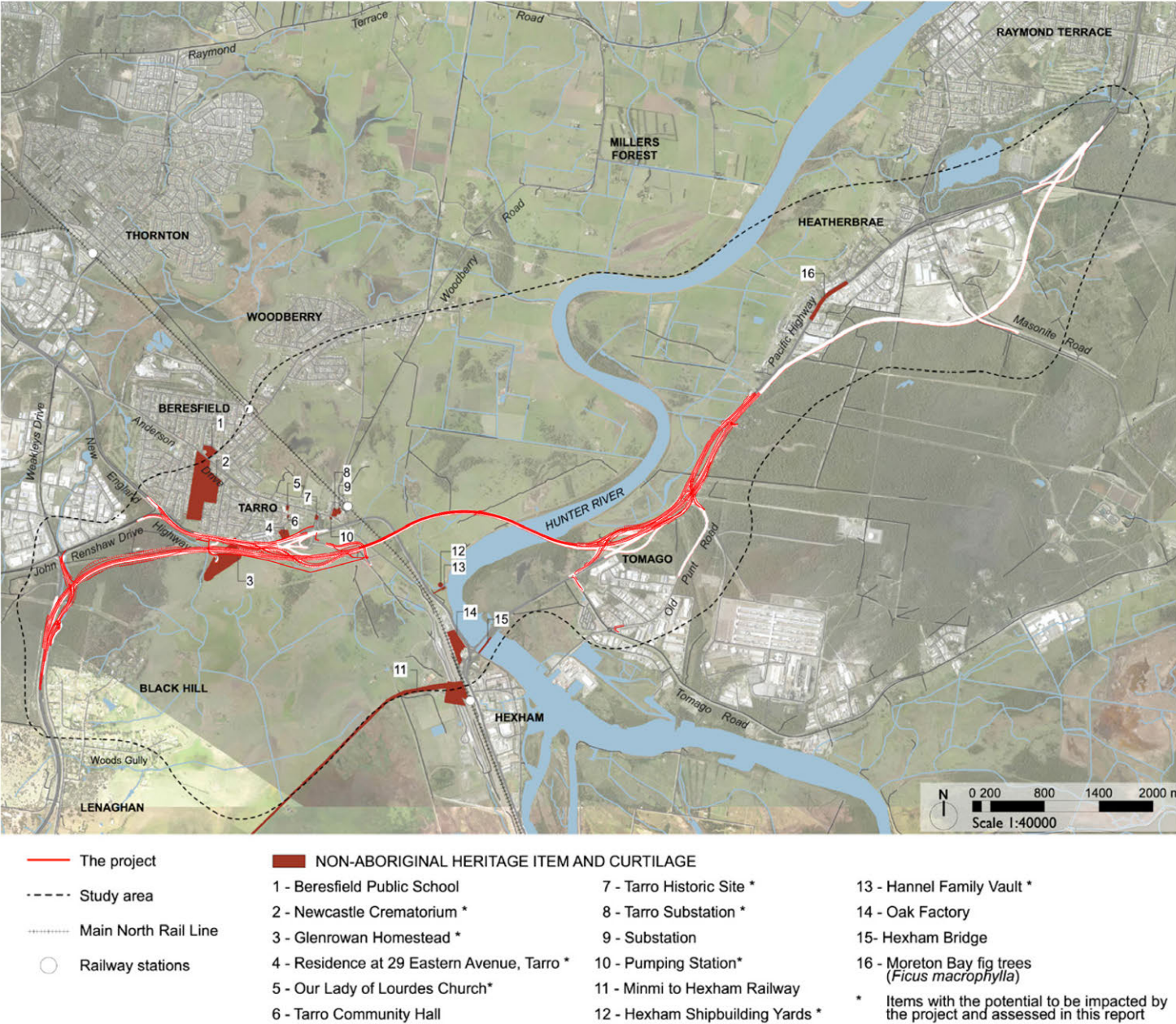


Figure 12: Heritage (base image from M12RT, EIS - Appendix O, TfNSW, June 2021)

2.3.7 Transportation networks

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

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 and limited to footpaths and pedestrian crossings at the Pacific Highway and Tomago Road intersection, and cycle lanes at the intersection at Weakleys Drive and John Renshaw Drive
- A dedicated off-road cycleway is proposed by the City of Newcastle between Tarro and Shortland.

Design implications

- Facilitate the legibility of the M1 Pacific Motorway, New England Highway and Pacific Highway that will connect both sides of the Hunter River floodplain
- Enhance a more direct and continuous cycle route between Black Hill and Raymond Terrace, utilising the new motorway
- Ensure planned cycle links by Councils (Tarro to Shortland) are not precluded.

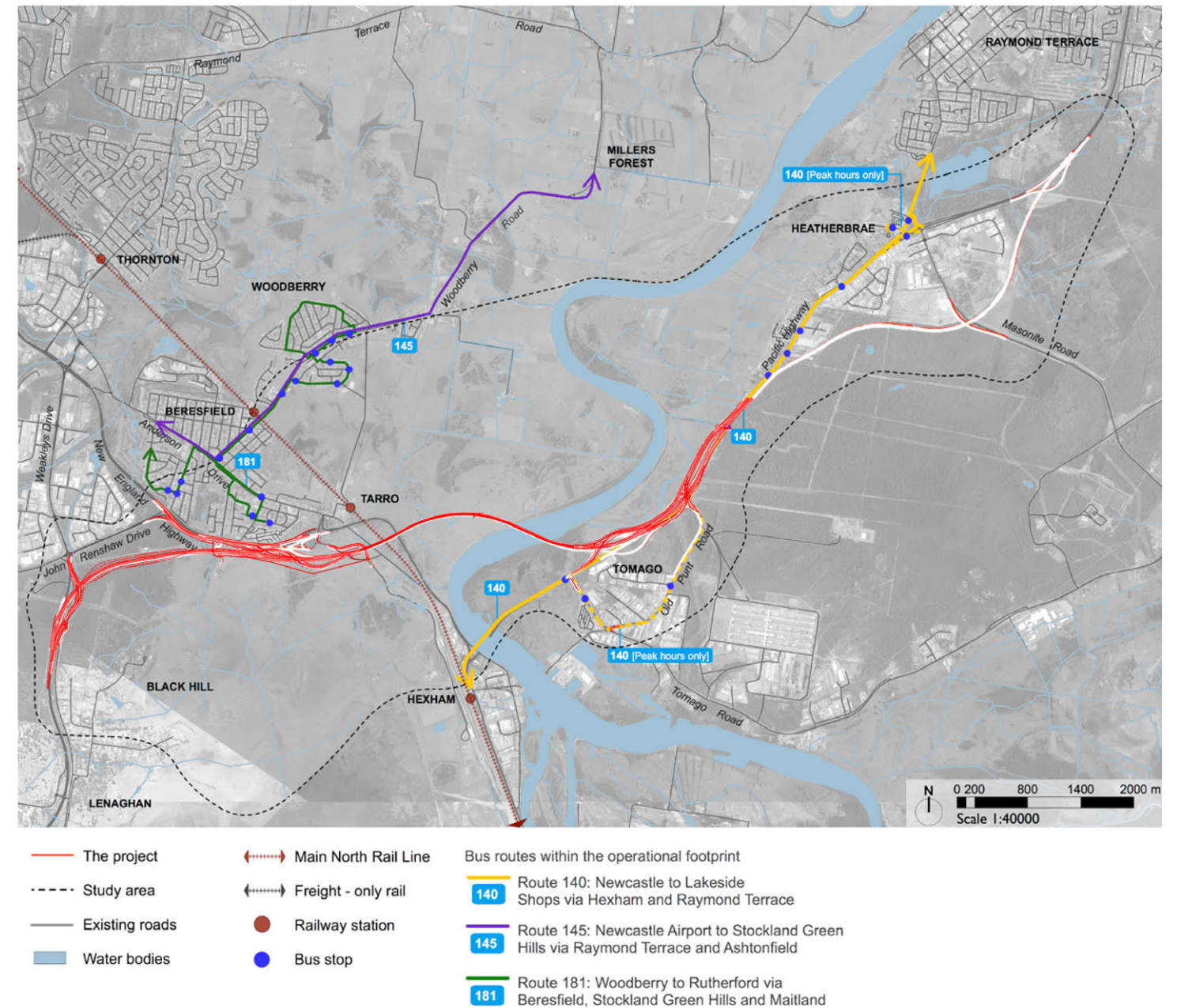


Figure 13: Transportation networks (base image from M12RT, EIS - Appendix O, TfNSW, June 2021)

2.3.8 Utility services

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

- Electricity supply and infrastructure (transmission towers and street lights)
- Telecommunications (optic fibres and telephone cables)
- Gas (pipelines and gas fired power station)
- Water and sewer services and infrastructure (including the Chichester Trunk Gravity Water Main).

Design implications

- Relocate utilities, adjust or protect in the Project corridor
- 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.

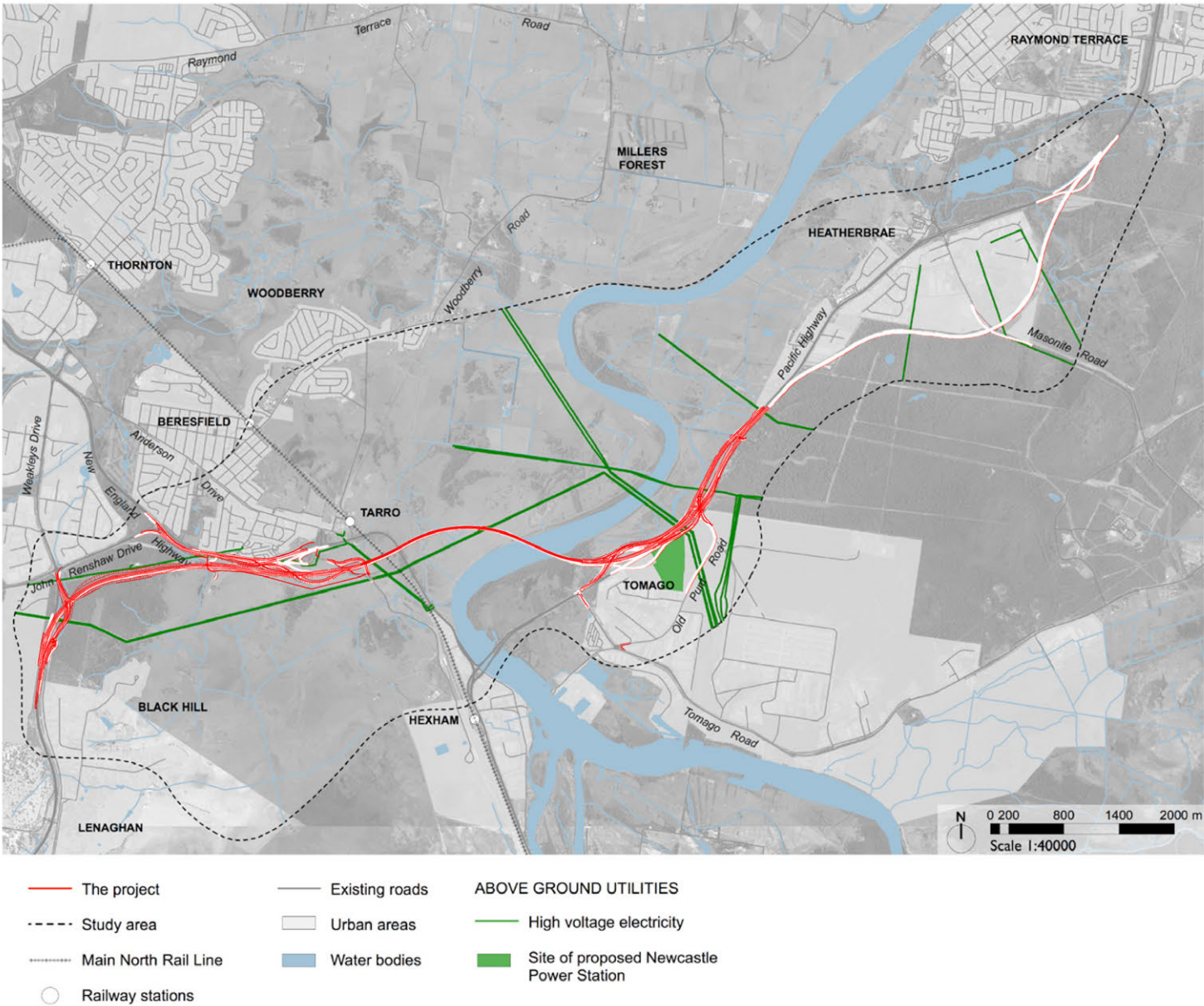


Figure 14: Utility services (base image from M12RT, EIS - Appendix O, TfNSW, June 2021)

2.3.9 Landscape character zones

Character Zones

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

- **Black Hill:** Located at the southern interface with the existing motorway, it is dominated by native woodlands set within an elevated and undulating topography. Vegetation cover and topography limit the visibility of these elements
- **Hunter River floodplain:** This is the dominant element of the corridor and runs adjacent to, or is crossed by the proposed alignment. It is characterised by a low lying and flat topography, grazing land, large wetlands, natural swamps and the Hunter River. This flat low landscape means that the visual catchment is expansive both to and from the corridor
- **Beresfield – Tarro – Woodberry:** Located to the north of the corridor, it consists predominantly of low density residential on undulating land and on higher ground overlooking the floodplain, as well as open space and recreation areas to suburbs, industrial or employment area in Beresfield north. The corridor acts as a barrier to development to the south and its elevated position means this community potentially overlooks the corridor and its structures. Consideration needs to be given both to the desire to conceal the alignment from view and where not possible, limit its visual impact through design or screening
- **Tomago:** Located on the eastern side of the Hunter River it consists of employment lands comprising an industrial precinct ranging from warehouses, light industry to heavy industry
- **Tomago Sandbeds:** Located to the east of the corridor, the landscape is flat and low lying, dominated by native forest and woodlands. The vegetation restricts visibility and views providing strong definition to the existing corridor.

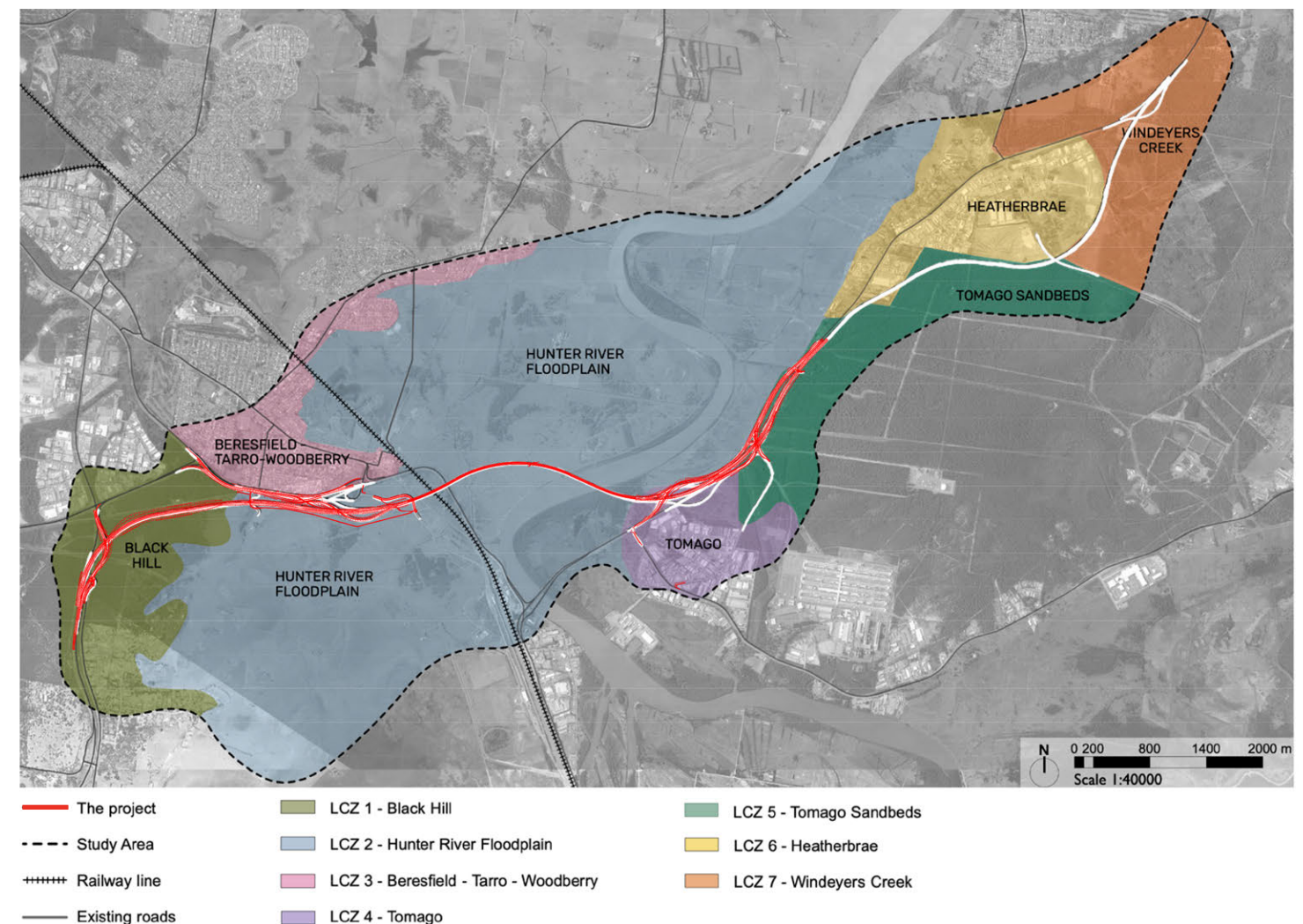


Figure 15: Landscape character (base image from M12RT, EIS - Appendix O, TfNSW, June 2021)



FLOODPLAIN LANDSCAPE WITH POWER LINES



BLACK HILL



TARRO PUMPING STATION



HUNTER REGION BOTANIC GARDENS



PANORAMIC VIEW OF THE FLOODPLAIN

Figure 16: Site photos

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.

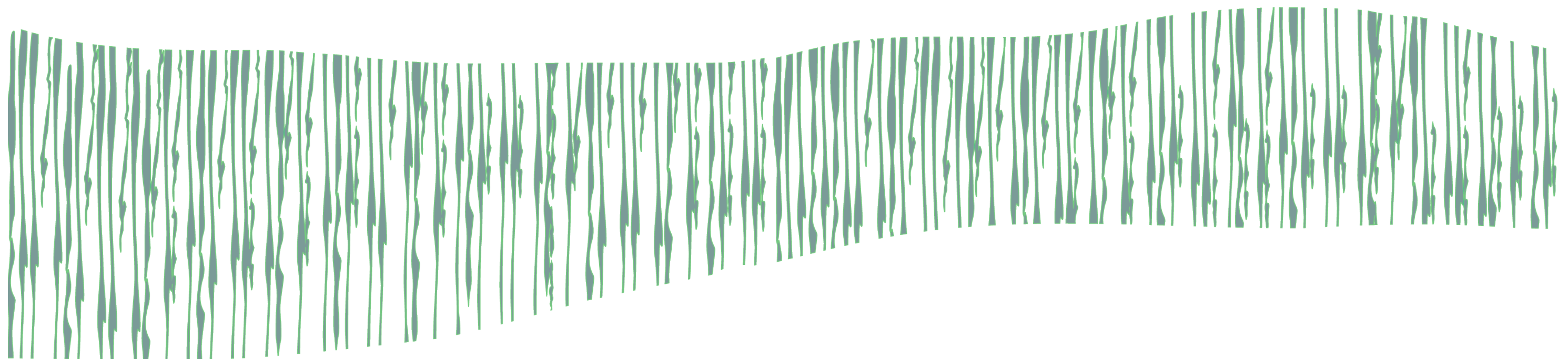


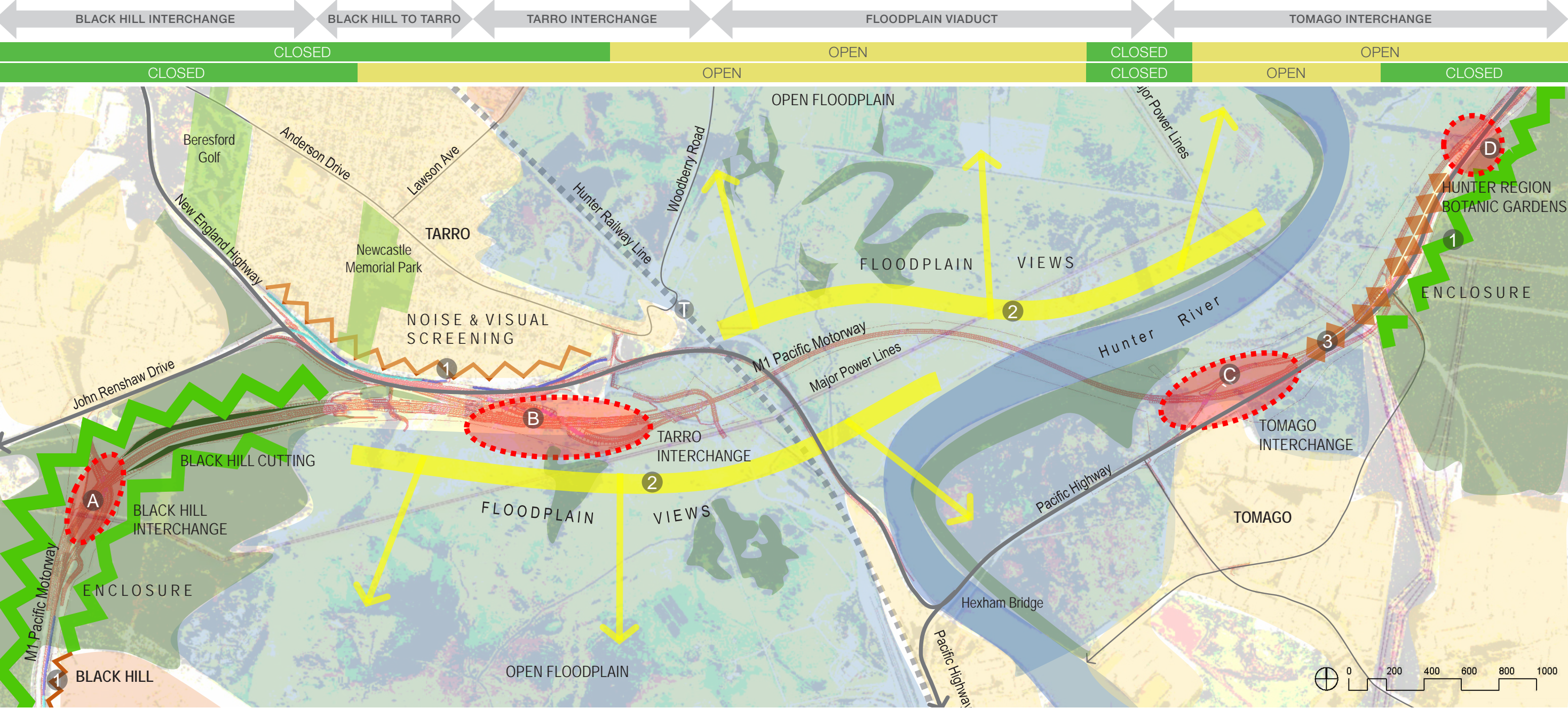
Figure 17: M12RT Wetlands Bush artwork, Saretta Art & Design

3.2 Urban design objectives and principles

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

OBJECTIVES	EIS URBAN DESIGN PRINCIPLES (STAGE 1 AND STAGE 2)	APPLICATION TO BLACK HILL TO TOMAGO (STAGE 1)
1 Provide a flowing road alignment that is responsive and integrated with the landscape.	<ul style="list-style-type: none">– Maintain and integrate the road corridor with existing landscape types and characters, considering different woodland, open floodplain and rural landscapes.	<ul style="list-style-type: none">– The design integrates the road corridor with the region's native landscapes to reflect its open and closed environments, with landscape treatments that enhance the region's contrasting visual character. These treatments have been further defined at the Black Hill, Tarro and Tomago interchanges, with the Black Hill Interchange integrated into the closed forest environment and the Tarro and Tomago interchanges reflecting the open floodplain environment on either side of the Hunter River.
2 Provide a landscaped motorway that integrates with the adjoining natural setting.	<ul style="list-style-type: none">– 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 motorway through the coastal hinterland landscape setting– Design cuttings and embankments to maximise opportunities for vegetation to be established.	<ul style="list-style-type: none">– The landscape at Black Hill integrates with the forest environment, whilst the use of feature Paper Bark trees provides legibility and definition of the interchange.– The floodplain areas maximise views, whilst providing screening.– Feature landscape has been provided at the Hunter Region Botanic Gardens (HRBG) to enhance the Gardens entry, through the use of planting colours and patterns, and artwork provided at the abutments.– Feature landscape has been provided at the Tarro and Tomago interchanges to screen the western sides from the neighbourhoods (at Tarro), whilst maximising open floodplain views to the east.
3 Provide an enjoyable, interesting motorway.	<ul style="list-style-type: none">– 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 placemaking, 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.	<ul style="list-style-type: none">– The tree cover at Black Hill has been articulated to enhance the cutting and enclosed landscape setting, incorporating a more organic tree canopy arrangement at the interchange, which provides definition through clustered tree planting along the southbound entry ramp from Weakleys Drive to M1 Pacific Motorway. At Tarro, the treatments transition from the enclosed setting just west of the interchange, to the open floodplain environment with grasslands at the viaduct approaches. At Tomago, the open landscape setting with the grasslands has been enhanced.– The floodplain areas maximise views with the incorporation of grasslands landscape typologies, with strategically placed Eucalypt trees framing strategic views across the floodplain, whilst providing screening.– Feature landscape has been provided at the HRBG in the form of a ribbon, with colours and patterns used to enhance the gardens entry and strengthening the facility's sense of place.– Feature landscape has been provided at the Tarro and Tomago interchanges, to screen the western sides from adjacent neighbourhoods, whilst maximising open floodplain views to the east.– Feature artwork has been provided on the safety screens of overbridges over the M1 Pacific Motorway at Black Hill (BR01), Tarro (BR04) and Tomago (BR06), incorporating the waterways and wetlands theme, developed with the Aboriginal artist. Additionally, feature artwork has also been incorporated in the BR09 undercroft abutments to provide references to key community elements such as the Kulangulan (the tiny bat) and the Dilmun (the tree creeper). The noise walls and retaining walls adopt an art pattern that reflects the Project narrative.

OBJECTIVES	EIS URBAN DESIGN PRINCIPLES (STAGE 1 AND STAGE 2)	APPLICATION TO BLACK HILL TO TOMAGO (STAGE 1)
<div>4</div> <div>Value the communities and towns along the road.</div>	<ul style="list-style-type: none">– 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.	<ul style="list-style-type: none">– The Project maintains connections at Black Hill, Tarro and Tomago with the provision of cycleway connections at these interchanges, which increases connectivity between the neighbourhoods– Connections at the HRBG have been enhanced with improved pedestrian and cyclist connections to nearby amenities such as bus stops, etc– Screening has been provided at Tarro through landscape treatments incorporated as visual buffers to screen the noise walls and the interchanges from nearby residents of Eastern Avenue who have a direct line of sight to the Project.
<div>5</div> <div>Provide a simplified and unobtrusive road design.</div>	<ul style="list-style-type: none">– 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.	<ul style="list-style-type: none">– 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 bridge elements including parapet profiles, abutment treatments and safety screen elements to provide design continuity and user experience.– Interpretation of items 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.



The strategy plan diagram identifies the key elements and design strategy which have been considered in the development of the concept design. These elements include strategies for the three interchange areas at Black Hill, Tarro and Tomago, HRBG and the noise and screening measures.

A BLACK HILL INTERCHANGE

- Provide legibility to mark the continuation of the M1 Pacific Motorway and the deviation to New England Highway
- Integrate with the enclosed forest environment while providing definition to the interchange
- Provide landscape treatments to Black Hill cutting
- Provide opportunities for interpretation on visual elements such as the overbridge safety screens and landscape features.

B TARRO INTERCHANGE

- Provide legibility to the interchange, located strategically at the edge of the floodplain
- Provide contrast in the landscape treatments to ensure screening for areas facing neighbourhoods, while enhancing floodplain views
- Provide definition to mark the southern side of the Hunter River crossing
- Provide clear identity and separation between the New England Highway and the M1 Pacific Motorway corridors
- Enhance cyclist connectivity
- Provide opportunities for interpretation on visual elements such as the overbridge safety screens and landscape features.

C TOMAGO INTERCHANGE

- Provide legibility to the continuation of the M1 Pacific Motorway and the deviation of Pacific Highway
- Provide structured feature elements which mark a sense of arrival and departure to, and from the northern side of the Hunter River crossing
- Provide landscape treatments to disturbed lands
- Enhance pedestrian and cyclist connectivity
- Provide opportunities for interpretation on visual elements such as the overbridge safety screens and landscape features.

D HUNTER REGION BOTANIC GARDENS

- Provide a marker on the Pacific Highway to define the entry and exit to and from the Hunter Region Botanic Gardens
- Provide opportunities to incorporate art as a feature element.

1 NOISE AND VISUAL SCREENING

- Provide noise and visual screening at Tarro and Black Hill.

2 FLOODPLAIN VIEWS

- Capitalise on the introduction of elevated structures and viaduct to maximise views across the Hunter River.

3 STRUCTURED ARRIVAL

- Incorporate structured elements to mark separation between M1 Pacific Motorway and Pacific Highway to provide linear identity to the M1 Pacific Motorway.

Figure 18: Strategy plan

3.3 Urban design strategy

The urban design strategy is responsive to the Project context, providing both a sense of enclosure and openness, depending on the landscape setting through which it passes.

A key focus of the approach is a celebration of the floodplain and the expansive views across the landscape, that this enables. By responding to this, it acknowledges both the presence of the Hunter River and enables the story and its connection to Newcastle to be revealed.

Opportunities have been identified to enhance placemaking, wayfinding and the user experience as well as increase legibility of the two corridors - New England Highway and M1 Pacific Motorway.



Figure 19: A sketch of Woodlands Close, Tarro (K Rangan)

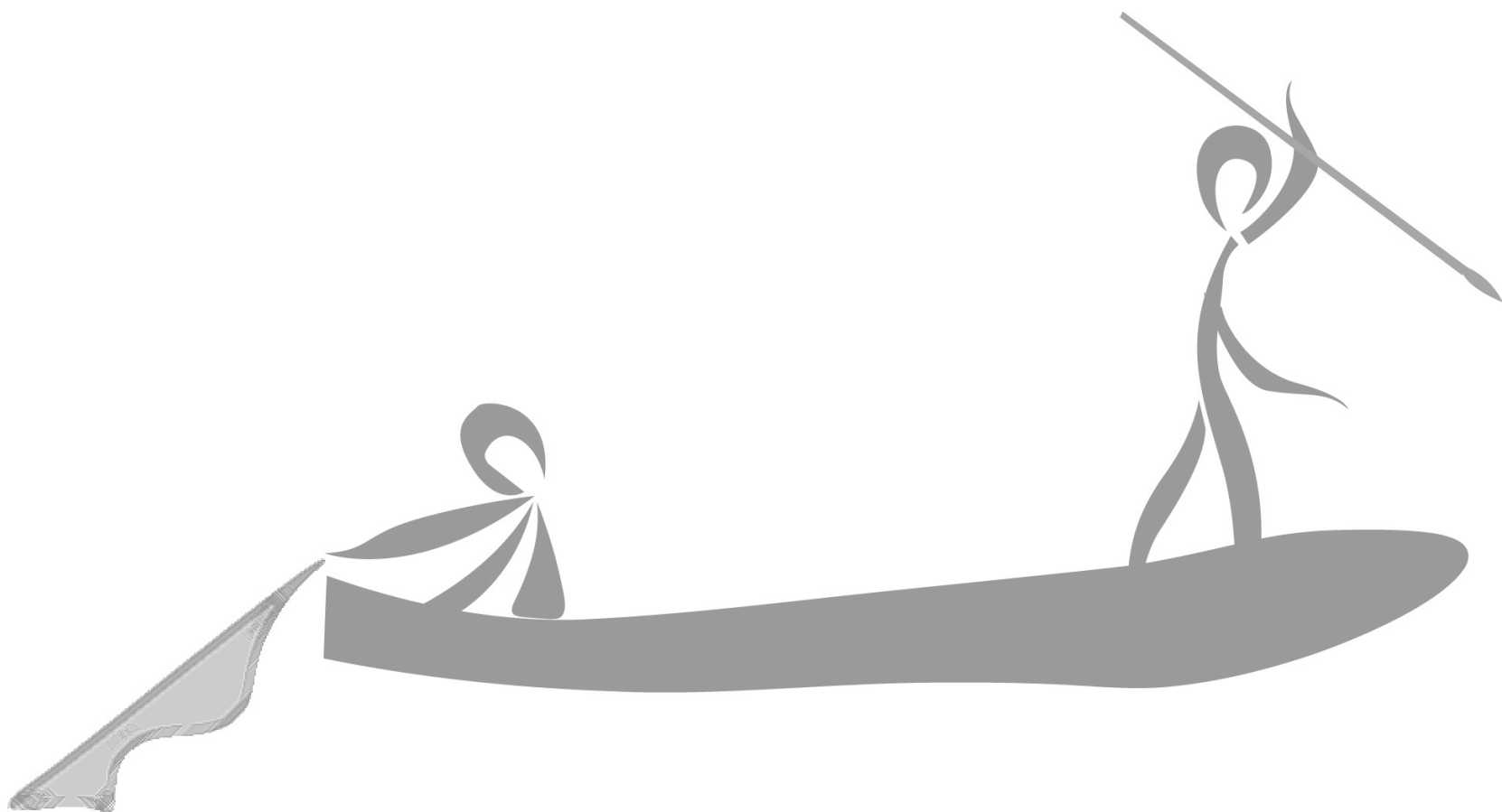


Figure 20: M12RT Fishing artwork, Saretta Art & Design

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, while also providing 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 for the Project.

The design has been developed to integrate seamlessly with the adjoining sections of the M1 Pacific Motorway while 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.

As illustrated in the urban design strategy, the design identifies four areas to enhance placemaking and provide legibility for the two corridors of M1 Pacific Motorway and the New England Highway. These areas include:

- The three interchanges at Black Hill, Tarro and Tomago
- The Hunter Region Botanic Gardens.

The overbridges associated with the three interchanges at Black Hill (BR01), Tarro (BR04) and Tomago (BR06) will form a major part of the user experience, as they will be visible from the M1 Pacific Motorway. Of these, Black Hill Interchange is mostly characterised by an enclosed setting, and therefore the design of this interchange reinstates the forest setting whilst providing gestures that mark the deviation to and from the M1 Pacific Motorway to New England Highway.

Interchanges at Tarro and Tomago mark the transition between the 'closed forest' views to 'open floodplain views'. The creek bridge (BR05) is a key element, meandering between the crowns of these two interchanges, allowing for open views across the Hunter River to be maximised.

The other feature area is the entry to the Hunter Region Botanic Gardens (HRBG), which has been developed as an opportunity to celebrate the 'botanica' concept, providing a sense of identity for the HRBG and enhance its lateral connection to the Hunter River.

A key component of the urban design narrative is the development of an art strategy, which is illustrated in the following section of this document.

4.2 Interpretation strategy

The interpretation strategy is underpinned by the response to Country and has been based on 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 in the design elements as an expression of the urban design, referencing the Aboriginal 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 Aboriginal communities that have a 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 historical records, there were two distinct Aboriginal clan groups being the Pambalong clan of Awabakal on the southern side of the Myan (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 within these two traditional lands of the Garuagal clan of the Worimi people, who were associated with the northern side of the river, and the Pambalong clan of the Awabakal people, who were associated with the southern 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.

4.3 Application of the artwork

The strategy adopted to incorporate the artwork has been 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.

A waterways and wetlands theme has been identified as the primary theme for the Project. The themes are overlaid with people and community themes, such as the symbols and objects related to gathering places for men and women, or boats and fishes. These combine to bring together one large theme of the life on Country and acknowledges the traditional custodians of the land.

Significant cultural designs have been identified for use on the following elements:

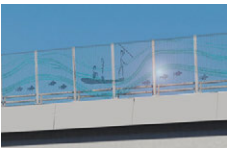
- Bridge safety screens - The overbridge safety screens will be prominent elements that will be seen and experienced by the users. They also serve as wayfinding elements and give users a sense of orientation in the journey. The artwork has been incorporated on the overbridge safety screens on BR01, BR04 and BR06 using the wetlands and waterways themes as the main feature, providing linear continuity to the motorway experience, whilst also providing for lateral integration.
- Noise walls (new noise walls) - The artwork has been incorporated using a pattern that depicts the Waterways theme. The pattern has a horizontal emphasis.
- Retaining walls - The artwork has been incorporated on all the blade wall retaining walls using a pattern that depicts the wetlands theme. The pattern has a vertical emphasis.
- Hunter Region Botanic Gardens - The artwork has been incorporated using two significant symbols, Kulangulan, the tiny bat and the Dilmun, the small tree creeper on the abutment walls on either side of BR09, providing a welcome and departure statement. Kulangulan has been incorporated on the northern side and the Dilmun has been incorporated on the southern side.
 - › Kulangulan flew about at dusk and was the totem for the Worimi men. He was ‘Gimbi’ the friend of the men. The women were linked to Dilmun and his arrival was seen to be the onset of good fortune.
 - › A bespoke sculpture has been incorporated on the southern side of the Pacific Highway, which serves as a feature entry statement to HRBG, providing an interpretation of the *Banksia* shrub, which has a relationship with the HRBG.

Colour has been incorporated in the design of the artwork for the above elements. The landscape treatments at the interchanges incorporate indigenous plant species that have a Connection to Country.

ARTWORK		APPLICATION
Waterways References the Hunter River.		
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 region.		
Traditional life on waterways - canoe and fishes Traditional lifestyle on water includes fishing.		
The Gathering Community element such as gathering of people.		
Dilmun The women were linked to the tree creeper known as Dilmun and his arrival was seen to be the onset of good fortune.		
Kulangulan The totem for the men of Worimi was the tiny bat that flew about at dusk. He was ‘Gimbi’ the friend of the men. The bat was called Kulangulan.		
Dawibang The native shrub, <i>Banksia</i> referred to as the Dawibang in the Warrimay (Worimi) language. (Reference: A grammar and dictionary of Gathang by the Gathang Language Group)		

Table 4: Artwork application

1. Bridge safety screens



Waterways + community elements (canoe and fishes)



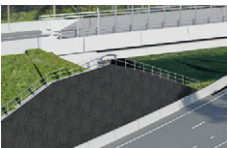
Wetlands + community elements (the gathering)

2. Noise walls (new)



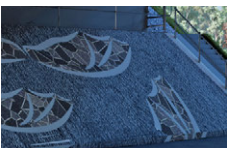
Waterways theme

3. Retaining walls



Wetlands theme

4. Hunter Region Botanic Gardens



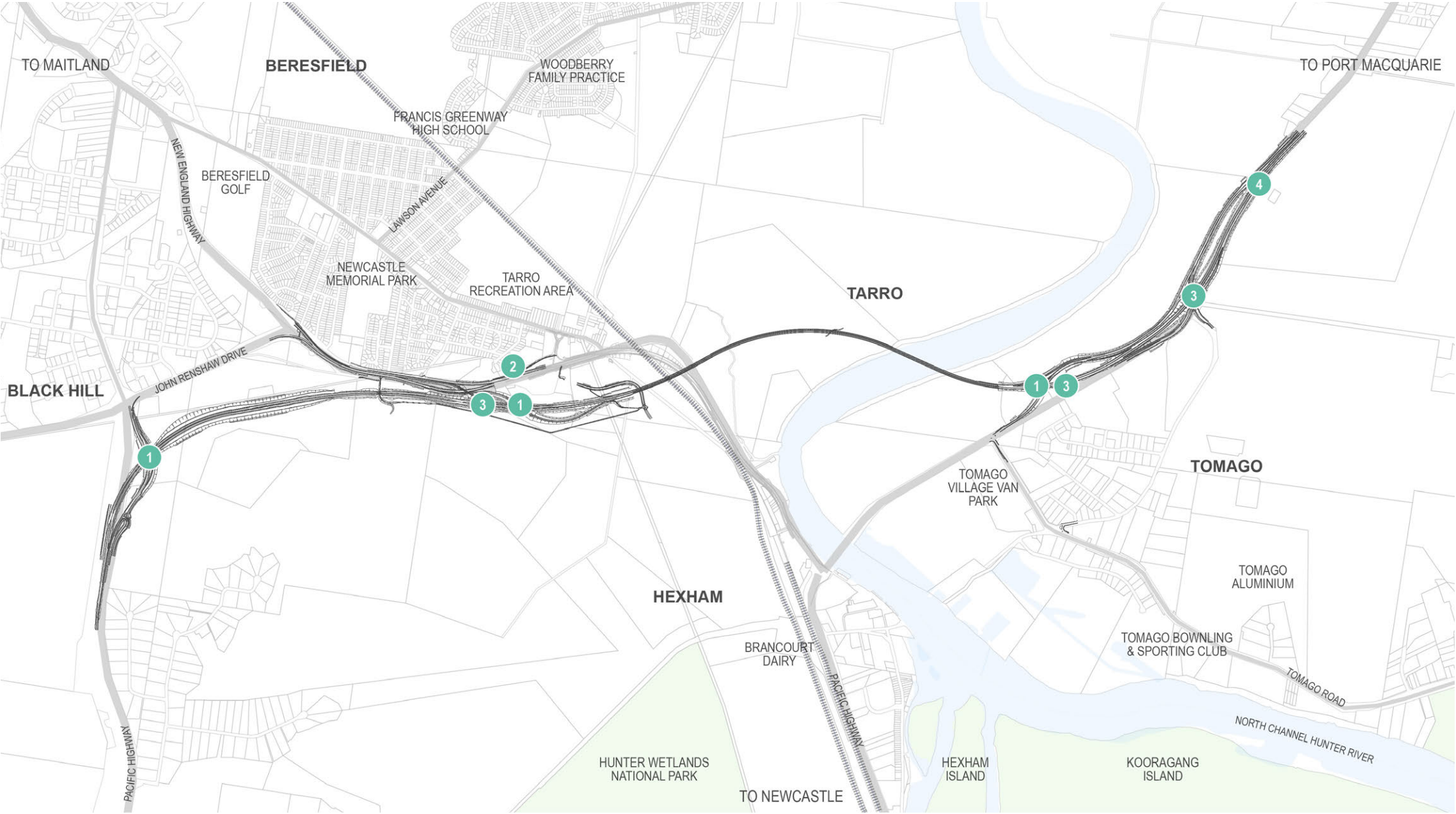
Kulangulan



Dilmun



Dawibang



LEGEND
— Project alignment
--- Hunter Rail Line
● Art opportunities



Figure 21: Artwork application - key plan

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



Figure 22: Waterways theme - safety screen

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



Figure 23: Wetlands theme - safety screen

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



Figure 24: Dilmun, Kulangulan and Dawibang - HRBG

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

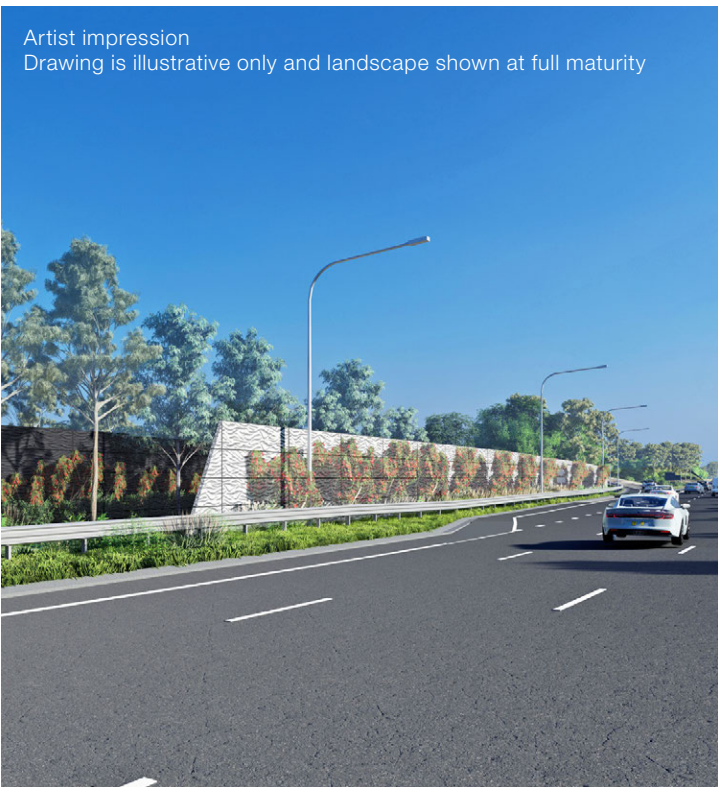


Figure 25: Waterways theme - noise wall

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



Figure 26: Wetlands theme - retaining wall

5. Urban design concept plans

5.1 Urban design concept

This section of the report illustrates the urban design concept for the Project. The plans are divided into five parts based on a sequential experience:

- Black Hill Interchange
- Black Hill to Tarro Interchange
- Tarro Interchange
- The floodplain viaduct
- Tomago Interchange.

The plans are accompanied by cross sections included at the end of each part to further illustrate the urban design concept.

5.1.1 Black Hill Interchange

Black Hill Interchange represents the current termination of the M1 Pacific Motorway and the arrival at the northwestern edge of Newcastle City's limits. It also represents the point of connection between the New England Highway and the M1 Pacific Motorway ie the confluence of the two main northbound highways.

The landscape setting at this point is heavily wooded, providing a sense of enclosure and containment. The landscape response adopted is to continue this character, reinstating and reinforcing the differing landscape communities through which the road corridor passes. While the landscape is predominantly characterised by Spotted gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest (PCT 1590), a small low-lying section of Prickly-leaved Paperbark forest on coastal lowlands of the Central Coast and Lower North Coast (PCT 1716) forest occurs near the intersection of the corridor with Lenaghans Drive. This landscape type is reinforced and celebrated, providing a visual marker as the new alignment veers east prior to its intersection with John Renshaw Drive and the connecting overbridge from Weakleys Drive.

The crossing of the southbound traffic from Weakleys Drive over the alignment enables the bridge structure to provide a gateway to the new alignment, as well as reinforces the sense of containment experienced as the road enters the Black Hill Cutting.



