Peacocke Infrastructure Project

CONCEPT LANDSCAPE MANAGEMENT PLAN

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NZ TRANSPORT AGENCY
WAKA KOTAHI

Hamilton City Council
Te kaunihera o Kirikiriroa

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1 Introduction

1.1 Purpose of Report

The Concept Landscape Management Plan (CLMP) has been developed for the Peacocke Structure Plan area (Project) on behalf of Hamilton City Council (HCC), as the Requiring Authority.

The CLMP has been developed in response to the Southern Links Designation Condition 6.0 requirements and has been developed in conjunction with NZ Transport Agency (NZTA) and the Tangata Whenua Working Group (TWWG).

The purpose of the document is to provide a platform for the integrated urban and landscape design requirements of the Project. It focuses on outcomes, principles and provides potential design responses (but avoids quantifying specific designs) for the subsequent detail design stage of the Project.

The CLMP provides an overview of the objectives and defines the design outcomes sought for the Project area. The cultural theme/narrative has been developed in conjunction with TWWG, which helps define the landscape and urban design interventions. The document provides clear directives in terms of the design outcomes sought for the various project components, including cycleway and pedestrian requirements, bridge design elements, landscape and ecological interventions and stormwater management.

The CLMP will be further developed during the detailed design phase and will be in accordance with Southern Links Designation, condition 14.0.

It is intended that the CLMP will be used by:

- HCC to approve the initial concept to enable monitoring and management of the subsequent stages of design development to ensure the Project meets HCC policy and technical requirements
- Designers of the detailed design and construction phase of the Project as a reference and guiding document in relation to the Project objectives, urban design and landscape opportunities, design approach and outcomes sought
- NZ Transport Agency and HCC to ensure that the during the detailed design, consenting and construction phases the Project maintains alignment to the Project's objectives and design intent.
- TWWG and iwi to be able to work with the design professionals and to help deliver culturally sensitive narrative outcomes

1.2 Requirements of the Concept Landscape Management Plan

The provision for a CLMP relates to the Southern Links Designation, Condition 6.0 and is required to be lodged (in accordance with Condition 2.0) prior to the lodgement of any outline plan of works. In addition, the CLMP will also have regard to the natural character policies of the Waikato Regional Policy Statement, as required by Condition 6.4.

The CLMP is a technical document that aims at providing sufficient information to remove any ambiguity of the design requirements and to provide a clear rationalisation of the design process that will be utilised during the detailed design process. Although, the CLMP addresses the HCC component of Southern Links, by necessity it also discusses the integration of the Project at a wider (HCC and NZTA) project level.

As per Condition 6.2, the objective of the CLMP is to provide an overview of the landscape and urban design approach, which will be subsequently developed into a fully detailed Landscape Management Plan (LMP) as the Project design progresses. In addition, the CLMP

As required the CLMP will include the following:

- A vision statement
- An outline of the landscape and urban design themes to be adopted for the entire Project including overbridges and noise barriers
- An outline of the landscape and urban design elements, including hard and soft landscape materials, planting types, sizes and spaces
- Concept landscape plans showing the design scheme, and
- Planting management and maintenance requirements

In addition, the CLMP will be in general accordance with the indicative landscape and mitigation measures and urban design proposals outlined within the Southern Links Urban Design and Landscape Framework prepared by Opus, dated 5th August 2013.

The CLMP has also been developed in consultation with the Tangata Whenua Working Group (TWWG) and NZTA, which is an ongoing requirement during the detail design stage(s).

1.3 Methodology

The approach in preparing the CLMP has included:

- Undertaking a series of site visits
- A desk top study of previous documentation, structure plan requirements and HCC policy
- Undertaking a series of consultation meetings with key stakeholders and technical meetings with Council to ensure suitable collaboration and inputs have occurred

- Identifying key aspects of the project and determine the design outcomes that need to be considered by the technical teams. Identify opportunities for design integration can be achieved to deliver preferred design solutions
- Defining the urban design and landscape requirements with directives in how the design should evolve in the next phases of the project

1.4 Project Overview

Hamilton City is currently experiencing high growth with indications that Hamilton is well on the way to being a city of 200,000 residents. The projected population growth requires HCC to progress the Peacocke residential development area within the time frame of the 2018-2028 Long Term Plan. The strategic infrastructure project falls within the Peacocke Structure Plan, which is located 5km to the South of Hamilton City and is zoned for urban development. The Peacocke Structure Plan provides the framework to guide the infrastructure programme and subsequent urban development within the area. Additionally, the infrastructure associated with the Peacocke area forms part (Sector 3) of the Southern Links Network and is governed by the designation conditions and requirements.

SITE DESCRIPTION
From Cobham Drive the Transport Network follows the Waikato River terraces south, crossing the deeply incised Mangakotukutuku Stream Gully, then skirts the lower flanks of the low lying hill country near Hall Road. The Main Arterial traverses south across rolling topography crossing the Mangakotukutuku Gully and cuts through low level ridges (beyond the Project area) to connect with the proposed Southern Links Central Interchange. The Minor Arterials traverse the river terraces along the existing Peacocke Road and also traverses the rolling landscape with gully systems to connect with Ohaupo Road.

The Peacocke area is dominated by two large physical features being the Waikato River and the Mangakotukutuku Gully with the landscape being predominantly undulating. Varied soil types occur across the area and typically comprise of soft silt and organic material of varying depths, which overlay Hinuera formation. The area has pumiceous sands and tephra ash that are associated with the Taupo formation and gives rise to free draining yellow pumice loams.

The land use currently supports a range of activities including market gardening, cattle and dairying plus a mix of lifestyle properties, although remnant stands of kahikatea occur within the landscape and are important for biodiversity while providing a strong visual character to the area. Vegetation cover has largely been modified to pastoral land although the Waikato River edges and Mangakotukutuku Gully has a high biodiversity and ecological value compared to other streams in and around Hamilton. The gullies support a variety of common native bird, invertebrate and reptile species and provide important foraging, commuting and roosting habitat for long-tailed bats.

1.5 Project Components

The Project involves the following components:

- Waikato River Bridge, which will be a four lane landmark structure that will incorporate utility services.
- Three bridge crossings of the Mangakotukutuku Gully
- Major north-south arterial transport corridor with signalised intersection at Peacockes Road including pedestrian underpass
- Four lane extension of Wairere Drive to Peacockes Road
- An upgrade of the existing Peacockes Road from a rural road to an urban collector road
- An upgrade of the existing Weston Lea Drive from a rural to an urban road
- New stormwater treatment devices and discharges to stream and river
- Cycle and pedestrian network and facilities, including provision for paths beneath bridges
- Landscape ecological restoration and amenity planting
- Open space integration
- Cultural sensitivity and development of an appropriate cultural narrative
- Noise mitigation (subject to further investigation)

In addition to the above, special areas of interest include the interface between urban and rural, the proximity to cultural sites such as Hamilton Gardens, Pa site and archaeological sites. The protection and enhancement of the Waikato River environment and maintenance of views are important considerations. Where possible consideration will be given in relation to future development that will occur in the area to ensure the Project's design proposals integrate.

2 Stakeholder Consultation

2.1 Introduction

To ensure the Project encompasses the requirements of stakeholders, a series of stakeholder consultation meetings have been progressed during the development of the CLMP. It is envisaged that engagement with stakeholders will continue through detail design stage of the Project to ensure the themes and design details fulfil stakeholder requirements.

The aim of the consultation is to understand the aspects or requirements of the various stakeholders and to ensure where practicable that the requirements are incorporated into the Project.

2.4 Mana Whenua Liaisons, Taangata Whenua Working Group (TWWG)

A number of consultation meetings have been organised in relation to the Project, which have aimed at the following:

- Undertaking a cultural mapping exercise to define the historic locations and landmarks that are important to iwi with the aim of integrating these aspects into the project
- The development and confirmation of the design theme (extending the initial theme from the Wairere/Cobham Drive interchange project and the Dixon/Ohaupo Road Roundabout project), which encompasses the idea of movement networks, trading and reference to habitation and garden activities
- Specific intervention mapping, which aims at identifying key areas where cultural design interventions can be incorporated

It is envisaged that material developed in the concept stage will be further developed during the detailed stage of the Project with additional consultation meetings to agree specific detail design elements.

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2.2 Hamilton City Transport, Parks and Open Spaces Department

Consultation with the HCC Transport, Parks and Open Spaces Units has focused on the extent, selection and long-term maintenance requirements of the planted areas, open spaces and evolving thinking on cycling provisions. Therefore, the focus is on the selection of a robust palette of planting to suit the visual amenity areas of the project, which will balance with the re-vegetation requirements of the gully and other habitat creation initiatives. Discussion around how the Project can help fulfil the HCC Gully Reserves Management Plan have been undertaken. In addition, safety and access requirements will also be covered for the general maintenance plus access to wetland ponds for periodic maintenance.

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2.5 Consultation with NZTA

Consultation with The Agency has been undertaken with NZTA's Urban Designer with a focus on the integration of multi transportation modes, landscape and urban design interventions and cultural engagement. Input into bridge designs will also be sought to ensure a suitable design outcomes are achieved.

AECOM

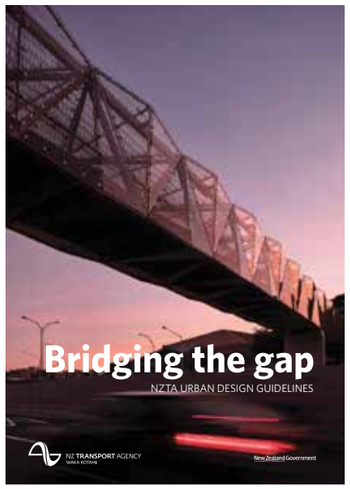
2.3 Ecological Consultants - AECOM Environmental Monitoring and Management Plan (EMMP) Team

AECOM have undertaken additional studies in relation to the ecological values of the Southern Links Project, which has also covered the Peacocke area. Therefore, consultation has focussed on the extent of findings from monitoring, habitat corridors and the ecological mitigation requirements to maintain and improve habitat and biodiversity values of the area.