Figure 27: Aerial view of Black Hill Interchange

LEGEND

- SITE BOUNDARY
- TEMPORARY WORKS BOUNDARY
- BARRIERS & FURNITURE
- NEW NOISE WALL
- EXISTING NOISE WALL
- NEW LIGHT POLE
- EXISTING ROAD - REVEGETATED WITH HYDROMULCH

HYDROMULCH TREATMENT

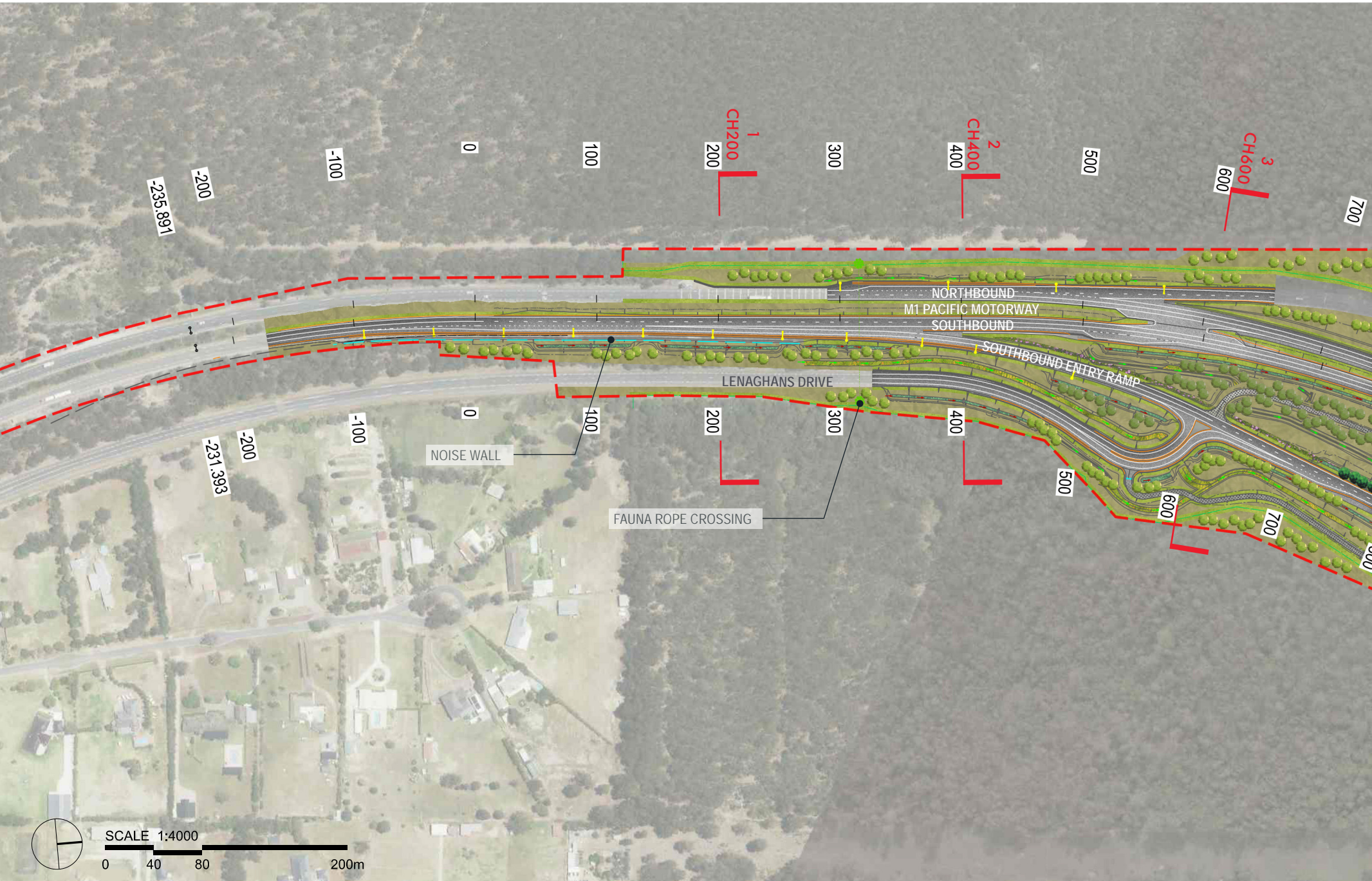
- PCT1736 - WATER COUCH
- PCT1588 - GREY IRONBARK
- PCT1590 - SPOTTED GUM
- PCT1646 - SMOOTH BARKED APPLE
- PCT1716 - PRICKLY PAPERBARK
- PCT1727 - SWAMP OAK
- SEDGES AND GRASSLAND
- INTERCHANGE
- BASIN EDGES AND SWALES
- NATIVE GRASSES
- MEDIAN

GARDEN BED

- GARDEN BED
- MANGROVE AREA- JUTE MATTING OVER NATURAL GROUND
- WETLAND GARDEN BED- JUTE MATTING OVER NATURAL GROUND
- BIOSWALE CHANNEL - JUTE MATTING OVER NATURAL GROUND
- BASIN - JUTE MATTING OVER NATURAL GROUND

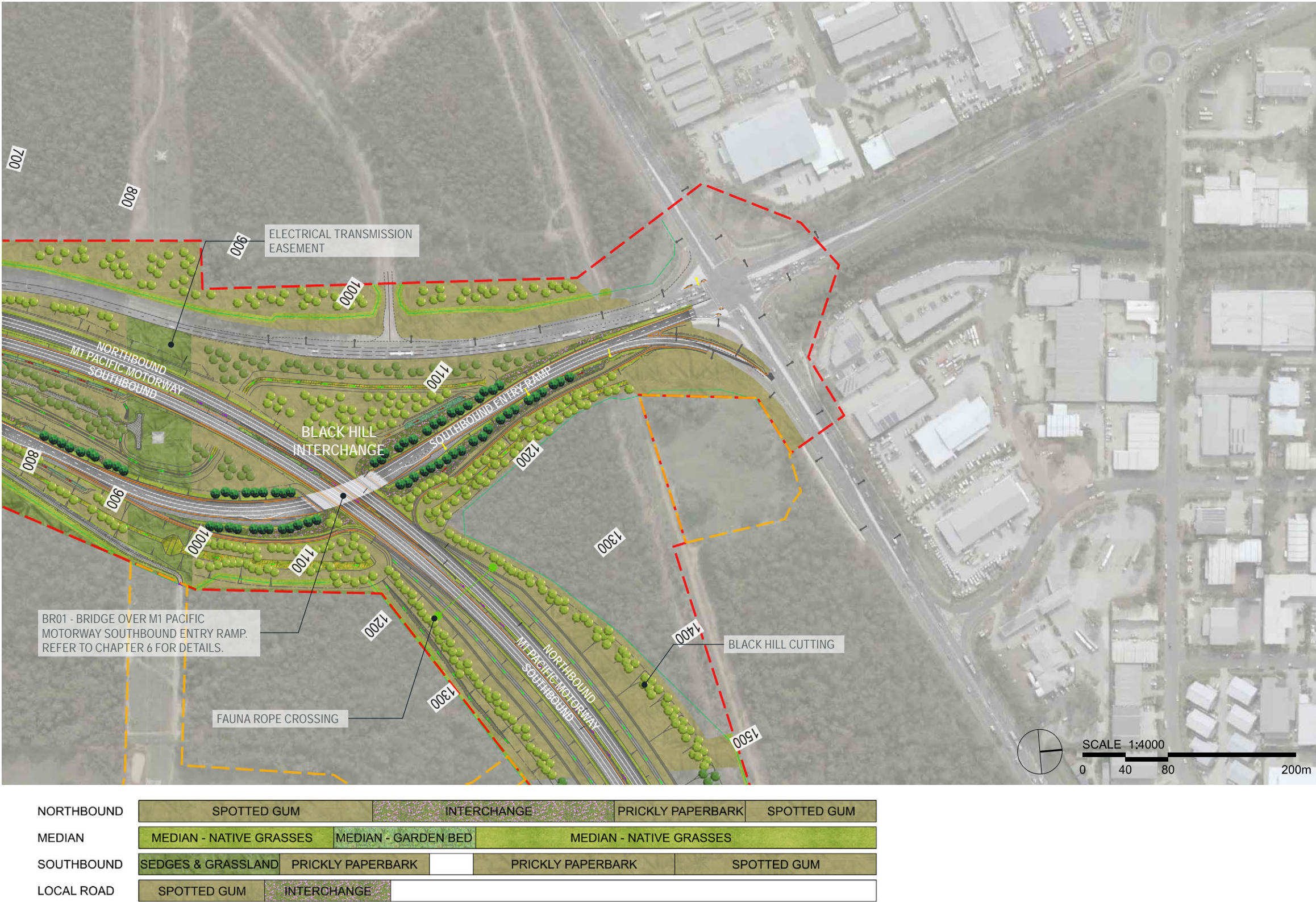
FEATURE TREE PLANTING (100L CONTAINERS)

- INTERCHANGE FEATURE TREES
BLACK HILL/TARRO - *Corymbia maculata*
TOMAGO - *Eucalyptus pilularis*
- ARRIVAL AVENUE TREES - *Brachychiton populneus*
- HUNTER BOTANIC GARDENS FEATURE TREES -
PACIFIC HIGHWAY - *Brachychiton populneus*
M1 MOTORWAY - *Syzygium luehmannii*



NORTHBOUND	SPOTTED GUM			
MEDIAN	MEDIAN - NATIVE GRASSES			
SOUTHBOUND	GARDEN BED	SPOTTED GUM	PRICKLY PAPERBARK	INTERCHANGE
LOCAL ROAD	SPOTTED GUM			

Figure 28: Concept plan - 1 of 10



LEGEND

- SITE BOUNDARY
- TEMPORARY WORKS BOUNDARY
- BARRIERS & FURNITURE
- NEW NOISE WALL
- EXISTING NOISE WALL
- NEW LIGHT POLE
- EXISTING ROAD - REVEGETATED WITH HYDROMULCH

HYDROMULCH TREATMENT

- PCT1736 - WATER COUCH
- PCT1588 - GREY IRONBARK
- PCT1590 - SPOTTED GUM
- PCT1646 - SMOOTH BARKED APPLE
- PCT1716 - PRICKLY PAPERBARK
- PCT1727 - SWAMP OAK
- SEDGES AND GRASSLAND
- INTERCHANGE
- BASIN EDGES AND SWALES
- NATIVE GRASSES
- MEDIAN

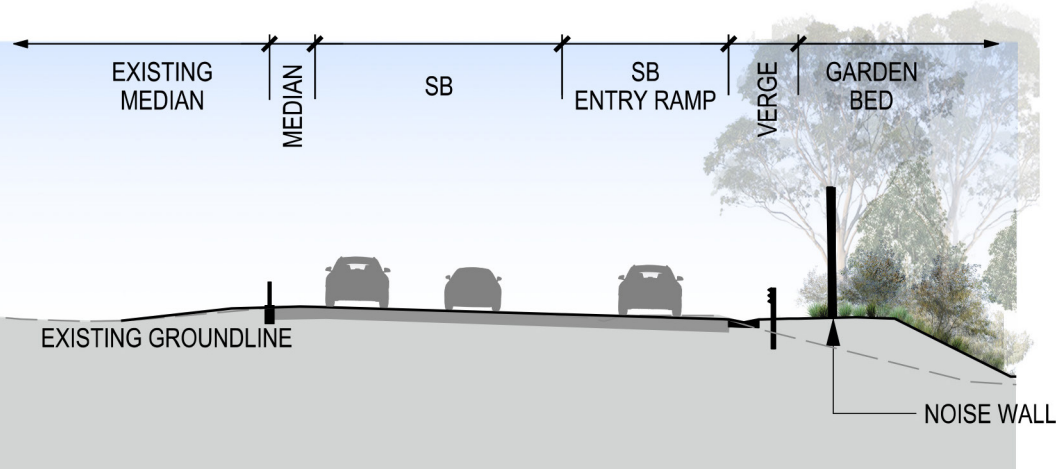
GARDEN BED

- GARDEN BED
- MANGROVE AREA- JUTE MATTING OVER NATURAL GROUND
- WETLAND GARDEN BED- JUTE MATTING OVER NATURAL GROUND
- BIOSWALE CHANNEL - JUTE MATTING OVER NATURAL GROUND
- BASIN - JUTE MATTING OVER NATURAL GROUND

FEATURE TREE PLANTING (100L CONTAINERS)

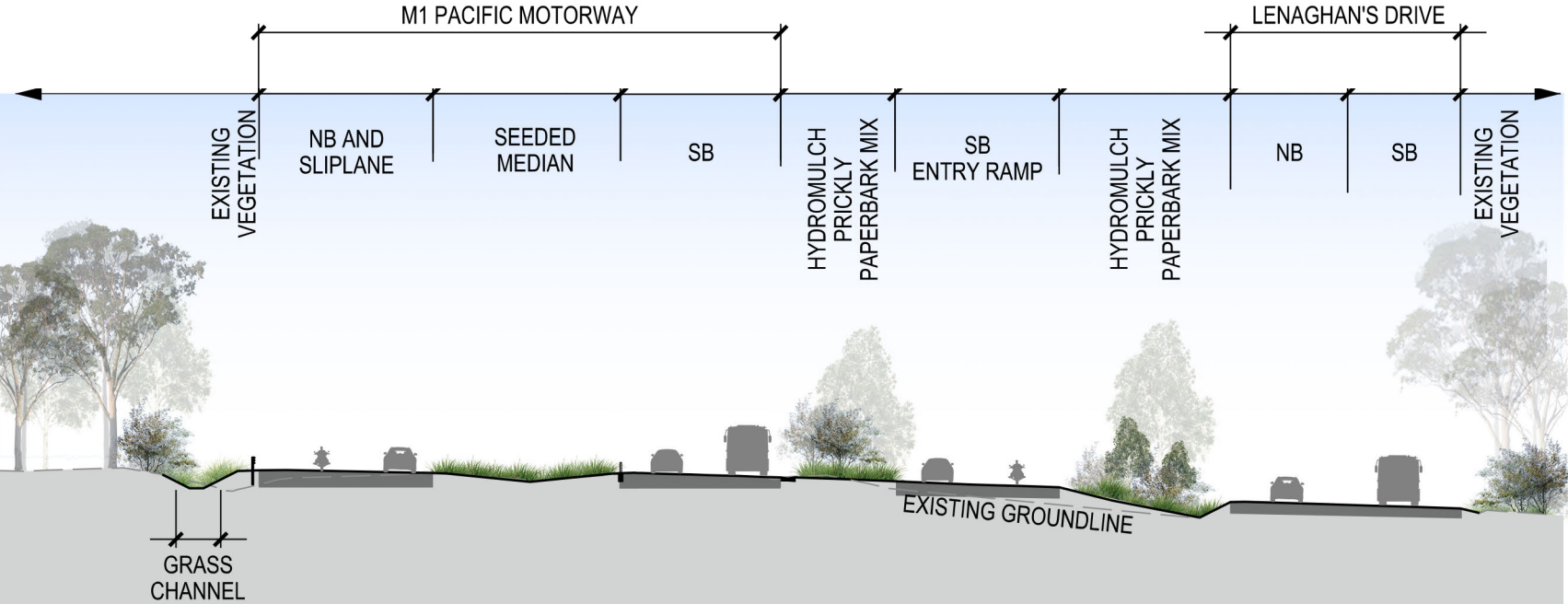
- INTERCHANGE FEATURE TREES
 - BLACK HILL/TARRO - *Corymbia maculata*
 - TOMAGO - *Eucalyptus pilularis*
- ARRIVAL AVENUE TREES - *Brachychiton populneus*
- HUNTER BOTANIC GARDENS FEATURE TREES -
 - PACIFIC HIGHWAY - *Brachychiton populneus*
 - M1 MOTORWAY - *Syzygium luehmannii*

Figure 29: Concept plan - 2 of 10



SECTION 1 - CH 200

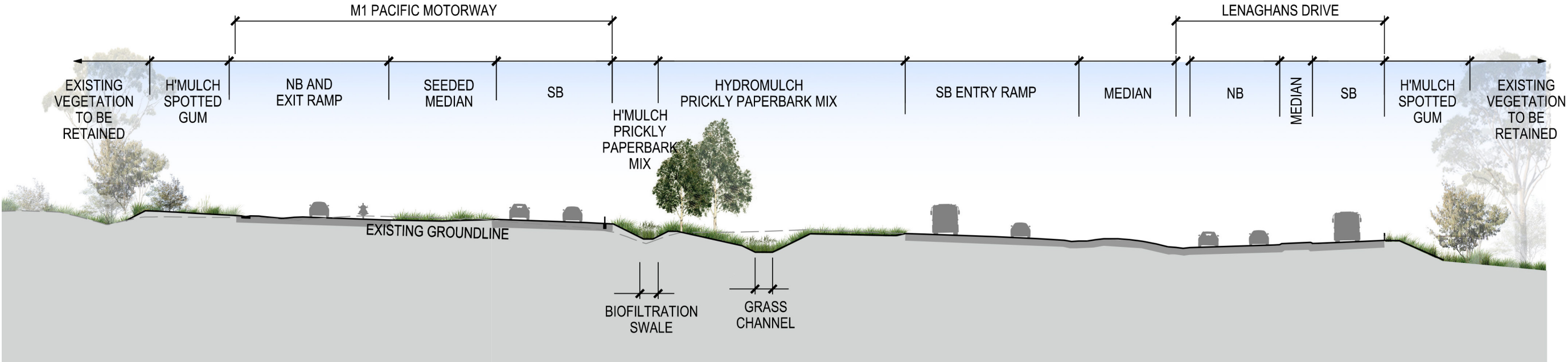
SCALE: 1:250



SECTION 2 - CH 400

SCALE: 1:500

Figure 30: Section 1 - CH 200 and Section 2 - CH 400



SECTION 3 - CH 600

SCALE: 1:500

Figure 31: Section 3 - CH 600

5.1.2 Black Hill to Tarro Interchange

Having passed under the Black Hill Interchange bridge, the landscape design responds to the natural vegetation communities and geology of the landscape. The Black Hill Cutting occurs just past the bridge, continuing the enclosed character of the alignment.

The design response to the Black Hill Cutting has been to widen the cutting, providing fill for the alignment but also enabling the continuation of the Prickly Paper Bark Forest through the base of the cutting. In doing so, the gateway experience is carried along the corridor. This landscape reflects the impeded drainage which will occur as a result of the changes in landform and the presence of lineal grass lined channels which convey the water from the alignment. The embankments of the cutting will be reestablished Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest and Grey Ironbark – Broad-leaved Mahogany – Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast (PCT 1588) communities, reinstating parts of the lost canopy, integrating back into the landscape.

The presence of this Eucalypt forest and the sense of enclosure that this provides continues through the elevated section of the corridor associated with Black Hill. This landscape terminates opposite Sapphire Drive where the views and landscape open as you enter the floodplain of the Hunter River. This landscape is dominated by open grass and sedgeland comprising exotic pasture lands, and Water Couch – Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter (PCT 1736).

North of the alignment is the New England Highway and the residential precinct of Tarro. The design response of the Motorway alignment has been to provide separation and screening of the residential precinct through the extension of the forest communities of Black Hill.

The New England Highway continues this intent but in a more structured way due to the confined space; located between the M1 Pacific Motorway and Tarro, its northern edge is flanked by noise walls providing protection and relief to residents from the highway noise.

5.1.3 Tarro Interchange

The design of the Tarro Interchange provides a focus on the establishment of an open canopy. This provides a connection to the adjoining woodland communities, while providing opportunities for views across the floodplain through and under the canopy. Garden beds are minimised and used to reinforce the scale and character of the New England Highway and integrate new structures of the interchange including noise and retaining walls, with *Callistemon* forming a key element within this planting.



Figure 32: Aerial view of Tarro Interchange



INTERCHANGE NB				GENERAL GARDEN BED	NATIVE GRASSES AND SHRUBS				
INTERCHANGE SB				SPOTTED GUM	GREY IRONBARK			SPOTTED GUM	
NORTHBOUND	GREY IRONBARK			PRICKLY PAPERBARK			SPOTTED GUM		
MEDIAN	MEDIAN - GARDEN BED		MEDIAN - NATIVE GRASSES				MEDIAN - NATIVE GRASSES		
SOUTHBOUND	GREY IRONBARK			PRICKLY PAPERBARK			SPOTTED GUM		WATER COUCH

LEGEND

- SITE BOUNDARY
- TEMPORARY WORKS BOUNDARY
- BARRIERS & FURNITURE
- NEW NOISE WALL
- EXISTING NOISE WALL
- NEW LIGHT POLE
- EXISTING ROAD - REVEGETATED WITH HYDROMULCH

HYDROMULCH TREATMENT

- PCT1736 - WATER COUCH
- PCT1588 - GREY IRONBARK
- PCT1590 - SPOTTED GUM
- PCT1646 - SMOOTH BARKED APPLE
- PCT1716 - PRICKLY PAPERBARK
- PCT1727 - SWAMP OAK
- SEDGES AND GRASSLAND
- INTERCHANGE
- BASIN EDGES AND SWALES
- NATIVE GRASSES
- MEDIAN

GARDEN BED

- GARDEN BED
- MANGROVE AREA- JUTE MATTING OVER NATURAL GROUND
- WETLAND GARDEN BED- JUTE MATTING OVER NATURAL GROUND
- BIOSWALE CHANNEL - JUTE MATTING OVER NATURAL GROUND
- BASIN - JUTE MATTING OVER NATURAL GROUND

FEATURE TREE PLANTING (100L CONTAINERS)

- INTERCHANGE FEATURE TREES
 - BLACK HILL/TARRO - *Corymbia maculata*
 - TOMAGO - *Eucalyptus pilularis*
- ARRIVAL AVENUE TREES - *Brachychiton populneus*
- HUNTER BOTANIC GARDENS FEATURE TREES -
 - PACIFIC HIGHWAY - *Brachychiton populneus*
 - M1 MOTORWAY - *Syzygium luehmannii*

Figure 33: Concept plan - 3 of 10

LEGEND

- SITE BOUNDARY
- TEMPORARY WORKS BOUNDARY
- BARRIERS & FURNITURE
- NEW NOISE WALL
- EXISTING NOISE WALL
- NEW LIGHT POLE

EXISTING ROAD -
REVEGETATED WITH HYDROMULCH

HYDROMULCH TREATMENT

- PCT1736 - WATER COUCH
- PCT1588 - GREY IRONBARK
- PCT1590 - SPOTTED GUM
- PCT1646 - SMOOTH BARKED APPLE
- PCT1716 - PRICKLY PAPERBARK
- PCT1727 - SWAMP OAK
- SEDGES AND GRASSLAND
- INTERCHANGE
- BASIN EDGES AND SWALES
- NATIVE GRASSES
- MEDIAN

GARDEN BED

- GARDEN BED
- MANGROVE AREA- JUTE MATTING OVER NATURAL GROUND
- WETLAND GARDEN BED- JUTE MATTING OVER NATURAL GROUND
- BIOSWALE CHANNEL - JUTE MATTING OVER NATURAL GROUND
- BASIN - JUTE MATTING OVER NATURAL GROUND

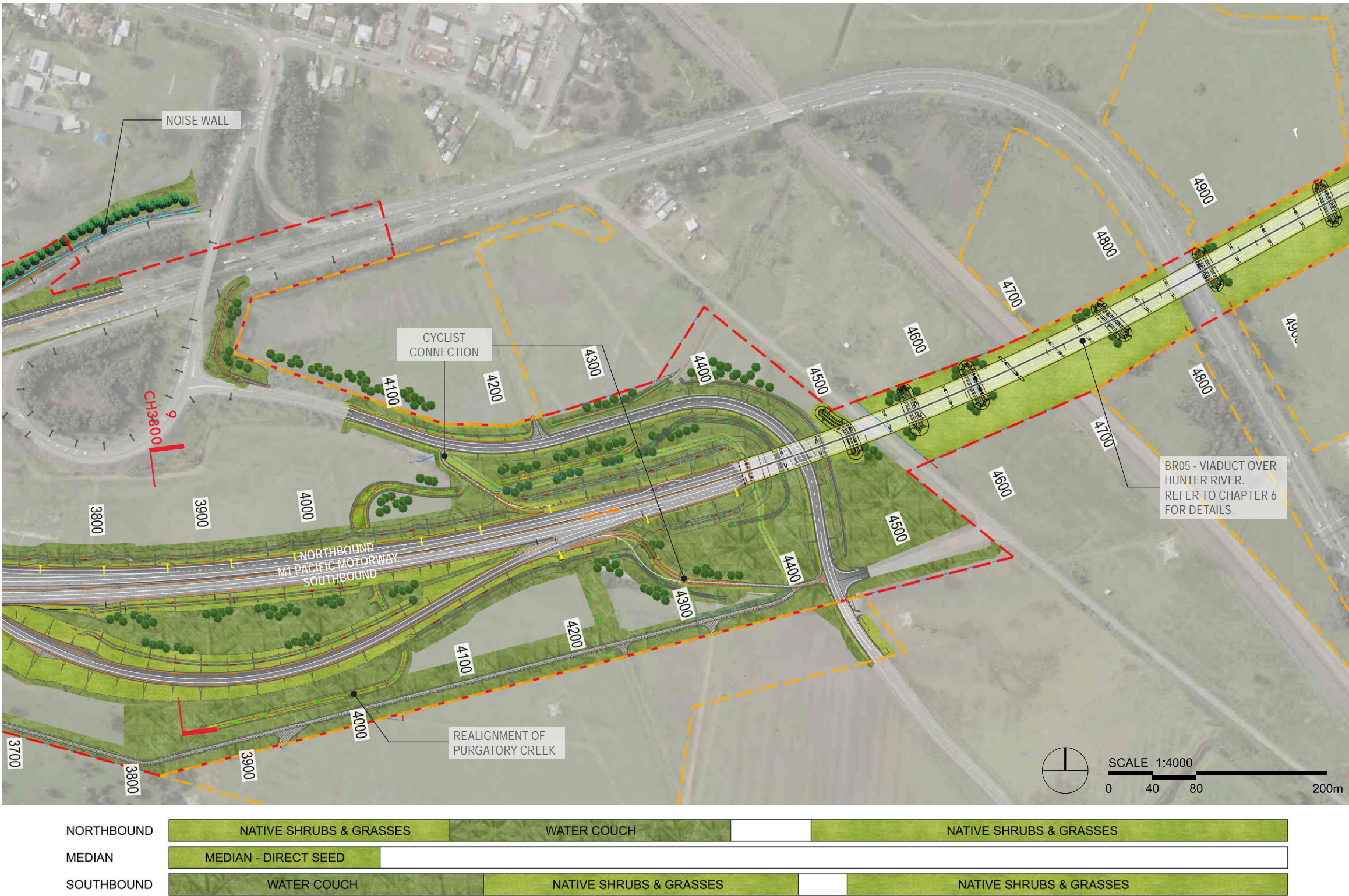
FEATURE TREE PLANTING (100L CONTAINERS)

- INTERCHANGE FEATURE TREES
BLACK HILL/TARRO - *Corymbia maculata*
TOMAGO - *Eucalyptus pilularis*
- ARRIVAL AVENUE TREES - *Brachychiton populneus*
- HUNTER BOTANIC GARDENS FEATURE TREES -
PACIFIC HIGHWAY - *Brachychiton populneus*
M1 MOTORWAY - *Syzygium luehmannii*



NE HIGHWAY NB	GENERAL GARDEN BED			GENERAL GARDEN BED	
NE HIGHWAY SB		INTERCHANGE			
NORTHBOUND	SPOTTED GUM		INTERCHANGE		NATIVE SHRUBS & GRASSES
MEDIAN	MEDIAN - NATIVE GRASSES				
SOUTHBOUND	SPOTTED GUM	WATER COUCH	SPOTTED GUM		NATIVE SHRUBS & GRASSES

Figure 34: Concept plan - 4 of 10



LEGEND

SITE BOUNDARY

TEMPORARY WORKS BOUNDARY

BARRIERS & FURNITURE

NEW NOISE WALL

EXISTING NOISE WALL

NEW LIGHT POLE

EXISTING ROAD - REVEGETATED WITH HYDROMULCH

HYDROMULCH TREATMENT

PCT1736 - WATER COUCH

PCT1588 - GREY IRONBARK

PCT1590 - SPOTTED GUM

PCT1646 - SMOOTH BARKED APPLE

PCT1716 - PRICKLY PAPERBARK

PCT1727 - SWAMP OAK

SEDGES AND GRASSLAND

INTERCHANGE

BASIN EDGES AND SWALES

NATIVE GRASSES

MEDIAN

GARDEN BED

GARDEN BED

MANGROVE AREA- JUTE MATTING OVER NATURAL GROUND

WETLAND GARDEN BED- JUTE MATTING OVER NATURAL GROUND

BIOSWALE CHANNEL - JUTE MATTING OVER NATURAL GROUND

BASIN - JUTE MATTING OVER NATURAL GROUND

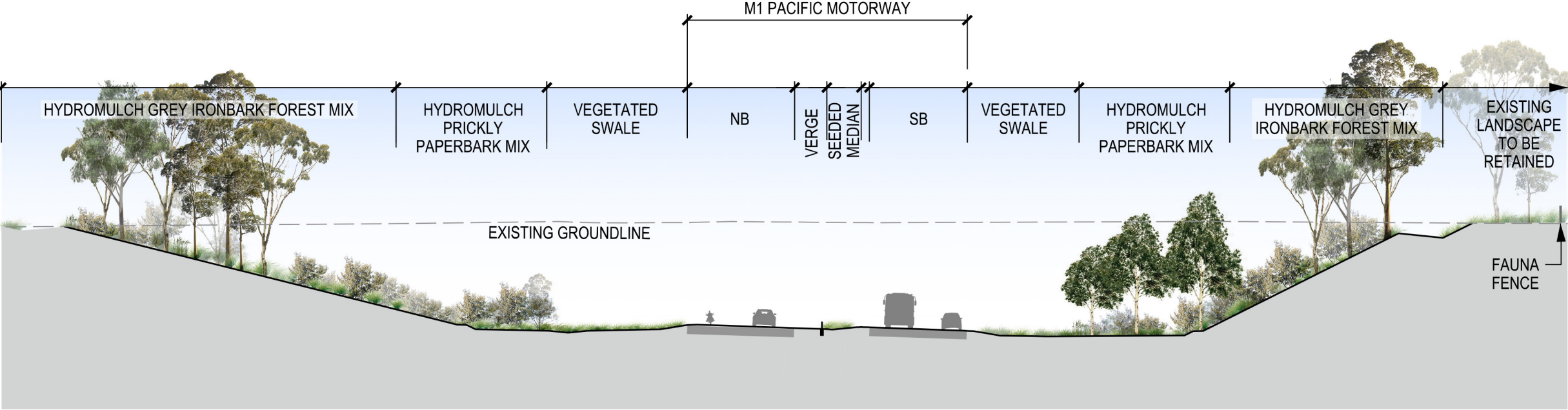
FEATURE TREE PLANTING (100L CONTAINERS)

INTERCHANGE FEATURE TREES
BLACK HILL/TARRO - *Corymbia maculata*
TOMAGO - *Eucalyptus pilularis*

ARRIVAL AVENUE TREES - *Brachychiton populneus*

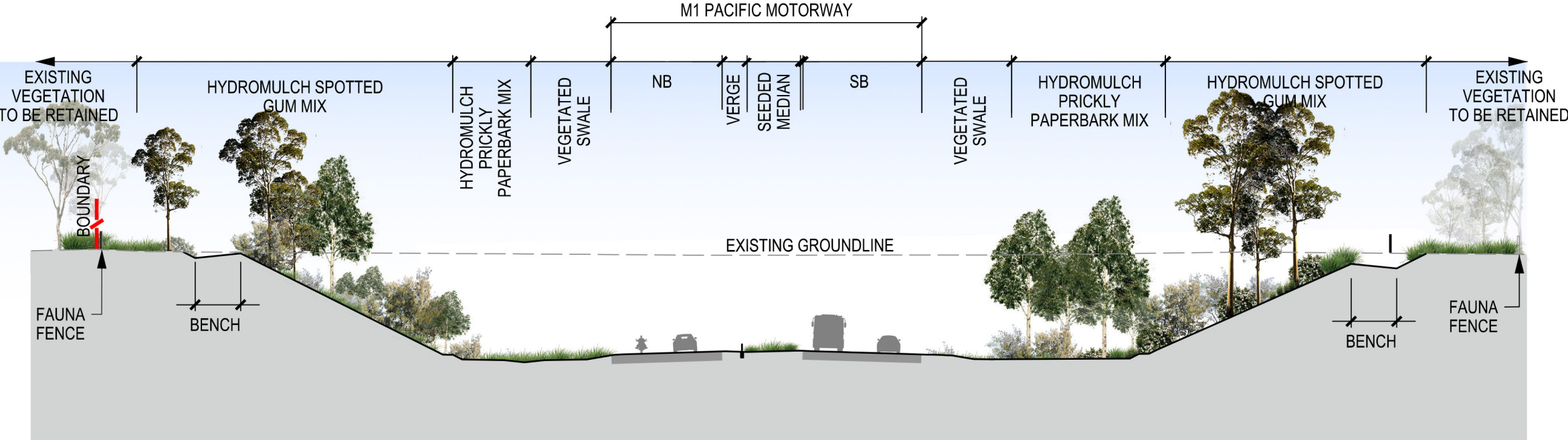
HUNTER BOTANIC GARDENS FEATURE TREES -
PACIFIC HIGHWAY - *Brachychiton populneus*
M1 MOTORWAY - *Syzygium luehmannii*

Figure 35: Concept plan - 5 of 10



SECTION 4 - CH 1400

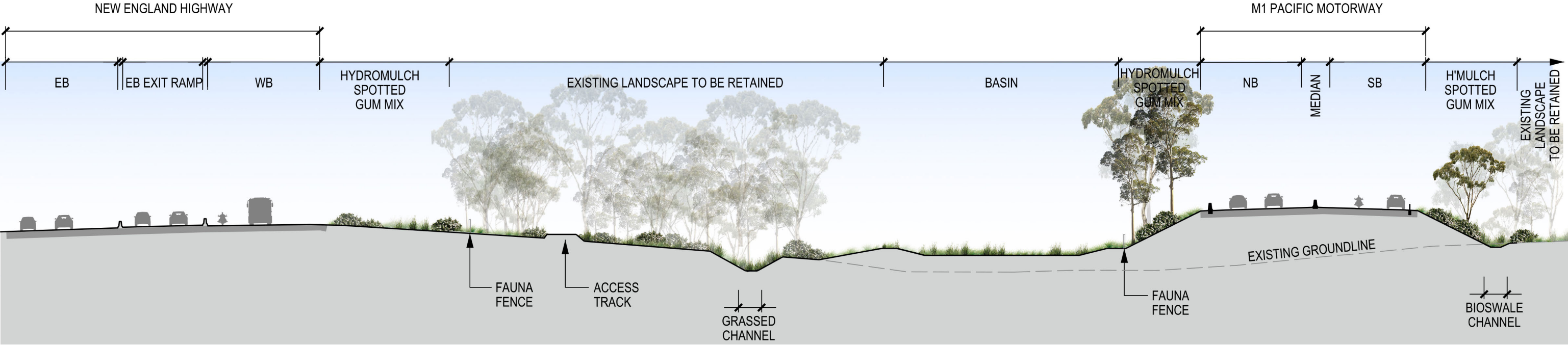
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SECTION 5 - CH 2000

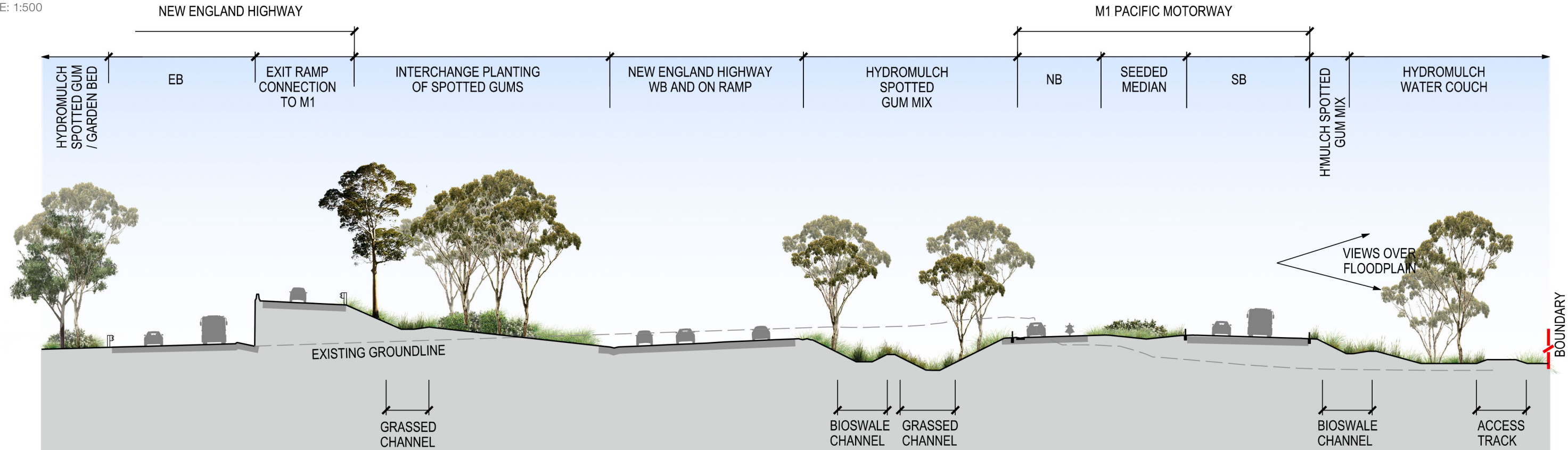
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Figure 36: Section 4 - CH 1400 and Section 5 - CH 2000



SECTION 6 - CH 2600

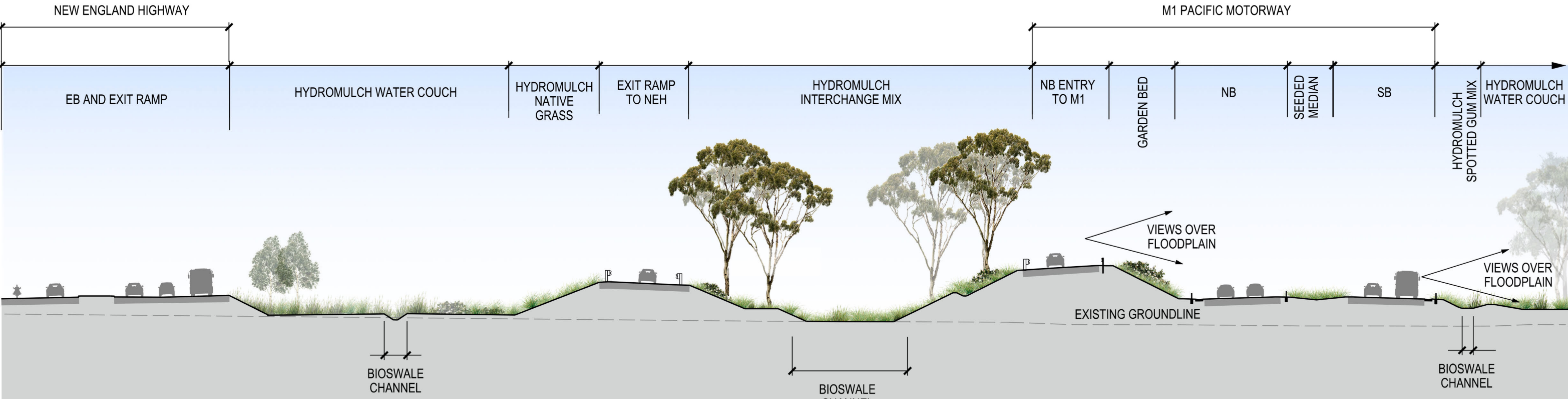
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SECTION 7 - CH 3100

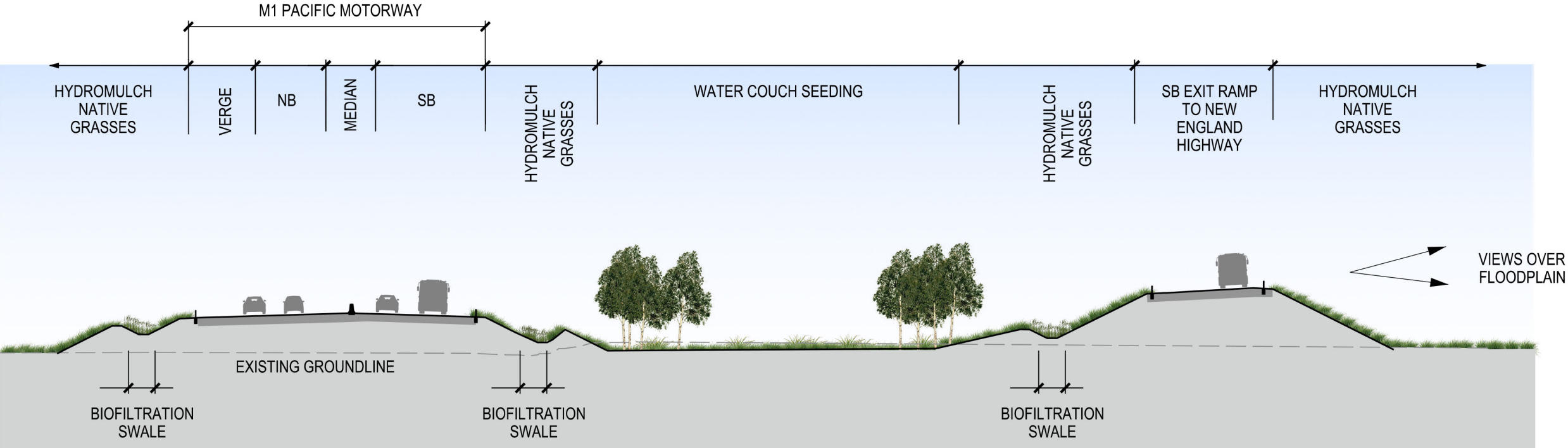
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Figure 37: Section 6 - CH 2600 and Section 7 - CH 3100



SECTION 8 - CH 3400

SCALE: 1:500



SECTION 9 - CH 3800

SCALE: 1:500

Figure 38: Section 8 - CH 3400 and Section 9 - CH 3800

5.1.4 The Floodplain viaduct

The floodplain is dominated by the BR05 viaduct structure which traverses the plains, providing views for the motorist up and down the Hunter River valley. The landscape response to this is largely to reinstate what is removed or disturbed as part of the construction process. The landscape is largely comprised of a grassland landscape - a combination of pasture grasses and natural communities.

The river's edge is reinstated with the following communities on either side of the corridor, in accordance with the environmental documents.

- Salt marsh to the southwestern shore
- Mangrove forest to the northeastern shore.

5.1.5 Tomago Interchange

The layout of the Tomago Interchange is made up of a number of different road connections including the M1 Pacific Motorway, and the former Pacific Highway; as a local road connection into and through Heatherbrae and across the river at Hexham. The connection at Old Punt Road is also provided as part of the local road network. This overlaying of roads has been reflected in the landscape response.

The eastern edge is defined by its interface with the Smooth-barked Apple – Blackbutt - Old Man Banksia woodland on coastal sands of the Central and Lower North Coast (PCT 1646). This landscape has been reinforced to provide definition of this edge, screening the highway from the industrial zone of Tomago and focusing views towards the river and floodplain.

Between the river and Pacific Highway, south of the viaduct, a section of land has been contaminated by previous Rutile Zircon Mining (RZM) processing activities. This RZM contaminated land is to be managed by construction of a capping layer and mound, revegetated with grassland to minimise potential to breach the capping layer.

The western edge of the highway provides a more diverse response, addressing views, arrival sequence and native communities as part of the response.

The Motorway alignment is flanked on the western side after BR05 where the viaduct hits the ground, by Casuarinas of the Swamp Oak Forest. This then transitions into the grasslands of the floodplain. The western edge of the highway provides a more diverse response, addressing views, arrival sequence and native communities as part of the response.

Along the northbound connection to the M1 Pacific Motorway and connection to Pacific Highway, the use of distinctive evergreen trees - distinct from the Sclerophyll species of the broader landscape form a defining element of the arrival sequence to Heatherbrae. The arrival sequence is punctuated by the entrance to the Hunter Region Botanic Gardens. The landscape at this point provides both a reflection of the gardens beyond but also expresses a Connection to Country through planting and abutment treatments, in a publicly accessible environment.

At either side of the access to the Hunter Regional Botanic Gardens intersection, the landscape has adopted the use of avenue plantings which address both the M1 Pacific Motorway and Pacific Highway alignments, providing a distinct and unique experience along the highway. This provides an indication of the changing function as you enter and leave the urban area of Heatherbrae and the presence of the Hunter Regional Botanic Gardens through the celebration of plants.



Figure 39: Aerial view of Tomago Interchange

LEGEND

- SITE BOUNDARY
- TEMPORARY WORKS BOUNDARY
- BARRIERS & FURNITURE
- NEW NOISE WALL
- EXISTING NOISE WALL
- NEW LIGHT POLE
- EXISTING ROAD - REVEGETATED WITH HYDROMULCH

HYDROMULCH TREATMENT

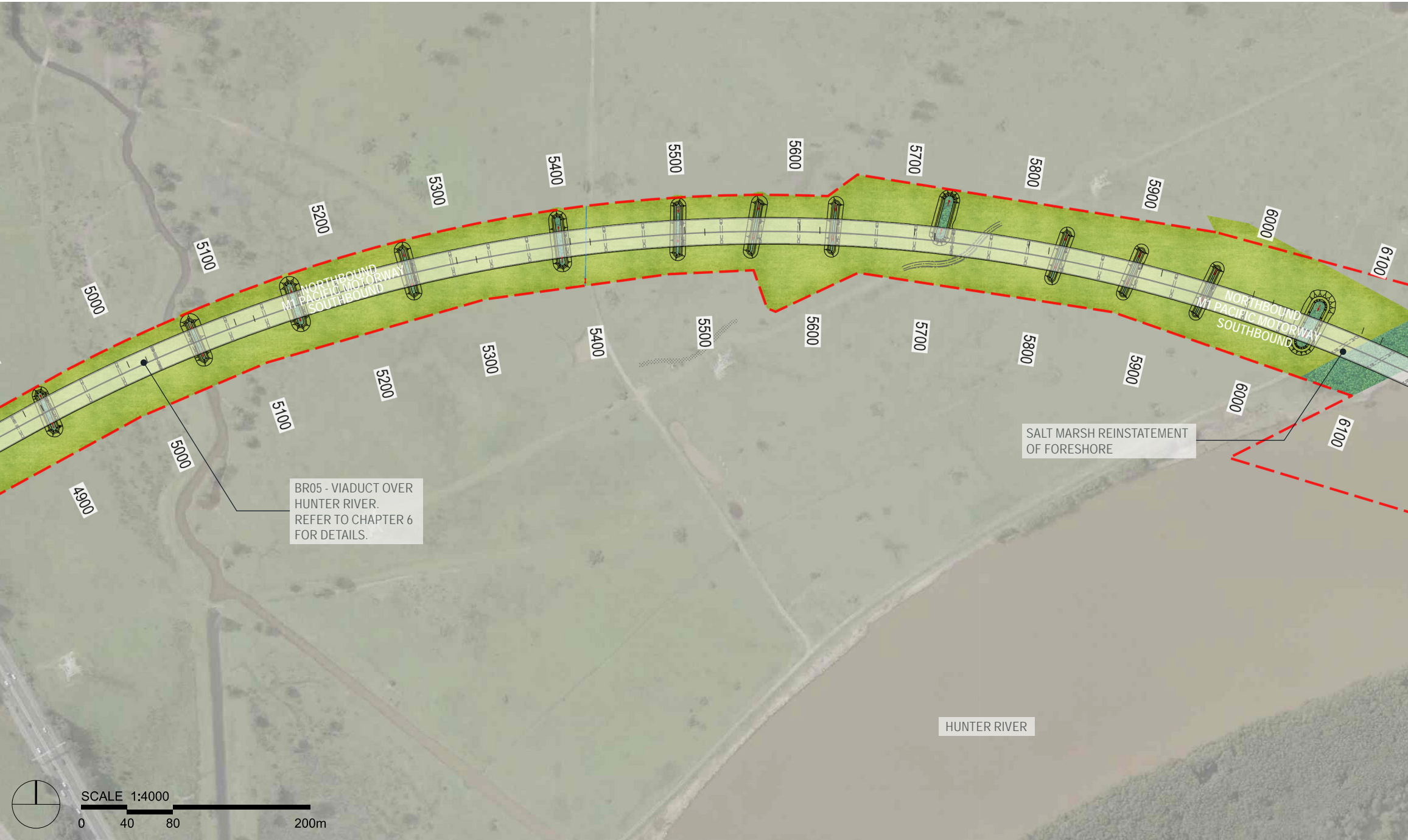
- PCT1736 - WATER COUCH
- PCT1588 - GREY IRONBARK
- PCT1590 - SPOTTED GUM
- PCT1646 - SMOOTH BARKED APPLE
- PCT1716 - PRICKLY PAPERBARK
- PCT1727 - SWAMP OAK
- SEDGES AND GRASSLAND
- INTERCHANGE
- BASIN EDGES AND SWALES
- NATIVE GRASSES
- MEDIAN

GARDEN BED

- GARDEN BED
- MANGROVE AREA- JUTE MATTING OVER NATURAL GROUND
- WETLAND GARDEN BED- JUTE MATTING OVER NATURAL GROUND
- BIOSWALE CHANNEL - JUTE MATTING OVER NATURAL GROUND
- BASIN - JUTE MATTING OVER NATURAL GROUND

FEATURE TREE PLANTING (100L CONTAINERS)

- INTERCHANGE FEATURE TREES
BLACK HILL/TARRO - *Corymbia maculata*
TOMAGO - *Eucalyptus pilularis*
- ARRIVAL AVENUE TREES - *Brachychiton populneus*
- HUNTER BOTANIC GARDENS FEATURE TREES -
PACIFIC HIGHWAY - *Brachychiton populneus*
M1 MOTORWAY - *Syzygium luehmannii*



NORTHBOUND	WATER COUCH	PASTURE GRASS	WETLAND GB
SOUTHBOUND	WATER COUCH	PASTURE GRASS	WETLAND GB

Figure 40: Concept plan - 6 of 10

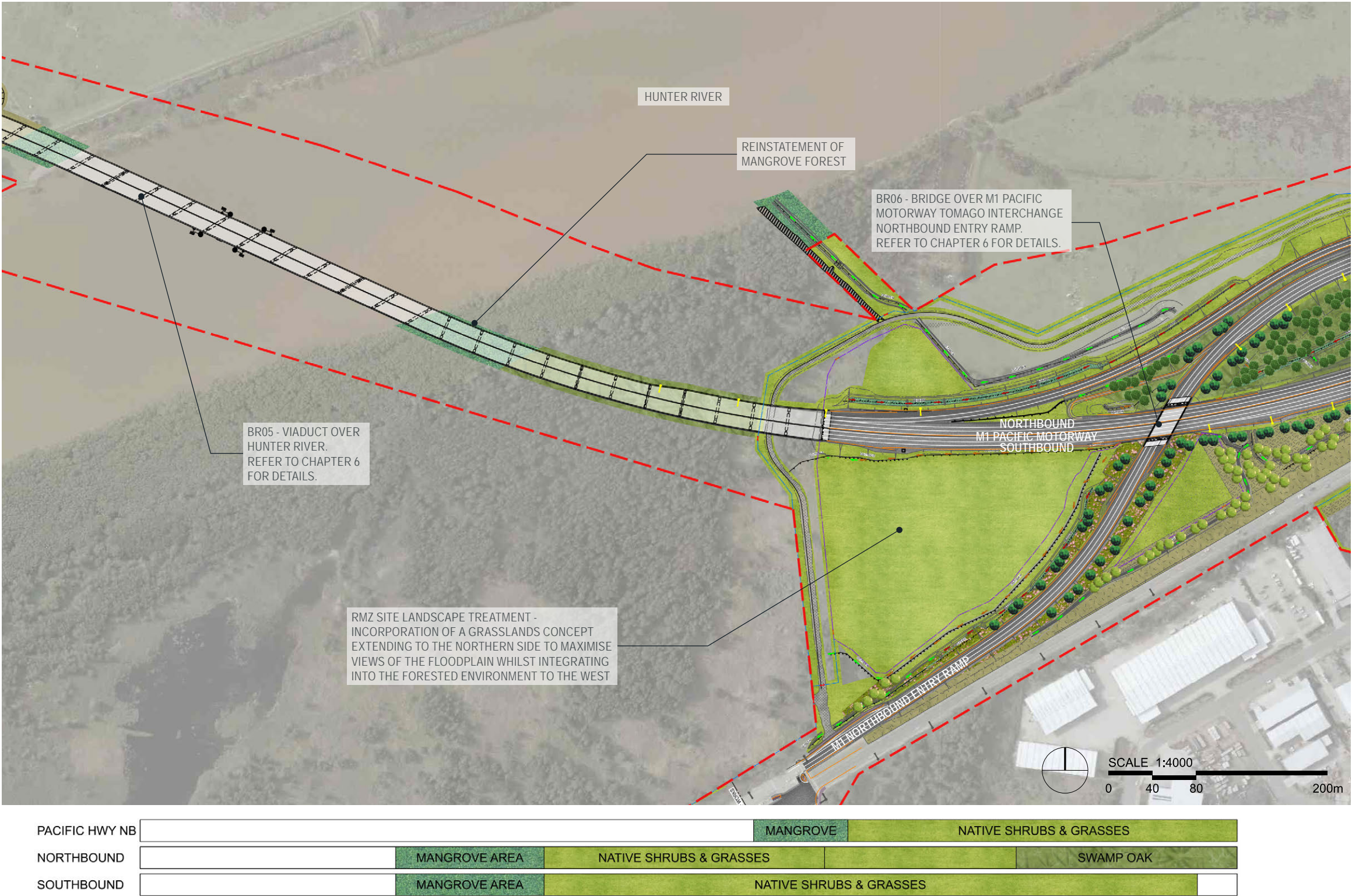


Figure 41: Concept plan - 7 of 10

LEGEND

- SITE BOUNDARY
- TEMPORARY WORKS BOUNDARY
- BARRIERS & FURNITURE
- NEW NOISE WALL
- EXISTING NOISE WALL
- NEW LIGHT POLE
- EXISTING ROAD - REVEGETATED WITH HYDROMULCH

HYDROMULCH TREATMENT

- PCT1736 - WATER COUCH
- PCT1588 - GREY IRONBARK
- PCT1590 - SPOTTED GUM
- PCT1646 - SMOOTH BARKED APPLE
- PCT1716 - PRICKLY PAPERBARK
- PCT1727 - SWAMP OAK
- SEDGES AND GRASSLAND
- INTERCHANGE
- BASIN EDGES AND SWALES
- NATIVE GRASSES
- MEDIAN

GARDEN BED

- GARDEN BED
- MANGROVE AREA- JUTE MATTING OVER NATURAL GROUND
- WETLAND GARDEN BED- JUTE MATTING OVER NATURAL GROUND
- BIOSWALE CHANNEL - JUTE MATTING OVER NATURAL GROUND
- BASIN - JUTE MATTING OVER NATURAL GROUND