3 Design Context

3.1 Policy and Guiding Documentation

The Project encompasses both the Hamilton City Council and NZ Transport Agency suite of documents, which include Statutory and Non-Statutory Documentation, The Peacocke Structure Plan, Urban and Landscape Design Guidelines and Specifications, as outlined in the table below. These documents provide the high-level design requirements with more technical detail within the technical specifications, which have been integrated where relevant into the CLMP.



(Figure A-31) Reference Document Examples

3.2 Reference to Statutory and Non Statutory Documents

Document Name	Organisation	Year
Environmental and Social Responsibility Manual	NZTA	2014
NZTA Landscape Guidelines	NZTA	2014
Bridging the Gap, NZ Transport Agency Urban Design Guidelines	NZTA	2013
PSG/12 Urban Design Professional Services Guide	NZTA	2010
NZTA P39 Standard Specification for Highway Landscape Treatments	NZTA	2013
NZTA Cycling Network Guidance – Planning & Design Guide https://nzta.govt.nz/walking-cycling-and-public-transport/cycling/cycling-standards-and-guidance/cycling-network-guidance/	NZTA	
Te Aranga Maori Cultural Landscape Strategy	NZTA	2008
Urban Design Principles publications • Noise walls • Landscape Design • Road Bridge Guidance Notes • Underpass Guidance notes	NZTA	2009
New Zealand Urban Design Protocol	MfE	2005
Guide to Road Design (Part 6)	Austroads	Current version
Regional Infrastructure Technical Specifications (RITS)	Waikato Local Authorities	2018
Waikato Regional Policy Statement	WRC	Updated 2018
Southern Links Urban Design and Landscape Framework	Opus	2013
Hamilton Biking Plan 2015 – 2045 Our Vision; A Bike Friendly City	HCC	
Auckland Transport Code of Practice	AT	2013
Hamilton Arts Agenda	HCC	2015
Hamilton Gateways Policy V2 (review due in Oct 2018)	HCC	2015
Hamilton City Council Streetscape Beautification and Verge Maintenance Policy	HCC	2012
Gully Reserves Management Plan	HCC	2007

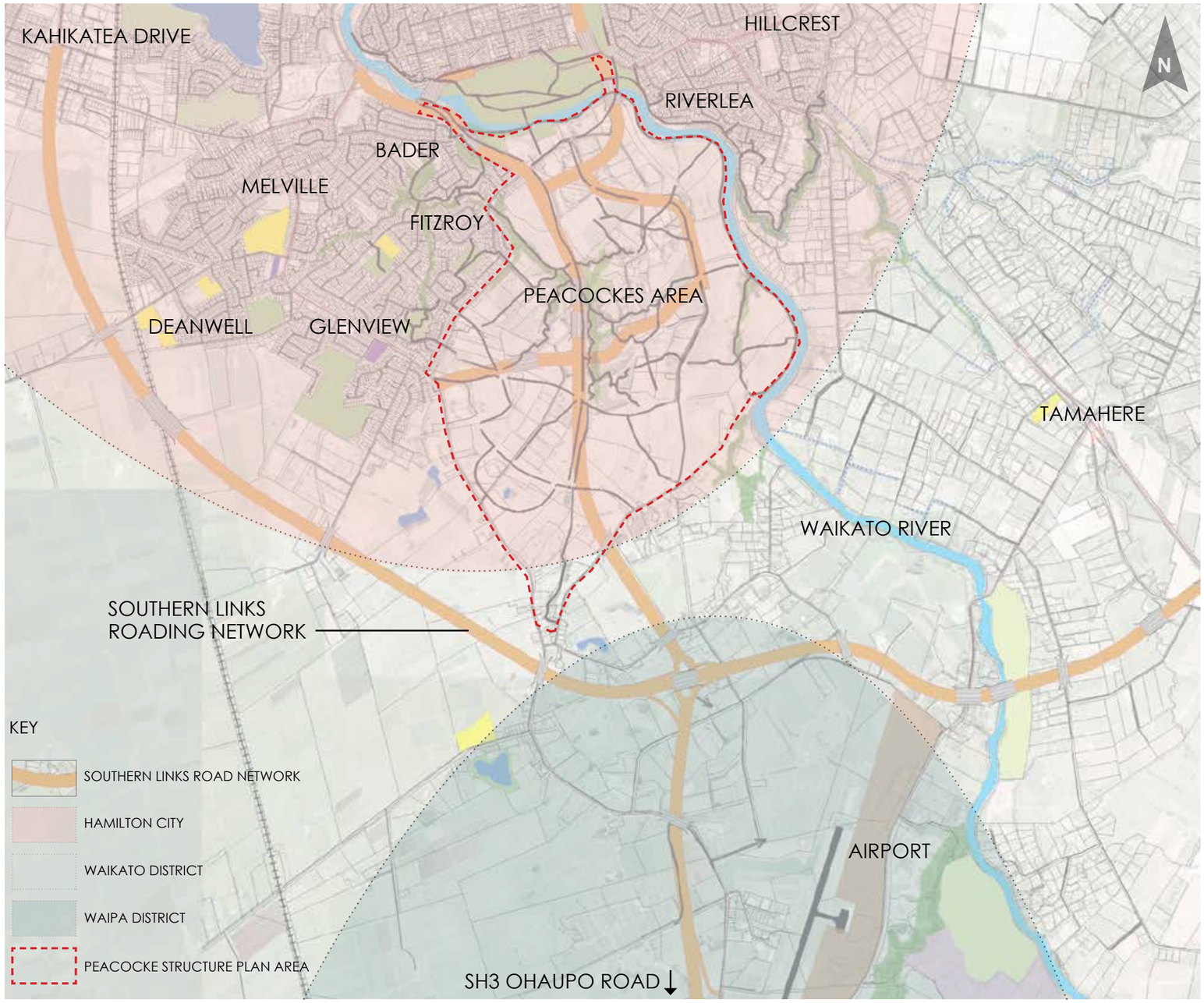
3.3 Southern Links

The Southern Links Network involves 32km of future transport network, including 21km of state highway (straddling Waipa District, Hamilton City, and Waikato District) and 11km of urban arterial roads located near the Peacockes area of Hamilton City. Once completed it will link SH1 from Kahikatea Drive in Hamilton to Tamahere and the Waikato Expressway in the south and SH3 from Hamilton International Airport to central and east Hamilton. The urban arterials will establish the key transport network within the Peacocke growth cell and become the building blocks for future urban development.

SOUTHERN LINKS OBJECTIVES

As outlined in the Southern Links ULDF, the key considerations/ objectives of the project include the following:

- Contribute to HCC Policy (refer to Section 3.2 Reference documentation)
- Contribution to NZTA's objectives and environmental policy (refer to Section 3.2 Reference documentation)
- Contribution to the objectives of the Waikato Expressway by improving journey times and reliability, easing congestion, improving transport connections for economic growth, access to markets, transport efficiency and road safety
- Incorporate NZTA Urban Design Policy and Urban Design Protocols, HCC and Waipa DC Structure Plans and Future Proof Strategy



(Figure A-330) Southern Links

- Utilise Urban Design Principles to develop an integrated design solution combining traffic, civil engineering, urban design, landscape ecology, stormwater and heritage aspects, with these aspects being brought together and opportunities developed and enhanced
- Avoid, minimise and mitigate adverse environmental, cultural and social effects
- Improve the residential, industrial and retail environments within Hamilton City, in particular Hillcrest, Melville and Hamilton East in accordance with the principles of good urban design
- Develop appropriate road hierarchies that will respond to future development and expansion of the city; and
- Improve options for public transport, walking, cycling and demand management, both within the City and the District Council areas adjoining the City.

These aspirations align with the Hamilton Urban Growth Strategy and Peacock Structure Plan, which looks to integrate the growth of the city with the development of the area.

SOUTHERN LINKS VISION

As outlined within the ULDF, the overarching vision is to provide an environmentally sensitive, multimodal network that 'sits' within the landscape while providing a clear hierarchy of elements, forms and textures.

The vision seeks to progress design that is sensitive to the environment and provides an integrated design approach. The project aims at integrating the following:

- The aesthetic response to the areas context/character
- Existing landscape views and elements
- Drainage and stormwater management
- Cultural and heritage aspects of the area
- Communities and their connectivity to local services and facilities
- The integration of all engineered aspects of the network
- Urban design strategies and interventions, particularly of bridges and structures; and
- Consideration to the areas ecology and biodiversity

(Figure A-33) View across West-East Minor Arterial and the North to South Main Arterial

3.4 Peacockes Structure Plan

3.4.1 Overview

Hamilton City Council has developed the Peacocke Structure Plan, which outlines the design outcomes for the future development of the area. It incorporates the urban and landscape design requirements for both the infrastructure design and the future residential development. The focus for development in the area aims at providing a well-integrated design that supports multimodal transport modes, well considered open spaces and links well into the existing built and natural fabric of the area (refer to Figure A-342 below).