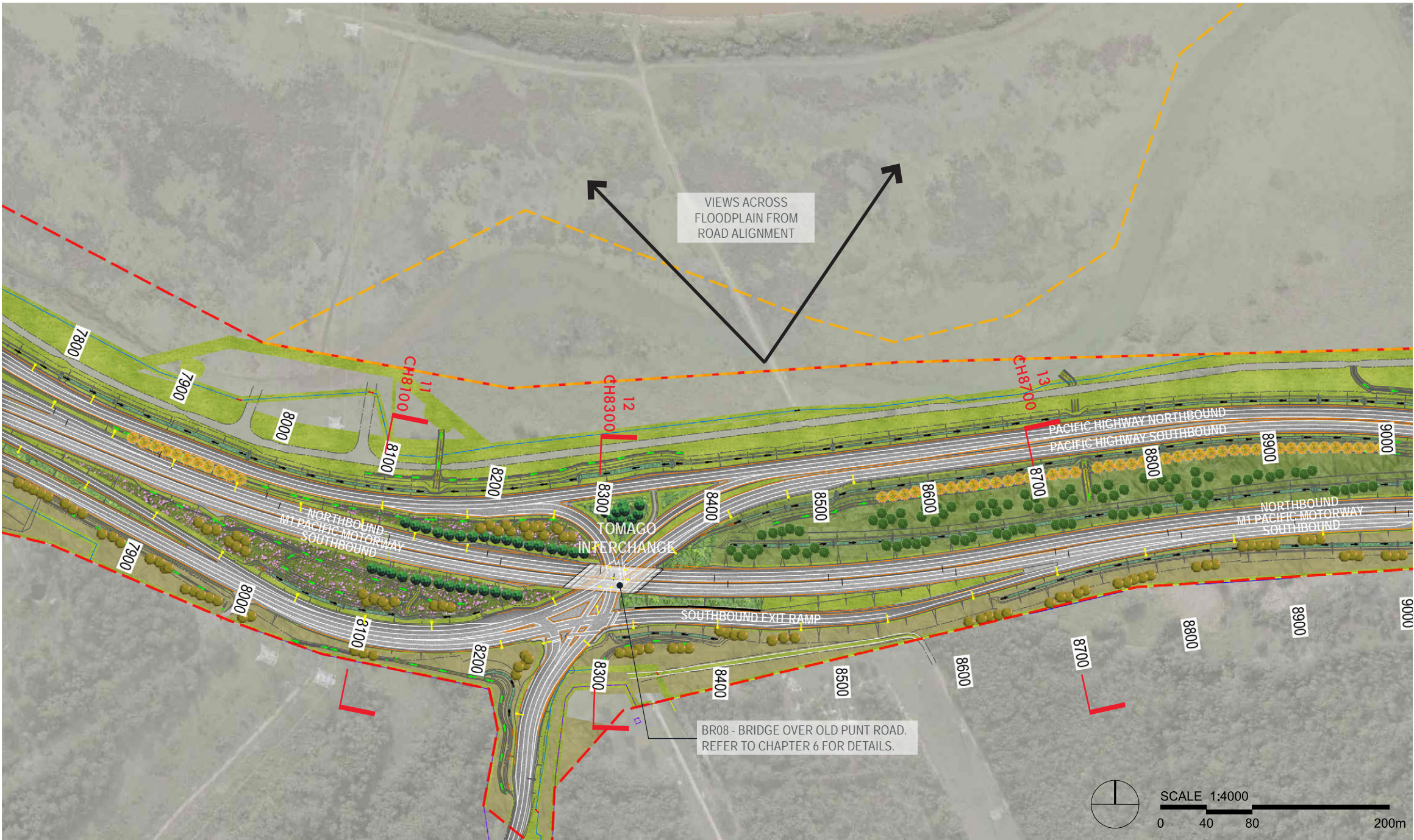
FEATURE TREE PLANTING (100L CONTAINERS)

- INTERCHANGE FEATURE TREES
BLACK HILL/TARRO - *Corymbia maculata*
TOMAGO - *Eucalyptus pilularis*
- ARRIVAL AVENUE TREES - *Brachychiton populneus*
- HUNTER BOTANIC GARDENS FEATURE TREES -
PACIFIC HIGHWAY - *Brachychiton populneus*
M1 MOTORWAY - *Syzygium luehmannii*



PACIFIC HWY NB	NATIVE SHRUBS & GRASSES		
NORTHBOUND	SWAMP OAK		
SOUTHBOUND	INTERCHANGE	SPOTTED GUM	GENERAL GARDEN BED
PACIFIC HWY SB	SPOTTED GUM		

Figure 42: Concept plan - 8 of 10



LEGEND

SITE BOUNDARY

TEMPORARY WORKS BOUNDARY

BARRIERS & FURNITURE

NEW NOISE WALL

EXISTING NOISE WALL

NEW LIGHT POLE

EXISTING ROAD -
REVEGETATED WITH HYDROMULCH

HYDROMULCH TREATMENT

PCT1736 - WATER COUCH

PCT1588 - GREY IRONBARK

PCT1590 - SPOTTED GUM

PCT1646 - SMOOTH BARKED APPLE

PCT1716 - PRICKLY PAPERBARK

PCT1727 - SWAMP OAK

SEDGES AND GRASSLAND

INTERCHANGE

BASIN EDGES AND SWALES

NATIVE GRASSES

MEDIAN

GARDEN BED

GARDEN BED

MANGROVE AREA- JUTE MATTING OVER
NATURAL GROUND

WETLAND GARDEN BED- JUTE MATTING
OVER NATURAL GROUND

BIOSWALE CHANNEL -
JUTE MATTING OVER NATURAL GROUND

BASIN -
JUTE MATTING OVER NATURAL GROUND

FEATURE TREE PLANTING (100L CONTAINERS)

INTERCHANGE FEATURE TREES
BLACK HILL/TARRO - *Corymbia maculata*
TOMAGO - *Eucalyptus pilularis*

ARRIVAL AVENUE TREES - *Brachychiton populneus*

HUNTER BOTANIC GARDENS FEATURE TREES -
PACIFIC HIGHWAY - *Brachychiton populneus*
M1 MOTORWAY - *Syzygium luehmannii*

PACIFIC HWY NB	NATIVE SHRUBS & GRASSES				
NORTHBOUND	NATIVE SHRUBS & GRASSES	INTERCHANGE	GENERAL GARDEN BED	SWAMP OAK	BASIN
MEDIAN			MEDIAN - GARDEN BED	MEDIAN - DIRECT SEED	
SOUTHBOUND	INTERCHANGE		SMOOTH BARK APPLE		
PACIFIC HWY SB	SMOOTH BARK APPLE				

Figure 43: Concept plan - 9 of 10

LEGEND

- SITE BOUNDARY
- TEMPORARY WORKS BOUNDARY
- BARRIERS & FURNITURE
- NEW NOISE WALL
- EXISTING NOISE WALL
- NEW LIGHT POLE
- EXISTING ROAD - REVEGETATED WITH HYDROMULCH

HYDROMULCH TREATMENT

- PCT1736 - WATER COUCH
- PCT1588 - GREY IRONBARK
- PCT1590 - SPOTTED GUM
- PCT1646 - SMOOTH BARKED APPLE
- PCT1716 - PRICKLY PAPERBARK
- PCT1727 - SWAMP OAK
- SEDGES AND GRASSLAND
- INTERCHANGE
- BASIN EDGES AND SWALES
- NATIVE GRASSES
- MEDIAN

GARDEN BED

- GARDEN BED
- MANGROVE AREA- JUTE MATTING OVER NATURAL GROUND
- WETLAND GARDEN BED- JUTE MATTING OVER NATURAL GROUND
- BIOSWALE CHANNEL - JUTE MATTING OVER NATURAL GROUND
- BASIN - JUTE MATTING OVER NATURAL GROUND

FEATURE TREE PLANTING (100L CONTAINERS)

- INTERCHANGE FEATURE TREES
BLACK HILL/TARRO - *Corymbia maculata*
TOMAGO - *Eucalyptus pilularis*
- ARRIVAL AVENUE TREES - *Brachychiton populneus*
- HUNTER BOTANIC GARDENS FEATURE TREES -
PACIFIC HIGHWAY - *Brachychiton populneus*
M1 MOTORWAY - *Syzygium luehmannii*

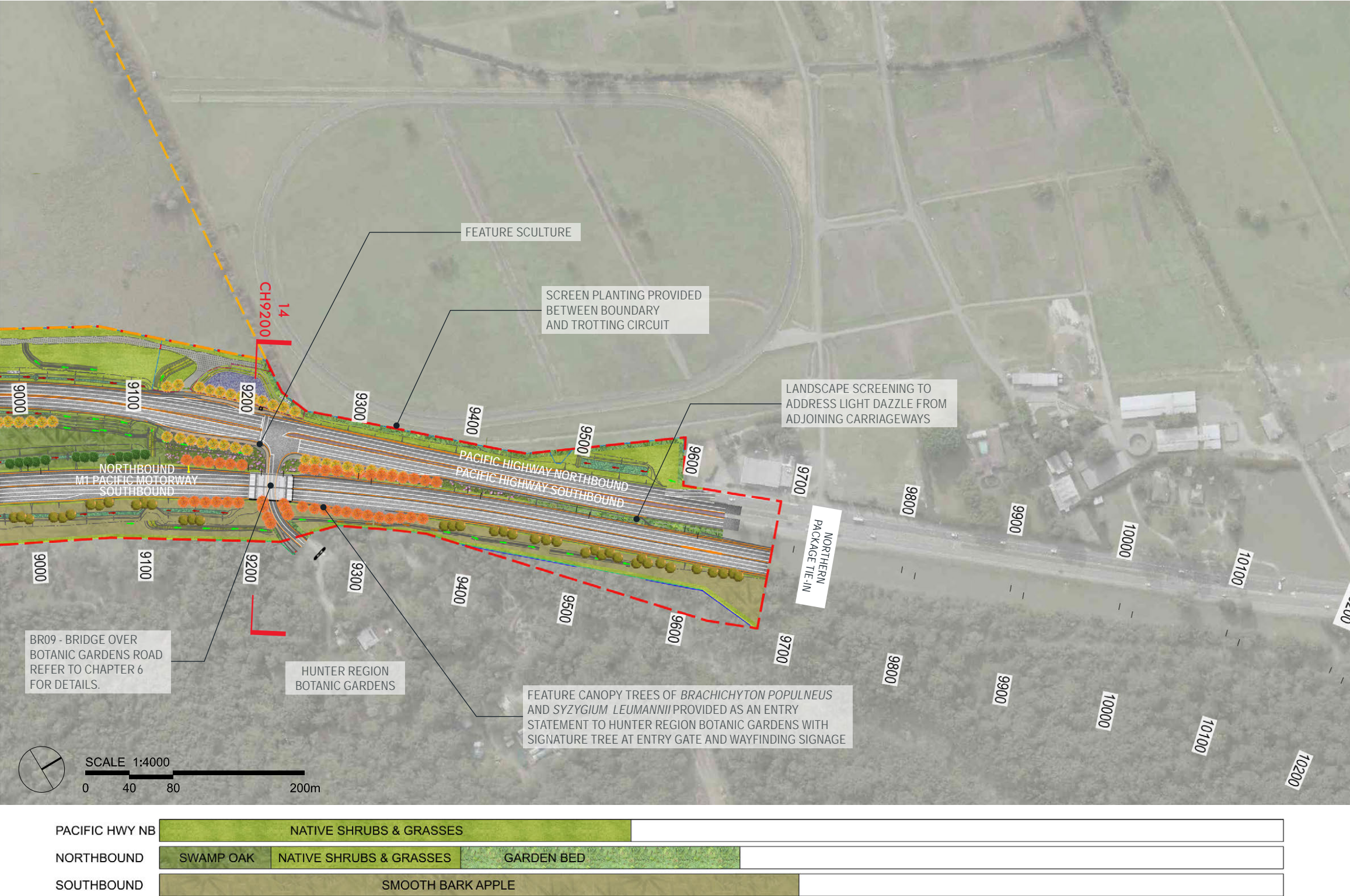
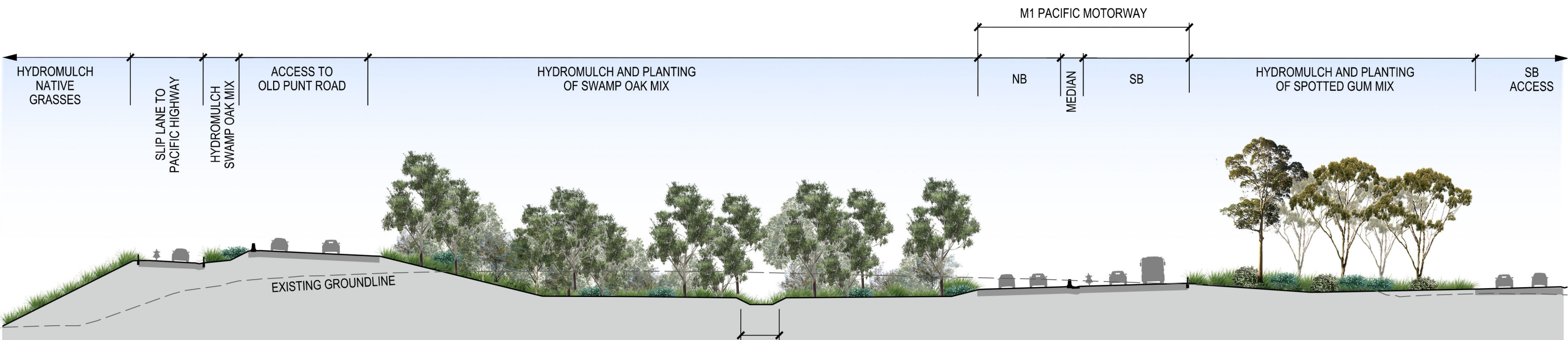
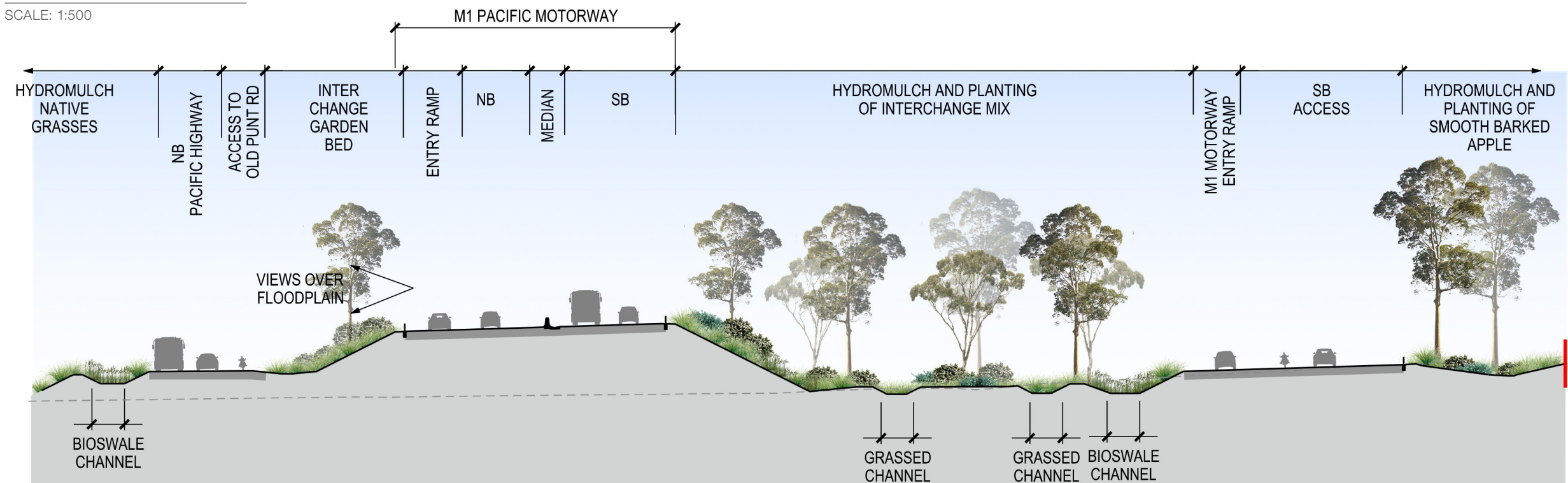


Figure 44: Concept plan - 10 of 10



SECTION 10 - CH 7400

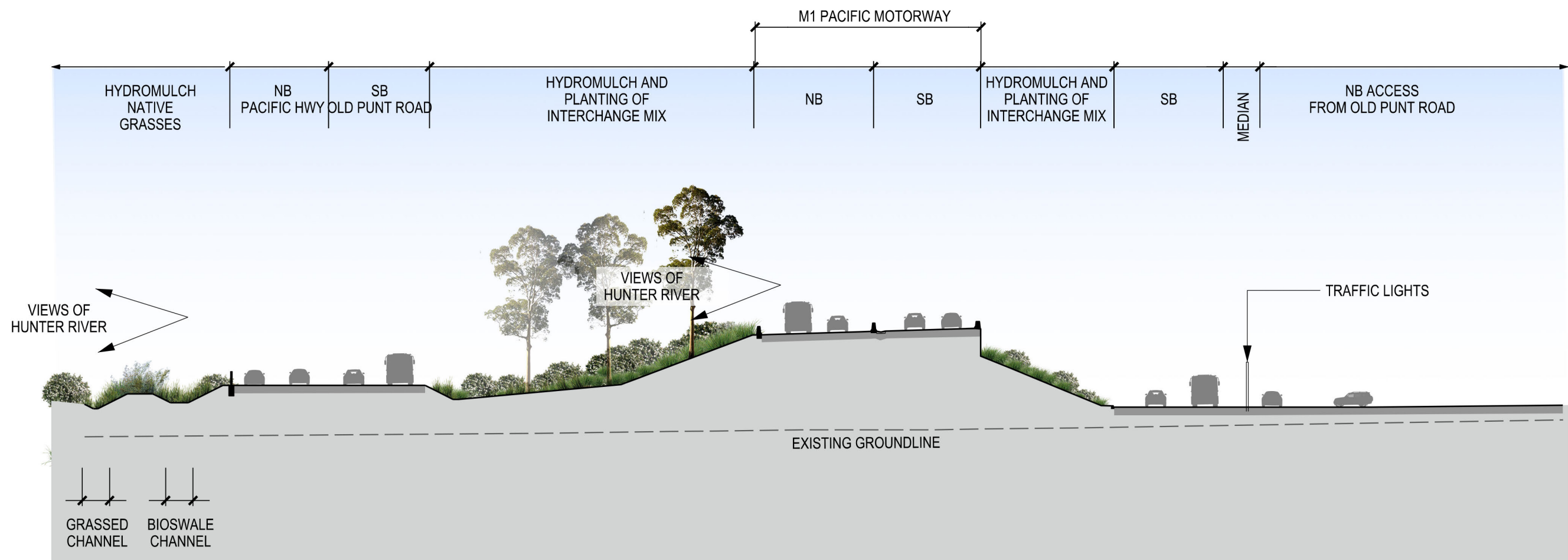
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SECTION 11 - CH 8100

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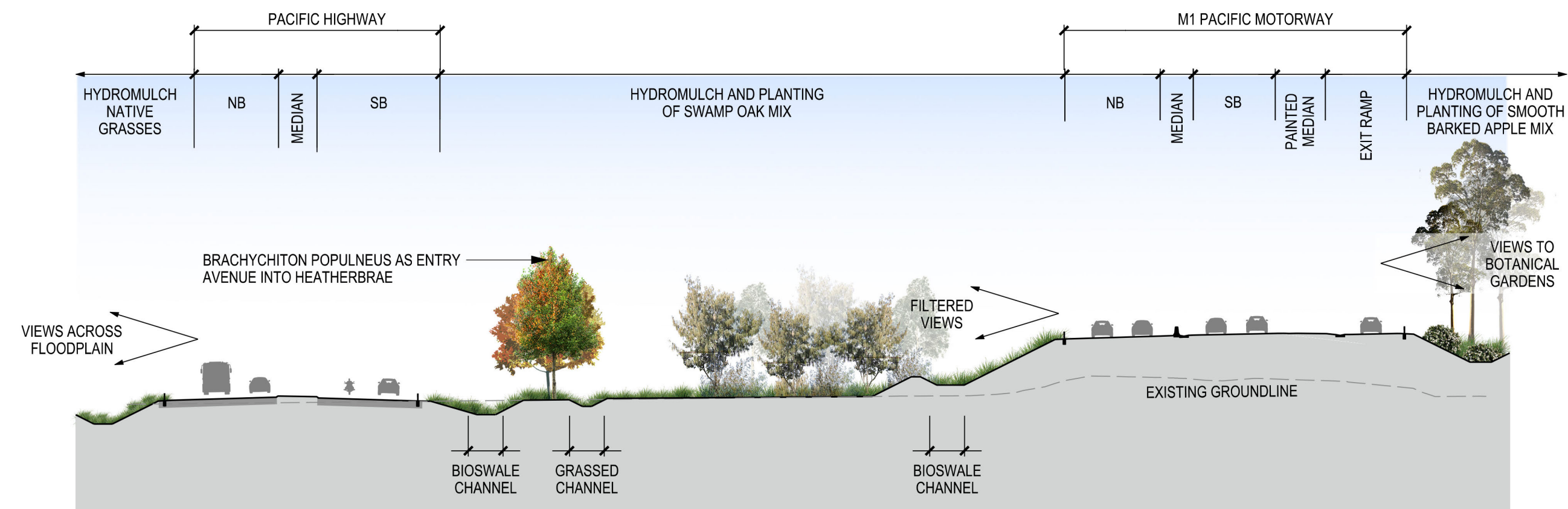
Figure 45: Section 10 - CH 7400 and Section 11 - CH 8100



SECTION 12 - CH 8300

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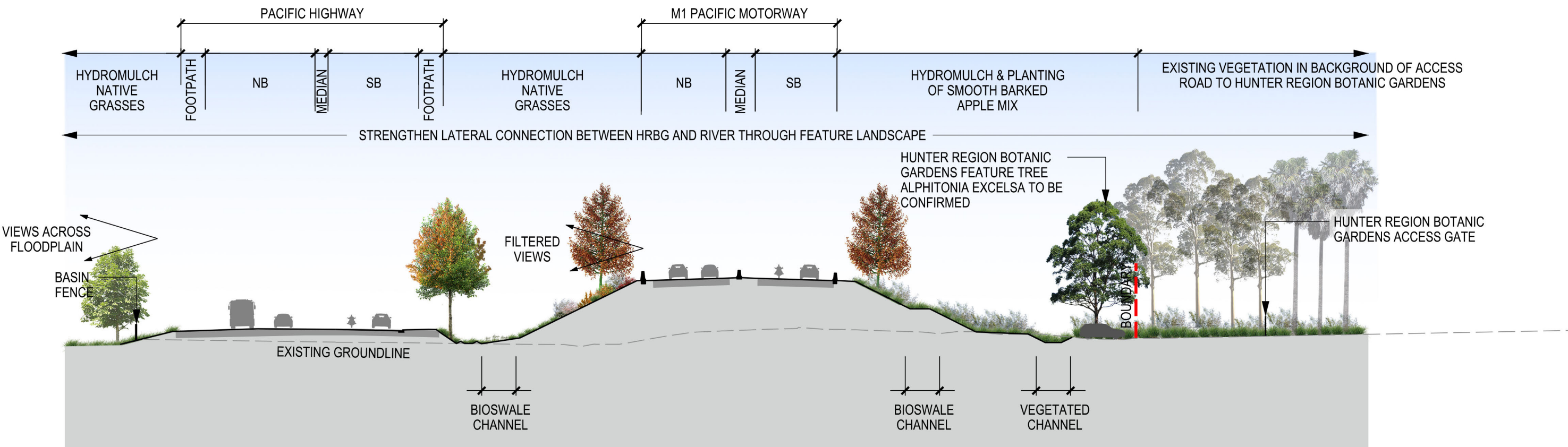
Figure 46: Section 12 - CH 8300



SECTION 13 - CH 8700

SCALE: 1:500

Figure 47: Section 13 - CH 8700



SECTION 13 - CH 9200

SCALE: 1:500

Figure 48: Section 14 - CH 9200

6. Design elements

6.1 Overview

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

- Interchanges
- Hunter Region Botanic Gardens (HRBG)
- Bridges
- Safety screens
- Retaining walls
- Noise walls and visual screening
- Maintenance and management strategy
- Signposting Country
- Anti-graffiti strategy
- Lighting
- Fencing
- Signage and Intelligent Transport Systems (ITS)
- Crime Prevention Through Environmental Design (CPTED)
- Fauna passages
- Active transport links
- Landscape implementation
- Landscape management.

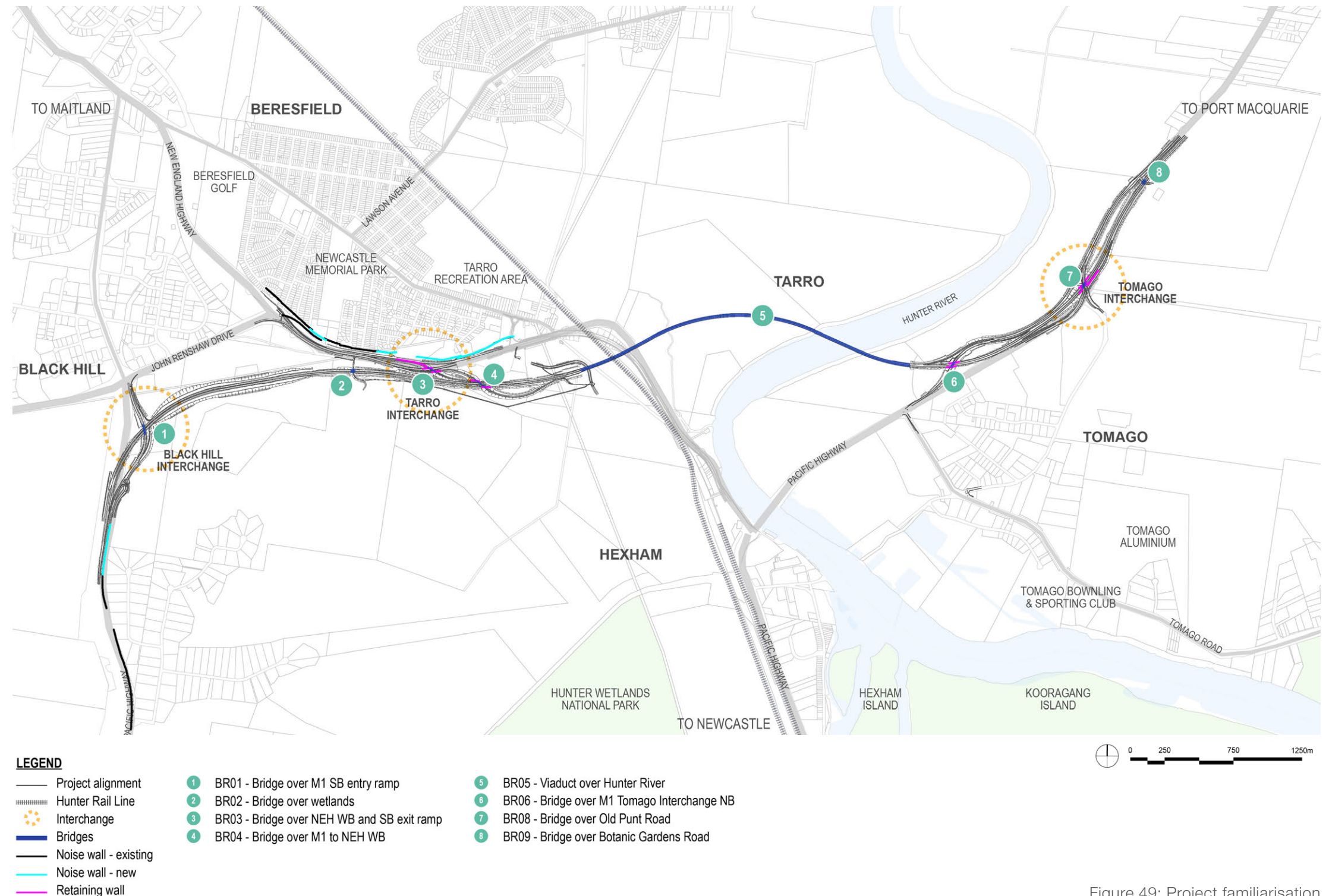


Figure 49: Project familiarisation

6.2 Interchanges

6.2.1 Black Hill Interchange

The Black Hill Interchange facilitates access to the new M1 Pacific Motorway alignment, but also continued access along the existing highway northbound to the John Renshaw Drive intersection, as well as access southbound from Weakleys Road via an overbridge connecting to the southbound highway. This is a relatively simple configuration involving a skewed, half diamond intersection.

The landscape response has been to integrate with the adjoining context, while both highlighting its occurrence through the structural form of the bridge, and also the way the landscape is associated with the bridge structure.

Prickly-leaved Paperbark Forest on coastal lowlands of the Central Coast and Lower North Coast occurs in a poorly drained depression in what is otherwise dominated by Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest. This landscape type is both reinstated and reinforced on the southeastern corner of the intersection, but also stretched through the base of the Black Hill Cutting, to reflect both the low-lying nature of this section of the road and its potential for impeded drainage. In doing so, the interchange becomes flanked by this community, providing a contrast to the adjoining forest. The landscape's denser habit and white flowers combine to create a clear and distinct identity within the road corridor.

Southbound access from Weakleys Road is reinforced by planting of *Corymbia maculata*. This defines the path of travel for southbound traffic and also relates to the dominant forest community adjacent.

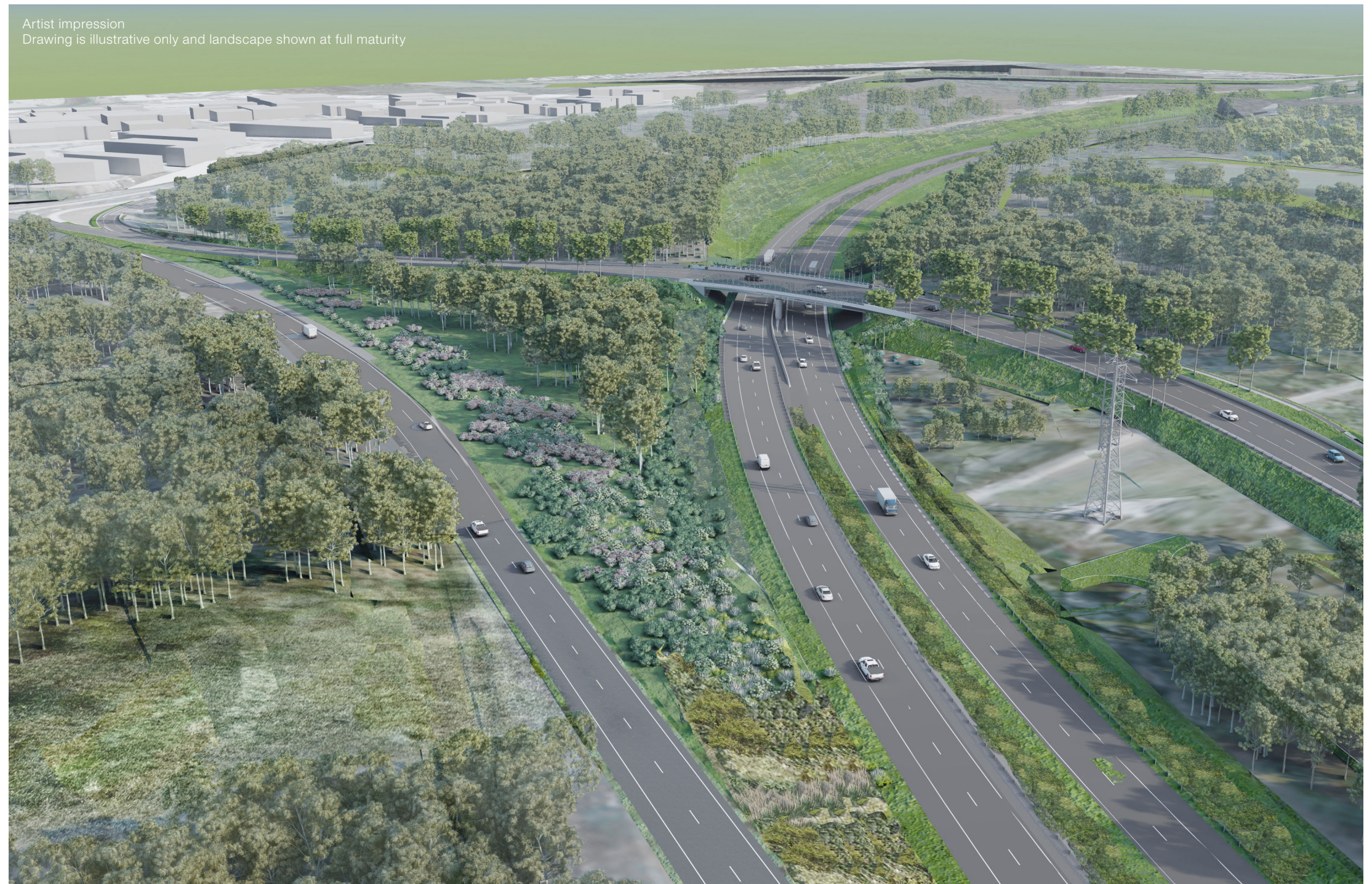


Figure 50: Aerial view of Black Hill interchange, looking north

6.2.2 Tarro Interchange

The Tarro Interchange is a complex interaction between the New England Highway and M1 Pacific Motorway which operate in parallel to one and other. The connection between the two is created by a plaited arrangement in which cross overs intertwine, enabling a southbound connection from the New England Highway to the M1 Pacific Motorway, and conversely a northbound connection from M1 Pacific Motorway to the New England Highway.

The key drivers in the design of this interchange are:

- Creation of separation and distinct experiences for the two highways
- Creation of separation and screening of the Eastern Avenue residential precinct from the highway corridor
- Connection of the M1 Pacific Motorway with the floodplain and the expansive views that this provides
- Structure and legibility for the way the connections and motorways are provided.

Bridge elements have been developed as consistent and unified elements consisting of a near vertical abutment and flanking walls, with a skewed bridge span.

The landscape response seeks to provide a structured landscape that separates the two highways. The canopy of these trees is reflective of the adjoining plant community of the Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest. Within the broad separation island, an informal grid of this canopy community is planted, to provide structure and direction within the interchange.

Another key element of this interchange is the use of *Callistemon* shrubs in front of, and along the noise and retaining walls of the New England Highway alignment. The use of *Callistemon* as a key element of the design is consistent with the existing highway and its character, providing a clear and defined character to the New England Highway which differentiates it from the M1 Pacific Motorway.

The alignment of the M1 Pacific Motorway is on the western edge of the corridor and addresses the floodplain and the expansive views this offers. The design has consequently adopted a distinctly open character in which the landscape beyond the corridor is the key element of the corridor experience.



Figure 51: Aerial view of Tarro interchange, looking east

6.2.3 Tomago Interchange

Similar to the Tarro Interchange, the Tomago Interchange is a complex arrangement of new and existing roadways. Consequently, the focus has been on ensuring smooth flow of both local and through-traffic, while minimising conflicts and providing clear and accessible connections for all road users.



Figure 52: Aerial view of Tomago interchange, looking west

6.3 Hunter Region Botanic Gardens

‘A botanical garden or botanic garden is a garden dedicated to the collection, cultivation, preservation and display of an especially wide range of plants, which are typically labelled with their botanical names.’

‘Botanic gardens are institutions holding documented collections of living plants for the purposes of scientific research, conservation, display and education.’

The unique location of the Hunter Region Botanic Gardens (HRBG) and its existing gardenesque character provide opportunities for interpretation of both Aboriginal and non-Aboriginal heritage and landscape. It also serves as a visual point of interest to mark the transition between the enclosed forest environment of Heatherbrae to the east, and the open floodplain environment of Tomago to the east of HRBG.

The mural by Aboriginal artist Jason Russell features key elements that reference the Hunter River and the community and people symbols. This provides HRBG with a Connection to Country that further enhances the primary waterways and wetlands themes developed as part of the Project narrative.



Figure 53: Aboriginal artist Jason Russell and family and his beautiful mural. (Source: Hunter Region Botanic Gardens Inspiration - Botanical Gardens as ART, Colour, Movement, Patterns, Vibrancy, Striking, Energy and Life)



Figure 54: HRBG - existing gardenesque character



Figure 55: Benchmark - Avenue of Honour, Ballarat. Form, Structure, Identity and Place

6.3.1 Urban design strategy

The design strategy for the HRBG has been developed to adopt a holistic approach that enhances HRBG as a place, and provides a unique sense of identity. The strategy is defined by incorporating landscape features that celebrate the ‘botanica’ concept, integrated with interpretive art elements and supported by signage.

Key design features include:

- Developing an enhanced entry statement to HRBG - creating a sense of place to highlight HRBG as a ‘jewel’ in the landscape
- Celebrating ‘botanica’ and the river as a planted intersection extending from inside the gardens out to the M1 Pacific Motorway, strengthening its lateral connection to the Hunter River
- Incorporating feature planting with signature trees near the entry gate and along M1 Pacific Motorway, to enhance lateral connection between the HRBG and the river
- Incorporating artwork on the undercroft spaces of the two abutments to tie in with the ‘botanica’ concept
- Incorporating a bespoke sculpture that is unique to HRBG
- Consolidating wayfinding signage at the entry points to provide more definition and a welcome gesture to HRBG
- Separating tourist directional signage from wayfinding signage - placing them on approaches and key driver orientation locations
- Enhancing shared path and active transport connections from HRBG to Pacific Highway.



Figure 56: HRBG - aerial view, looking east

6.3.2 HRBG access strategy

HRBG is located on the eastern side of the M1 Pacific Motorway. The approach to the Gardens is provided via the Pacific Highway as follows:

- From Sydney via the M1 Pacific Motorway off ramp to Pacific Highway located west of Old Punt Road and BR06
- From Newcastle via Pacific Highway
- From Port Stephens via Old Punt Road
- From Heatherbrae via the M1 Pacific Motorway off ramp to Pacific Highway at the Raymond Terrace Interchange.

The access to the Gardens itself is provided via a dedicated roadway off the Pacific Highway which passes under the M1 Pacific Motorway at BR09. The bridge is an important element as it defines the entry to the Gardens.

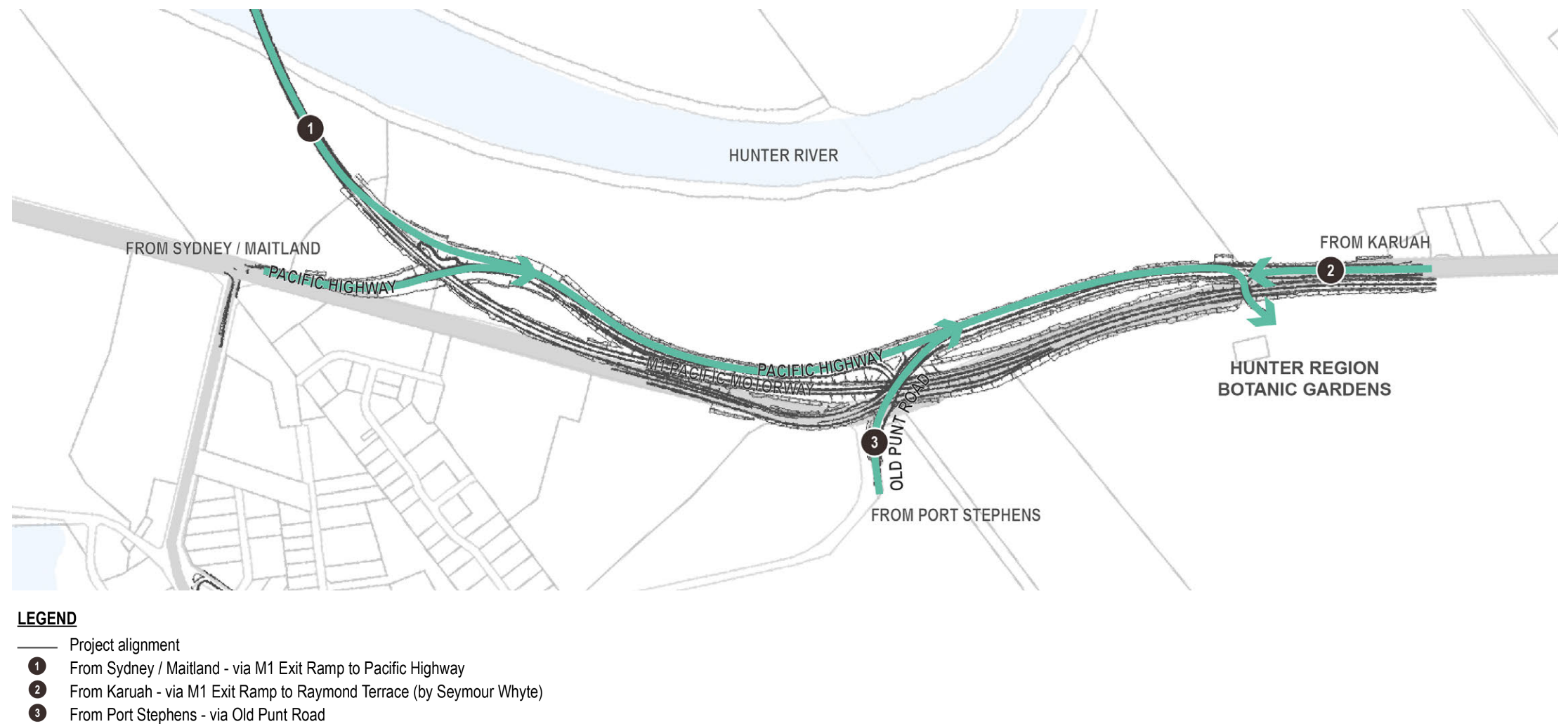


Figure 57: Access to HRBG

6.3.3 Landscape strategy

The landscape strategy comprises two layers:

- Upper layer: Feature canopy as a marker on the Motorway
- Lower layer: Feature planting on the Pacific Highway frontage and access to HRBG.

The upper layer canopy planting has been provided to define the Motorway with feature trees of *Brachichiton Populneus* which provide an element of colour, differentiating it from the normal broadscale landscape.

The lower layer planting has been provided to define Pacific Highway with feature trees *Syzygium Leumannii*. These plantings are further enhanced with the provision of a signature tree at the entry gate to strengthen the HRBG's lateral connection to the river.

Understorey planting is also provided to compliment the entry statement. The upper layer planting wraps around the lower layer planting at the approaches to BR09, providing a welcome gesture to HRBG.

The feature landscape treatments, along with the artwork and signage elements will enhance HRBG and provide it with a unique sense of place.

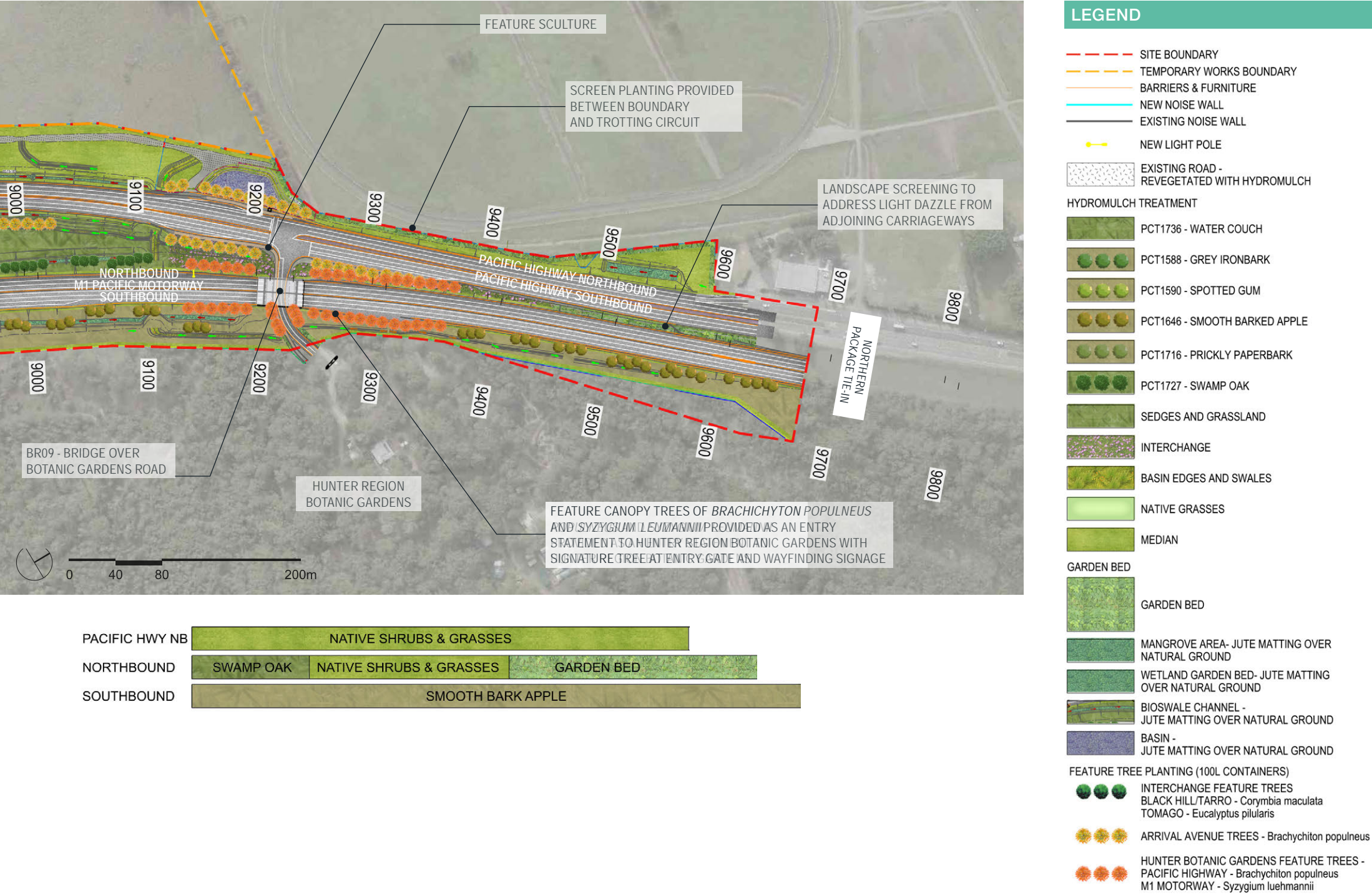


Figure 58: HRBG - landscape strategy

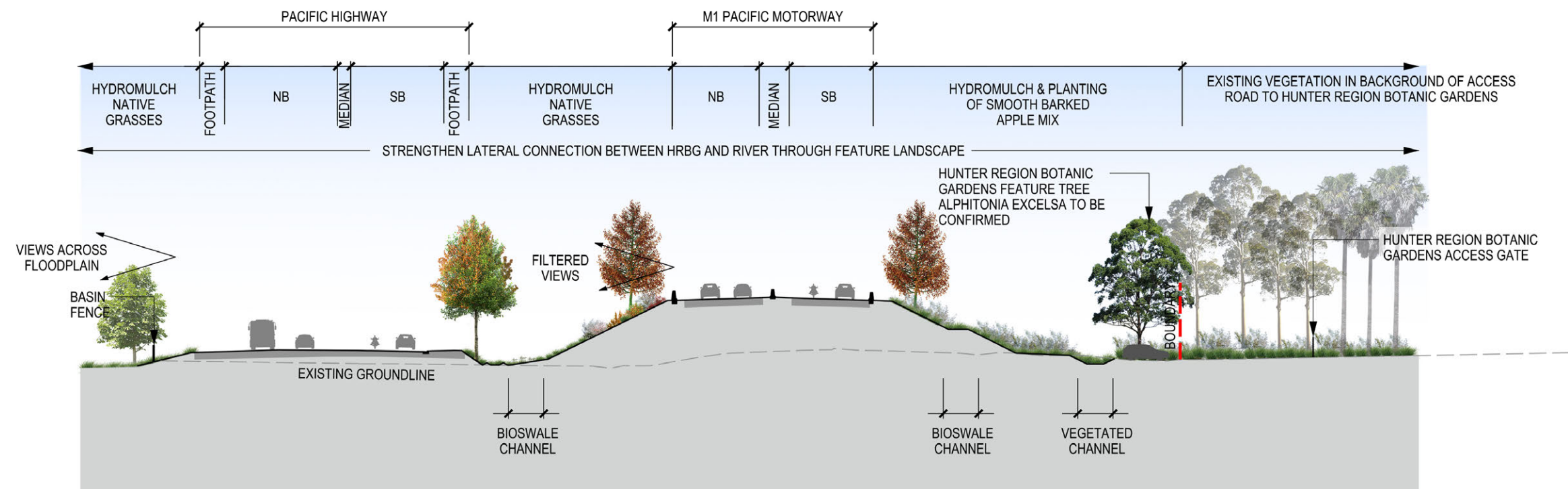


Figure 59: HRBG - section



Figure 60: HRBG - entry view 1



Figure 61: HRBG - entry view 2

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



Figure 62: HRBG - view looking west



Figure 63: HRBG - aerial view looking north

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



Figure 64: HRBG - view from northbound lanes



Figure 65: HRBG - view from southbound lanes

6.3.4 Artwork interpretation strategy

The artwork strategy has been developed by capitalising on the undercroft spaces of the bridge over the HRBG access road, to enhance placemaking initiatives with the incorporation of art on the two spill through batters. The artwork has been developed to reference the Kulangulan and the Dilmun provided by Saretta Art & Design, the Aboriginal artist.



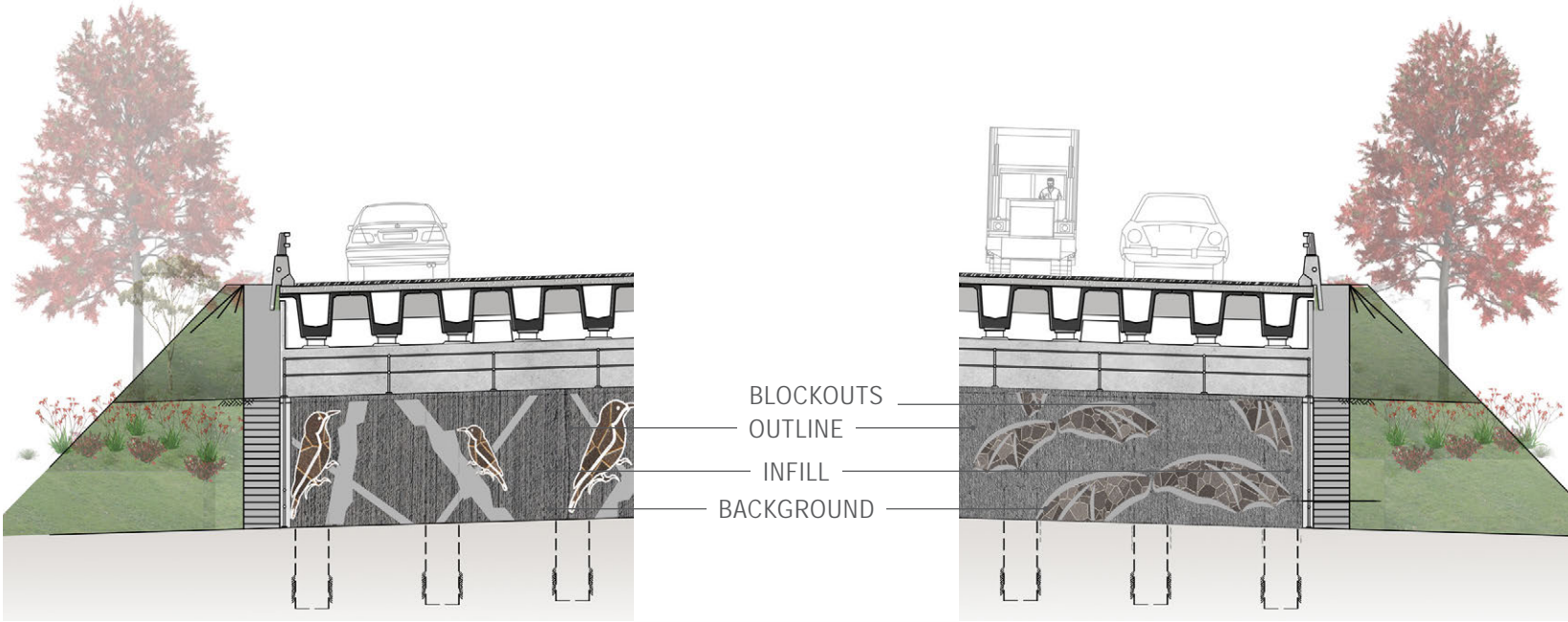
Figure 66: Entrance to HRBG

Materials

The materials, colours and finishes for the feature abutment treatments use earthy tones, which compliment the design.

They include:

- A base wall background with a textured concrete brushed or broom finish in a recessive colour
- An infill element overlaid over the base comprising of crazy pavers in porphyry or calor or a combination. The outlines that form the artwork will have a steel edging
- Blockouts which are the branches of the Dilmun or Kulangulan, provided using a steel plate or corten.



The Kulangulan (northern abutment)

The Dilmun (southern abutment)

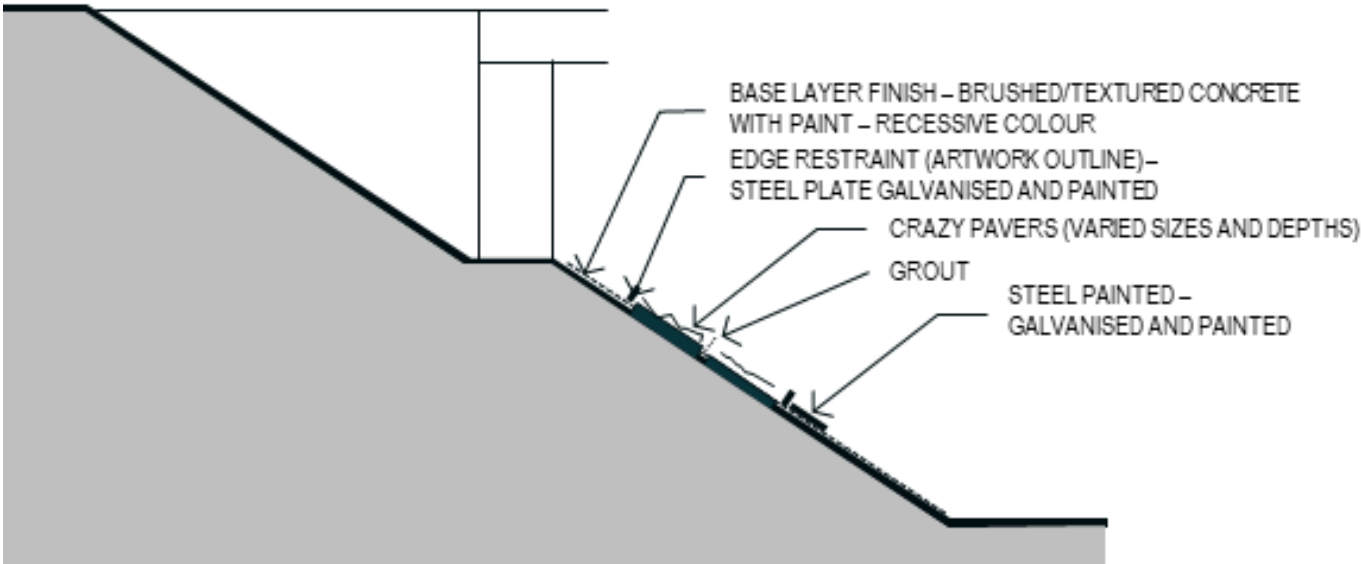


Figure 67: HRBG - BR09 materiality

6.3.5 Signage strategy

The signage strategy comprises two components:

- Tourist attraction signposting - This refers to the standard TfNSW signage which is provided along the Pacific Highway and will be used to direct users to the HRBG. They are characterised by a white sign overlaid over a brown background, containing the text 'Hunter Region Botanic Gardens'
- Wayfinding signage - This refers to the customised signage which is provided to define the entry to the HRBG. It is characterised by using colourful graphics and text. It has been developed by consolidating the existing wayfinding signage at the entry (Signage 1 and 2) and relocating others (Signage 3).

Signage 4 will be provided by others.

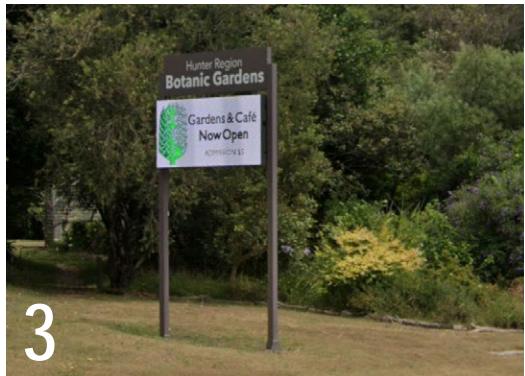
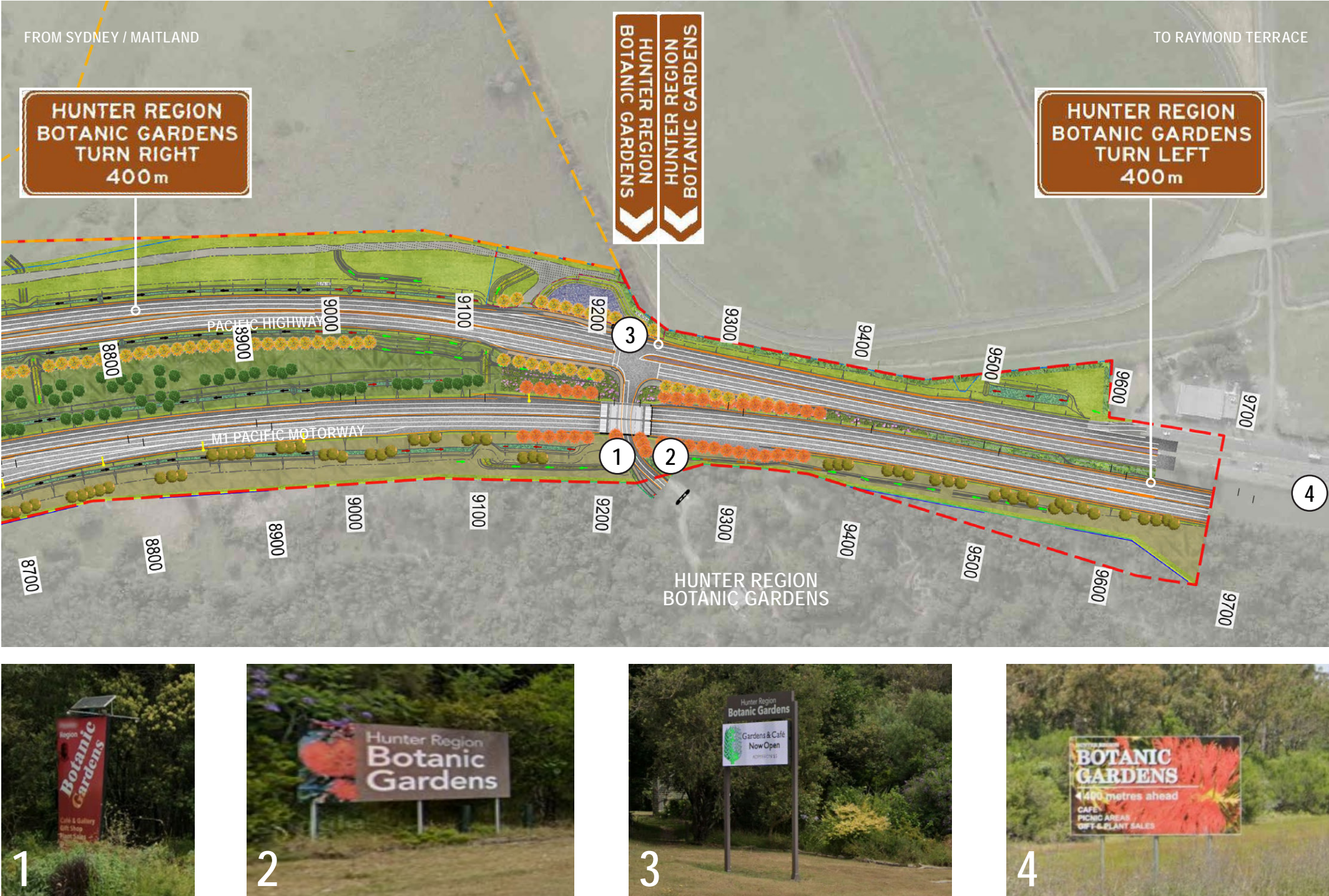


Figure 68: HRBG - signage strategy

6.3.6 Sculpture

A bespoke sculpture has been incorporated at the southwestern corner of the Pacific Highway at the approach to the HRBG. The sculpture has been developed to reference the *Banksia* seed pod which has an Aboriginal significance, referred to as the Dawibang by the Warrimay (Worimi) people, and provides a Connection to Country. It also has a relationship with the HRBG, being one of the natives of the gardens, as well as the region.

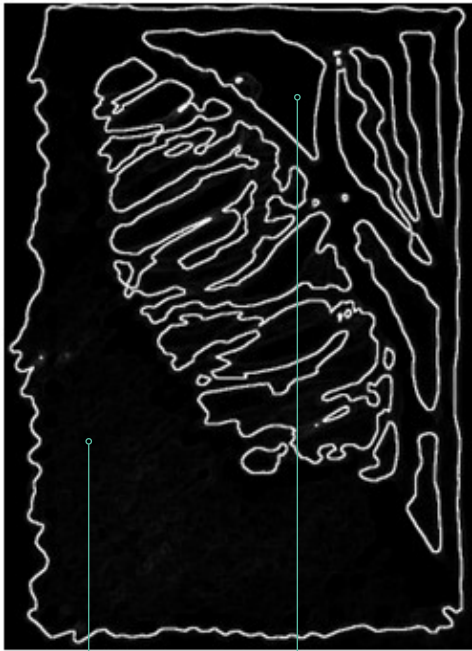
The metal sculpture has been developed by deconstructing the shape of the seed pod as an abstraction into three parts. It can be perceived to be experienced both as three individual sculptural elements or as a single sculpture, as a collective of the three individual sculptural elements, depending on the angle from where it is viewed from. At some angles, the three parts of the sculpture will overlap to form the shape of the seed pod as seen in its entirety. At other angles the sculpture will be seen as three different sculptural elements. The Dilmun has also been integrated in the sculpture which strengthens the relationship with the abutment artwork and enhances the lateral connection between the HRBG and the river, within its greater context.

This configuration provides a dynamic and a playful experience through the application of different colours and articulation of the individual shapes, enhancing the entry statement to HRBG, along with the feature abutment artwork and feature landscape.

Note: Sculpture design is subject to final detailed structural design.

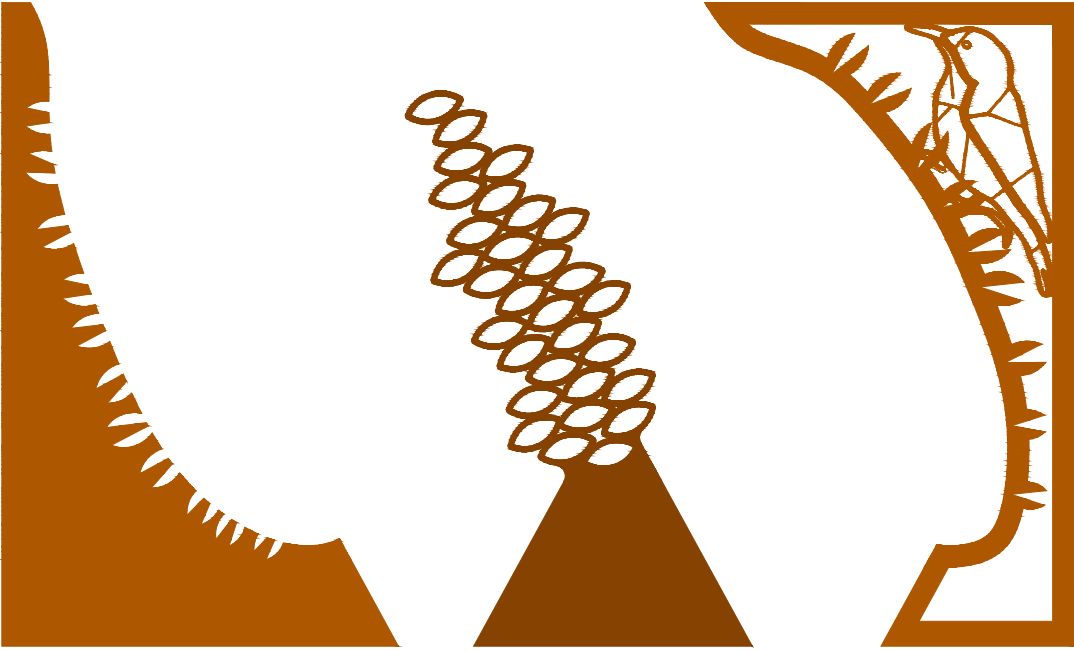


Figure 69: HRBG - sculpture

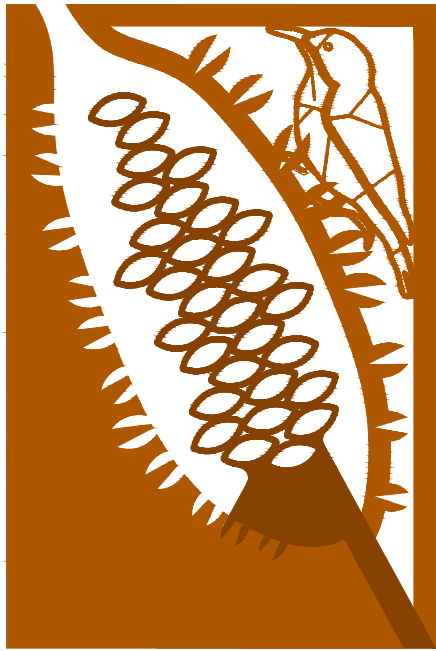


Solid

Hollow



Sculpture when seen separately -
as three individual elements



Sculpture when seen
together as one element



Note: Sculpture design is subject to final detailed structural design.

Figure 70: HRBG - blow up views of the sculpture



Figure 71: HRBG sculpture - view looking at the intersection illustrating the relationship with the bridge undercroft narrative

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



Figure 72: HRBG - view of the sculpture, southbound on Pacific Highway



Figure 73: HRBG - view of the sculpture, northbound on Pacific Highway

6.4 Bridges

Bridges are a key visual element on the Project. Due to their physical characteristics, elevated geometries and long spans, they are highly visible in the environment, and can be seen from various locations and distances.

Bridges are also a key element where placemaking initiatives can be incorporated and the aesthetic identity of the Project enhanced.

The bridges design, form, materials and finishes have been developed from a kit of parts which are 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

- BR01 - Bridge over M1 Pacific Motorway southbound entry ramp
- BR03 - Bridge over New England Highway westbound and southbound exit ramp
- BR04 - Bridge over M1 Pacific Motorway to New England Highway westbound
- BR06 - Bridge over M1 Pacific Motorway Tomago Interchange northbound entry ramp.

Underbridges

- BR02 - Bridge over wetlands
- BR08 - Bridge over Old Punt Road
- BR09 - Bridge over Botanic Gardens Road.

Viaduct

- BR05 - Viaduct over Hunter River.

All the overbridges along the M1 Pacific Motorway (BR01, BR04 and BR06) will be experienced sequentially as one traverses along the Motorway. They incorporate art as a main visual feature on the safety screens, which helps to distinguish them from the New England Highway bridges and assists with wayfinding.

BR02, BR08 and BR09 will be experienced as underbridges along the M1 Pacific Motorway. BR02 is a bridge over the wetlands and will be less prominent. BR08 is the bridge over Old Punt Road and will be experienced predominantly from the local road. BR09 marks the entry to the HRBG and special treatments have been incorporated in the abutments to incorporate art as an interpretive element.

BR03 is an overbridge over the New England Highway. The design of this bridge has been kept neutral, to tie in with the New England Highway corridor aesthetic and to differentiate it from the M1 Pacific Motorway.

BR05 is a 2.6 kilometre viaduct and the sweeping curved alignment over the floodplain and Hunter River forms a feature in itself, maximising views across the river.

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 the superstructure, substructure, form, materials, colours and consistency in design aesthetic.

Key features of the bridges include:

- Consistent family of forms for overpasses and underpasses - reducing the number of structural types
- Consistent profiles for the blade wall abutments
- Refined lengths of the reinforced soil walls (RSW) minimising the visual bulk of solid walls
- Safety screen art as a feature element which is integrated into the screen design
- Consistent pier shapes adopted for all bridges - circular forms with portal frame or integrated headstocks.



Figure 74: View of BR01 looking north

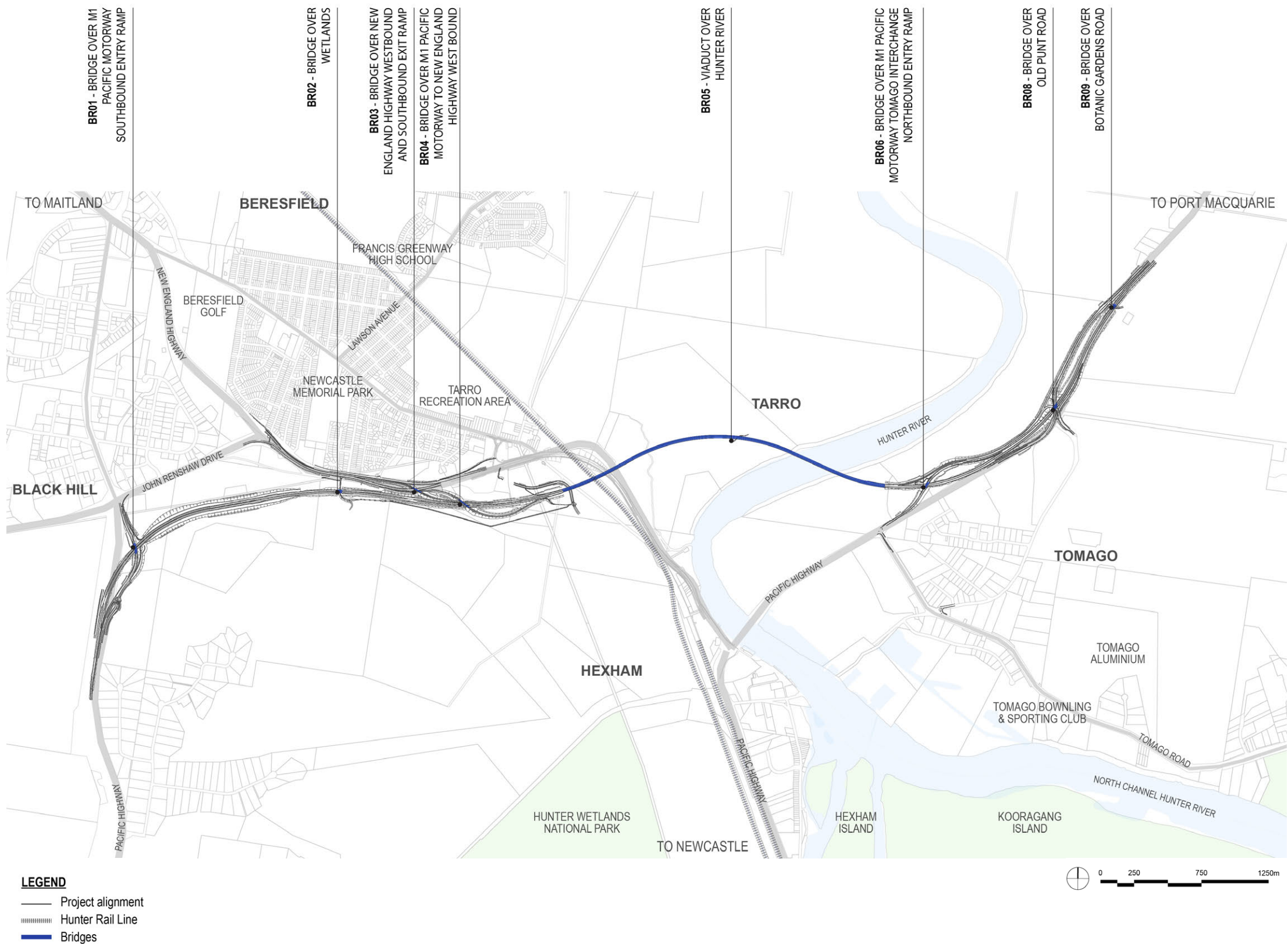


Figure 75: Bridges - key plan

6.4.1 Family of forms – kit of parts (M1 Pacific Motorway)

	OVERBRIDGES	UNDERBRIDGES	VIADUCT
Bridge form and structure	 <p>The design, form, materials and finishes of these bridges (BR01, BR04 and BR06) over the M1 Pacific Motorway provide a consistent aesthetic to ensure visual continuity.</p> <p>Key attributes include:</p> <ul style="list-style-type: none">– Incorporate art as a main visual theme– Sympathetic to the structural forms:<ul style="list-style-type: none">› Spill through and blade wall abutments› Integration with piers.– Consistent pier shapes adopted – circular forms with integrated headstocks.	 <p>These bridges (BR02, BR08 and BR09) are mostly experienced as individual entities, as part of a local environment and not directly as part of the Motorway. The bridge form, structure and the visual aesthetic vary to each other.</p> <p>Key attributes include:</p> <ul style="list-style-type: none">– Simple visual aesthetic sympathetic to the structural forms:<ul style="list-style-type: none">› Spill through and blade wall abutments› Single span bridges.– Consistent parapet profiles.	 <p>Special bridges (BR05) have a unique identity and are experienced as individual entities, with enhanced lateral connections with their context.</p> <p>Key attributes include:</p> <ul style="list-style-type: none">– Simple visual aesthetic sympathetic to the structural forms:<ul style="list-style-type: none">› Spill through abutments› Multi-span bridge.– Consistent parapet profiles.
Parapets and piers			

Table 5: Family of forms - kit of parts

6.4.2 BR01 - Bridge over M1 Pacific Motorway southbound entry ramp

BR01 is a two-span bridge and is 18 metres wide, with two lanes of traffic in a southbound direction. The bridge serves as the southbound entry ramp to M1 Pacific Motorway. The bridge is located at the southern end of the Project near the tie in with the existing M1 Pacific Motorway.

SUPERSTRUCTURE		
Structure	Parapets	Safety screens
Two-span bridge with Super-T precast girders with a cast in-situ composite reinforced concrete deck	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		

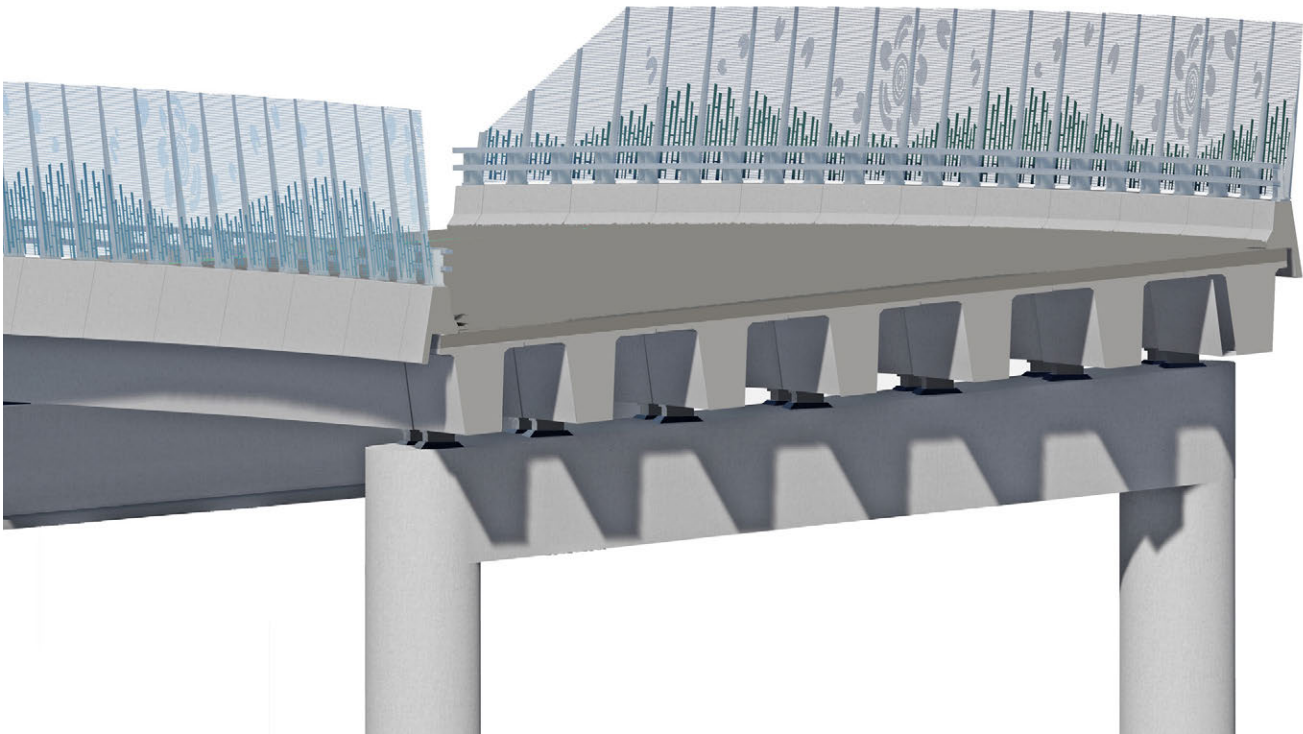
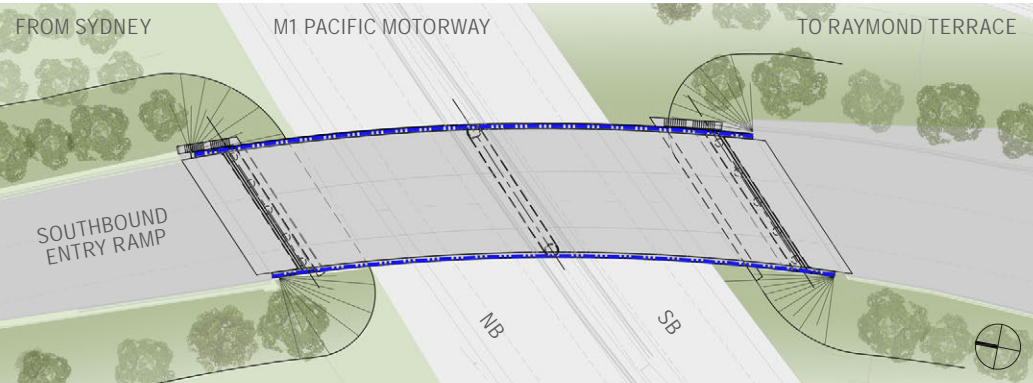
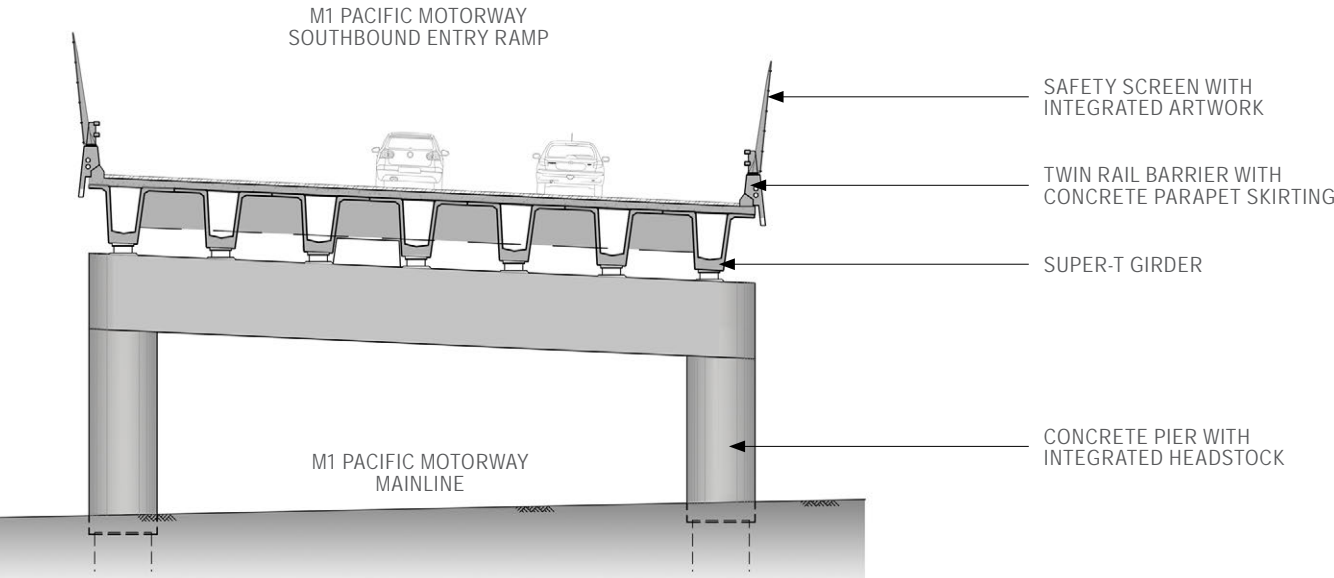


Table 6: BR01 - bridge summary

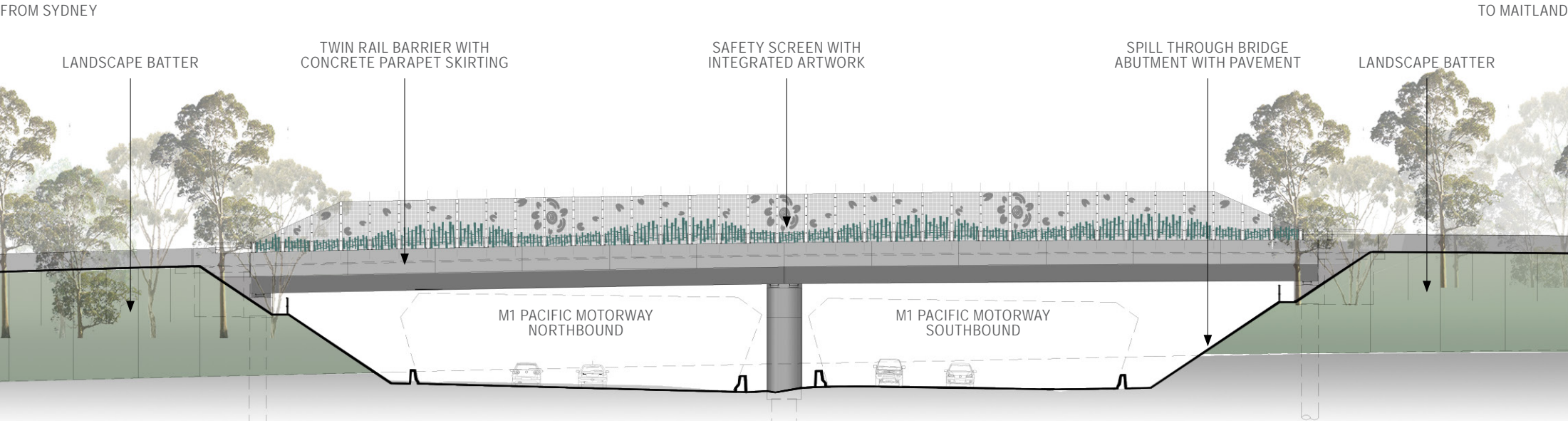
Figure 76: BR01 - section



BR01 - PLAN



BR01 - SECTION



BR01 - ELEVATION

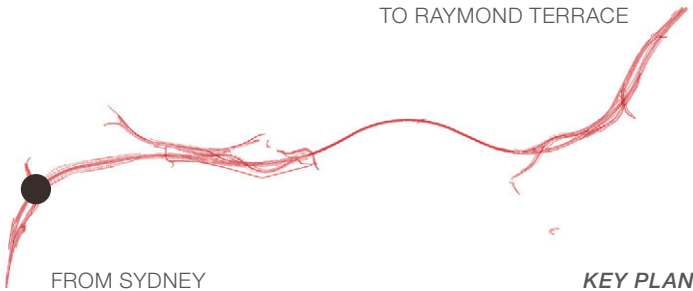


Figure 77: BR01 - plan, section and elevation



Figure 78: BR01 - looking north

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



Figure 79: BR01 - looking North

6.4.3 BR02 - Bridge over wetlands

BR02 is a single span bridge and is 21 metres wide, with two lanes of traffic in both the northbound and southbound directions. The bridge is located over a wetlands corridor and serves as a fauna access passage, as well as vehicular access to a private property.

SUPERSTRUCTURE		
Structure	Parapets	Safety screens
Single span bridge with PSC planks	Simple tapered parapets with twin steel railing inclined at 10 degrees	N/A
SUBSTRUCTURE		
Abutments	Piers and headstocks	
Spill through abutments with rip rap to provide a natural look, synonymous with creek environments	N/A	
INTERPRETIVE ELEMENTS		
N/A		
LANDSCAPE		
Riparian landscape treatments provided		

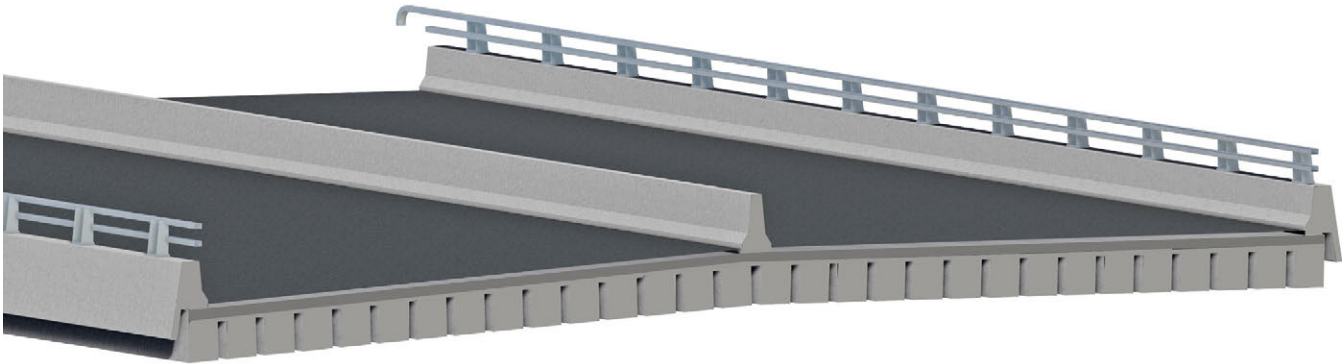
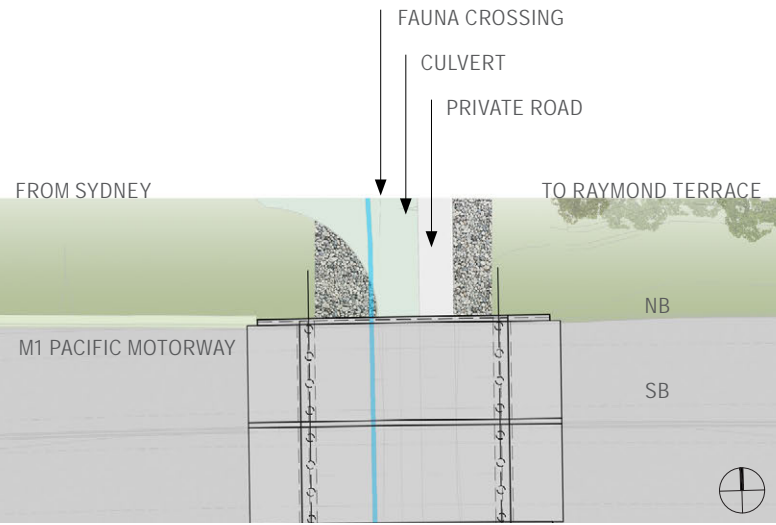
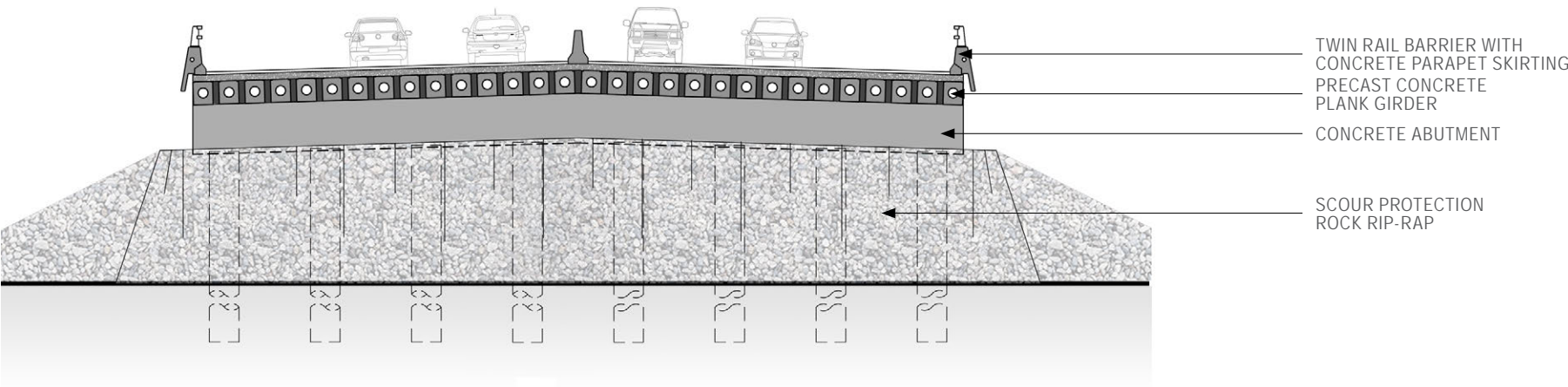


Table 7: BR02 - bridge summary

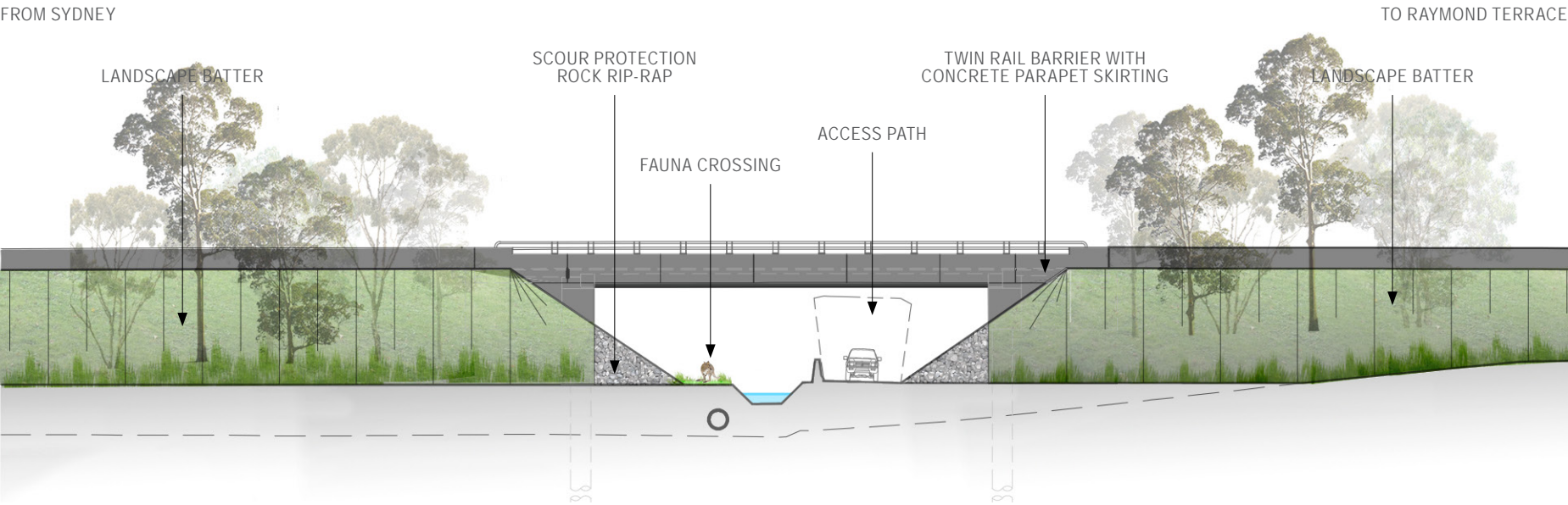
Figure 80: BR02 - section



BR02 - PLAN



BR02 - SECTION



BR02 - ELEVATION

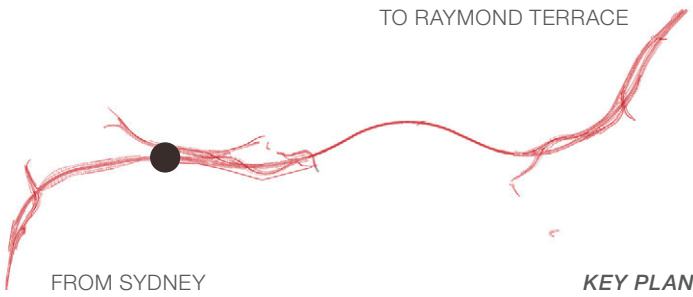


Figure 81: BR02 - plan, section and elevation



Figure 82: BR02 - looking north

6.4.4 BR03 – Bridge over New England Highway
westbound and southbound exit ramp

BR03 is a two-span bridge and is 64 metres in length, with a single lane of traffic on the northbound entry ramp. The bridge is located in Tarro and serves as the northbound connector from New England Highway to the M1 Pacific Motorway.

SUPERSTRUCTURE		
Structure	Parapets	Safety screens
Two-span bridge with Super-T precast girders with a cast in-situ composite reinforced concrete deck	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	
RSW blade wall abutments with pattern. Unit concrete pavers under the bridge behind the RSW.	Integrated headstock with circular pier	
INTERPRETIVE ELEMENTS		
Interpretive elements incorporated in the retaining wall design through art that responds to Country		
LANDSCAPE		
Feature landscape on approaches		

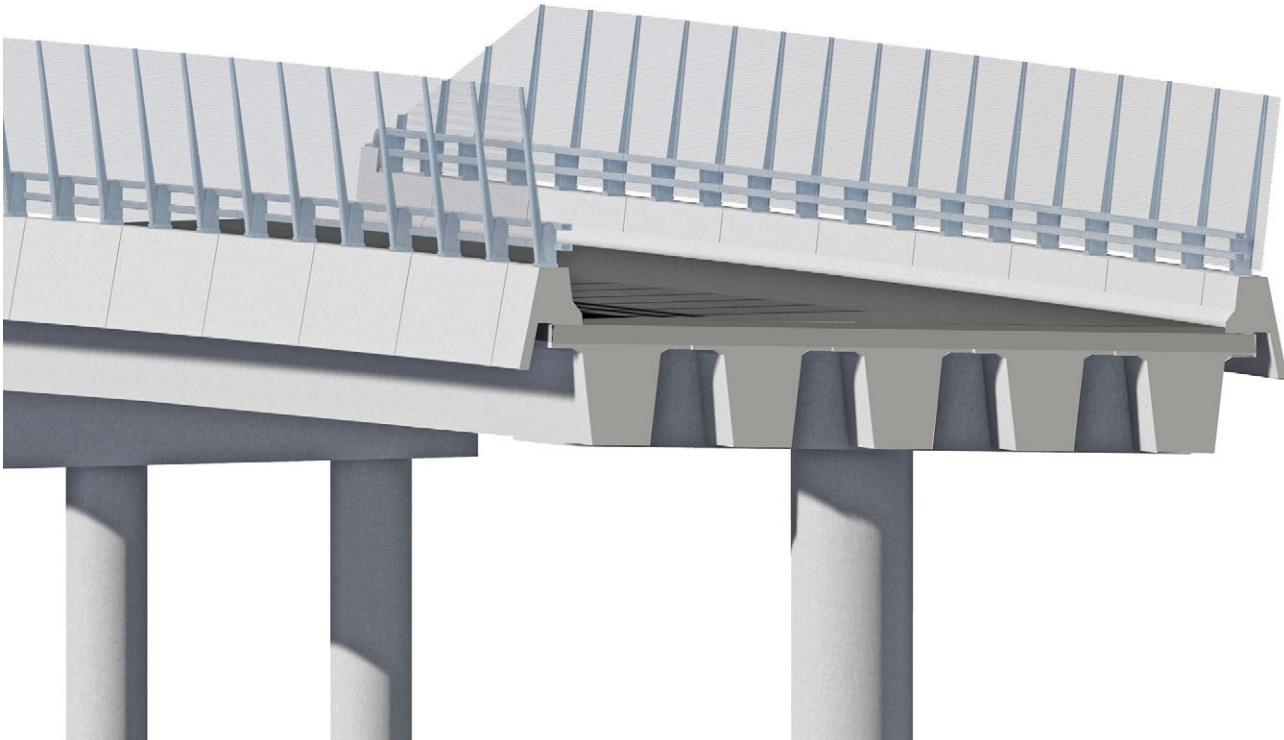
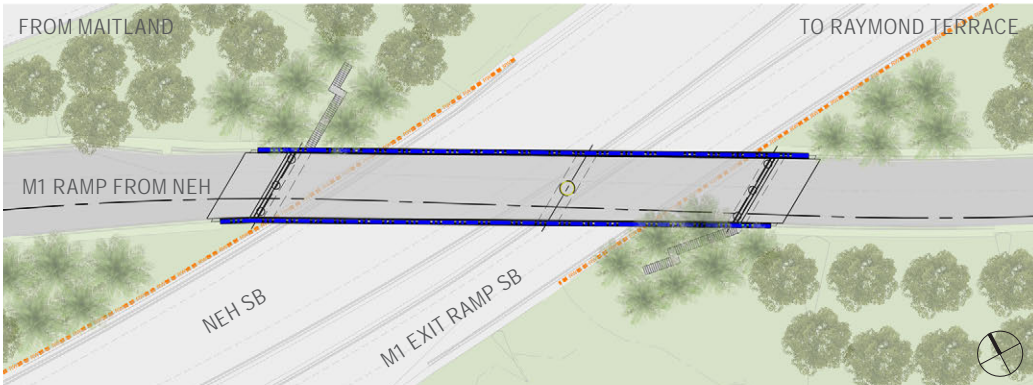
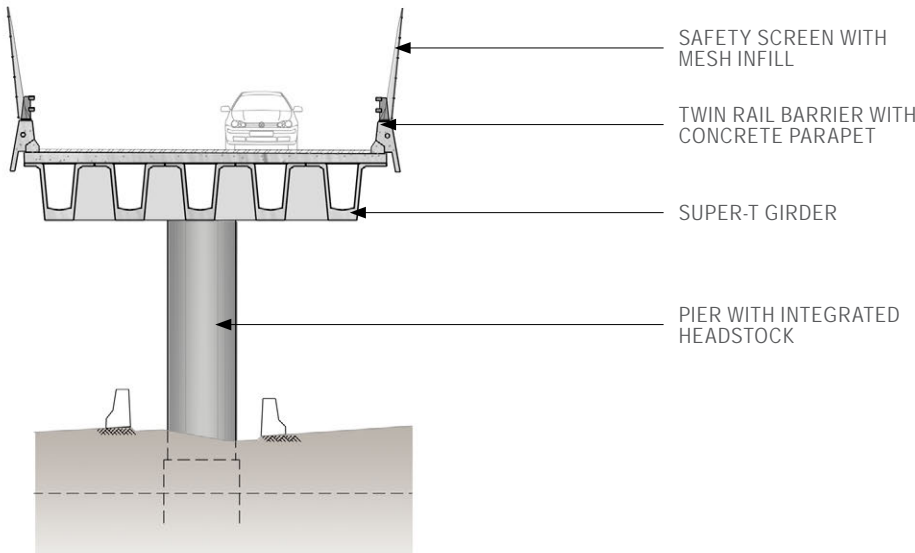


Table 8: BR03 - bridge summary

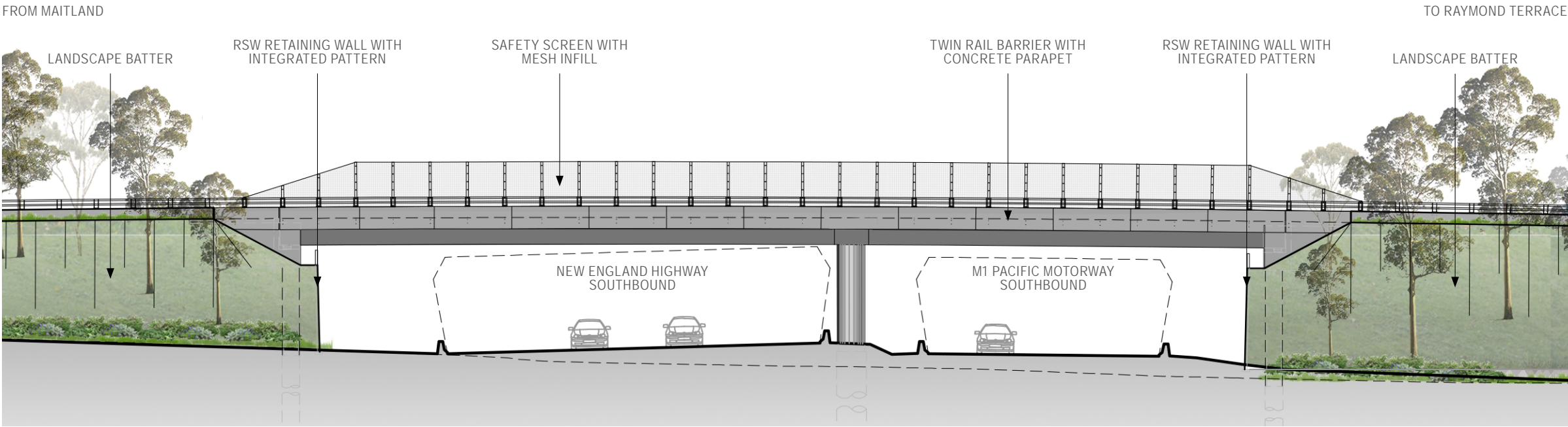
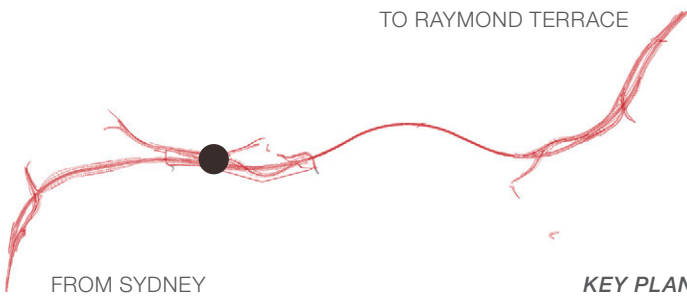
Figure 83: BR03 - section



BR03 - PLAN



BR03 - SECTION



BR03 - ELEVATION

Figure 84: BR03 - plan, section and elevation

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



Figure 85: BR03 - looking west

6.4.5 BR04 – Bridge over M1 Pacific Motorway to New England Highway westbound

BR04 is a three-span bridge and is 94 metres in length. The bridge is located in Tarro and serves as a westbound connector from the M1 Pacific Motorway to the New England Highway.