The key Peacocke Objectives and Policies relevant to the infrastructure project include (but are not limited to) the following:

- Protect and enhance significant natural areas
  - This includes protecting the physical integrity and ecological and stormwater function of the Mangakotukutuku Gully and Waikato River
  - Provide for re-vegetated gullies and river margins
  - Manage stormwater to minimise the effect of development on the Mangakotukutuku stream values
- Create ecological and open space links between gully and river
- Integrate movement routes with surrounding neighbourhoods to promote a high degree of connectivity both within and out of the Structure Plan area
- Create a continuous network of open space
- Protect historic and culturally significant sites or features
  - Respect known pa sites, borrows pits and other cultural associations with waterways and the land, through the creation of protective reserves

3.4.2 Transport Network

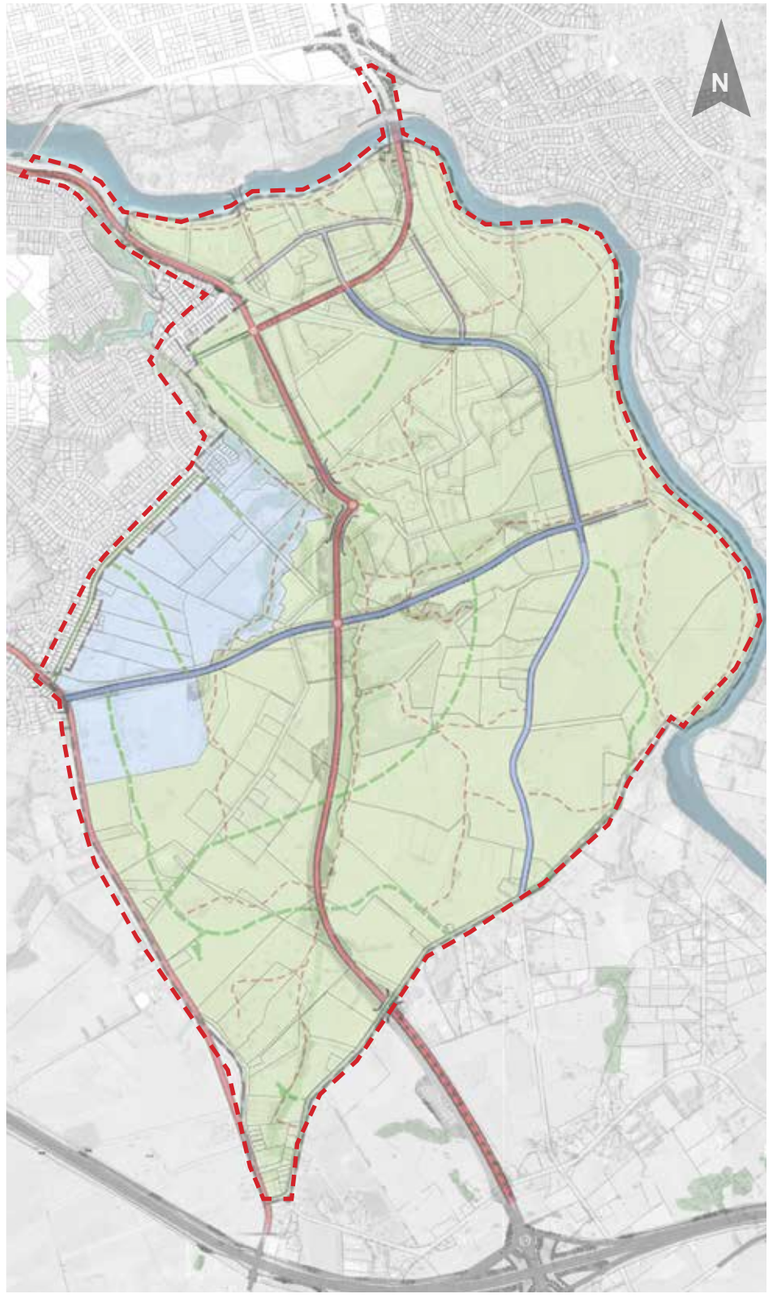
A fundamental urban design principle is the ease of movement to ensure well connected communities. It is essential that transportation routes are designed to give priority to walking and cycling, and facilitate a seamless web of direct and efficient passenger transport routes that connect neighbourhoods with the central area of the City and other key destinations. In considering the final alignment of the Transport Network the alignment of transport routes needs to be taken into account, as identified in Volume 2, Appendix 2, Figure 2-2 Peacocke Structure Plan Staging and Transport Network.

The transport network (refer to Figure A-342) shown on the Structure Plan is indicative and not intended to show exact alignments. Collector roads in particular are shown conceptually to provide key linkages between different residential neighbourhoods. Their precise alignment will be largely determined as individual subdivisions are progressed.

The transportation network is made up of the following:

- A walkway/cycleway network which wherever possible has been developed as a segregated network (i.e. separated from the carriageway),
- An arterial transport network which links destinations, and
- A collector road network which serves to connect residential neighbourhoods together as well as to the arterial roading network.

The distribution of roads across Peacocke is based on this hierarchy through linking key nodes and provides a logical passenger transport network. While in the foreseeable future this will be based on buses, it is intended that the arterial routes can potentially accommodate alternative modes of transport such as light rail.