SUPERSTRUCTURE		
Structure	Parapets	Safety screens
Three-span bridge with Super-T precast girders with a cast in-situ composite reinforced concrete deck	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	
RSW blade wall abutments with signature pattern referencing wetlands theme. Unit concrete pavers under the bridge behind the RSW.	Integrated headstock with circular pier	
INTERPRETIVE ELEMENTS		
Interpretive elements incorporated in the safety screen and retaining wall design through art that responds to Country		
LANDSCAPE		
Feature landscape on approaches		

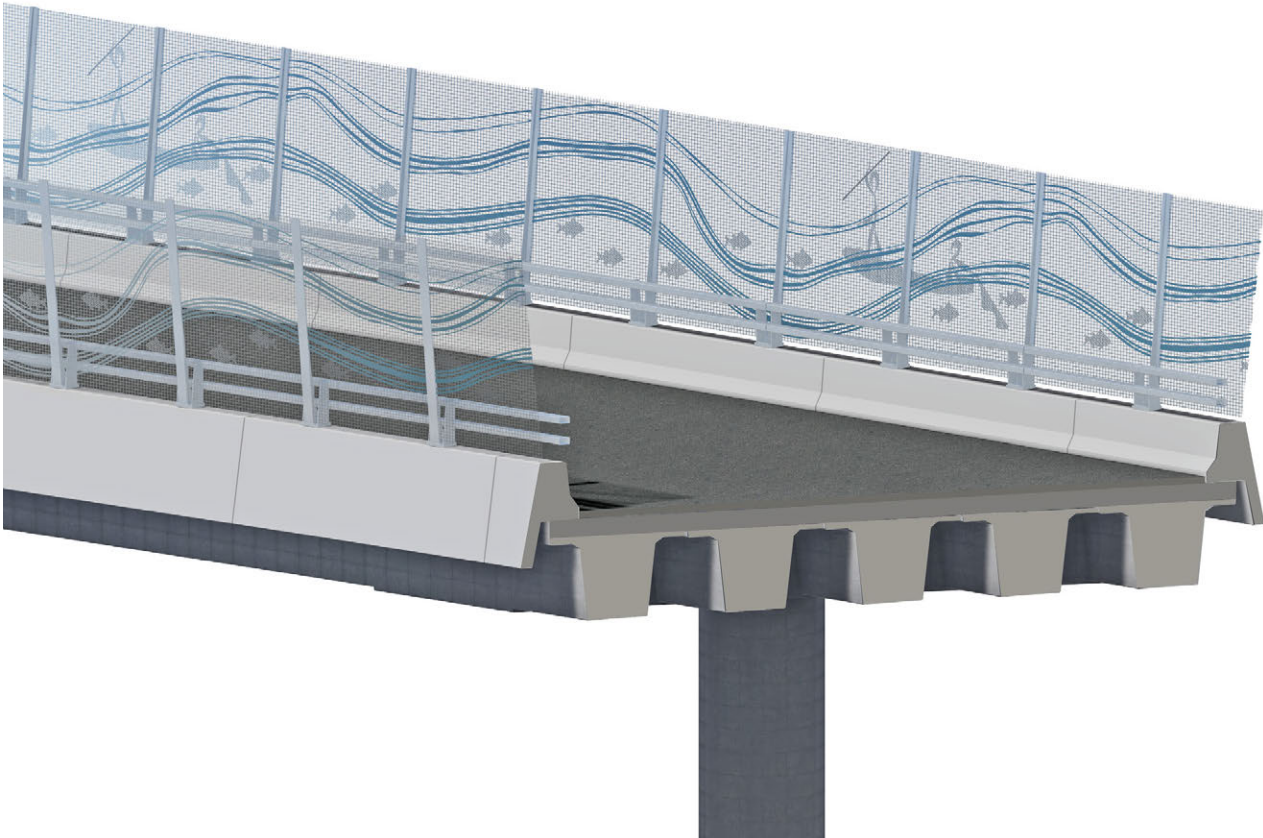
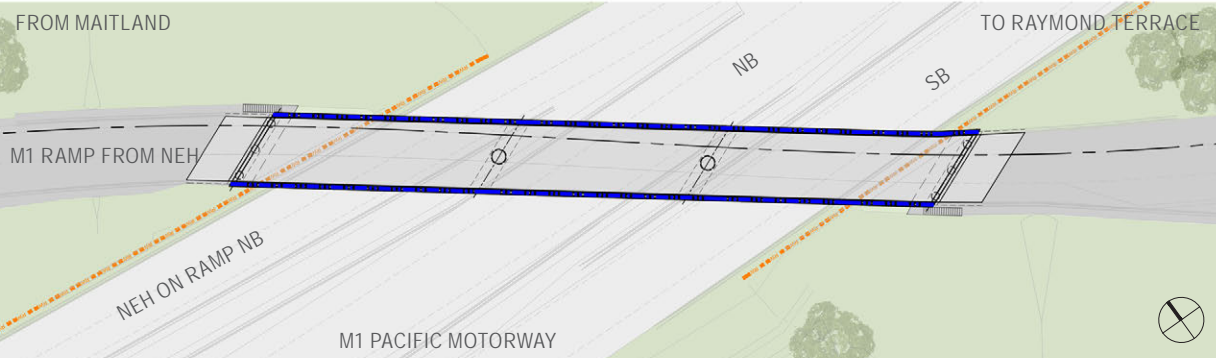
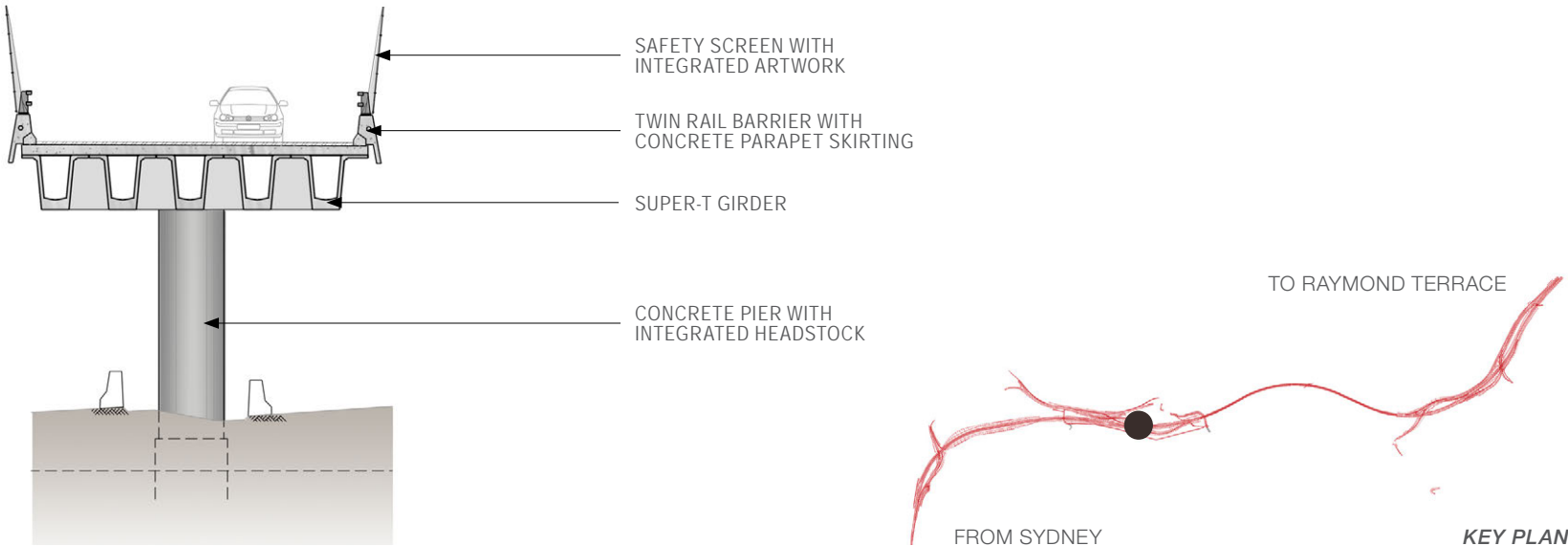


Table 9: BR04 - bridge summary

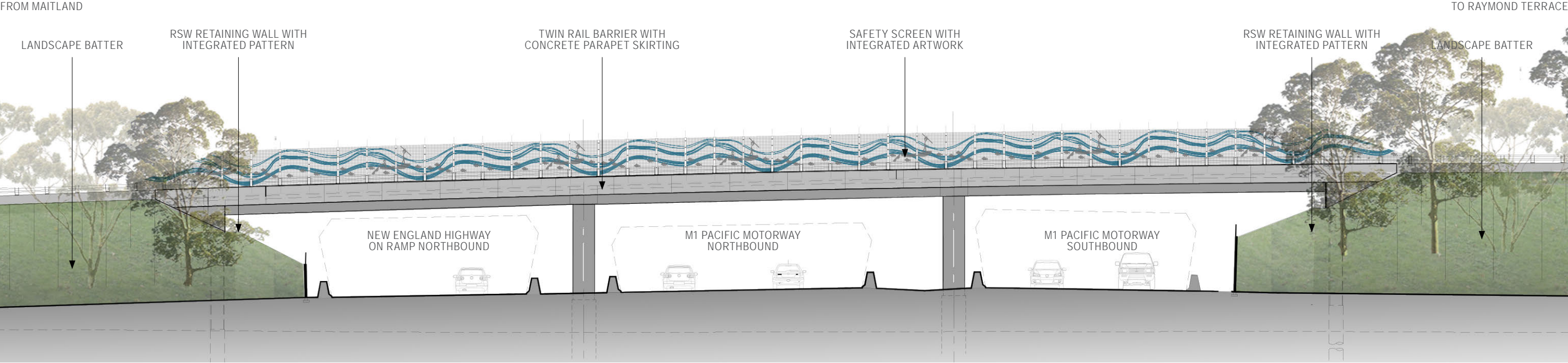
Figure 86: BR04 - section



BR04 - PLAN



BR04 - SECTION



BR04 - ELEVATION

Figure 87: BR04 - plan, section and elevation



Figure 88: BR04 - looking west

6.4.6 BR05 – Viaduct over Hunter River

BR05 is a multi-span structure with an overall length of about 2.6 kilometres spanning the Hunter River. The northbound and southbound carriageways consisted of two traffic lanes.

The viaduct incorporates Super-T girders with circular piers, enhancing open views across the Hunter River and floodplain. The headstocks have also been articulated to follow the alignment, with the edges designed to be mostly parallel to the alignment. This allows for the headstocks to be complimentary to the sinuous curve of the alignment.

The profiles of the headstock and piers have been kept consistent, which provides an elegant aesthetic and reduces clutter.

SUPERSTRUCTURE		
Structure	Parapets	Safety screens
Multi-span bridge comprised of Super-T girders	Simple tapered parapets with twin steel railing inclined at 10 degrees deep enough to conceal drainage	Only over the Railway and New England Highway
SUBSTRUCTURE		
Abutments	Piers and headstocks	
Spill through abutments with rip rap to provide a natural look, synonymous with creek environments	Articulated headstocks with an integrated pier-headstock profile consistent for all piers	
INTERPRETIVE ELEMENTS		
N/A		
LANDSCAPE		
N/A		

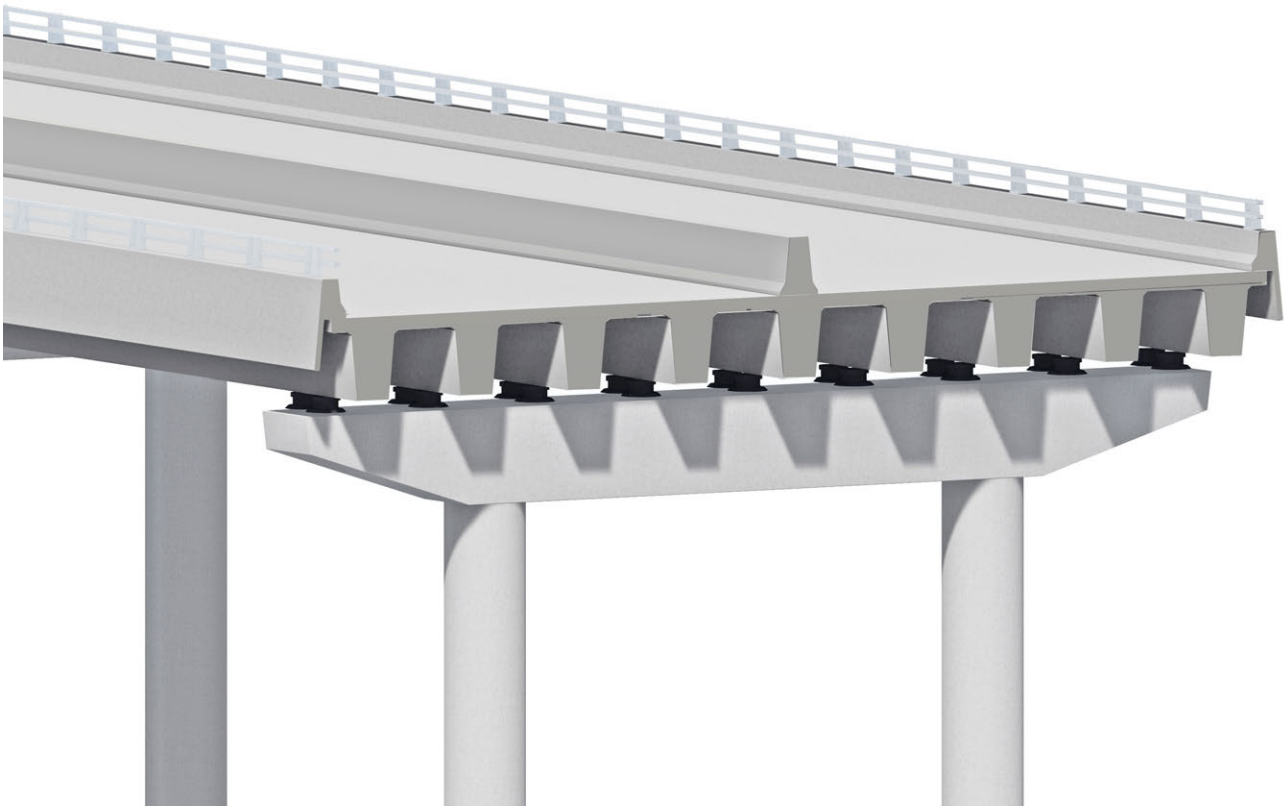


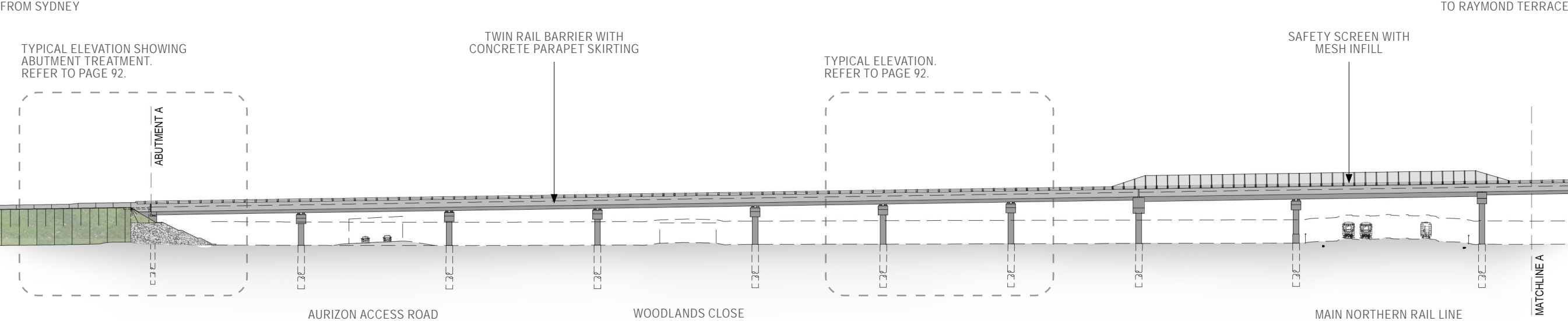
Table 10: BR05 - bridge summary

Figure 89: BR05 - section

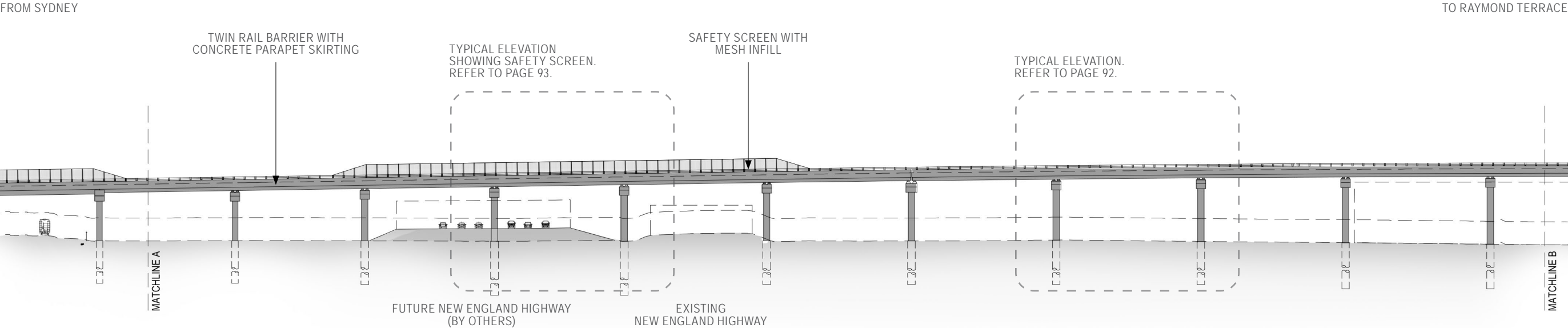


BR05 - PLAN

Figure 90: BR05 - plan

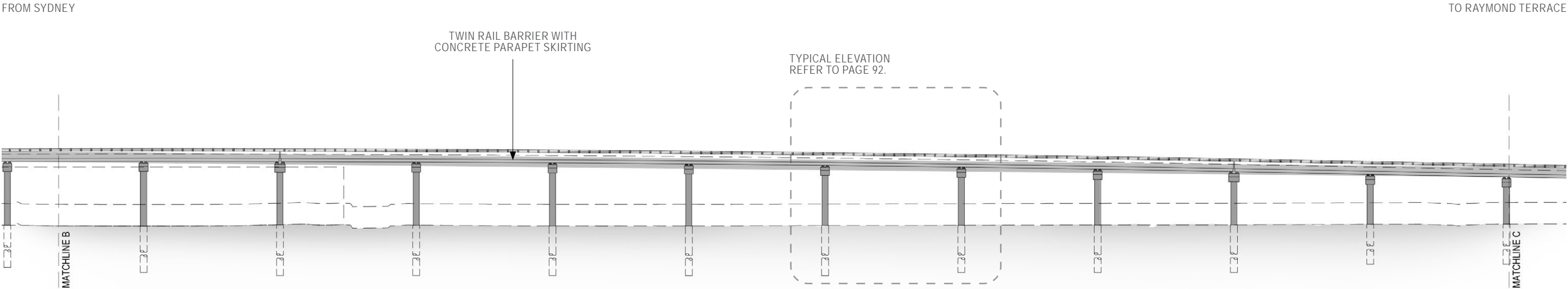


BR05 - ELEVATION 1

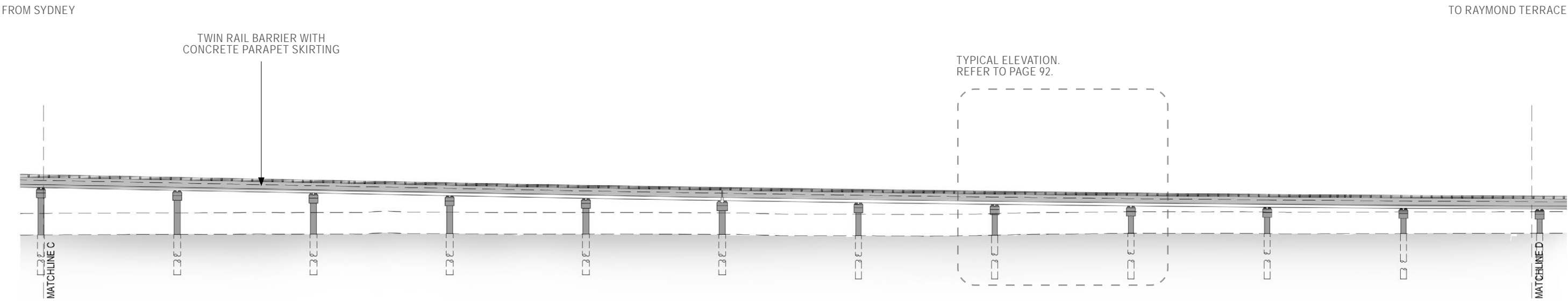


BR05 - ELEVATION 2

Figure 91: BR05 - elevations 1 and 2

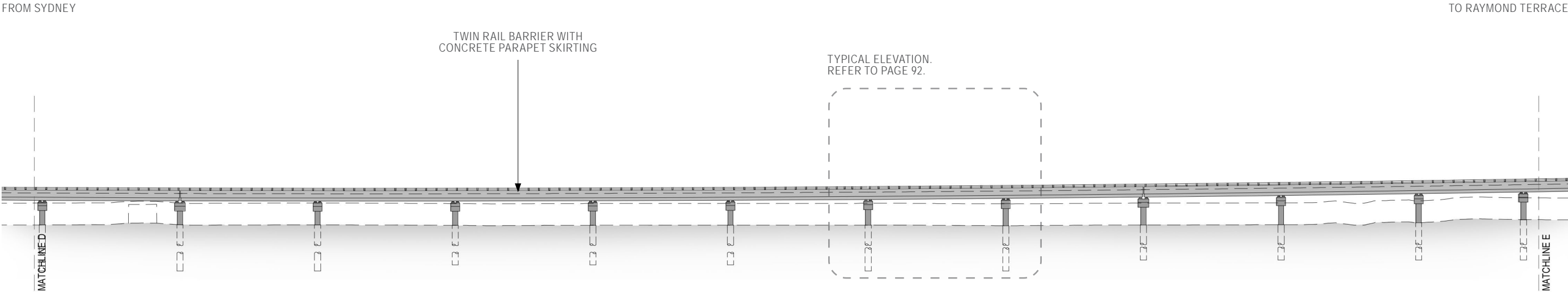


BR05 - ELEVATION 3

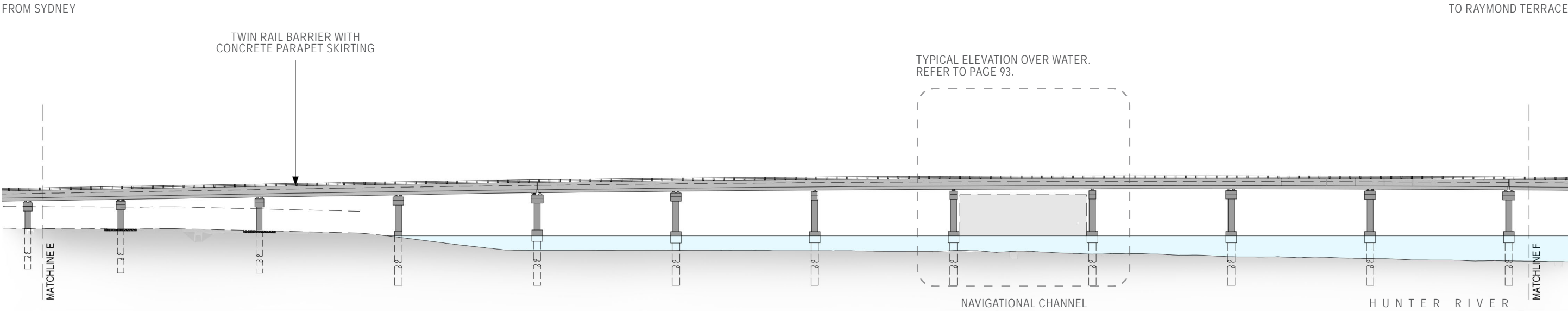


BR05 - ELEVATION 4

Figure 92: BR05 - elevations 3 and 4

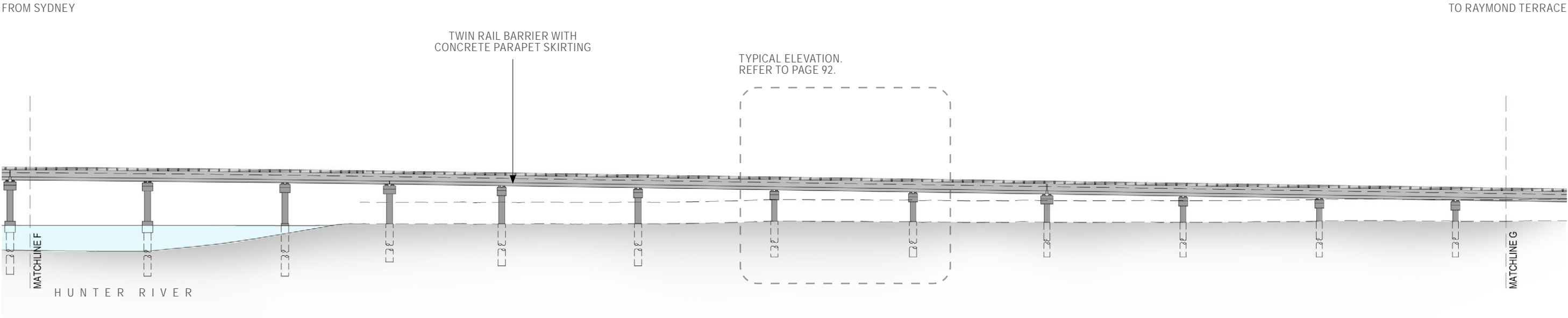


BR05 - ELEVATION 5

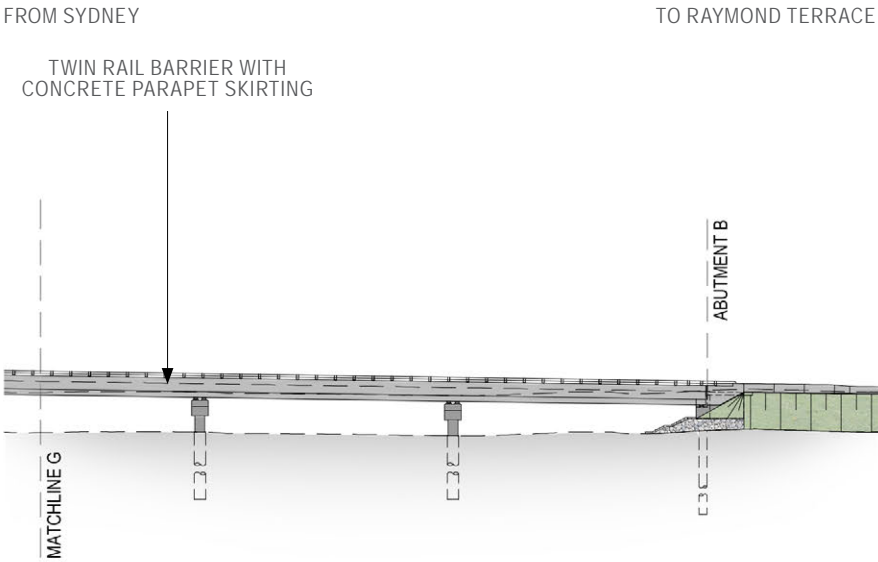


BR05 - ELEVATION 6

Figure 93: BR05 - elevations 5 and 6

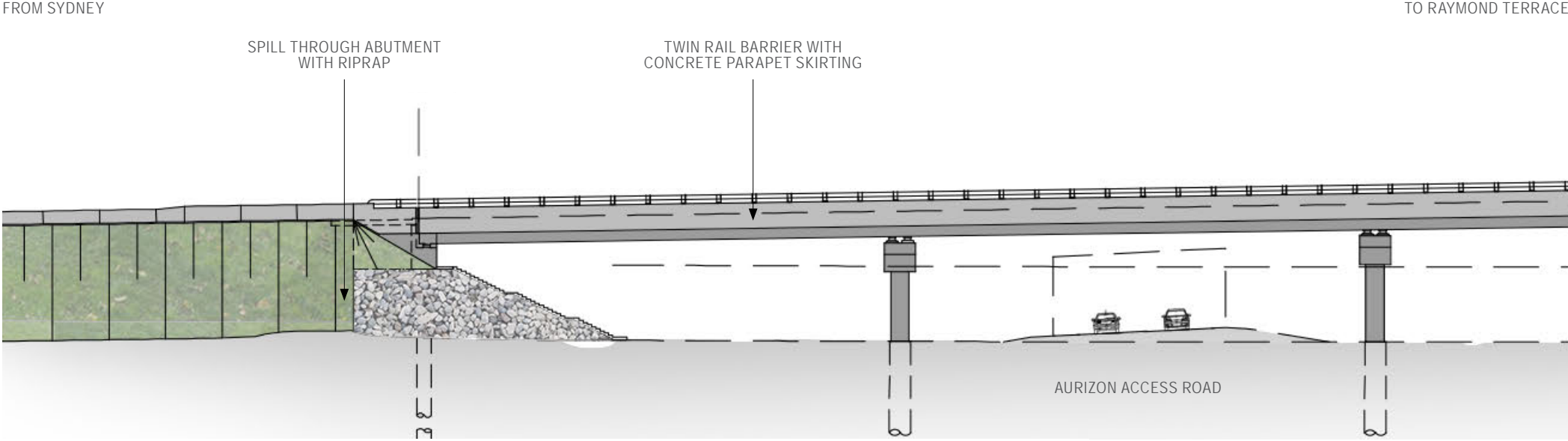


BR05 - ELEVATION 7

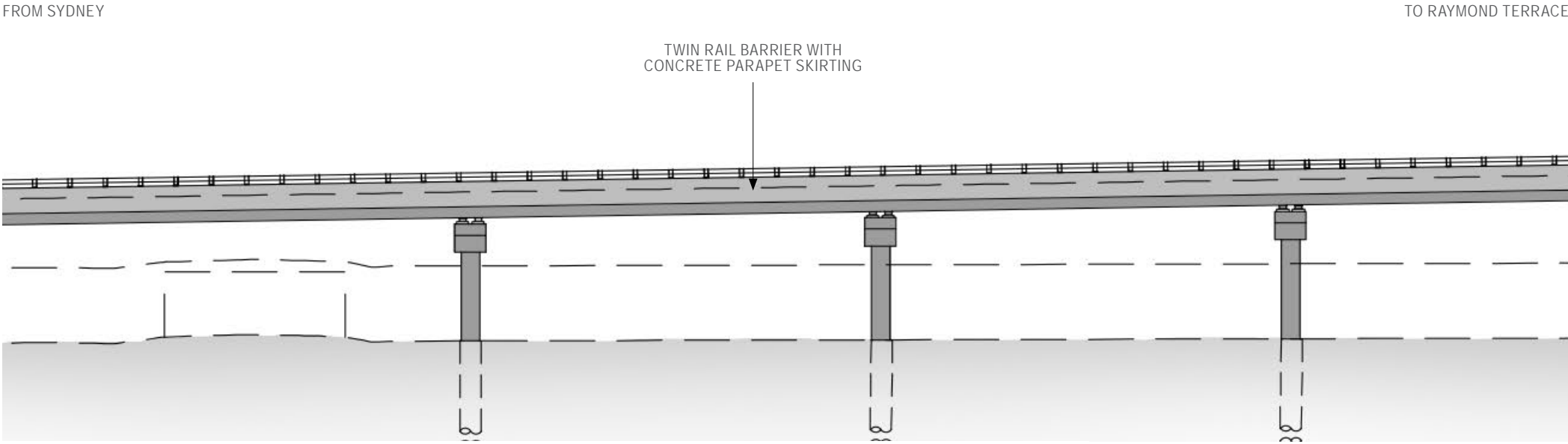


BR05 - ELEVATION 8

Figure 94: BR05 - elevations 7 and 8



BR05 - TYPICAL ELEVATION SHOWING ABUTMENT TREATMENT



BR05 - TYPICAL ELEVATION

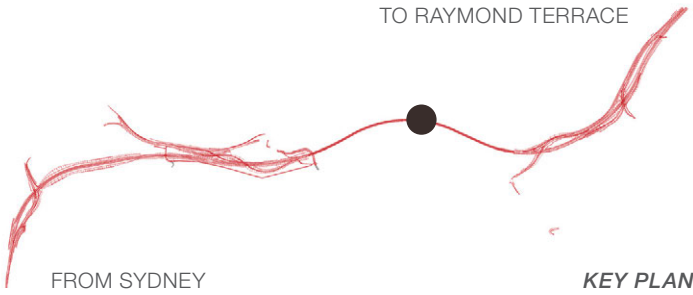
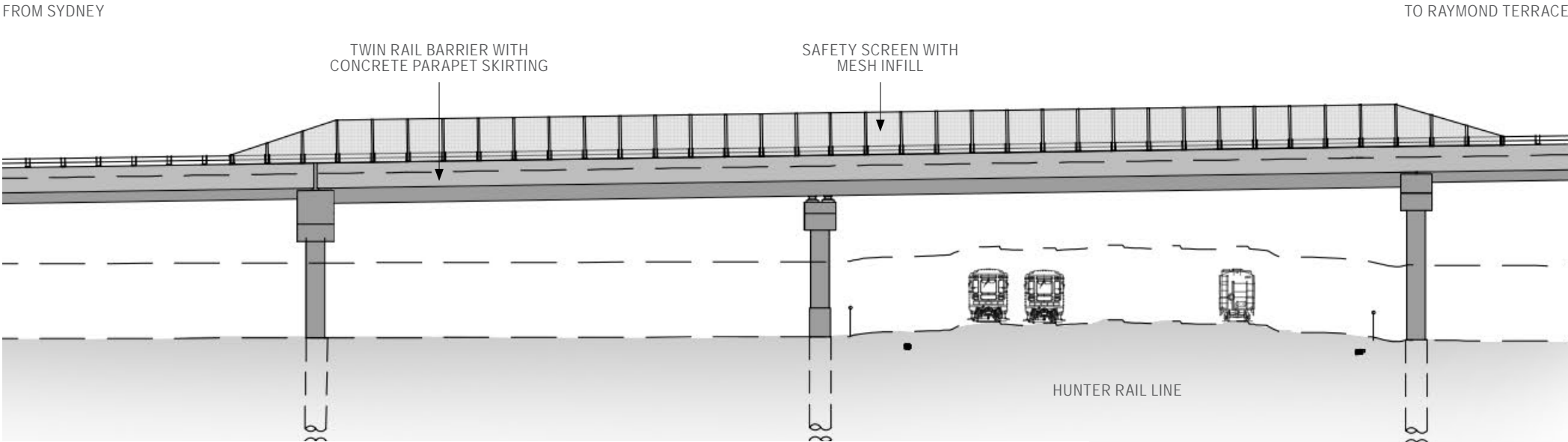
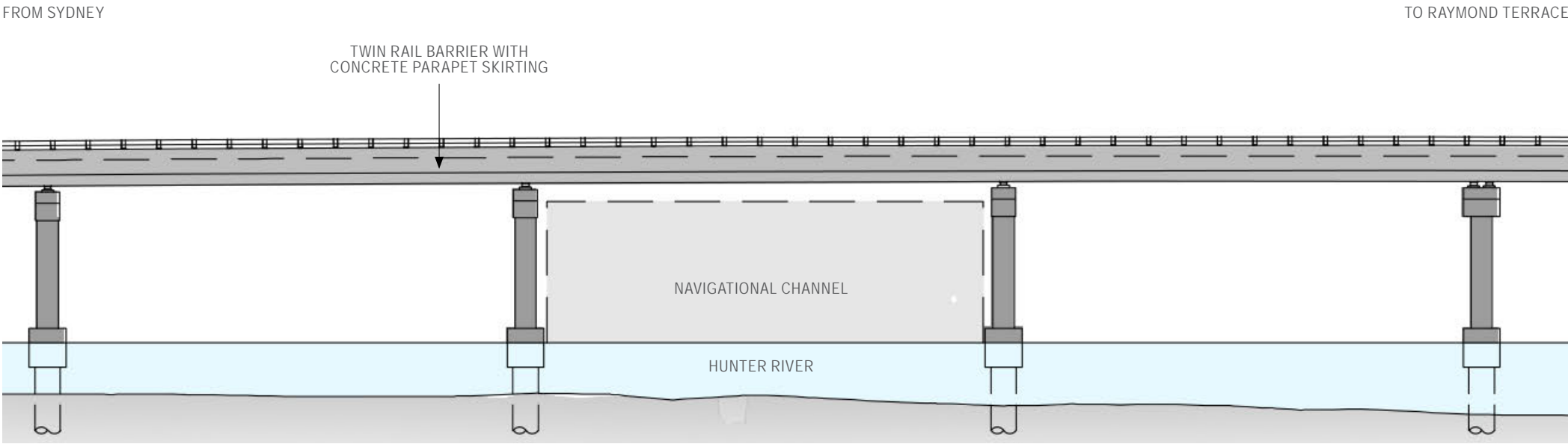


Figure 95: BR05 - typical elevations 1



BR05 - TYPICAL ELEVATION SHOWING SAFETY SCREEN



BR05 - TYPICAL ELEVATION OVER WATER

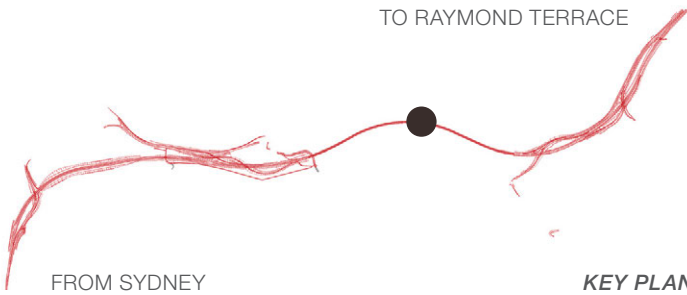
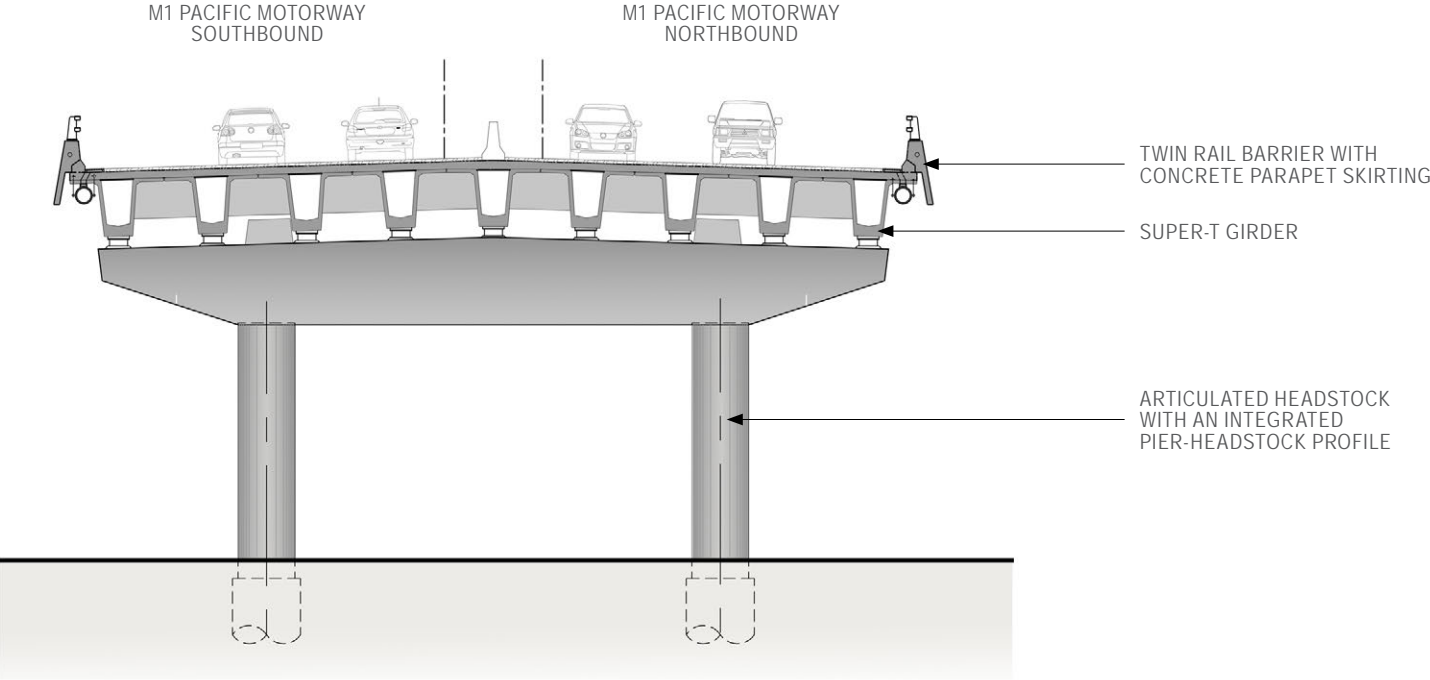
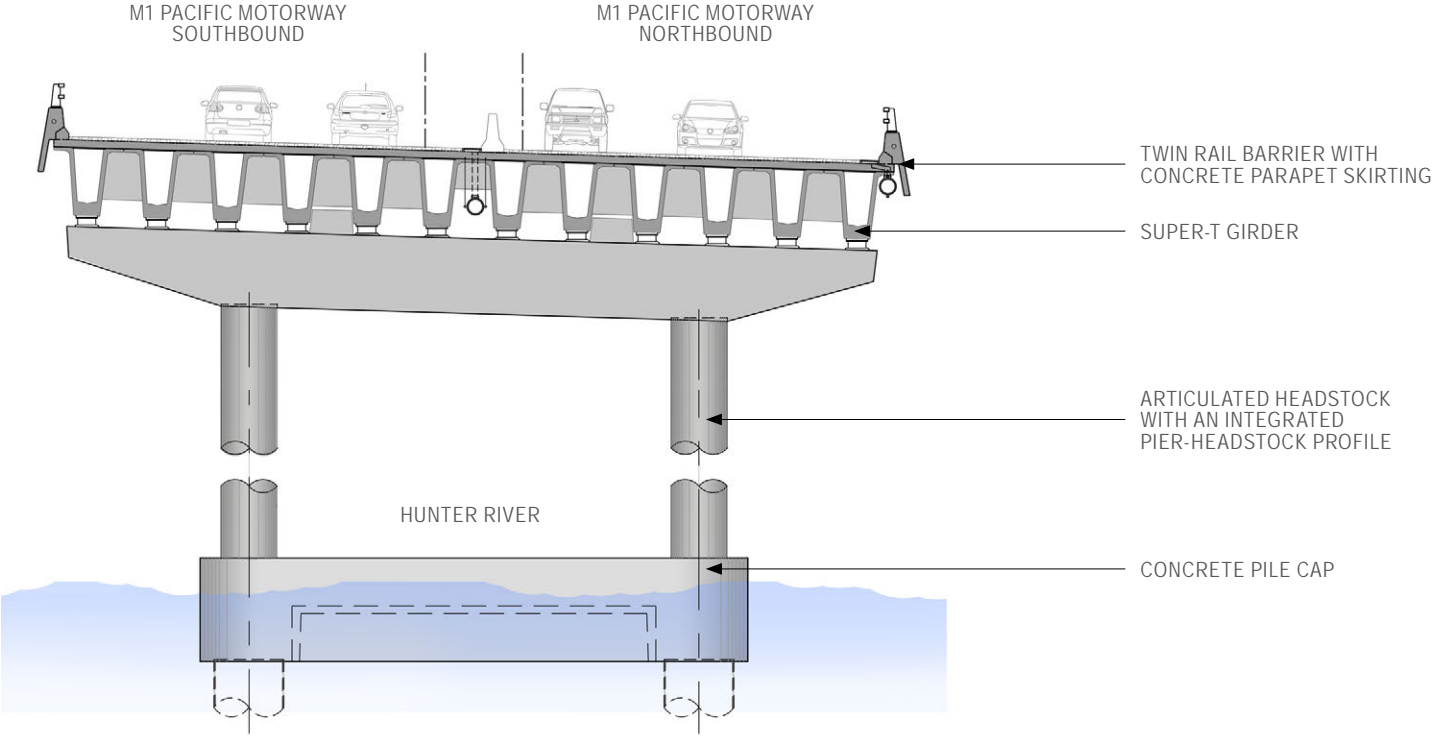


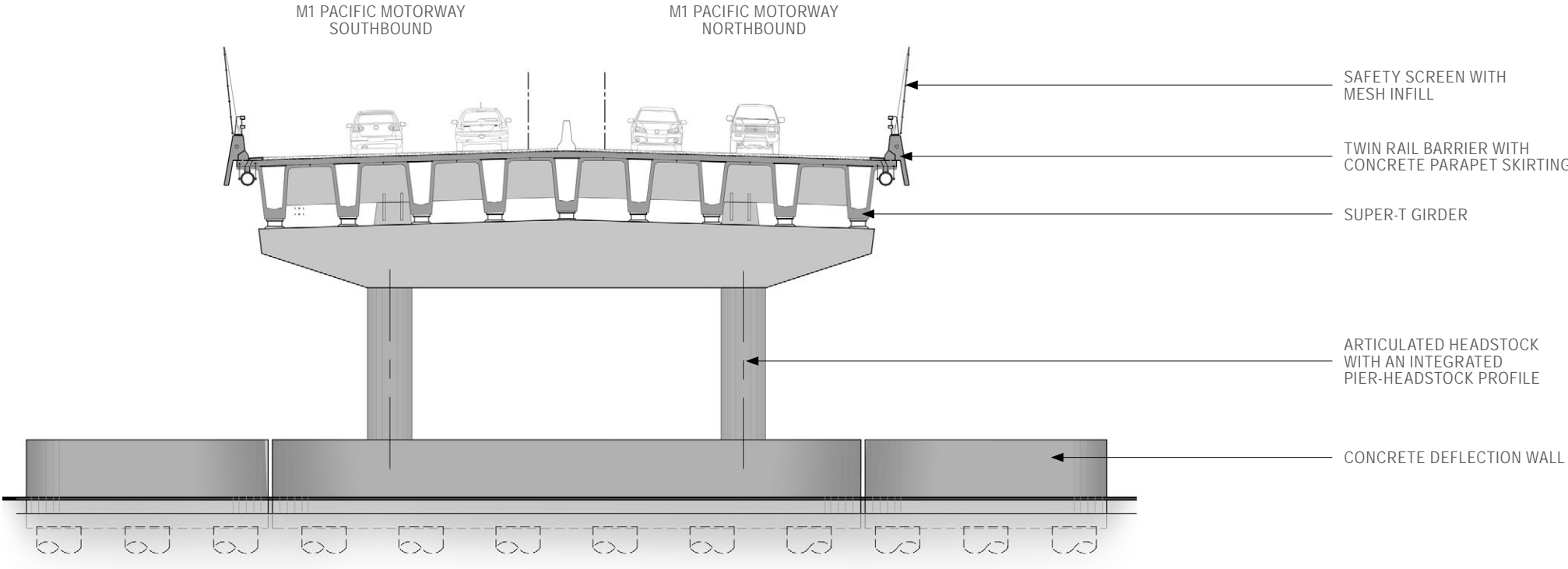
Figure 96: BR05 - typical elevations 2



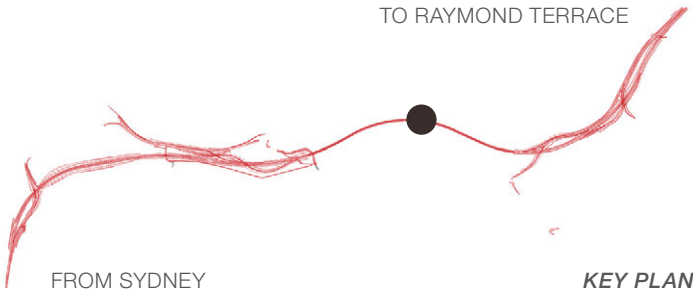
BR05 - TYPICAL PIER SECTION



BR05 - TYPICAL PIER SECTION (OVER WATER)



BR05 - TYPICAL PIER SECTION (RAILWAY PIER)



KEY PLAN

Figure 97: BR05 - sections



Figure 98: BR05 - view from the ground, looking east

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



Figure 99: River view of BR05 - looking north



Figure 100: River view of BR05 - looking west

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



Figure 101: View of BR05 from New England Highway - looking south

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



Figure 102: View of BR05 from New England Highway - looking north west

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



Figure 103: Street view of BR05 - looking east

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



Figure 104: View of BR05 from Woodlands Close - looking north west



Figure 105: Aerial view of BR06 - looking east

6.4.7 BR06 – Bridge over M1 Pacific Motorway Tomago
Interchange northbound entry ramp

BR06 is a single span bridge and is about 38 metres in length. The bridge is located just to the east of the Hunter River and forms part of the Tomago Interchange (south). It serves as the northbound entry ramp to the M1 Pacific Motorway.