(Figure A-342) Peacockes Staging and Transport plan

3.5 Cultural and Physical Context

3.5.1 Matauranga Maaori - Background Documentation

Documentation associated with the Southern Links Designation Project and Peacocke Structure Plan provide an important cultural context in relation to the development of the CLMP and project in general. The reports illustrate the connection and knowledge that the Maaori communities, iwi, hapu and whanau have for the area and expresses their specific observations and interactions they have with the environment and the natural world in which Maaori have existed for generations. Therefore, Matauranga Maaori can be integrated to inform the (landscape) design and development of project area and to allow Maaori aspirations to be fulfilled to achieve quality environmental outcomes.

To this extent the Tangata Whenua Effects Assessment Report (TWEAR) provides useful guidance in that the Maaori world view takes into consideration the entirety of the environment as living breathing entity. Further to this Ngaati Koroki Kahukura holds mauri as the cornerstone of life. A weak ecosystem will result in weakened mauri. The opposite can also be said; that a strong vibrant self-sustaining ecosystem equals strong vibrant mauri. Therefore, to ensure the well-being of the environment the TWEAR report highlighted concerns in relation to the effects of development and construction in relation to:

- Waahi Tapu
  Concerns in relation to the possible destruction/damage/ attrition that may befall waahi tapu sites of historical/ significant interest
- Waterways
  The effects on gully systems and their associated waterways in the rohe, which must be protected as far as possible during the construction and operation of roading projects. To protect the mauri of water and ecosystems the preference for no culverts within streams, no bridge piers are to be embedded within waterways and flood plains and that construction must be undertaken in such a way that minimal sedimentation and /or contamination are allowed to enter the waterways.
- Flora and Fauna
  Of particular interest is the management and well being of aquatic species, bats and birds, insect life, source of mahinga kai and native plants especially the long-term management of taonga species, which many uses were derived from.

The requirements of consultation in the development of the CLMP and subsequent detail design stages (including Landscape Management Plans as required under Condition 14.0) will ensure the Project supports and promotes co-ordinated, co-operative and collaborative approach to natural resources, environmental management, restoration and care within the Waikato-Tainui rohe.

3.5.2 Designation Conditions and Iwi Engagement

In accordance with the Southern Links Designation Condition 6.0 the CLMP shall be developed in consultation with (NZ Transport Agency and) the Southern Links Tangata Whenua Working Group (TWWG).

The requirement aims at ensuring the successful implementation of Matauranga Maaori, including kaitiakitanga (stewardship) in the design of the project. It seeks to ensure:

- The engagement of the TWWG into the project will enable representation from the local hapu stakeholders to identify and inform solutions relating to landscape design, environmental management, construction methods, artworks and cultural heritage management (wahi-tapu/wahi taonga)
- Design solutions are informed by Matauranga Maaori, ensuring context specific outcomes draw on local knowledge and interpretation through a consultation process that spans the duration of the project
- The design solutions meet the expectations of Maaori pertaining to kaitiakitanga particularly in relationship to monitoring requirements, plant species selection, mahinga kai, cultural harvest, biodiversity, ecological enhancement and the sustenance of mauri (life force)