SUPERSTRUCTURE		
Structure	Parapets	Safety screens
Single-span bridge with Super-T precast girders with a cast in-situ composite reinforced concrete deck	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	
RW blade wall abutments with signature pattern referencing wetlands theme	N/A	
INTERPRETIVE ELEMENTS		
Interpretive elements incorporated in the safety screen design and retaining wall through art that responds to Country		
LANDSCAPE		
Feature landscape on approaches		

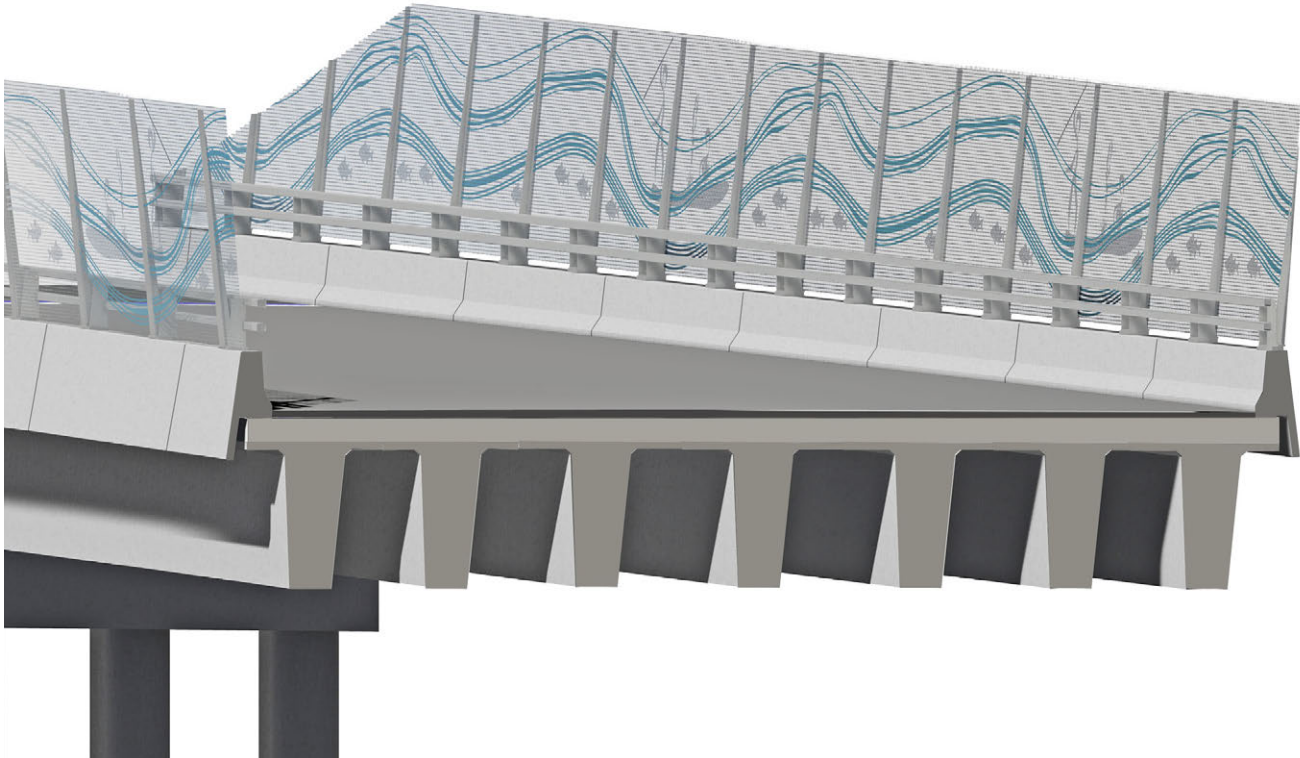
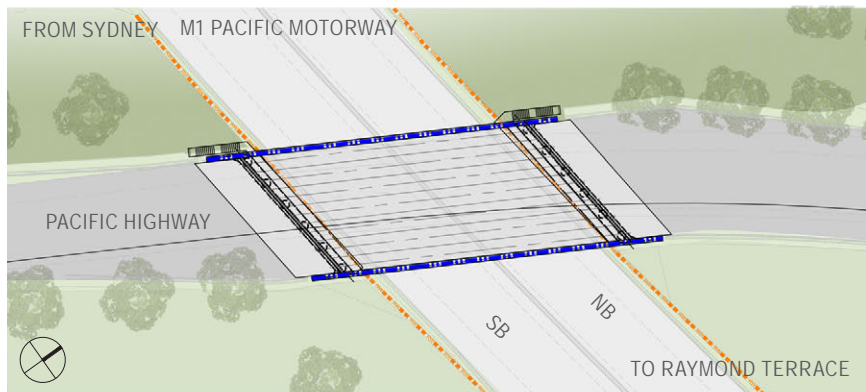
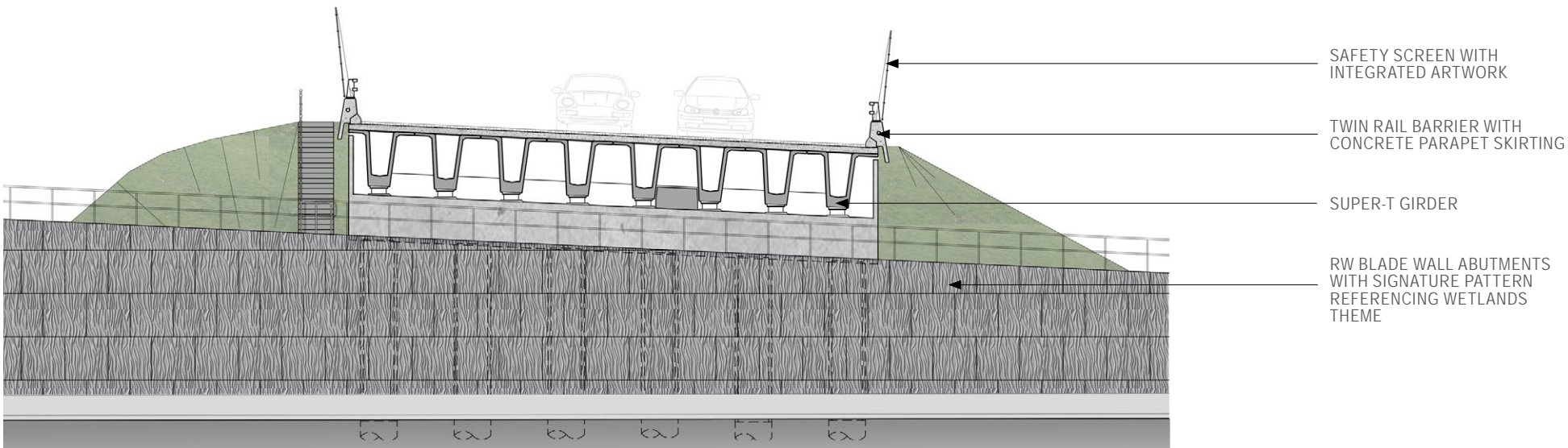


Table 11: BR06 - bridge summary

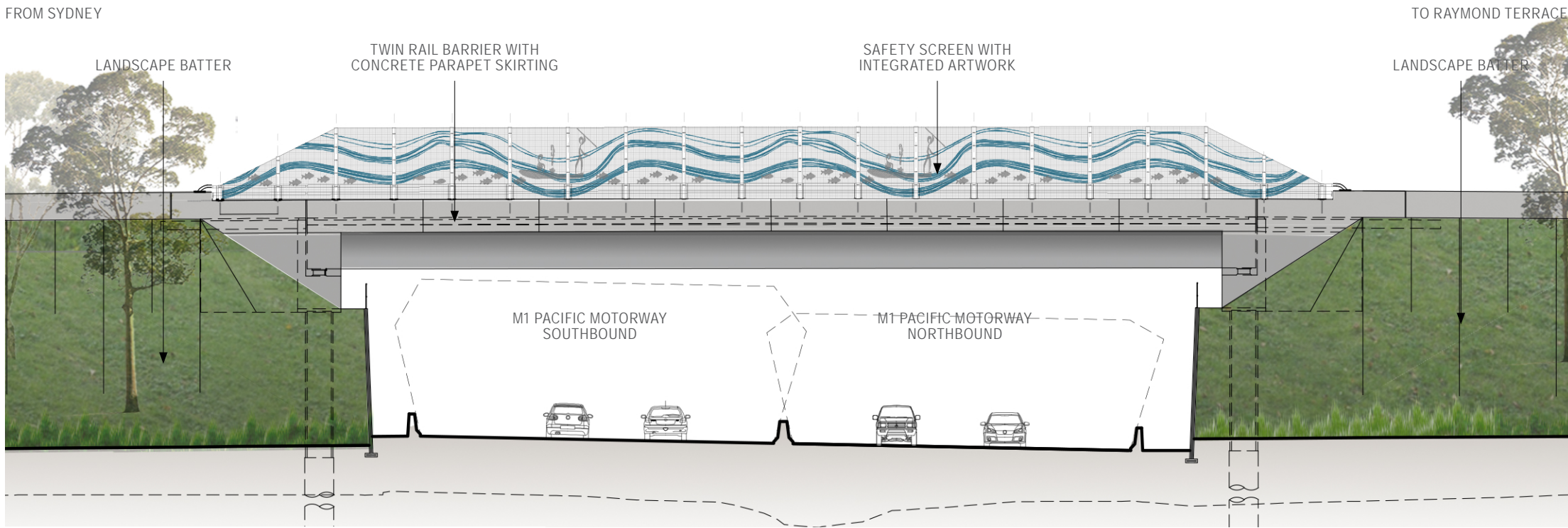
Figure 106: BR06 - section



BR06 - PLAN



BR06 - SECTION



BR06 - ELEVATION

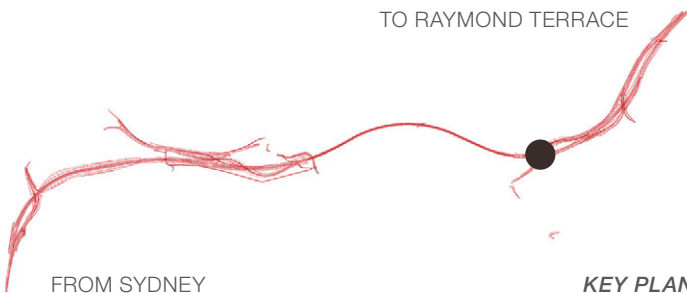


Figure 107: BR06 - plan, section and elevation

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



Figure 108: BR06 - looking east from northbound lanes

6.4.8 BR08 – Bridge over Old Punt Road

BR08 is a single span bridge and is about 49 metres in length, carrying two lanes of traffic in both northbound and southbound directions. The bridge is located just to the east of the Hunter River and forms part of the Tomago Interchange (north). It provides access to Old Punt Road and the Pacific Highway.

SUPERSTRUCTURE		
Structure	Parapets	Safety screens
Single span bridge with Bulb-T post-tensioned girders	Simple tapered parapets with twin steel railing inclined at 10 degrees	N/A
SUBSTRUCTURE		
Abutments	Piers and headstocks	
Buttress walls with pattern	N/A	
INTERPRETIVE ELEMENTS		
Interpretive elements incorporated in the retaining wall design through art that responds to Country		
LANDSCAPE		
Feature landscape on approaches of the return walls		

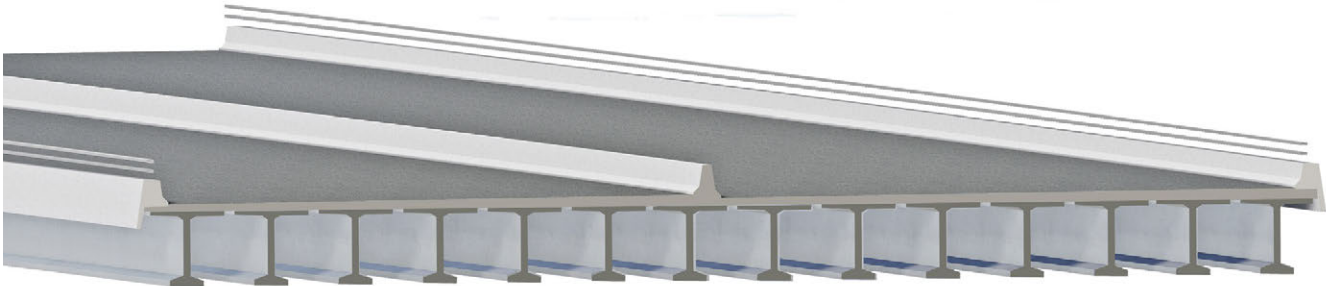
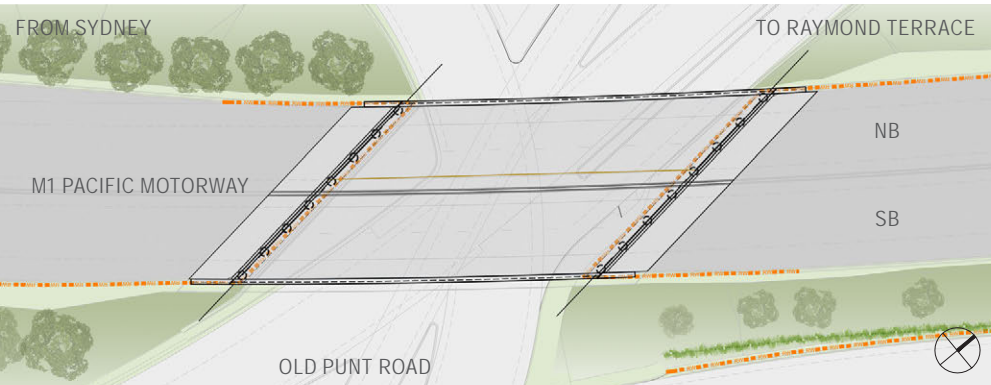
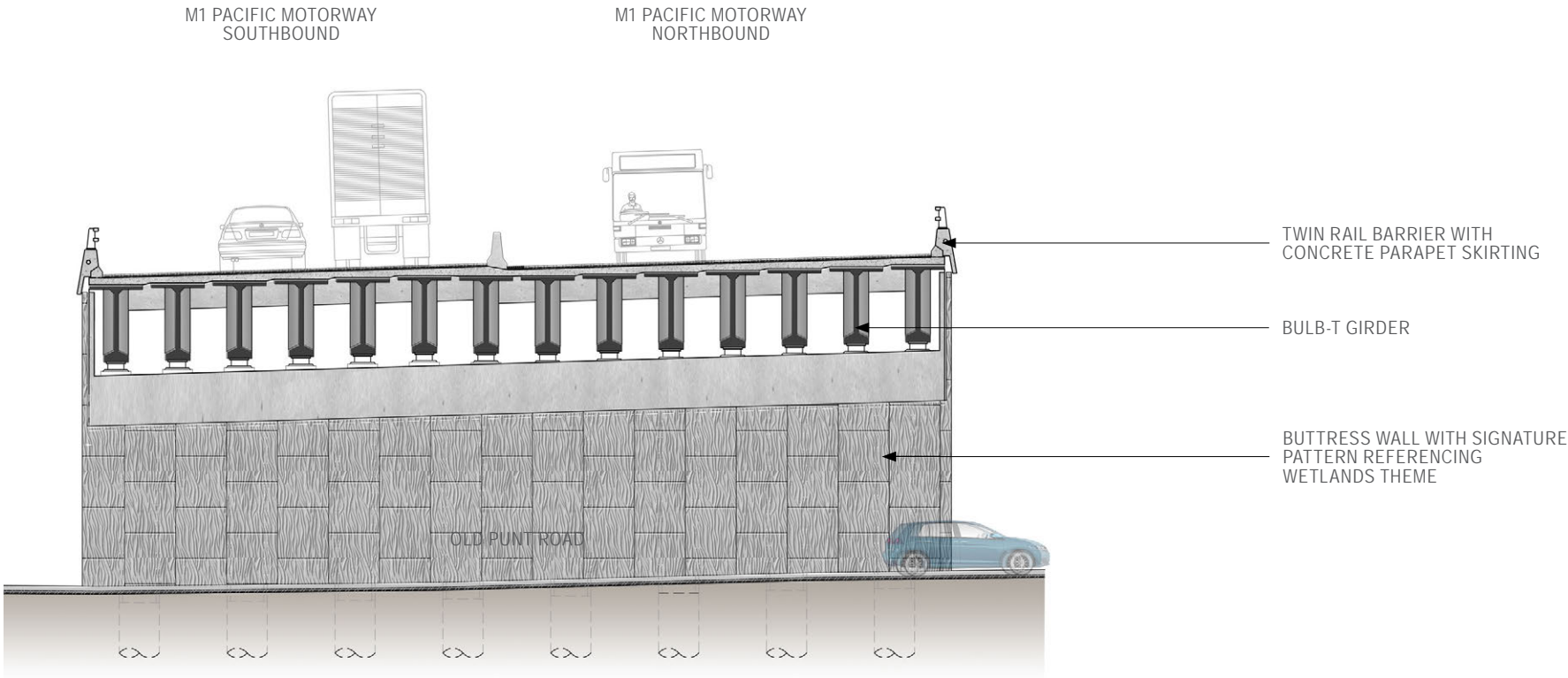


Table 12: BR08 - bridge summary

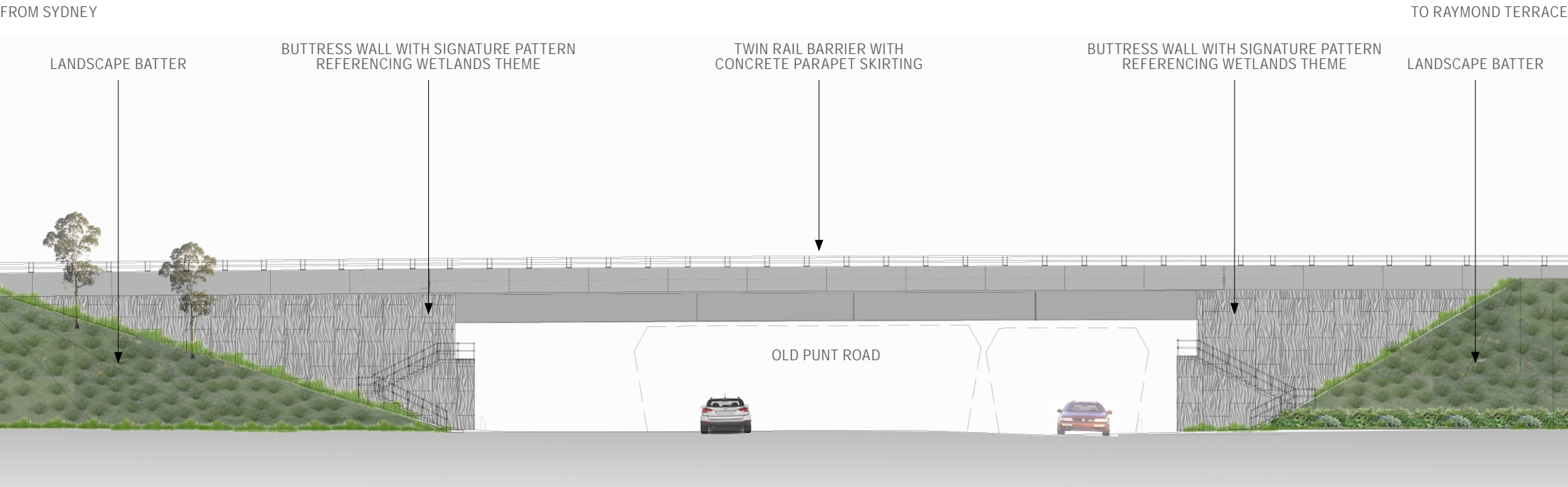
Figure 109: BR08 - section



BR08 - PLAN



BR08 - SECTION



BR08 - ELEVATION

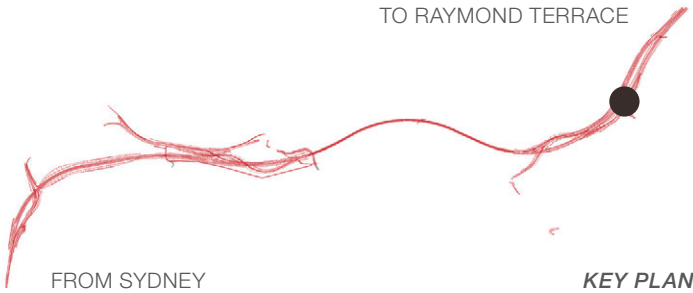


Figure 110: BR08 - plan, section and elevation



Figure 111: BR08 - looking north from Old Punt Road

6.4.9 BR09 – Bridge over Botanic Gardens Road

BR09 is a single span dual carriageway structure over the access road to HRBG with a length of about 25 metres. It defines the main entry to the HRBG and enhances its connection to the Pacific Highway and the Hunter River.

SUPERSTRUCTURE		
Structure	Parapets	Safety screens
Single span bridge with Super-T girders	Simple tapered parapets with twin steel railing inclined at 10 degrees	N/A
SUBSTRUCTURE		
Abutments	Piers and headstocks	
Spill through abutments with feature treatments provided for interpretation through artwork	N/A	
INTERPRETIVE ELEMENTS		
Interpretive elements incorporated at the two abutments through art that responds to Country. Incorporation of the Kulangulan (bat) and the Dilmun (bird tree creeper) which are significant totems of importance to the local community.		
LANDSCAPE		
Feature landscape provided at the approaches through a two layered tree canopy.		

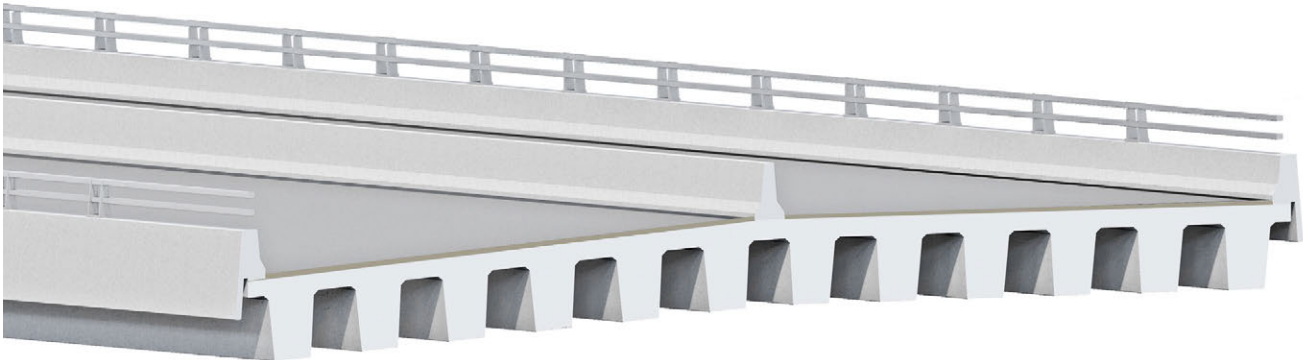
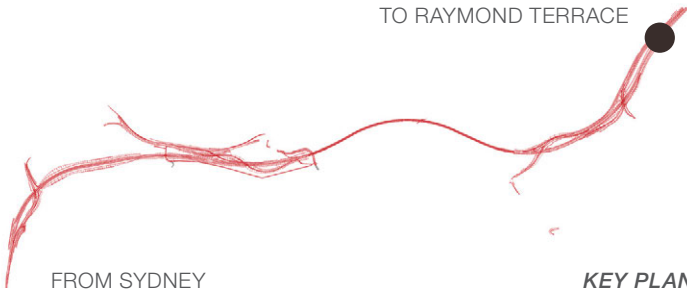
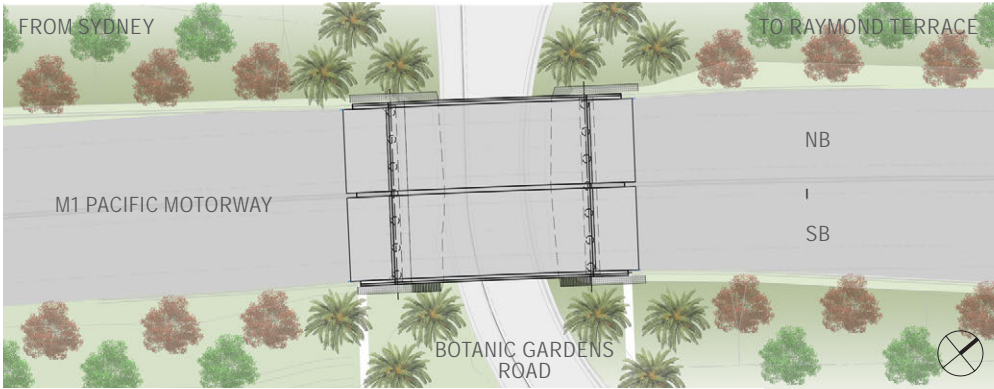
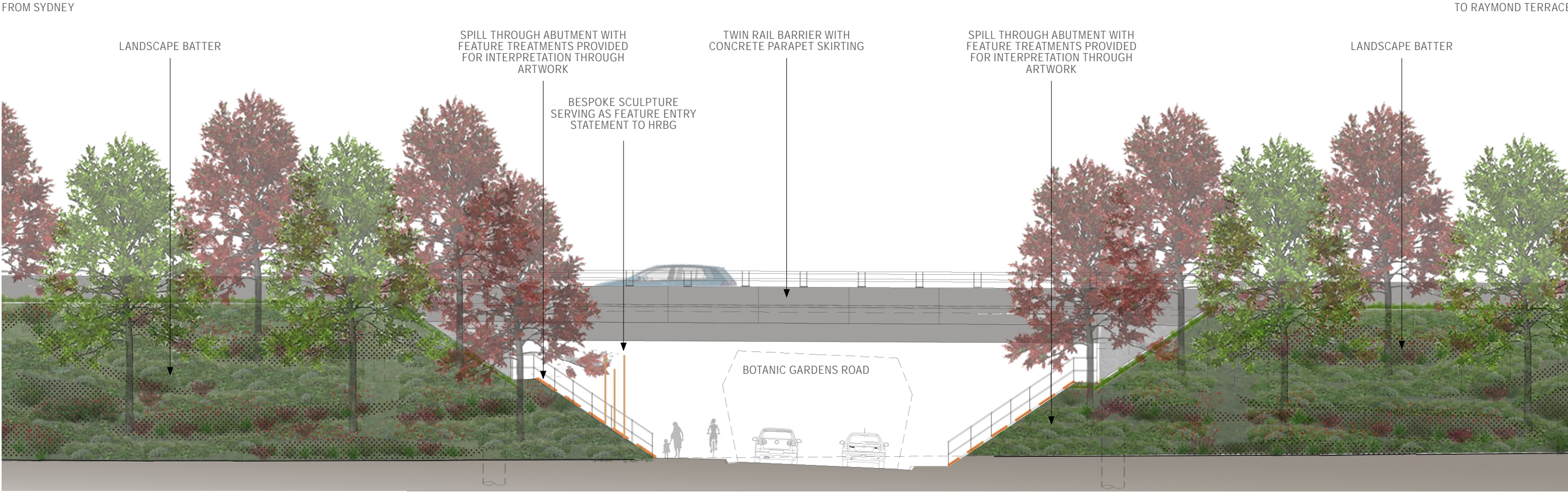


Table 13: BR09 - bridge summary

Figure 112: BR09 - section

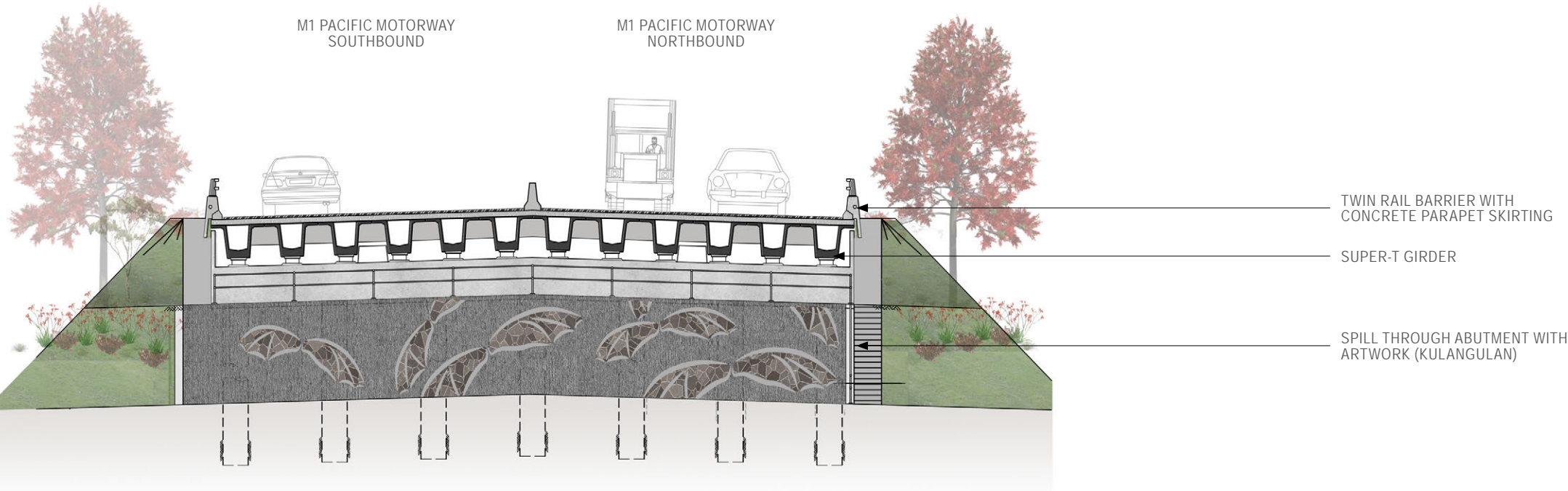


BR09 - PLAN

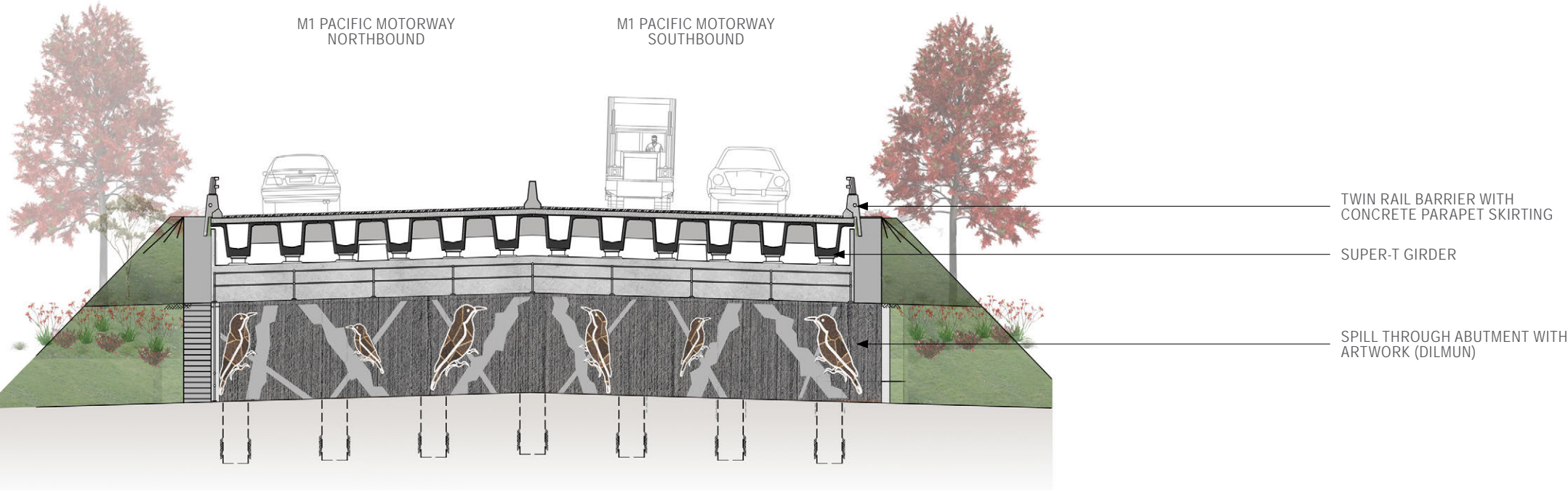


BR09 - ELEVATION

Figure 113: BR09 - plan and elevation



BR09 - SECTION (NORTHERN SIDE)



BR09 - SECTION (SOUTHERN SIDE)

Figure 114: BR09 - sections



Figure 115: BR09 - looking west

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



Figure 116: BR09 - looking east



Figure 117: BR09 - looking east

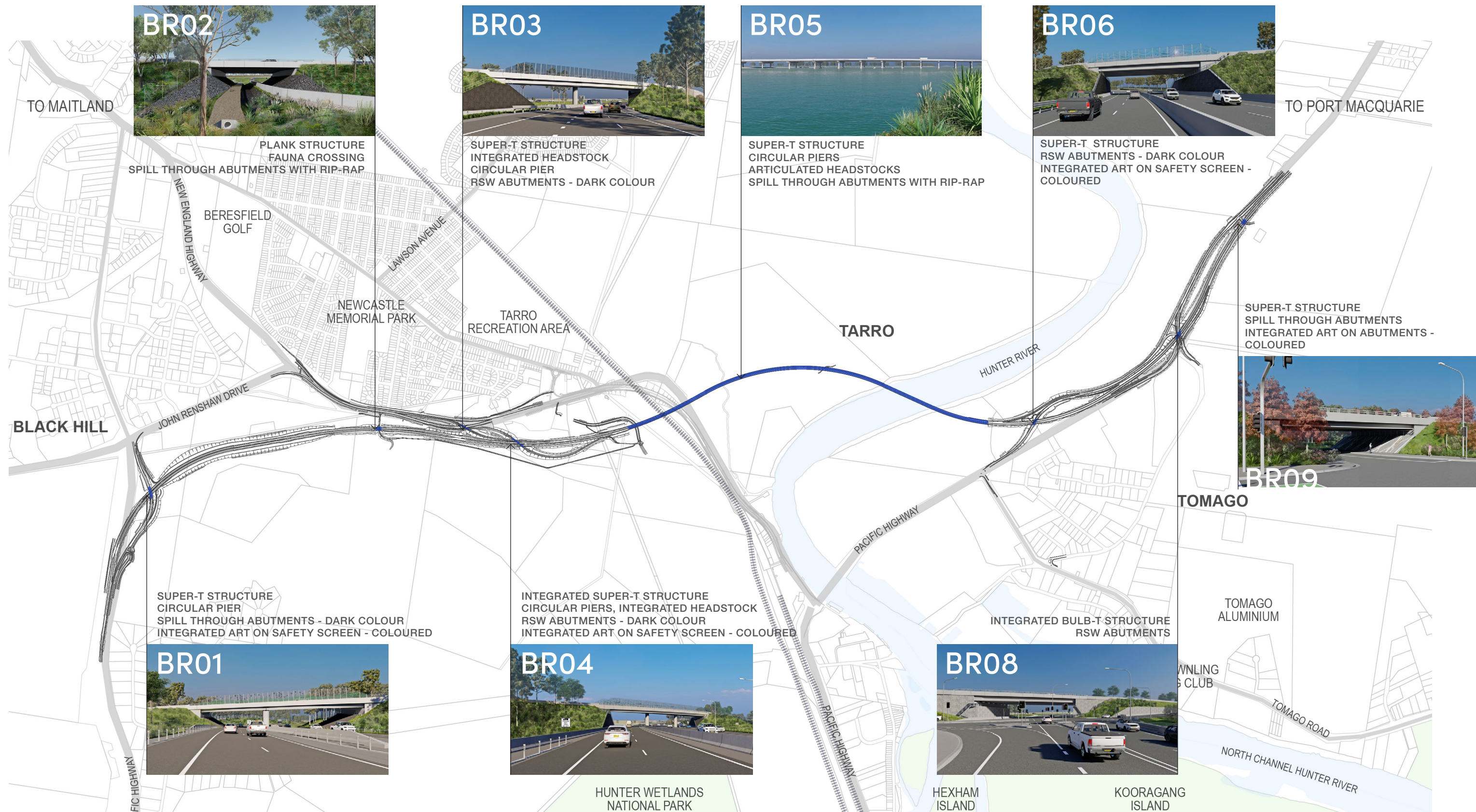


Figure 118: Bridges summary

6.4.10 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
BR01	Bridge over M1 Pacific Motorway southbound entry ramp	Overbridge	Super-T girders	<div><div>–</div>Spill through abutments with concrete unit pavers</div> <div><div>–</div>Feature art screen reflecting the wetlands theme to reference Country</div> <div><div>–</div>Integrated headstock with circular pier to provide a single portal frame.</div>
BR02	Bridge over wetlands	Underbridge	Plank bridge	<div><div>–</div>Spill through abutment with rip-rap treatments complementing the riparian environment</div> <div><div>–</div>Provision for fauna passage enhancing biodiversity.</div>
BR03	Bridge over New England Highway westbound and southbound exit ramp	Overbridge	Super-T girders	<div><div>–</div>RSW blade wall abutments incorporate pattern to reflect the wetlands theme to reference Country</div> <div><div>–</div>Integrated headstock with circular pier.</div>
BR04	Bridge over M1 Pacific Motorway to New England Highway westbound	Overbridge	Super-T girders	<div><div>–</div>Feature art screen reflecting the waterways theme to reference Country</div> <div><div>–</div>RSW blade wall abutments incorporate pattern to reflect the wetlands theme to reference Country</div> <div><div>–</div>Integrated headstock with circular pier.</div>
BR05	Viaduct over Hunter River	Special bridge	Super-T girders	<div><div>–</div>Spill through abutment with rip-rap treatments complimenting the riparian environment of Hunter River</div> <div><div>–</div>Articulated headstocks with a consistent pier-headstock for all piers</div> <div><div>–</div>Generally consistent profiles for superstructure, with transition elements where there is a change in the profile of the superstructure.</div>
BR06	Bridge over M1 Pacific Motorway Tomago Interchange northbound entry ramp	Overbridge	Super-T girders	<div><div>–</div>Feature art screen reflecting the waterways theme to reference Country</div> <div><div>–</div>RSW blade wall abutments incorporate pattern to reflect the wetlands theme to reference Country.</div>
BR08	Bridge over Old Punt Road	Underbridge	Bulb-T girders	<div><div>–</div>RSW buttress wall abutments incorporate pattern to reflect the wetlands theme to reference Country.</div>
BR09	Bridge over Botanic Gardens Road	Special bridge	Super-T girders	<div><div>–</div>Feature art incorporated at the abutments to reference Country and non-Aboriginal heritage</div> <div><div>–</div>Spill through abutments to maximise a sense of openness to welcome the approaches to HRBG.</div>

Table 14: Bridge type summary

6.5 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 heritage interpretation.

The safety screen is comprised of two main components:

- Articulated tapered T-posts
- Mesh or similar infill panels that provide an 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 themes of waterways or wetlands
 - › The secondary layer comprises an articulated mesh on mesh which expresses the people and community elements.

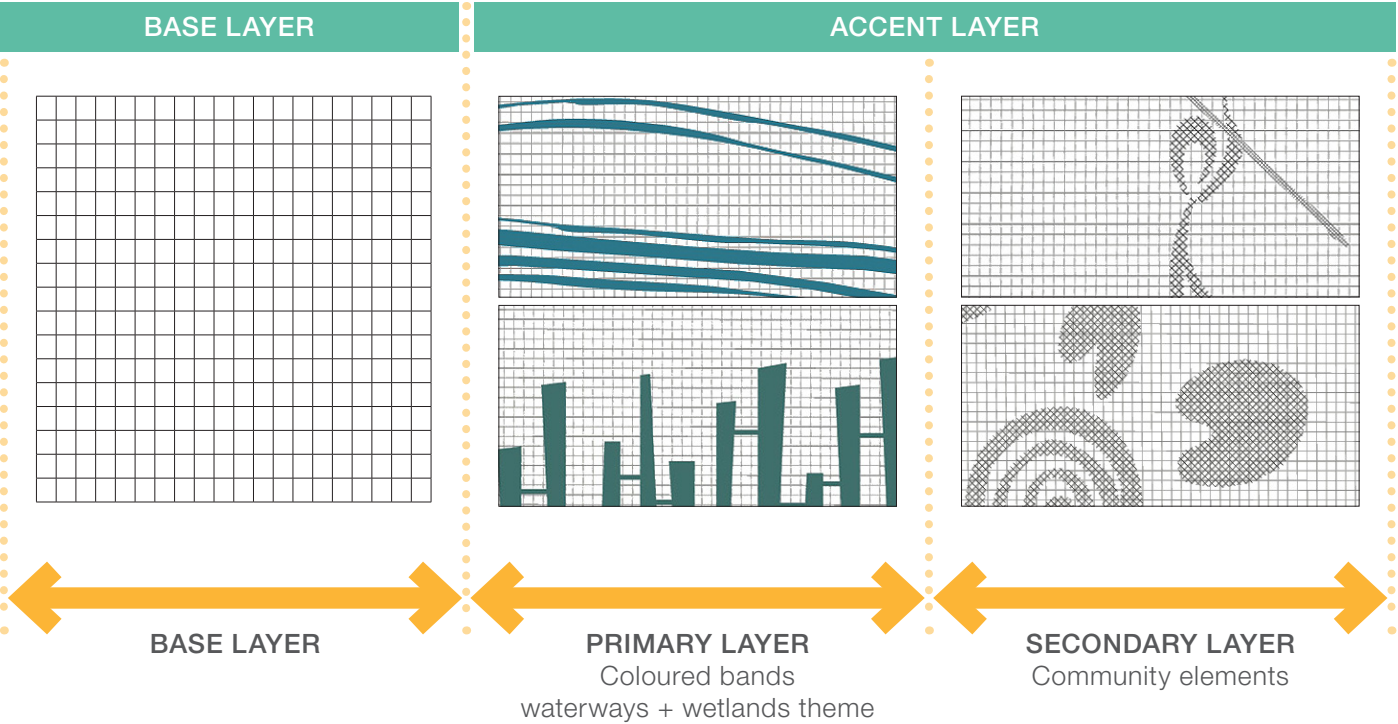


Figure 119: Safety screen - kit of parts

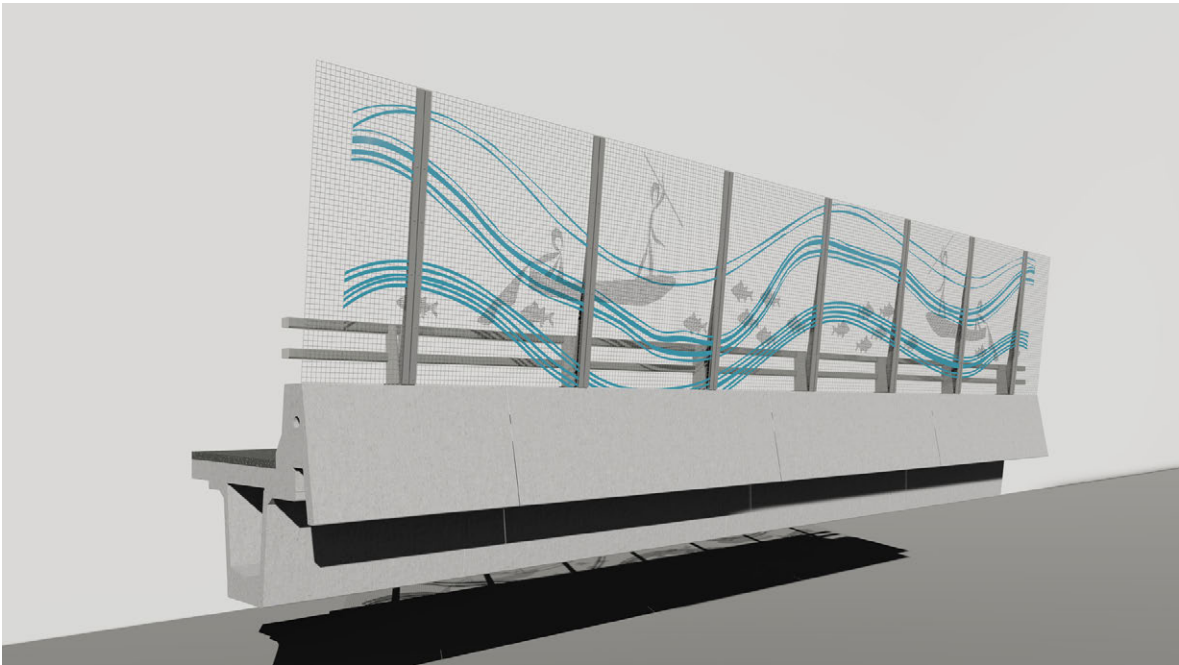


Figure 120: Safety screen - waterways theme

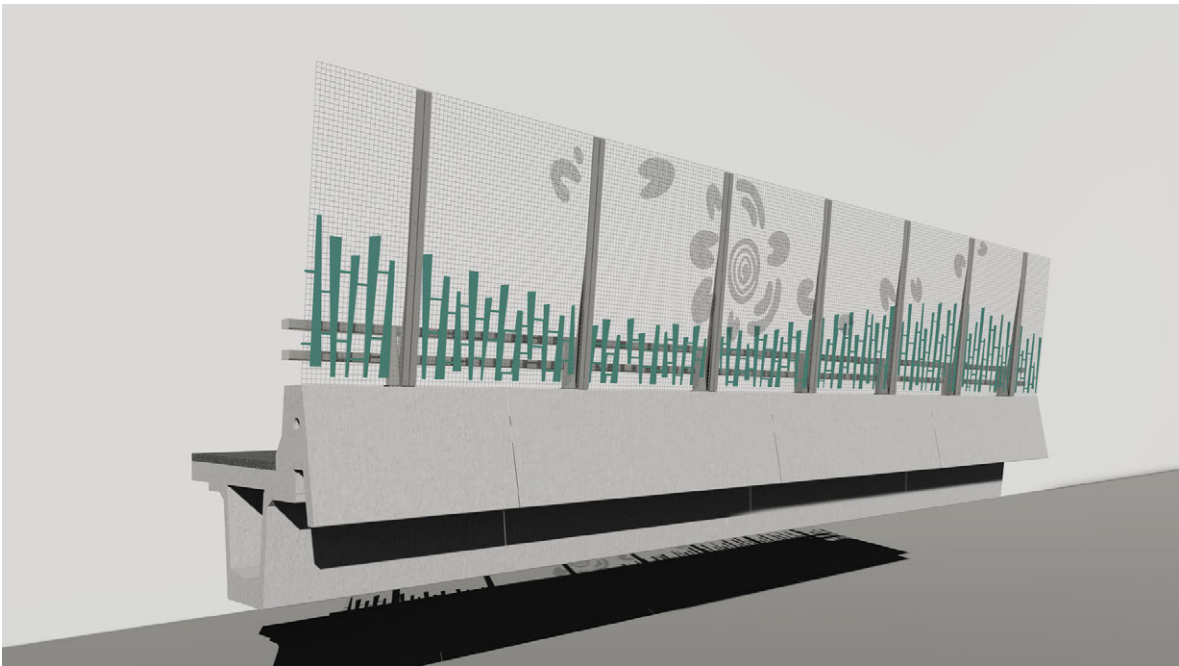


Figure 121: Safety screen - wetlands theme



Figure 122: Safety screen - waterways theme materiality

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



Figure 123: Safety screen - wetlands theme materiality



Figure 124: Safety screen theme - key plan

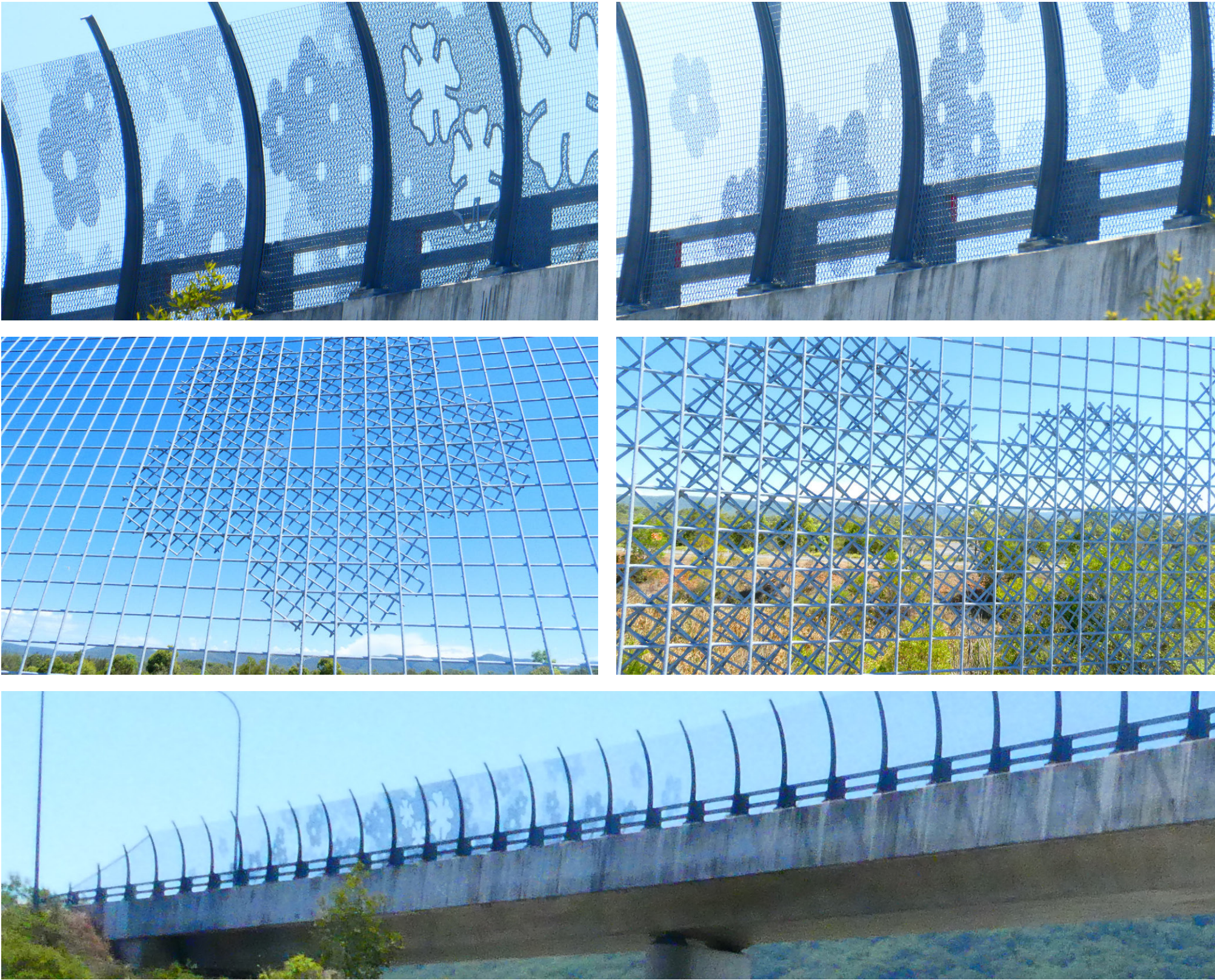
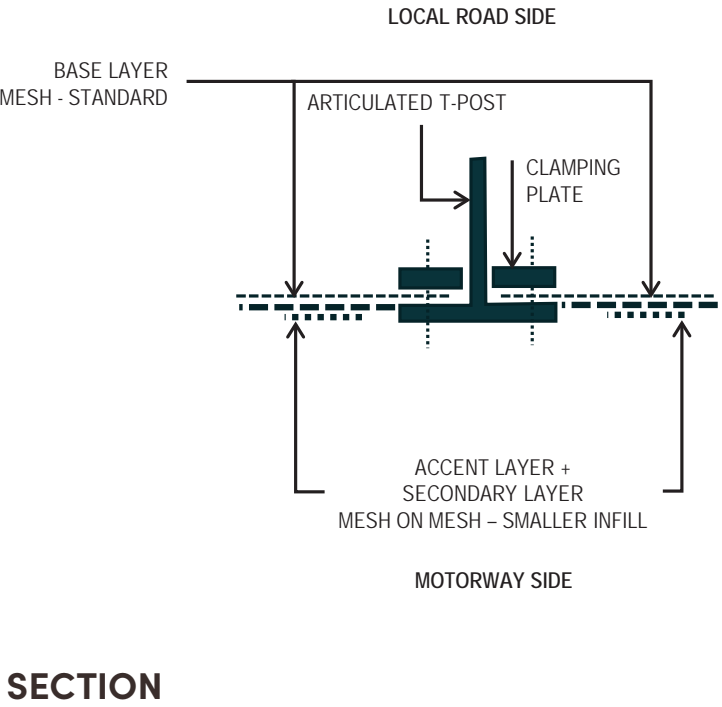
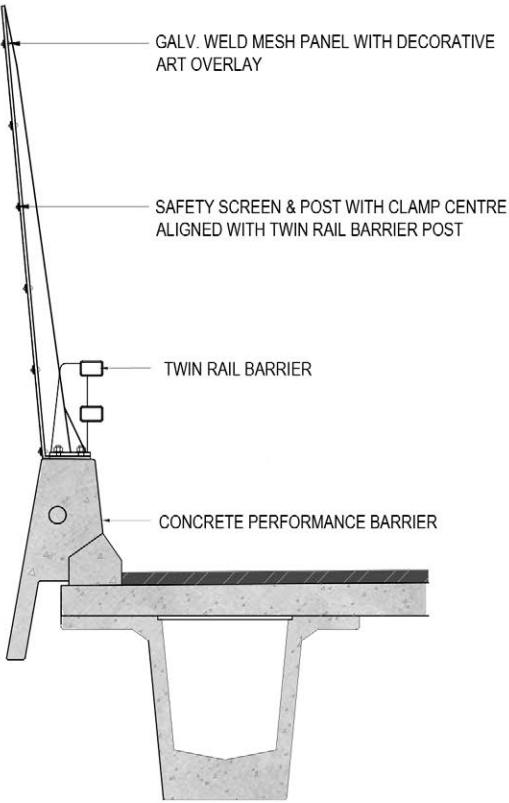


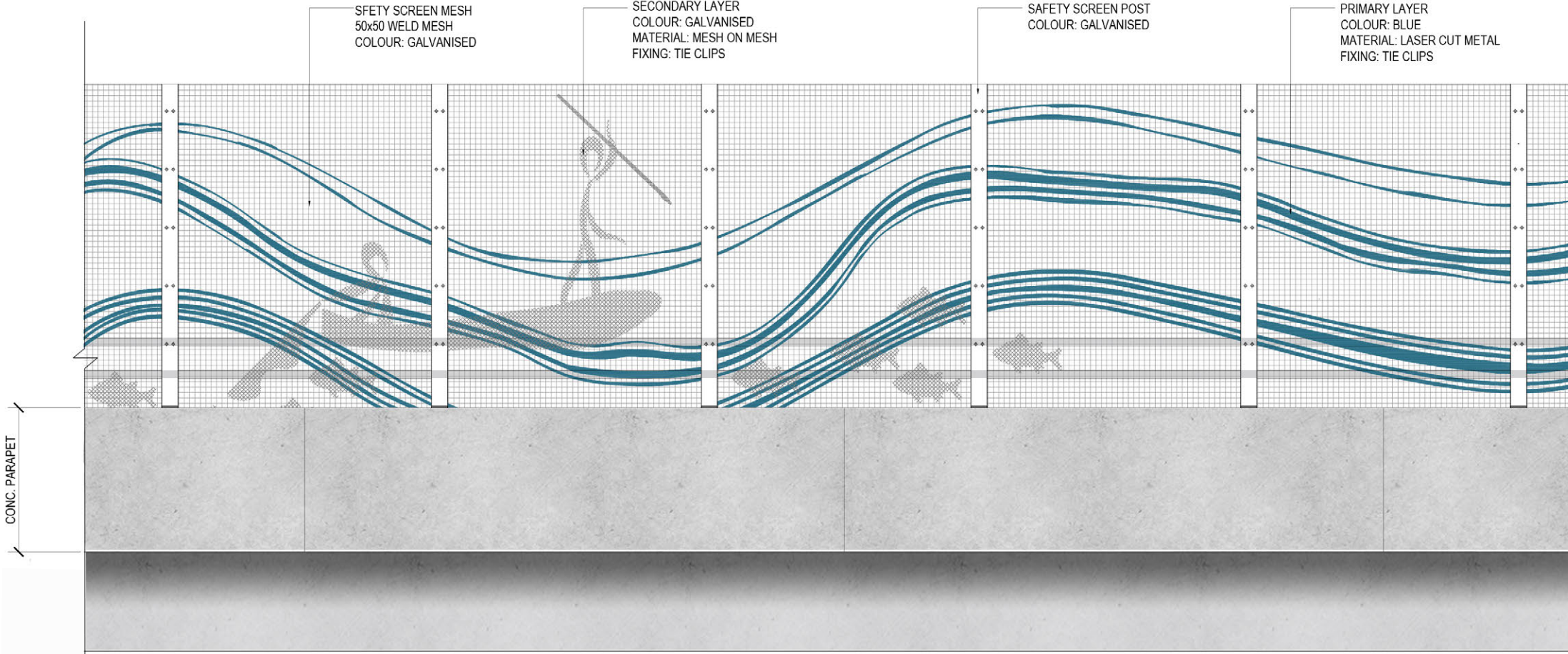
Figure 125: Safety screen - section

Figure 126: Safety screen - precedents



WATERWAYS TYPICAL BRIDGE EDGE - SECTION

SCALE: 1:25

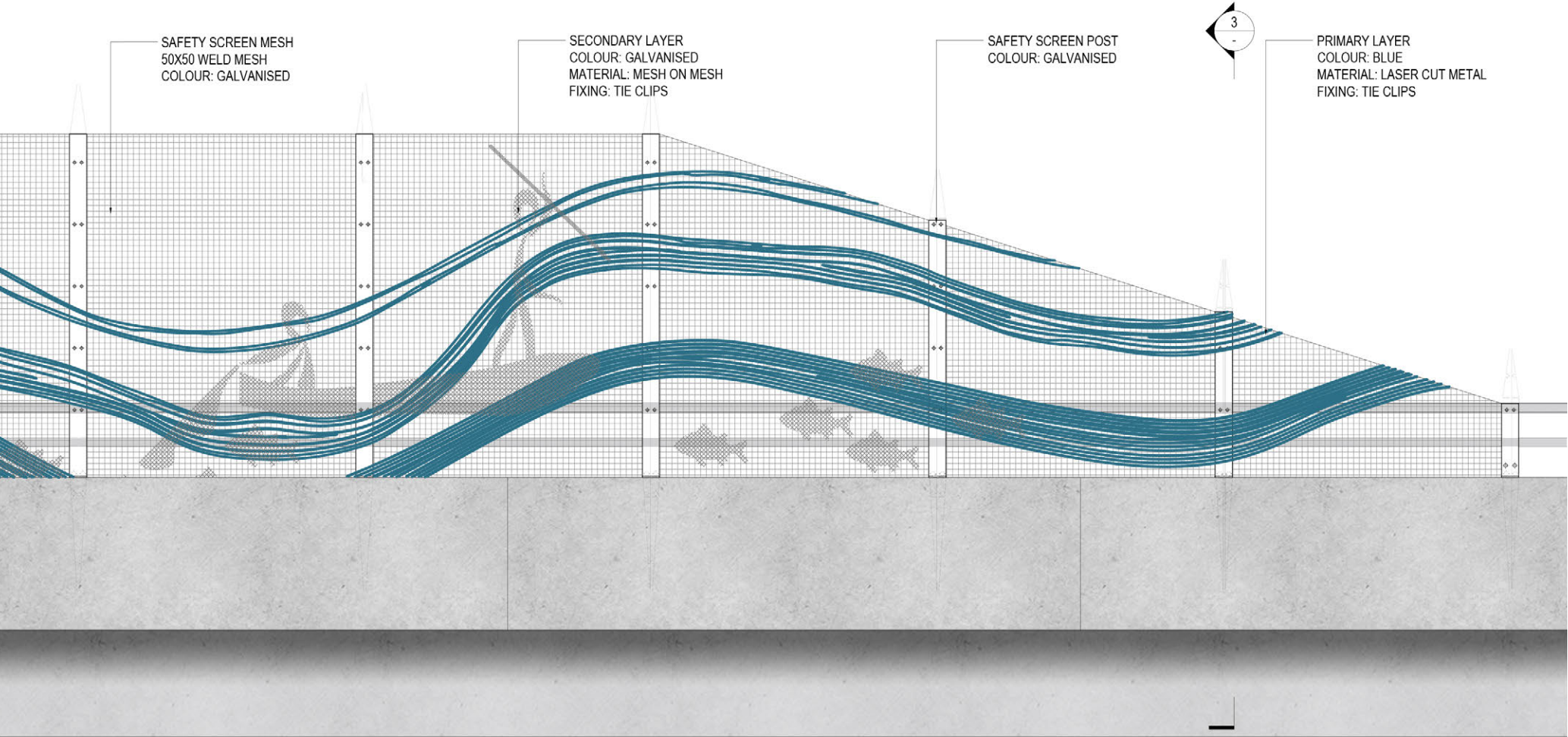
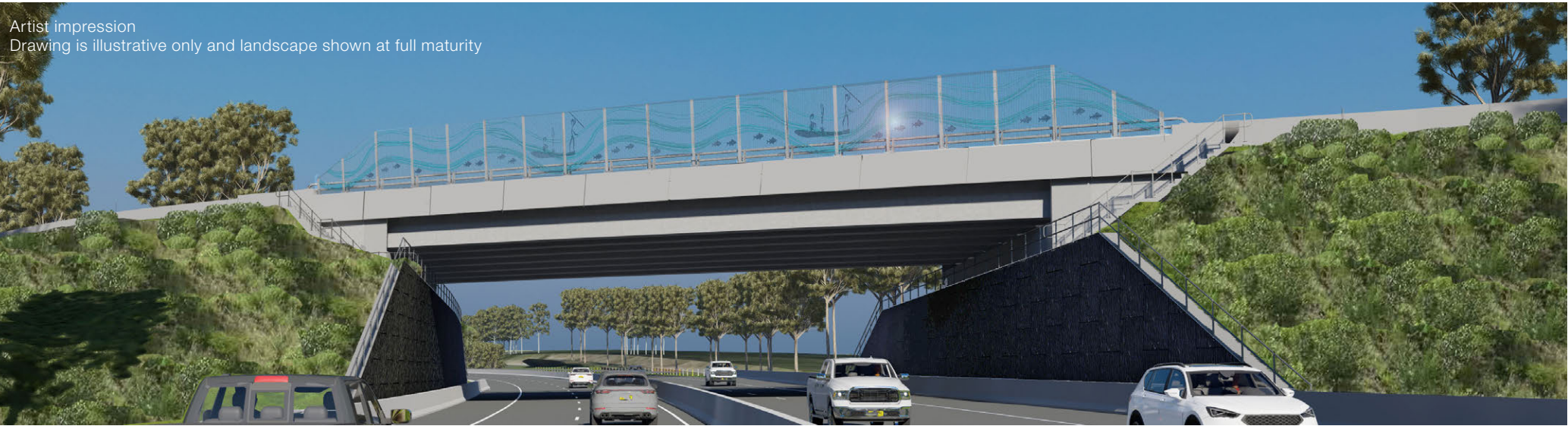


WATERWAYS TYPICAL SAFETY SCREEN - ELEVATION

SCALE: 1:25

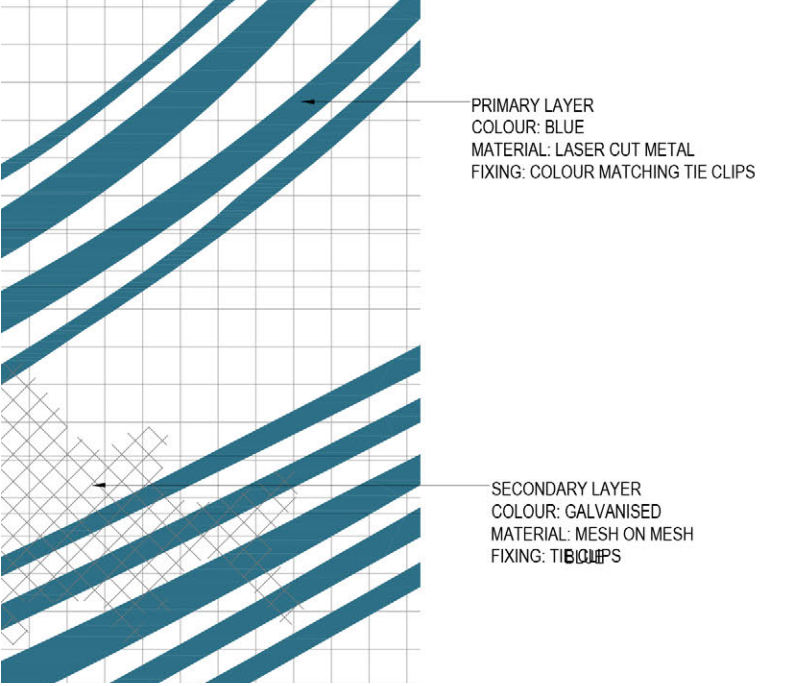
Figure 127: Safety screen - waterways theme typical detail 1

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



WATERWAYS TYPICAL SAFETY SCREEN - TRANSITION

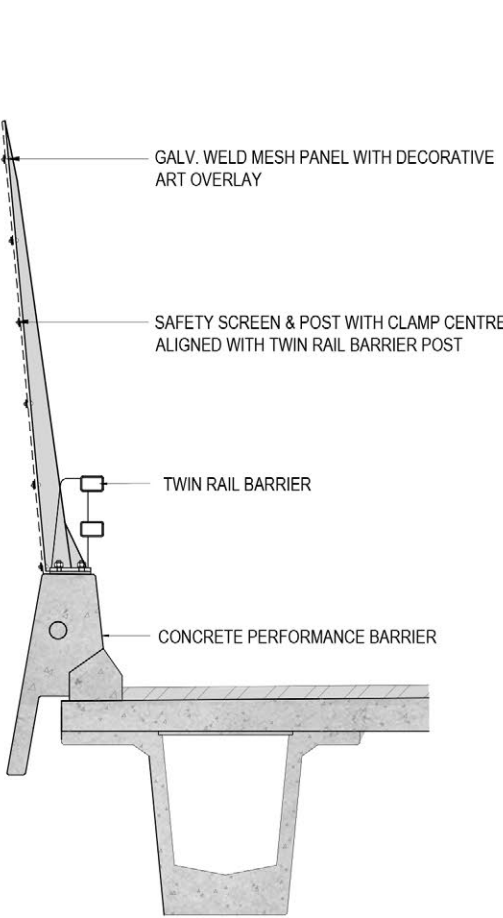
SCALE: 1:25



WATERWAYS TYPICAL SAFETY SCREEN MESH

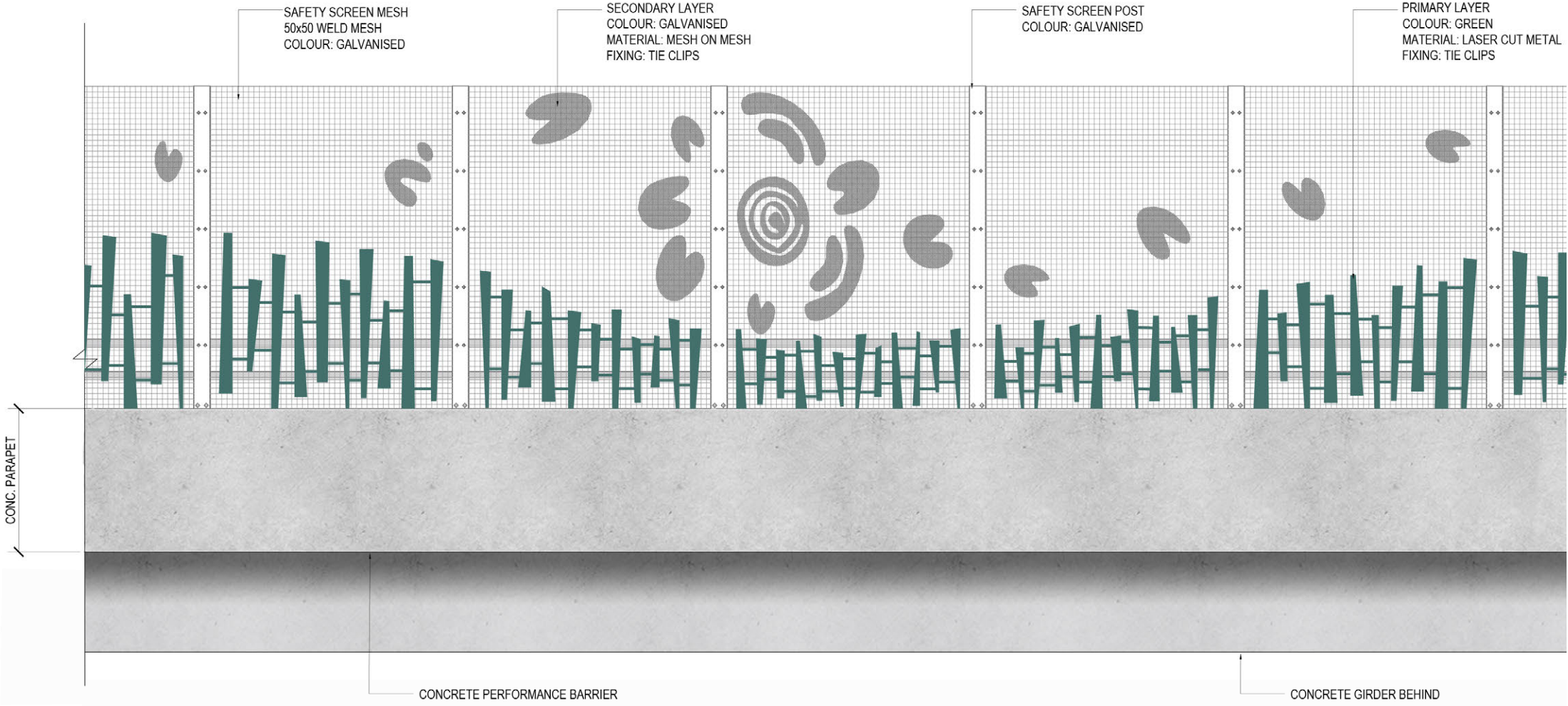
NTS

Figure 128: Safety screen - waterways theme typical detail 2



WETLANDS TYPICAL BRIDGE EDGE - SECTION

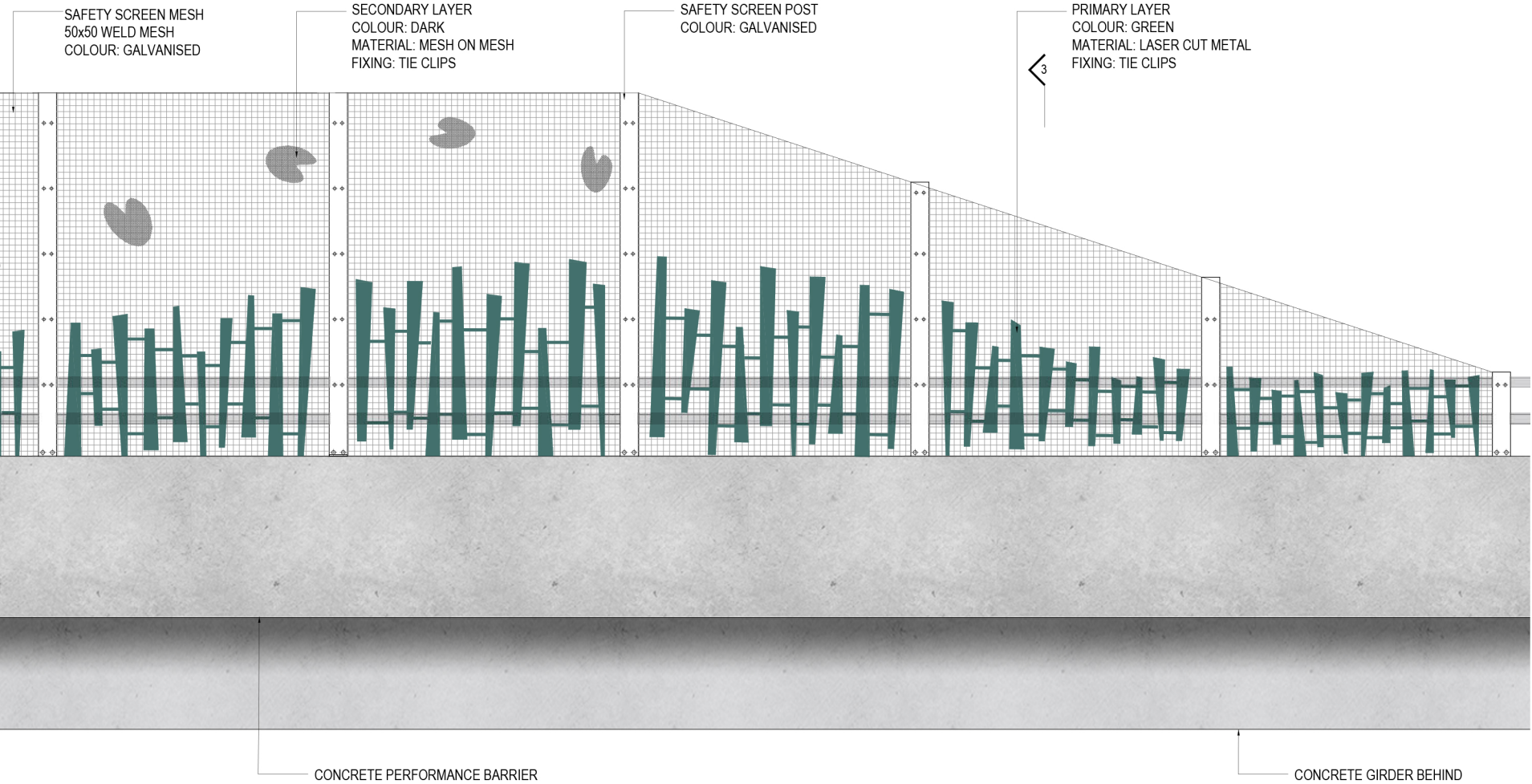
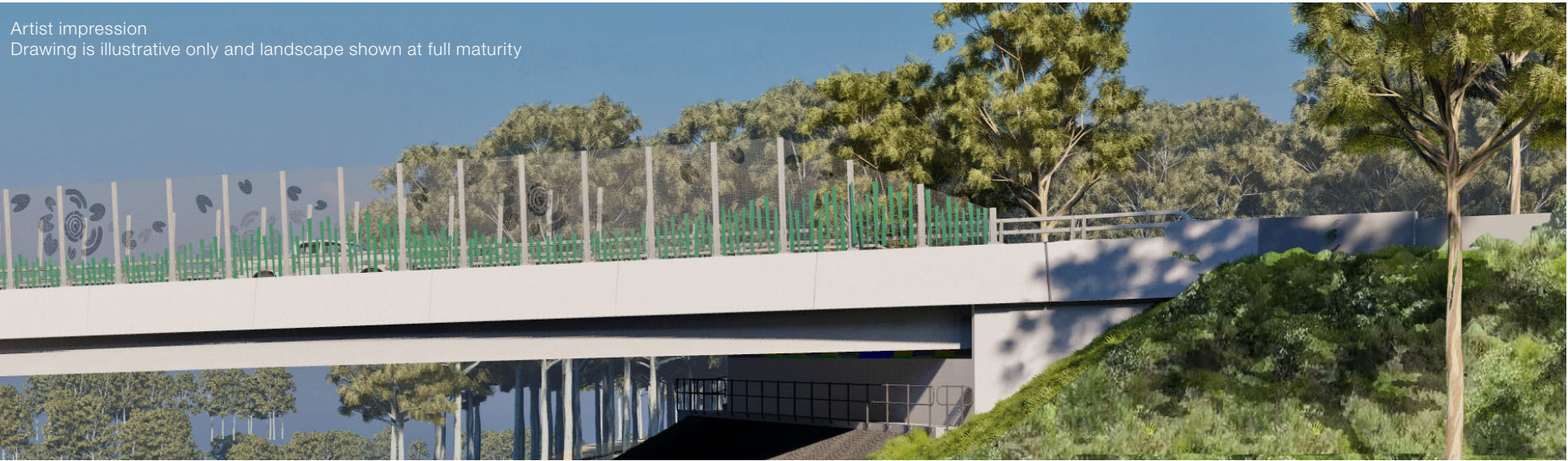
SCALE: 1:25



WETLANDS TYPICAL SAFETY SCREEN - ELEVATION

SCALE: 1:25

Figure 129: Safety screen - wetlands theme typical detail 1



WETLANDS TYPICAL SAFETY SCREEN - TRANSITION

SCALE: 1:25

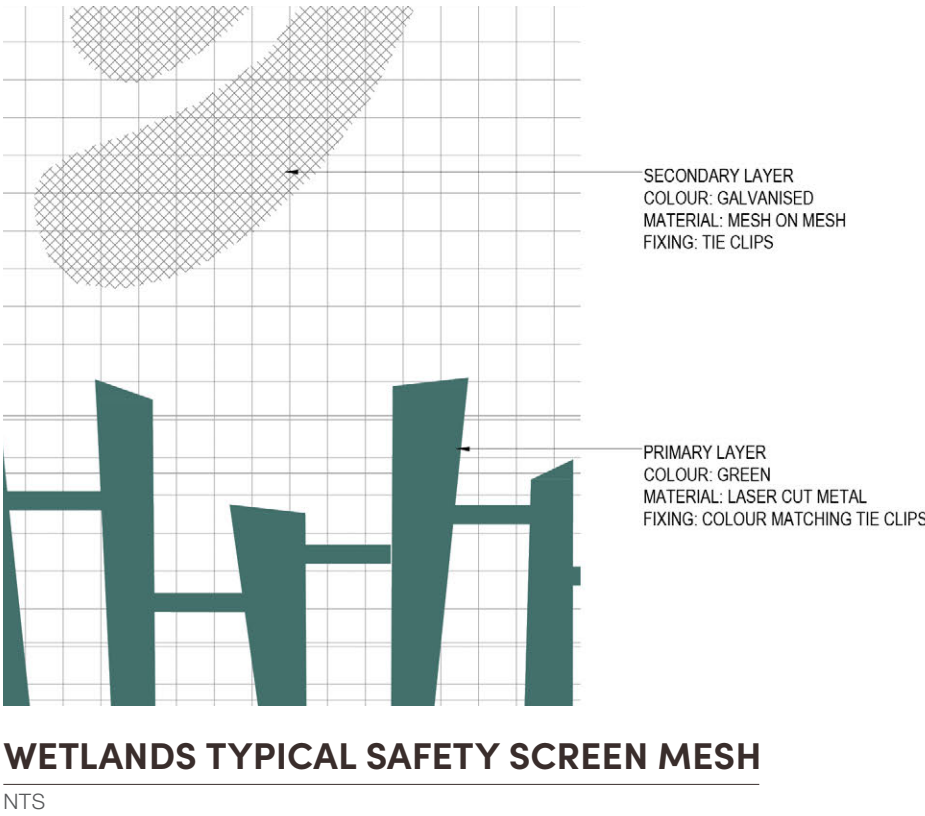


Figure 130: Safety screen - wetlands theme typical detail 2

6.6 Retaining walls

The retaining walls are located in the following areas:

- At the bridge abutments on BR03, BR04 and BR06
- Along the northern side of BR03
- At the eastern side of BR09.

The retaining walls will not be experienced as continuous elements along the Project roadway, and will be visible only on the approaches to the overbridges. The design has therefore, been deliberately kept recessive in appearance. The walls are configured in a blade type arrangement, which provides a clean appearance to its overall composition with the bridge. Landscape works have been provided along the batters adjacent to the walls, which help to soften the visual aesthetic of these hard elements.

A modular pattern has been incorporated in the walls which reference the wetlands theme patterns.

There are two types of walls:

- Type 1 - Patterned wall, recessive colour
- Type 2 - Patterned wall, natural concrete colour.

Type 1 walls are associated with the M1 Pacific Motorway and New England Highway overbridges. Type 2 walls are associated with the New England Highway interface at BR03 and at the M1 Pacific Motorway underbridges at BR08.

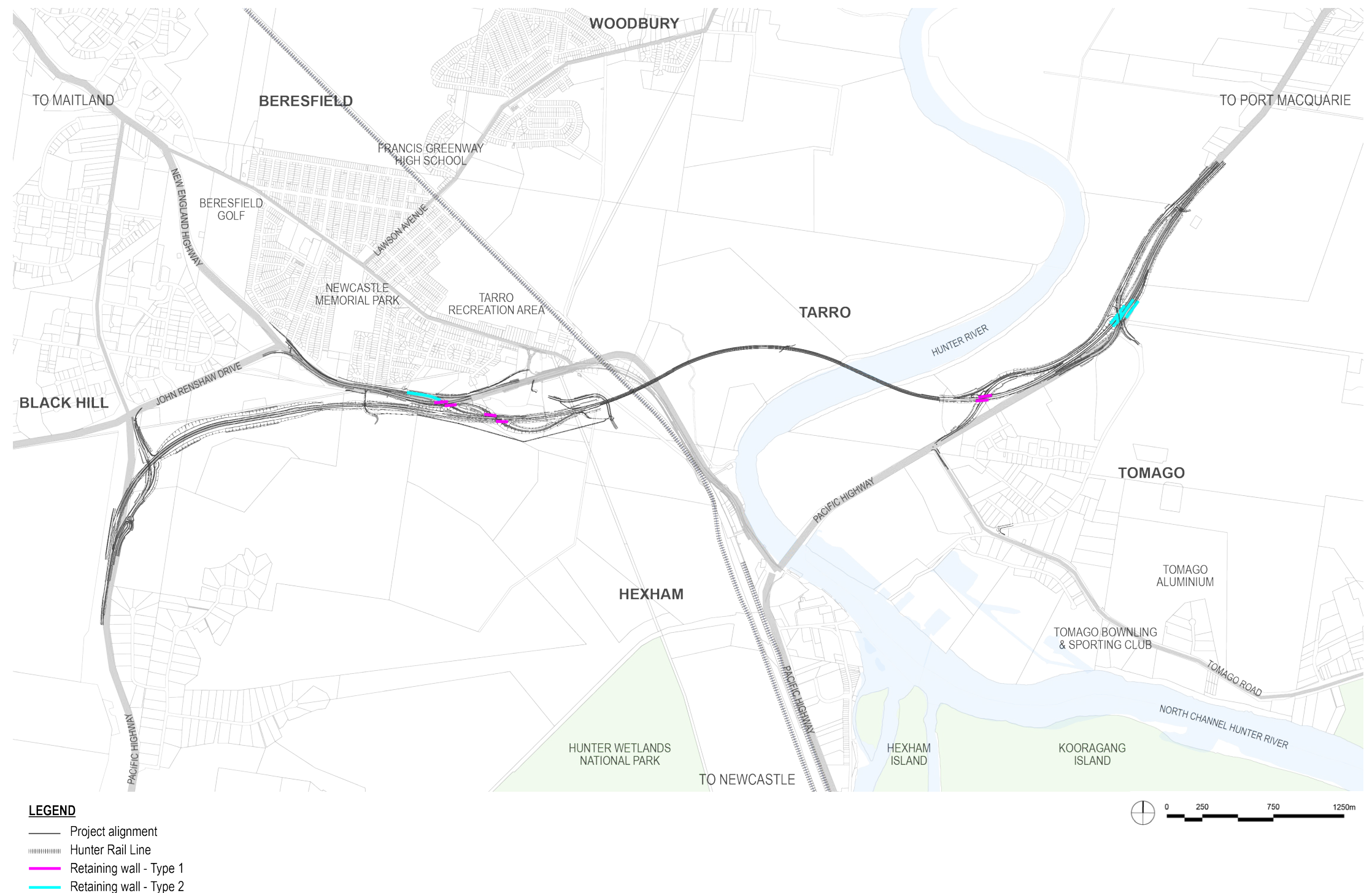


Figure 131: Retaining wall - key plan


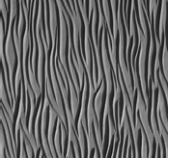


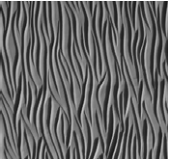
LOCATION	MATERIAL			
TYPE 1 WALLS (DARKER) <ul style="list-style-type: none">– BR03– BR04– BR06.		TYPE 1 Patterned wall: vertical configuration Finish: Painted in a dark colour to provide a recessive appearance		
		Pattern: Reckli 2/186 DALARNA in standard mould Size: 2m x 2m standard panels arranged in a staggered configuration		
TYPE 2 WALLS (LIGHTER) <ul style="list-style-type: none">– Standalone wall along the northern side of BR03– BR08 abutment walls– Adjacent wall on eastern side of BR08.		TYPE 2 Patterned wall: vertical configuration Finish: Natural concrete		
		Pattern: Reckli 2/186 DALARNA in standard mould Size: 2m x 2m standard panels arranged in a staggered configuration		

Table 15: Retaining wall - summary



Figure 132: RSW profile for overbridges

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



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



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



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



Figure 133: BR03 northern RSW wall

6.7 Noise walls and visual screening

6.7.1 Noise walls

Noise walls (noise barriers) have been designed to minimise visual and amenity impacts and are located at Black Hill and Tarro. They are comprised of two types:

Type 1 – These are new walls that are used as infills to the existing walls. These walls are proposed to match the colour and aesthetic of existing walls, which are timber construction. Type 1 walls are located in Tarro, along the New England Highway.

Key features include:

- Timber used as infill to tie in with existing wall so that the aesthetic is seamless
- Posts to be concealed similar to existing wall
- Landscape buffer with shrubs and trees in the front and back of noise wall - minimum two metres wide.

Type 2 – These are new walls are standalone walls and not used as infills. They are proposed to be made of rotationally moulded panels (RMPs) which is a recyclable material that provides sustainability. The new standalone walls in Black Hill are located along M1 Pacific Motorway and the new standalone walls in Tarro are located along the New England Highway.

Key features include:

- RMP walls provided for all new Type 2 walls
- Walls have a pattern that compliments the waterways theme as an artwork element
- Wall posts to be hidden from highway side
- Tops of walls have a continuous flowing line
- Where breaks are required, the walls have an overlap
- Landscape buffer with shrubs and trees provided in the front and back of noise wall - minimum two metres wide.

The noise walls design has been prepared in accordance with TfNSW's policy guideline, *Noise wall design guideline: Design guideline to improve the appearance of noise walls in NSW* (TfNSW 2016) and as updated in 2021.

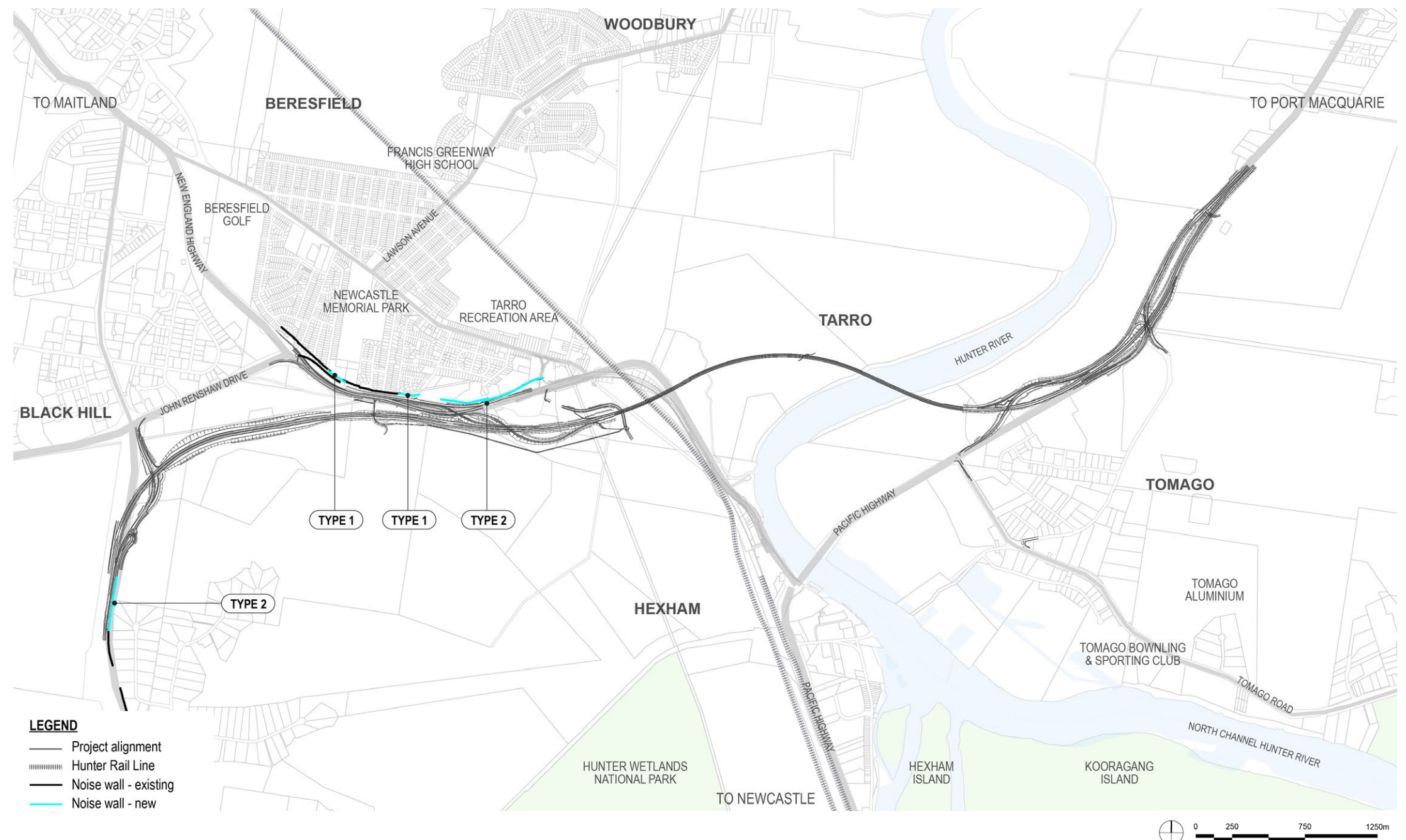
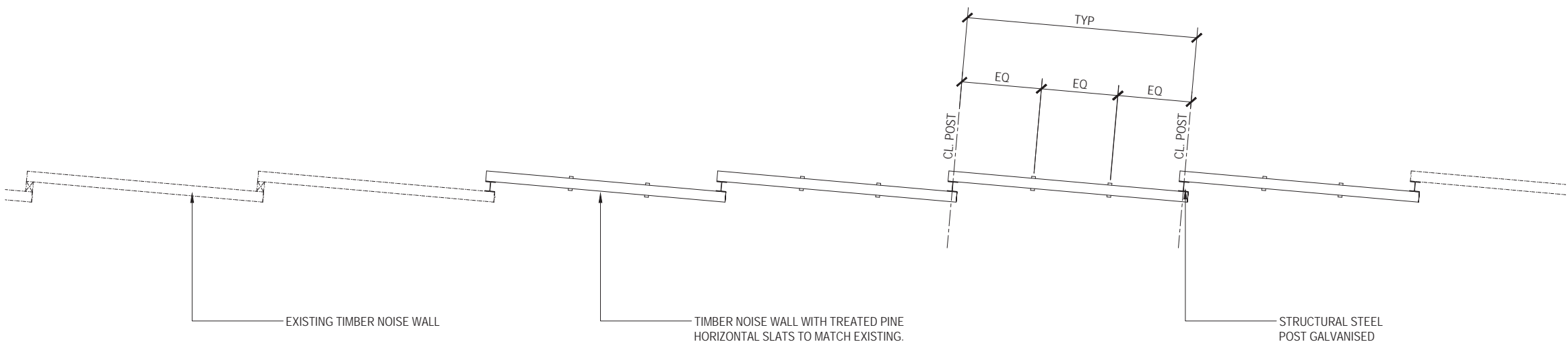


Figure 134: Noise wall - key plan

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



Figure 135: Type 1 timber noise wall at Tarro, looking north

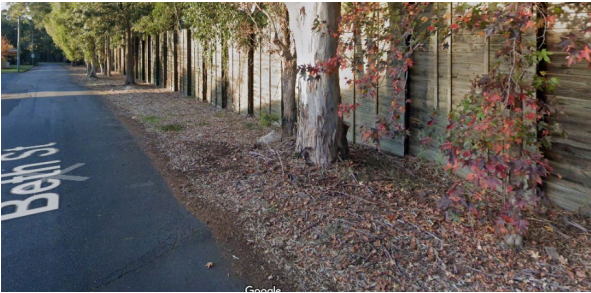


TYPE 1 NOISE WALL ALIGNMENT - PLAN

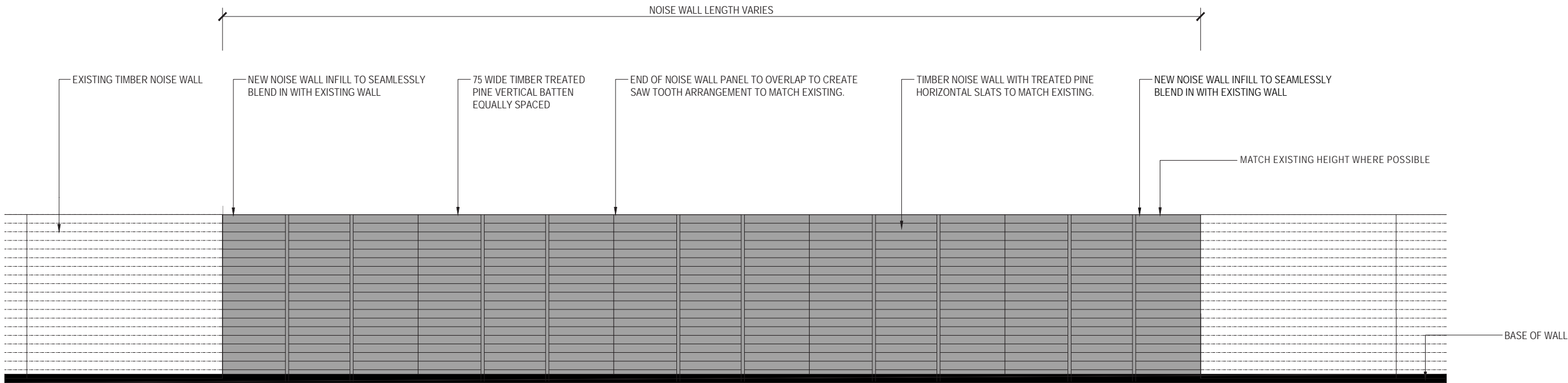
SCALE: 1:100



FROM HIGHWAY



FROM NEIGHBOURHOOD



TYPE 1 NOISE WALL ALIGNMENT - ELEVATION

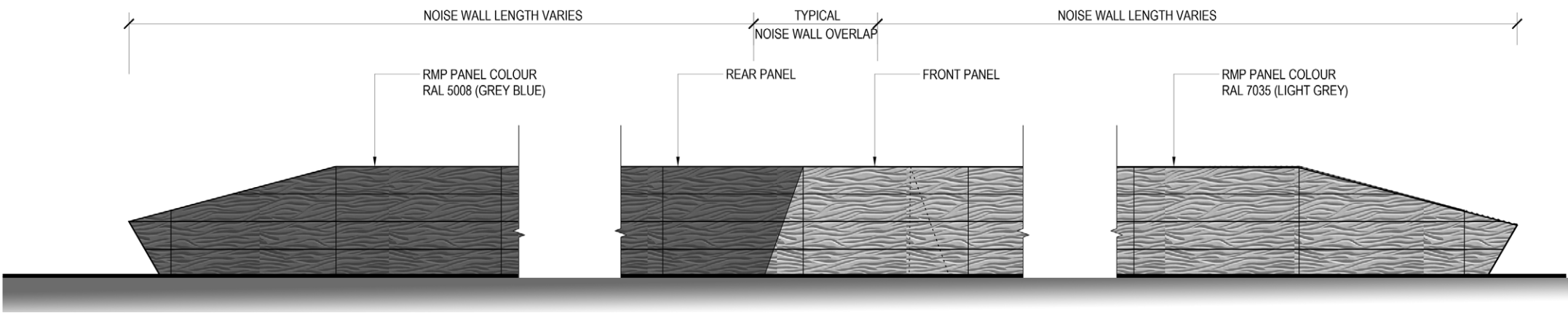
SCALE: 1:50

Figure 136: Type 1 timber noise wall - plan and section

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

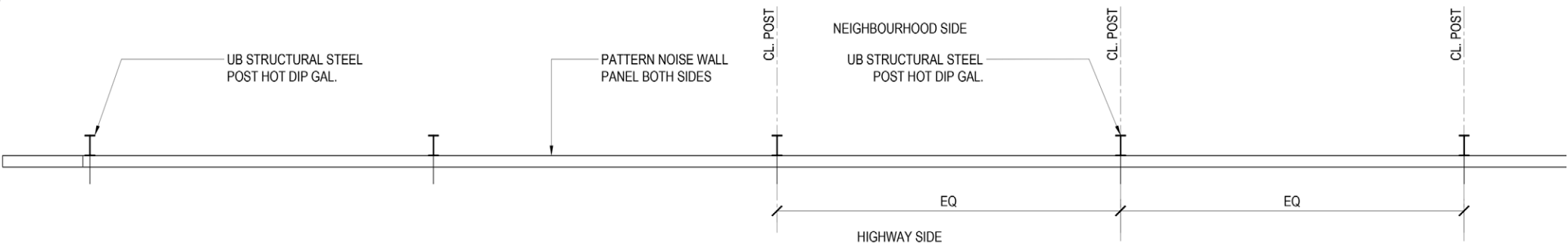


Figure 137: Type 2 RMP noise wall at Tarro, looking north



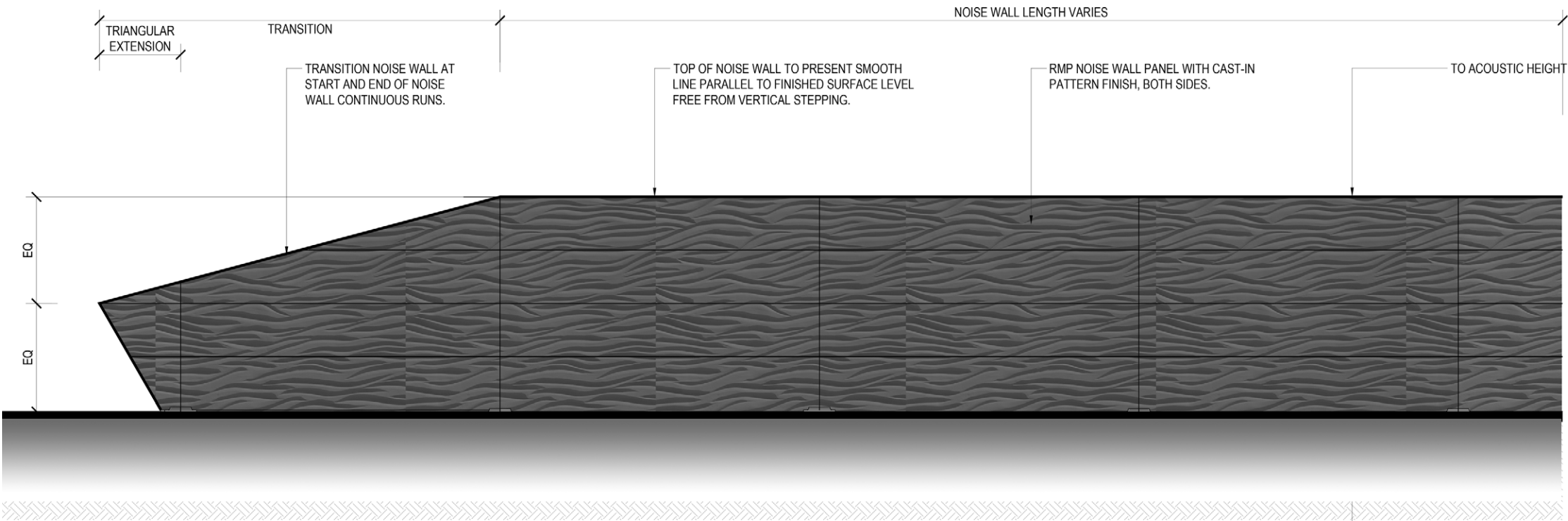
TYPE 2 NOISE WALL - TYPICAL ELEVATION

SCALE: 1:100



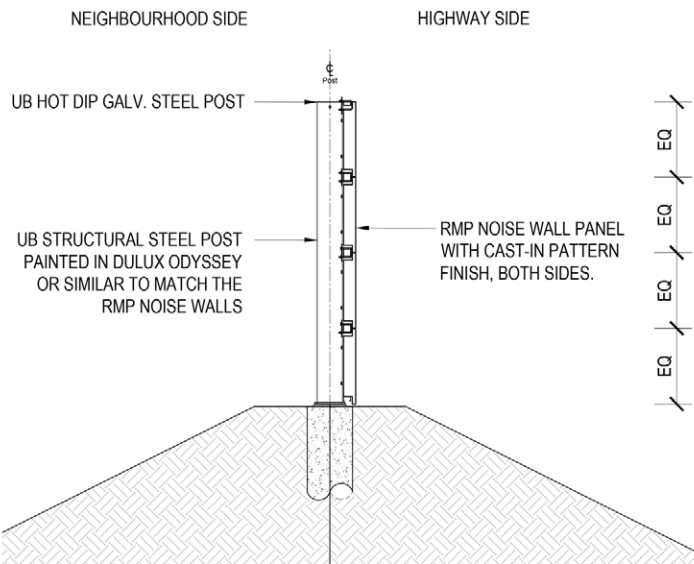
TYPE 2 NOISE WALL ALIGNMENT - PLAN

SCALE: 1:50



TYPE 2 NOISE WALL - ELEVATION - FLAT GROUND

SCALE: 1:50



TYPE 2 NOISE WALL - SECTION

SCALE: 1:50

The residents and properties along Eastern Avenue are located closest to the Project and therefore the Project will be in their direct line of sight. Key visual elements include the bridge and ramp structures at Tarro Interchange and the noise wall.

Vegetation is used to screen the noise wall adjacent to Eastern Avenue properties and at the Tarro Interchange, to reduce the Project's visual impact.

Screening is provided in a layers, as an understorey as well as tree canopy planting. Vegetation has been selected from the native and endemic communities of the area and region. These include species from the Eucalypt family, such as the spotted gum, Red Ironbarks and Paper Barks. The understorey is comprised of Bottlebrushes and Tea Trees, in a garden bed type configuration that provides a domestic scale experienced from the neighbourhood side, as well as the larger scaled Canopy, experienced from the Motorway.

The understorey is a dense layer of low level vegetation that provides a high level of screening. The taller tree canopy provides a level of screening that breaks down the view of project elements, removing them from the central focus of these views.

In the short term the residents will experience views of the noise wall, which has been designed to have a visually pleasant aesthetic with patterns that reference Country themes. In the long term this area will be screened with vegetation.

The eastern side of the noise wall incorporates species from the floodplain mix and the western side incorporates species from the Ironbark forest mix.

The design aligns with feedback received from consultation undertaken with the Eastern Avenue residents in June 2023.

The images illustrate views that will be experienced from the nearby residents along Eastern Avenue.