(Figure A-351) Images of Landscape and Cultural Influences

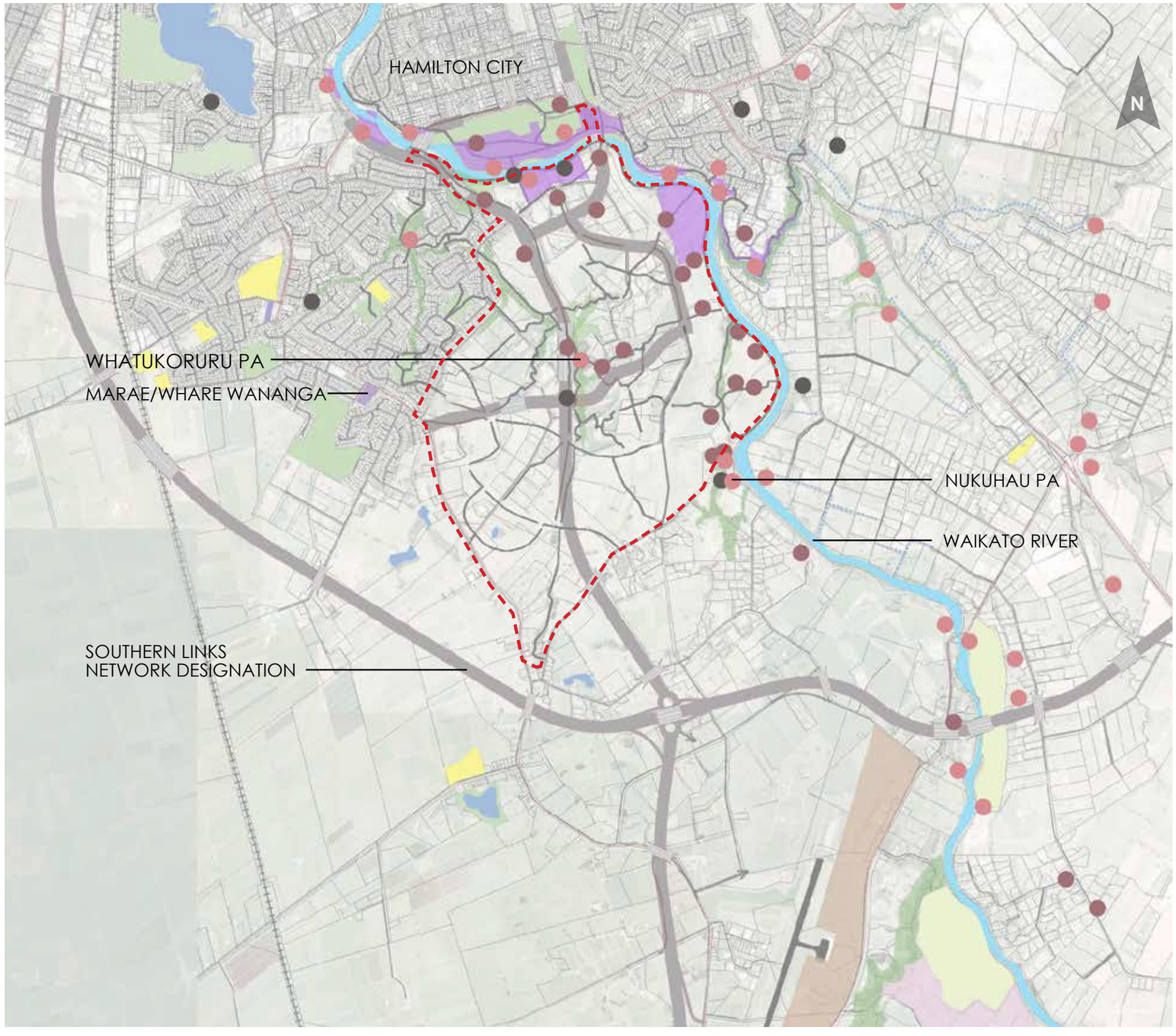
3.5.3 History and Heritage

The Cultural Map (Figure A-353) identifies a number of archaeological features located within the area to the south of Hamilton City.

The main archaeological sites are recorded to the north and east of the proposed Road Network and are mostly associated with the Waikato River and gully systems. The majority of sites are Maaori pa and borrow pits with all of the recorded borrow pits being attributed to pre-European horticultural activity. The recordings are relatively common within the Waikato basin and illustrate the extent of Maaori habitation within the area.

Whatukoruru Pa, a historic reserve is located between two arms of the Mangakotukutuku Gully near the end of Peacockes Lane. Some visible remnants of the Nukuhau Pa can be found near Stubbs/Gainsford Road. A further historic Pa is located next to the water treatment plant on Peacockes Road.

Borrow pits are often physically notable on the ground, either by dish-shaped hollows or by changes in soil colouration, the latter caused by infill with a different soil matrix than that which occurs naturally in the immediate surrounds. Borrow-pits were quarries for the extraction of underlying gravels occurring below the subsoil. Garden soils are identified by modifications to the natural matrix, often by the introduction of gravels, charcoal, and other foreign components. The gravels in garden soils have come from the borrow-pits, and were introduced to increase drainage and soil temperature and enable kumara growth.



KEY

- SCHOOLS
- HAMILTON AIRPORT
- MYSTERY CREEK
- PARKS & RESERVES
- PEAT LAKES
- PEACOCKE STRUCTURE PLAN AREA
- GULLY
- MAORI HORTICULTURE/ BORROW PITS
- PA SITES
- OTHER ARCHAEOLOGICAL SITES
- OPERATIVE DISTRICT PLAN ARCHAEOLOGICAL SITES