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

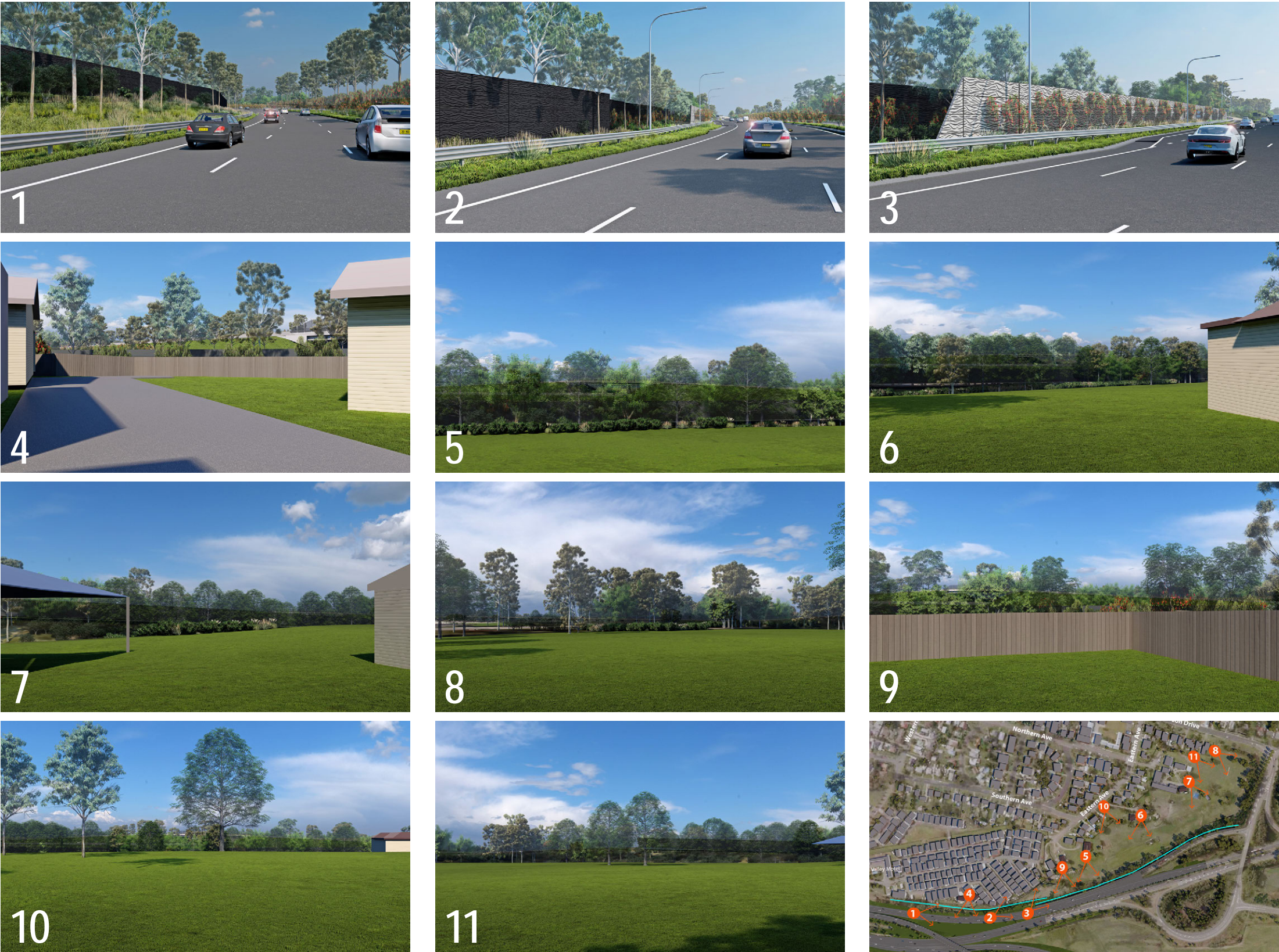


Figure 139: Eastern Avenue - visual assessment study

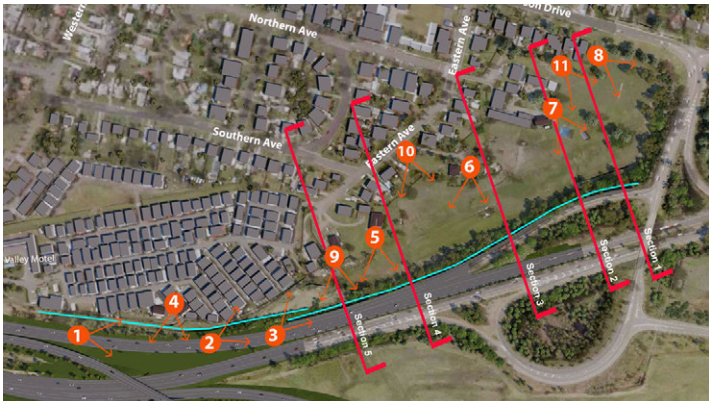
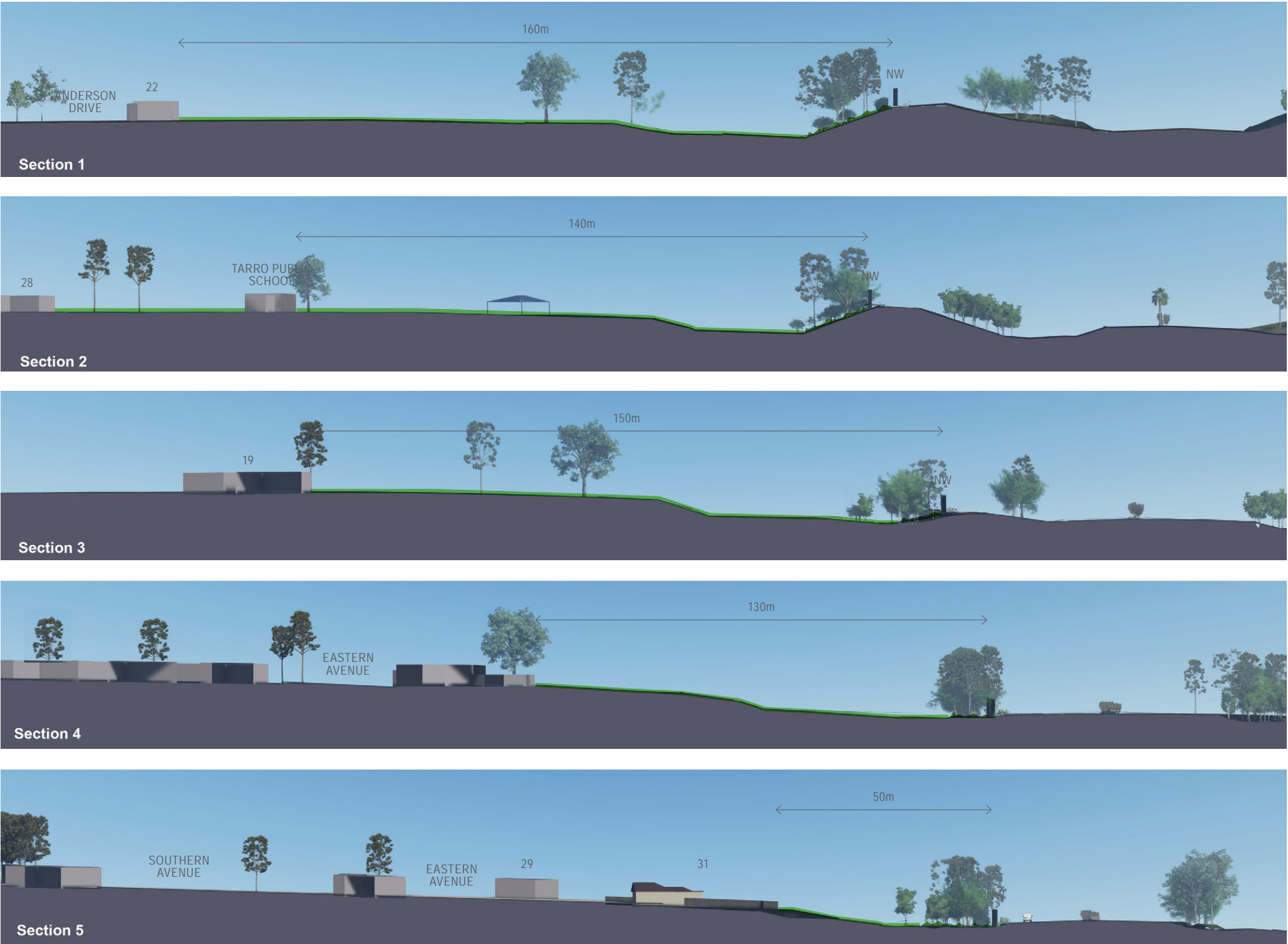
















Figure 140: Eastern Avenue - key plan

Figure 141: Eastern Avenue - sections



Figure 142: Urban design plan

NOISE WALL SCREENING (FLOODPLAIN MIX)			NOISE WALL SCREENING (SPOTTED GUM, BROAD LEAVED MAHOGANY, RED IRONBARK SHRUBBY OPEN FOREST MIX)				
TREES			TREES				
							
<i>Casuarina glauca</i> Swamp She-oak	<i>Melaleuca styphelioides</i> Prickly Paperbark	<i>Melaleuca linariifolia</i> Snow In Summer	<i>Corymbia maculata</i> Spotted Gum	<i>Eucalyptus fibrosa</i> Red Ironbark			
SHRUBS			SHRUBS / GROUNDCOVER				
							
<i>Callistemon salignus</i> Willow Bottlebrush	<i>Leptospermum polygalifolium</i> <i>subsp. polygalifolium</i>		<i>Bursaria spinosa</i> Sweet Bursaria	<i>Melaleuca nodosa</i> Prickly-leaved Paperbark	<i>Notelaea longifolia</i> Large-leaved Mock Olive	<i>Entolasia stricta</i> Wiry Panic	<i>Lomandra longifolia</i> Spiny-headed Mat-rush
GROUND COVERS							
							
<i>Carex appressa</i> Tall Sedge	<i>Lomandra longifolia</i> Spiny-headed Mat-rush						

Note: Images are indicative of mature plant sizes and will differ from time of installation. Sizes of trees are indicative of 10-15 years establishment.

Table 16: Noise wall screening - vegetation species

6.7.2 Landscape headlight screening

The design response for headlight screening on the Project has been to provide vegetated screening where roads are in close proximity to other roads travelling in the opposite direction; where the potential for headlight glare and confusion is high. The scope defines this as where roads are separate in height by up to 2.5 metres and offset less than 13 metres.

The design approach has been to provide vegetated screening along the higher road. As such, the minimum height requirement and screening will be determined by the height offset, as illustrated in the following cross section. This illustrates that the height of planting can be less than 2.5 metres in order to achieve a 2.5 metre screen along the lower road. The benefit of this approach is that it still provides a connection with the broader landscape from the higher road, particularly where the higher road overlooks the floodplain; an important consideration between Tomago and Heatherbrae. This approach also reduces the level of enclosure that is experienced along the road alignment, consistent with the spatial sequence of the environment.

The plant selection and size of planting has considered this as a key element in the design response to ensure screening achieves the height requirement at the time of opening. The following strategies have been adopted to achieve this:

- Installation of planting as soon as construction program permits, maximizing growing period
- Ensure advanced plants of already established size are planted, of a scale capable of screening headlights
- Planting arrangement - the overlapping of plants in an offset arrangement in multiple rows to ensure adequate screening
- Use of temporary irrigation to ensure rapid establishment, particularly in drier periods.

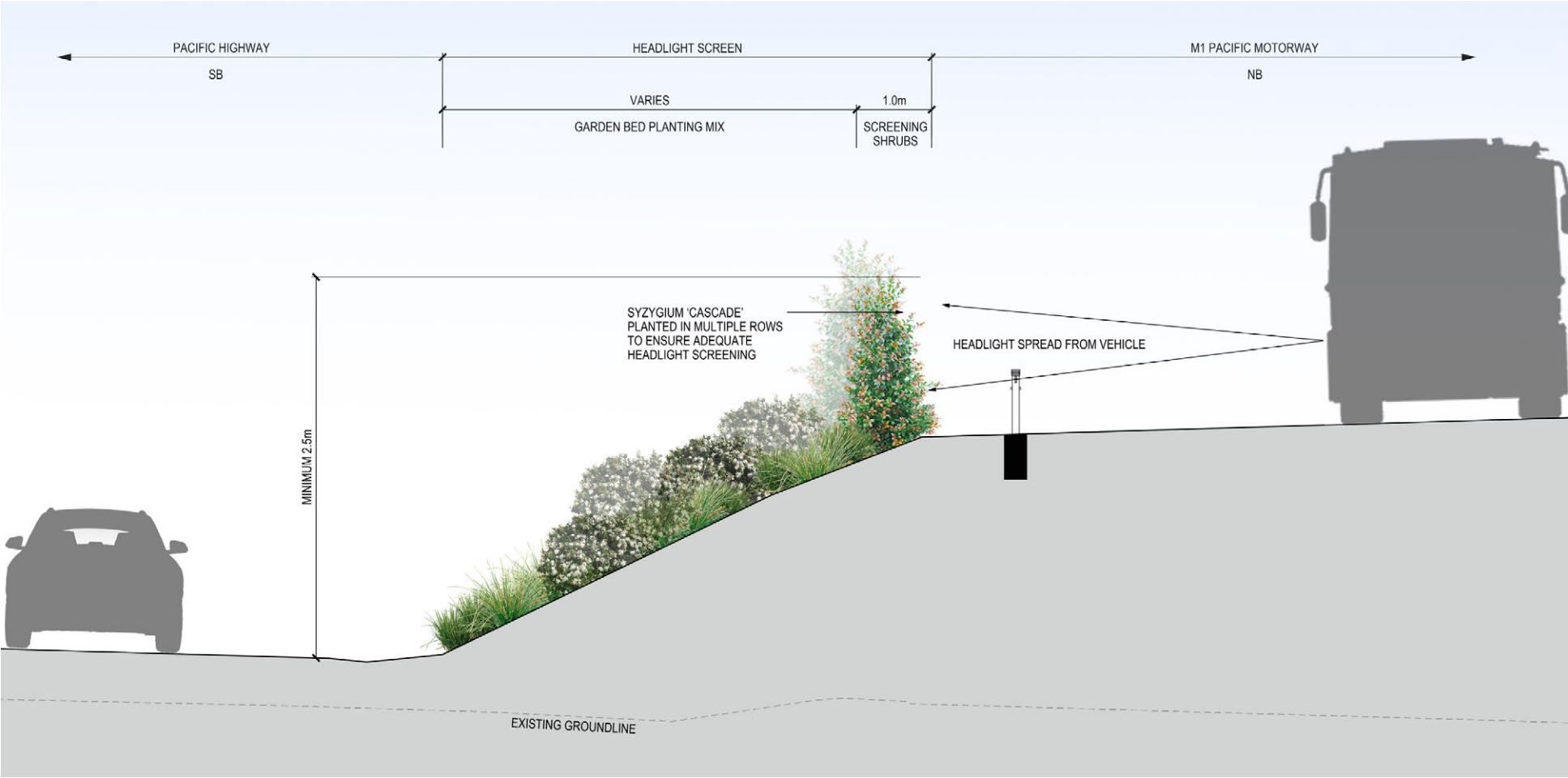


Figure 143: Landscape screen planting proposal

6.8 Maintenance and management of Project elements

6.8.1 Maintenance strategy

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

- Maintenance procedures for the various design elements and assets
- Timing and routines for 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 Chapters 6.14 and 6.15.

6.8.2 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 for overbridges will be from the local road down to the access platform, provided through the incorporation of stairs.

Maintenance access for underbridges will be from the bottom of the bridge up to the access platform, 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 144: Maintenance access to bridges - underbridges



Figure 145: Maintenance access to bridges - overbridges and underbridges

6.9 Signposting Country

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

A TYPE 2: Place series signage has been incorporated for Signposting Country.

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 incorporating the Hunter River as the geographical feature with the Aboriginal name of 'The Myan' integrated in the sign. They are located on the approaches on either side of the river.

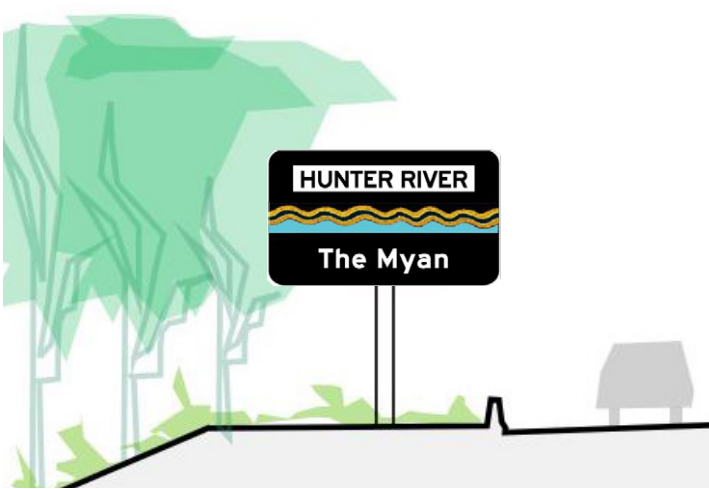
Place series signage is comprised of:

- TYPE 2: Geographical feature - Hunter River and Aboriginal name.

Signage will be placed adjacent to the carriageway.



Figure 146: Type 2 - Place series signage - The Myan



Type 2 - The Myan
Place series signage

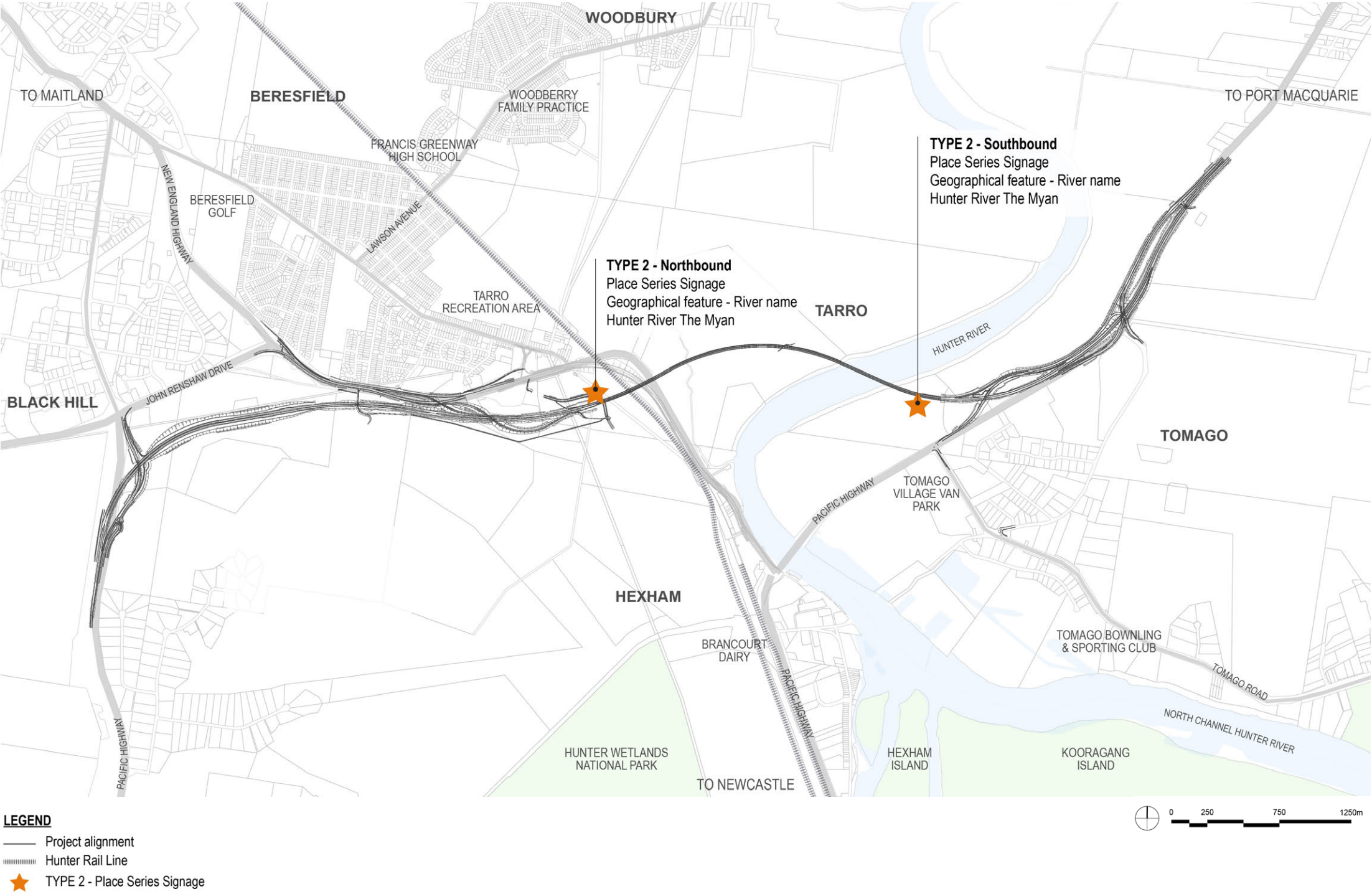


Figure 147: Signposting Country - key plan

6.10 Anti-graffiti strategy

A holistic anti-graffiti strategy has been developed which allows for future measures (by others). The strategy has been developed, based on the visual prominence or level of accessibility of the elements.

A summary of the strategy is noted below:

In general a painted method has been adopted as an anti-graffiti measure. All the elements of artwork will have an anti-graffiti measure incorporated.

BRIDGES

- RSW - BR03, BR04 and BR06: dark colour, painted
- RSW near BR03 and near BR08: light colour, painted equivalent to natural concrete.

NOISE WALLS

- RMP - integral colour, self clean-off.

ARTWORK - BR09 UNDERCROFT

- Crazy pavers - sealant provided as a protective element for graffiti
- Background - paint provided as an anti-graffiti measure.

PIERS

- BR01, BR03, BR04 and BR05 - piers painted to full height
- BR05 - paint piers to full height near Aurizon Access Road (piers 1-4), Railway (pier 5) and New England Highway (pier 8-16).

HEADSTOCKS

- BR01 - paint headstock
- BR05 - future paint over.

ABUTMENT SILL BEAM AND WING WALLS

- BR01, BR03, BR04, BR05 (western abutment), BR06, BR08 and BR09 - light colour painted equivalent to natural concrete.

6.11 Lighting

The provision of lighting is focused on key areas that need to be illuminated to improve road safety, such as conflict areas including at interchanges (Black Hill, Tarro, and Tomago) and intersections across the Project. Underpass lighting is provided where needed based on a see-through percentage (STP) analysis and applies to BR08. Lighting will also be provided for the navigational channel at BR05 over the Hunter River.

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). Mitigation measures such as the use of flag lighting has been incorporated at nominated intersections to manage any residual night lighting impacts to protect properties that are potentially in close proximity to the Project.

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 help increase Motorway safety.

6.12 Fencing

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

Types of fencing include:

- Security fencing - typically 1.8m high
- Cattle stock proof fence - typically 1.2m high
- Fauna fencing - typically 1.5 to 1.8m high
- Cycleway fencing - hand rail - 1.4m high.

6.13 Signage and Intelligent Transport Systems (ITS)

The 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 collocated onto one pole where possible and provided the required longitudinal spacing is available. 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 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
- Services signage
- Country signage
- Variable message signs.

6.14 Crime Prevention Through Environmental Design (CPTED)

Crime Prevention Through Environmental Design (CPTED) is focused on achieving safe spaces for people to pass and move through the Project corridor. The M1 Pacific Motorway has minimal pedestrian activity and limited opportunity for people to stop and/or gather. The principles of providing natural surveillance, natural access control, good definition of space and maintaining end to end visibility has been incorporated in the design. A key element of CPTED is the achievement of surveillance to discourage inappropriate behaviours.

Along the length of the Project some areas have been identified where there is interaction with the community and the potential to pose CPTED issues. These locations include bridges and their undercroft space (particularly over quieter local roads), and the various active transport connections including shared paths and cycleway links.

BRIDGES

The undercroft space of bridges generally occurs along the main alignment of the Pacific Highway and M1 Pacific Motorway and the New England Highway corridors. These include BR01, BR03, BR04, BR05, BR06. These zones have active surveillance provided by the passing traffic and are considered low risk due to the inability to access and/or the ability of passing traffic to observe undesirable behaviours.

BR02 and BR09 are the only underbridges which have a connection with limited traffic movement through them and so may pose a potential issue in terms of CPTED.

BR02

BR02 is a creek bridge and provides for both vehicular and fauna access. The bridge is a local property access and so is considered removed from the public domain, so CPTED is not a significant consideration.

BR09

BR09 provides access to the HRBG. The feature art incorporated on the spill through abutments activates the access roadway to HRBG and enhances its connection. The art along with feature landscape that is incorporated in its surrounds, helps to increase the perception that this would be a more active, usable space and act as a natural surveillance measure. The bridge undercroft is located in close proximity to the Pacific Highway intersection which incorporates flag lighting and therefore will have a significant amount of light spill, making it safe for pedestrians and cyclists to pass through.

The bridge facilitates the movement between access points at the HRBG entry and the Pacific Highway. Clear demarcation of access points has been incorporated. These include demarcation of signs, lines and traffic lights at the intersection of the HRBG access road and Pacific Highway (which is the main pedestrian route of travel to and from HRBG). Clear demarcation of the entrance gate to HRBG, highlighted by special landscape features and wayfinding signage (consolidating colourful, wayfinding signage to enhance the entry) has been incorporated in the design. Fencing which includes a vehicular and a pedestrian gate has also been provided, to mark the entry point for pedestrian and vehicular access.

The ‘botanica’ concept that has been adopted in the development of the design has been provided as a deliberate intervention to the otherwise broadscale landscape along the corridor. This concept provides a seamless user experience using feature landscape, bridge undercroft artwork and a sculpture to define this area. It also strengthens the lateral relationship between the HRBG and the river, and provides good definition of the space and its ownership, reducing any ambiguity between private and public spaces. The fencing at the gate, with signage provided at the boundary, clearly demarcates ownership of the HRBG space (private space) and the Project corridor (public space).

The bridge design has been developed as a single span bridge which maximises visual permeability. The continuation of the ‘botanica’ concept incorporating feature landscape, bridge undercroft artwork and sculpture further emphasises the visual transparency of end to end visibility, creating a unique identity for the HRBG area.

ACTIVE TRANSPORT LINKS

Active transport links are provided at bridges BR01 and BR04. They include the incorporation of cycleway and pedestrian connections between the local road network and the Motorway. These links are for experienced cyclists capable of riding within the shoulder of the Motorway environment.

– BR01

At BR01, cycleway links are from, or to the Motorway shoulder. The users are experienced cyclists and will be travelling at speed, limiting the opportunity for negative behaviours. The path is located below the road, but the landscape design has a clear understorey, with an informal avenue of trees enabling passive surveillance via open views to and from the path.

– BR04

The paths at BR04, like BR01 are from, or to the Motorway shoulder and are located within an open landscape, with grasses and low shrubs less than 1.5 metres in height, and so have a high level of visibility. Other links are associated with the road itself and so have a direct relationship to the road, ensuring a high level of surveillance.

PUBLIC TRANSPORT

Buses are the primary public transport connections provided in, or around the corridor. Bus stops have been incorporated at the intersection of the HRBG and the Pacific Highway. They are provided at a location where there is high visibility, with adequate lighting provided and with a concrete paved link between the gardens and the bus stop. The level of surveillance addresses the potential CPTED risks.

CPTED reviews have been carried out at each milestone, during the preparation of this DLP by a qualified professional. Additional recommendations as a result of reviews, will be implemented where reasonable and feasible during the final detailed design and documentation stages.

6.15 Active transport links

The design has allowed for the continuation and enhancement of key active transport links within the existing road configuration. A key element of these is the access to a wide shoulder within the Motorway alignment, facilitating access for experienced riders. The design enables clear and safe access to existing active transport links at key points, including the following:

BLACK HILL INTERCHANGE

John Renshaw Drive and Weakleys Drive – access is provided off the highway heading north, as part of the shoulder lane on the slip lane. Access to the highway from this intersection, heading north is also provided via a dedicated path adjoining the southbound overbridge BR01.

A southbound link is also provided from the main alignment, connecting to the southbound slip lane, as well as Lenaghans Drive.

TARRO INTERCHANGE

The design facilitates access from Aurizon Access Road to, and from the M1 Pacific Motorway, as well as a link from the New England Highway heading southbound. These connections both enable connection for the future Richmond Vale Rail Trail Path, as well as maintaining existing local connectivity. The Project does not preclude the delivery of the Hexham Junction to Tarro active transport link (intersection of the Minmi to Hexham rail line corridor and pipeline corridor).

TOMAGO INTERCHANGE

Local access links, mostly cyclist links are facilitated through the Tomago Interchange at the surface intersection with Old Punt Road. Access to the M1 Pacific Motorway is facilitated from the northbound Pacific Highway to the M1 Pacific Motorway via a dedicated path adjoining Bridge BR06. Shared path access is provided to connect to the bus stops.

HUNTER REG ION BOTANIC GARDENS

Shared path access provided to connect to the bus stops.

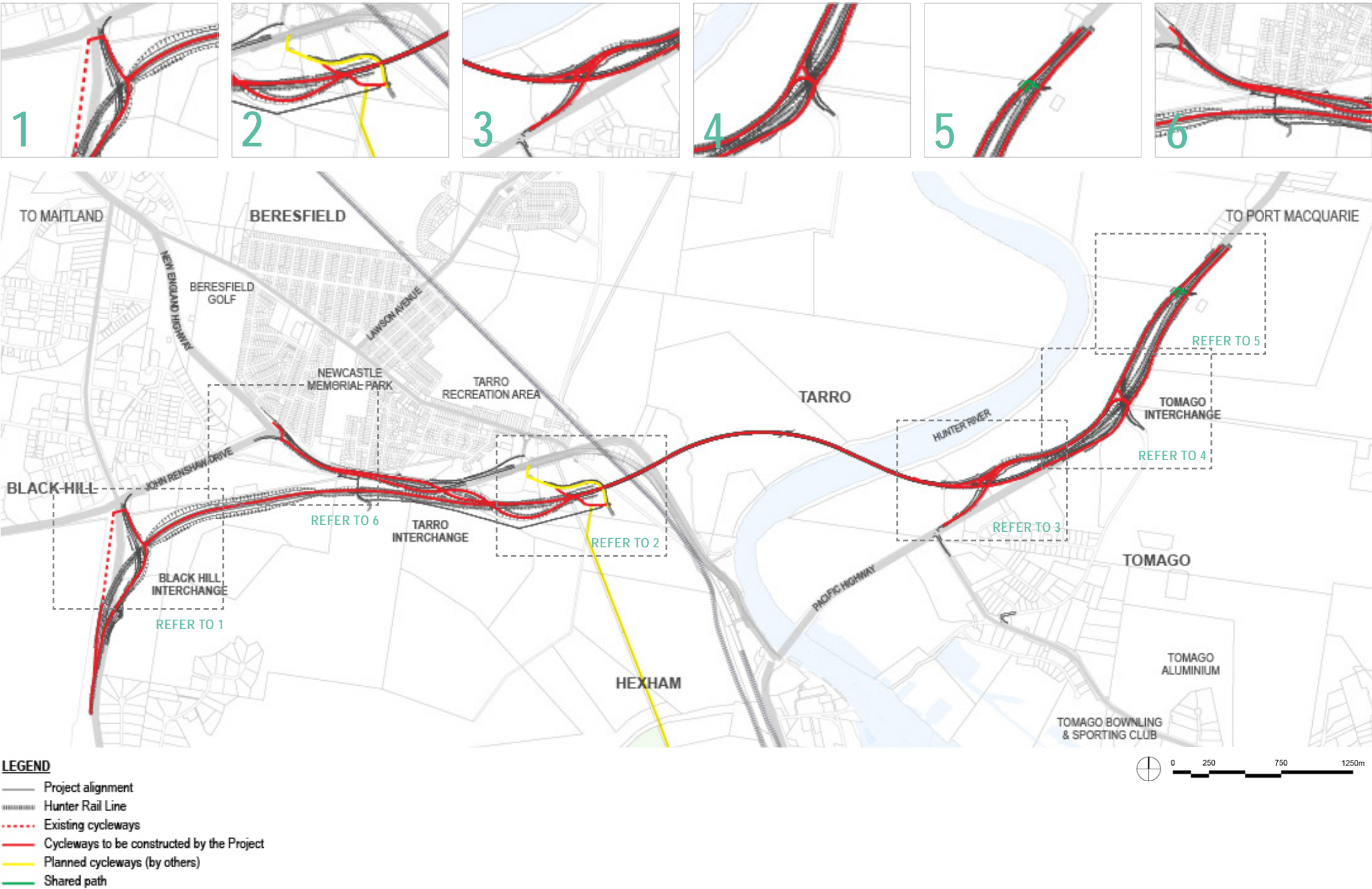


Figure 148: Active transport links

6.16 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 2018a).

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

6.16.1 Strategies and principles for site clearing

Site clearance impacts the areas of vegetation and soil management, which are strongly interrelated. These activities are informed by the TfNSW *Biodiversity Policy* and other 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:

- Minimising the extent of clearance
- Protecting environmentally significant vegetation
- Undertaking weed management to ensure that landscape outcomes are optimised
- Collecting local provenance material
- Ensuring details of site clearance protocols are addressed in the Construction Environmental Management Plan (CEMP).

6.16.2 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 stockpiles sizing and their distribution, so different soil types can be separated.

TOPSOILING

Testing of the site's topsoil has been undertaken to inform the amelioration of the soil required to maximise the landscape response. Topsoil used within the Project will comprise ameliorated site soil, ameliorated in accordance with soil testing. If a shortfall arises this will be made up for by imported soil.

ORGANIC FERTILISER

Application of fertiliser to all areas will be undertaken and 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.

6.16.3 Revegetation strategy

The revegetation of the corridor, disturbed areas 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 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 methods listed below will be adopted as part of the revegetation work:

- Seeding Mixes are consistent with TfNSW *Landscape Design Guidelines* for the region
- Seed mixes reflect either a broadscale grassland or 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 in 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, and 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 including mangroves 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.

The realignment of Purgatory Creek mimics natural stream design by incorporating a natural hydrological function and does not include 90 degree sharp meanders as illustrated in the concept plans (refer to Chapter 5 of this report). The realignment ties into upstream and downstream sections of the watercourse, and does not limit any connectivity in the area.

BIOSWALES AND BASINS

Bioswales have been incorporated as a key element of the site's water quality management system, avoiding the need for extensive large-scale basins to be accommodated within the floodplain environment. Bioswale planting will adopt local sedgeland species, providing both water quality and biodiversity outcomes responsive to wet and dry conditions.

The use of water quality basins has been minimised and replaced with bioswales. This provides benefits in terms of overall risk, limits requirements for fencing and meets water quality outcomes. In addition to the bioswales, a biofiltration basin is proposed at the southern end, adjoining BR02. This basin is to be established with sedges and is a wet dry basin.

One permanent basin is required at the northern end of the Project opposite the HRBG. This is a wet basin and is to be vegetated with emergent wetland plants which will be used within both the base and sides of the basin and transition to a terrestrial landscape beyond the high water level of the basin.

GARDEN BEDS

Garden beds are used for a variety of functions including to:

- Address and control headlights where roads are in close proximity to each other
- Provide a high level of presentation and robustness where there is either increased pedestrian movement or dwelling time for motorists
- Address stability for steep or narrow locations
- Provide screening from neighbouring residences, noise walls or retaining walls.

Their use within the Project is in association with medians and interchanges and retaining and noise walls. In these instances, landscape is wanted to provide a level of screening, as well as identity to the corridor.

Species selected for vegetation are to require minimum maintenance, providing a robust and long-term cover. Species selection will also consider their role as a deterrent, in situations where garden beds are required to provide context and screen noise walls and/or retaining walls.

Vegetation is responsive the Plant Community Types (PCT) identified along the corridor ensuring connectivity between the proposed road corridor and adjoining vegetation, enhancing biological outcomes.

6.16.4 Ancillary sites

Ancillary sites are required for construction but are to be returned to their previous use, to TfNSW at the completion of the Project in a condition reflective of the existing use. The dominant proposed 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 future uses. Where previous site use or condition is consistent with the native forest community and is immediately adjacent to it, the adoption of a bushland revegetation treatment may be adopted, subject to agreement with TfNSW and the relevant land owner. Final resolution of the use of ancillary sites is subject to finalisation of the construction methodology.

6.16.5 Fauna strategy

The biodiversity assessment undertaken as part of the Project environmental assessment identified several threatened fauna species including the following:

- Squirrel glider (Black Hill)
- Grey crowned babbler (Black Hill)
- Grey-headed flying fox (Black Hill)
- Varied sitella (Black Hill)
- White bellied sea eagle.

And outside of the alignment but adjoining:

- Little bent winged bat
- Wallum froglet.

The approach adopted to fauna management comprises both exclusion and provision of crossings.

Containment is in the form of fauna fencing to limit access to the corridor and, where appropriate focus fauna movement towards a strategic link. Fauna fencing is used within the forests of Black Hill and the eastern edge of the corridor at Tomago.

The installation of fauna exclusion fencing will occur as early after clearing of vegetation as practicable, to both limit access to the construction corridor but also establish revised movement patterns prior to the corridor opening to traffic. The type of fencing adopted will reflect the key fauna containment needs of the site.

Crossings are provided within the Black Hill area of the corridor and comprise:

- Rope crossings which occur at CH300 and CH1250. These are provided to address the movement of Arboreal mammals including (Squirrel Glider, Sugar Glider, Common Brushtail Possum, Common Ringtail Possum, Feathertail Glider)
- Underpass which is incorporated under BR02, providing both local property and fauna access.

Strategies adopted to enhance the performance of these structures are:

- Maximising retention of existing trees and understorey vegetation in the proximity of crossings. This will enable rapid integration of rope crossings into movement corridors
- Revegetation of appropriate planting to provide both short term cover, as well as planting of canopy to provide a overall long-term structure and integration of the crossing into the adjoining vegetation community. Selection of species will be determined based on the need of fauna prioritised to use the crossing facility
- Provision of a clear zone on either side of fauna fencing, to avoid breaching fencing by shrub and tree growth immediately adjacent and to enable surveillance of condition of fencing.

6.17 Landscape Management

6.17.1 Maintenance

Maintenance and operation costs of urban design, open space, landscaping and recreational items is a critical consideration in terms of design treatments and the need for ongoing management. Decisions made during the design and construction phases 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 (LMP) 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. Following this period management will revert to TfNSW. The ongoing maintenance will be the responsibility of TfNSW, until satisfactory arrangements have been put in place for 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
- 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 TfNSW 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 will 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.

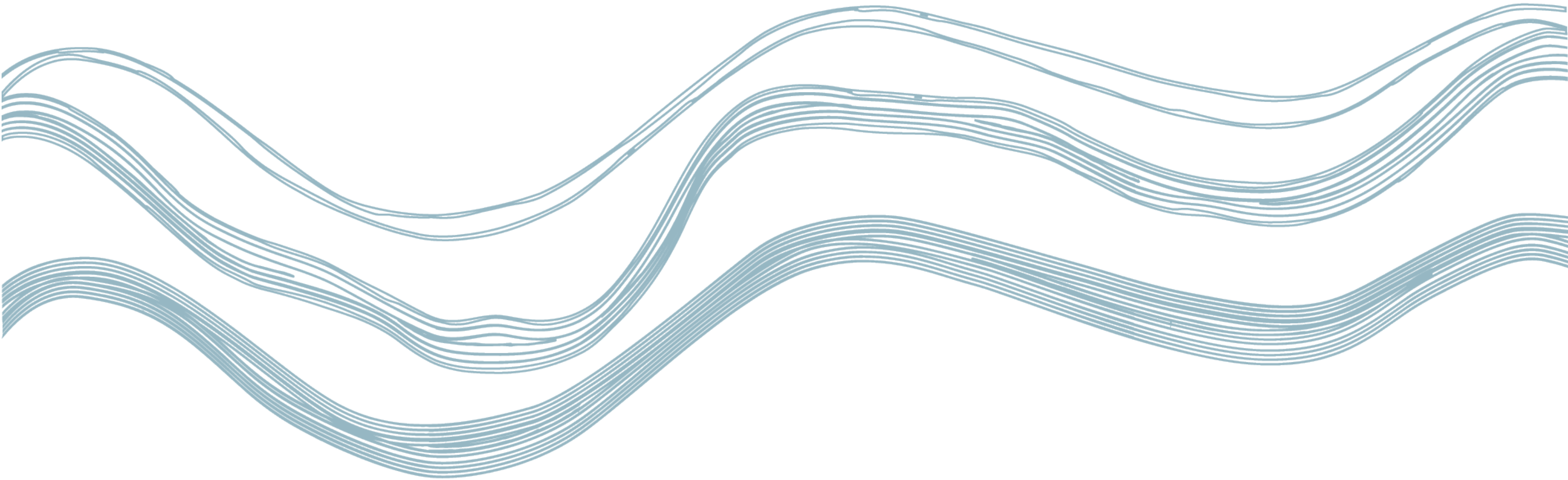


Figure 149: M12RT Waterways artwork, Saretta Art & Design

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	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	– Equivalent to rectangular pavers, 300x150x60min – Austral masonry Broadway 150 charcoal paver laid in stretcher bond pattern aligned parallel to abutment with a 300mm wide edgeing strip	
	Creek bridges	Informal rubble / crushed stone	– Recessive dark colour	– Varied sizes between 250-300mm – Stone rubble normally laid over the abutment batter under the bridge to provide a natural visual aesthetic and also provides for scour protection	
BR09 artwork	Paving infill	Crazy pavers	– Natural stone finish	– Sealant provided as a protective coating	
	Outline	Galvanised steel	– Galvanised and painted		
	Background	Concrete	– Painted: recessive dark colour equivalent to Domino GR10 / SG6G8 – Finishes: broomed		
HRBG Sculpture	Sculpture	Perforated and solid metal	– Corten look	– 4-10mm - subject to structural design development – Metal sculpture in a combination of perforated and solid metal to provide a Corten look	

Table 17: Materials and finishes

ELEMENT		MATERIAL	COLOUR / FINISHES	DESCRIPTION	IMAGE
Safety Screens	Base layer - Standard screen and posts	Hot-dipped galvanised (HDG)	– Galvanised steel	– Structure: HDG structural steel T-post – 50x50x4mm weldmesh panel – Safety screen system	
	Primary layer	4mm laser cut metal	Waterways theme: – Dulux Trade, '30BB10/337-Royal regatta 2' Wetland theme: – Interpon Stomboli GK148A or equivalent – Powercoated	– Laser cut with joining tabs – Aboriginal artwork overlay	
	Secondary layer	Mesh (size varies) Weldmesh - 25x25x4mm Weldmesh -12.5x12.5x4mm	– Interpon Black Stain GN150A or equivalent – Powercoated	– 25x25x4mm or lesser – Aboriginal artwork overlay	
Noise walls	Type 1	Timber panel	– Match existing wall colour	– 3m long planks – Aesthetic to match the existing timber noise walls	
	Type 2	RMP panels	– Similar to RECLI 2/186 DALARNA – Colour: RAL5008 'Grey Blue' and RAL7035 'Light Grey'	– 6x1m nominal – RMP noise wall with posts to match adjacent panel colour. Pattern arranged horizontally	
Retaining walls	Type 1	RSW panel	– Type 1 walls - Dulux Domino - GR10/high build acrylic paint – Finish: Concrete/Class 2X – Pattern: RECKLI 2/186 DALARNA	– 2x2m Precast panel – Paint to manufacturer's specifications – Panels to TfNSW D&C R57 Specification – Vertical arrangement	
	Type 2	RSW panel	– Colour: Painted concrete equivalent to Dulux Tranquil Retreat GR 24 / SN4G1 – Finish: Concrete/Class 2X – Pattern: RECKLI 2/186 DALARNA	– 2x2m Precast panel – Vertical arrangement	

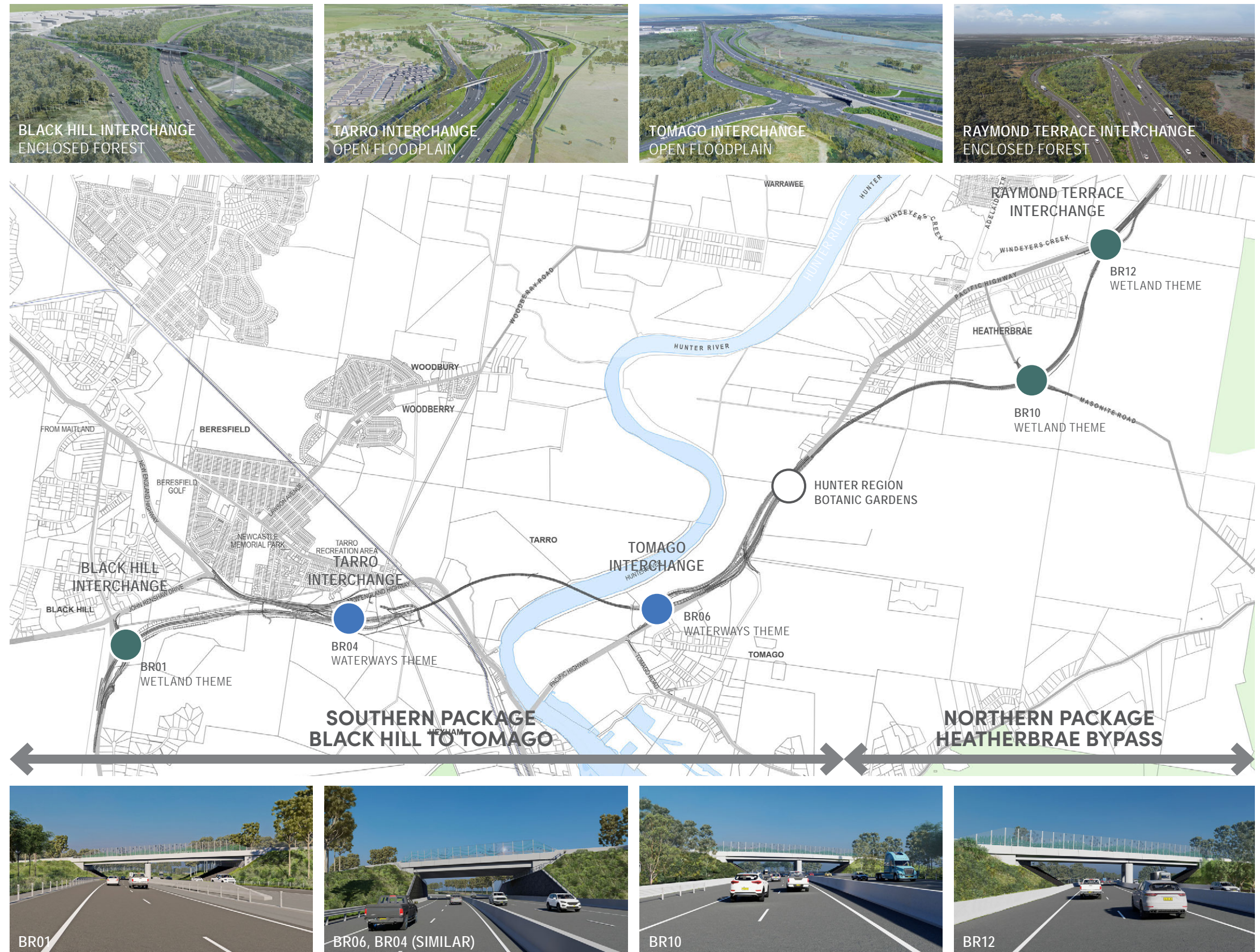
8. Conclusion

8.1 Integration between northern and southern packages

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

The urban design strategy responds to the Project 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 the surrounding environment, enhancing the linear identity of the motorway and providing lateral integration. The aesthetic of all overbridges which are experienced sequentially, have a similar appearance with the same treatments provided for the spill through abutments and blade wall abutments, piers and headstocks. The interpretive elements adopt the same overarching themes of the wetlands and waterways concept, and have been developed from a common palette, used in both packages. The Hunter Region Botanic Gardens explores the 'botanica' concept that enhances its connection to the Hunter River and provides a transition point to move from the enclosed forest experience into the open floodplain experience.

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



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

Figure 150: M12RT northern and southern packages integration

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



Figure 151: Aerial view of Tarro interchange, looking east

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 the Connection to Country and has been incorporated into various elements, including safety screens and the abutments at the Hunter Region Botanic Gardens entrance.

Innovative design solutions have been explored and incorporated including the use of rotational moulded plastic, which will help decarbonisation and reduce whole-of-life costs for Project assets. Opportunities for fauna crossings were also explored and incorporated to enhance biodiversity.

The Project will achieve the functional objectives of improving connectivity and enhancing the legibility for the M1 Pacific Motorway and New England Highway corridors; while also achieving a design that considers the natural environment, reinforces the waterways theme and captures the essence of the Hunter River.

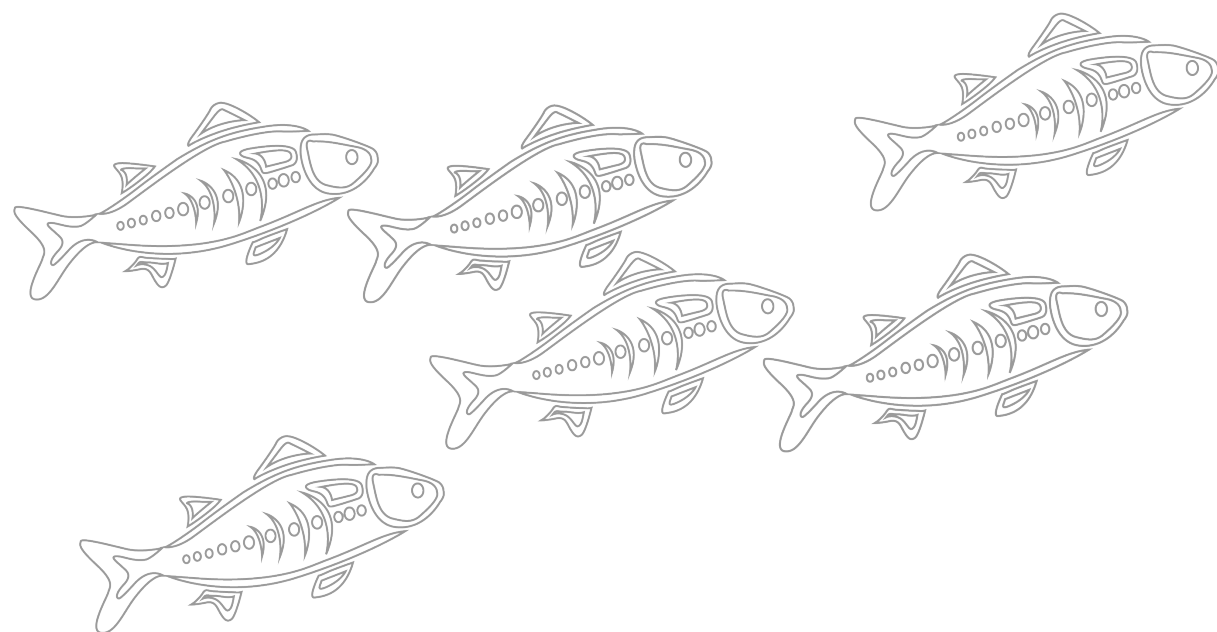


Figure 152: M12RT Fishes artwork, Saretta Art & Design