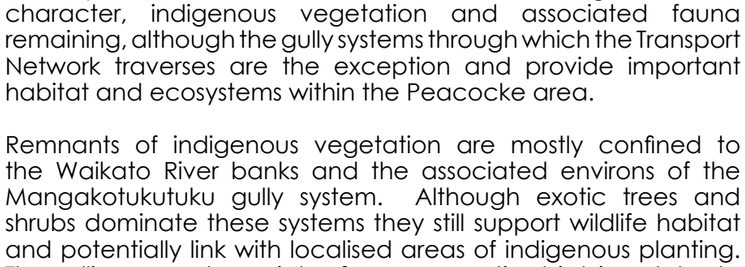
(Figure A-353) Cultural Map

3.5.4 Ecology and Vegetation

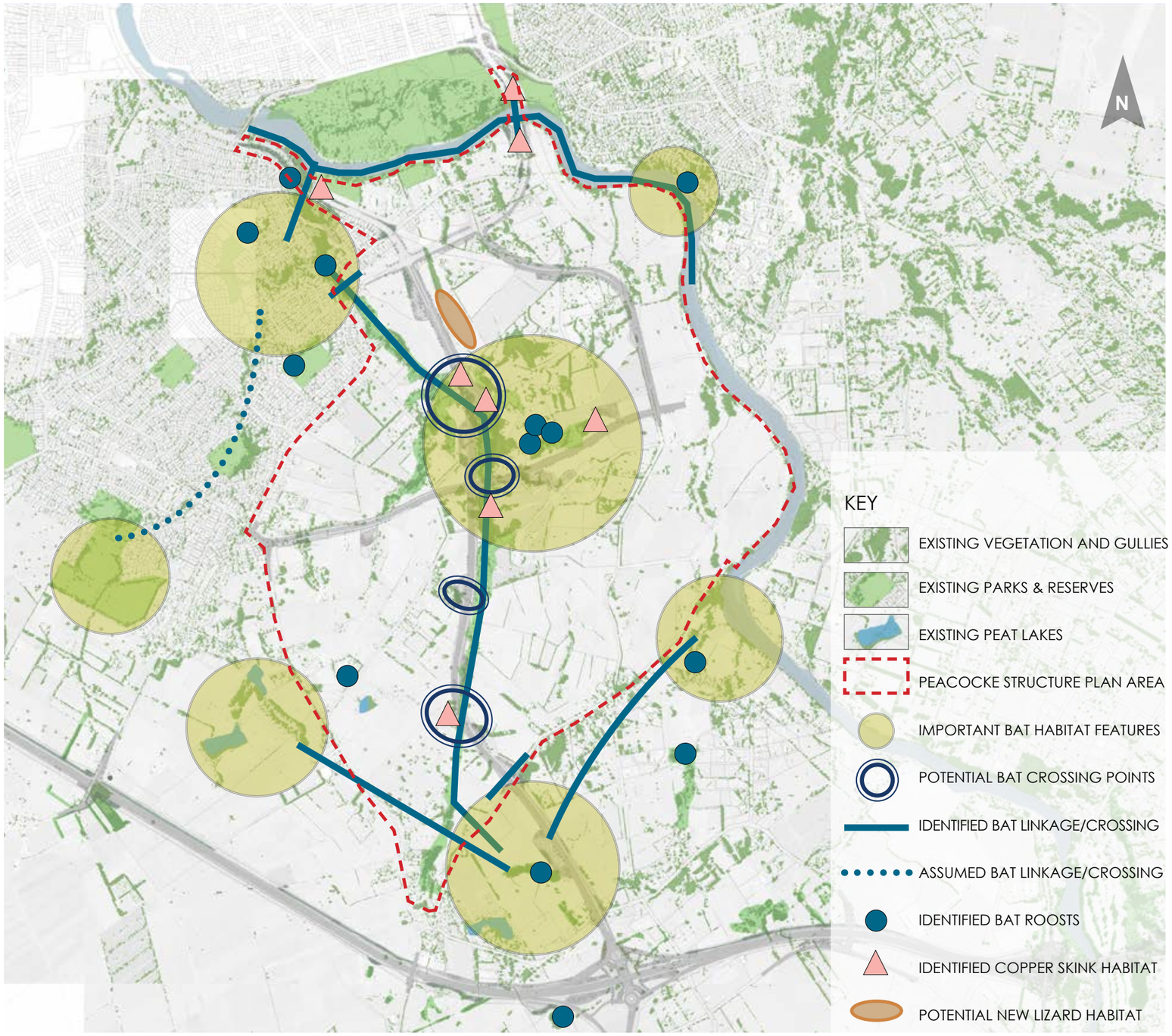
The majority of the Project corridor has been highly modified by agriculture and currently to a lesser degree residential development. This has resulted in little of the original natural character, indigenous vegetation and associated fauna remaining, although the gully systems through which the Transport Network traverses are the exception and provide important habitat and ecosystems within the Peacocke area.

Remnants of indigenous vegetation are mostly confined to the Waikato River banks and the associated environs of the Mangakotukutuku gully system. Although exotic trees and shrubs dominate these systems they still support wildlife habitat and potentially link with localised areas of indigenous planting. The gullies support a variety of common native bird, invertebrate and reptile species. In addition, they provide important foraging and roosting habitat for long-tailed bats. The presence of significant numbers of mature trees in the gullies is of particular importance, as these provide the necessary cavities and split bark niches where bats can roost. Interestingly, mature exotic trees are as important as native trees in this regard.

The Waikato River and the Mangakotukutuku stream are the main natural watercourses crossed by the Transport Network, although several other even smaller courses are crossed with little natural character, appearing simply as drainage ditches. The Mangakotukutuku Stream has high biodiversity and ecological values compared to other streams within and around Hamilton City. Nationally threatened species including Giant Kokopu and long-fin eel are found in good numbers in the shaded parts for the stream. The invertebrate community within the stream is diverse and contains mayfly, caddis fly and abundant koura (freshwater crayfish).



(Figure A-354) Examples of Local Wildlife



(Figure B-354) Ecological Features

3.5.5 Topography and Stormwater

The topography of the Peacocke area includes the Waikato River terraces, the incised Mangakotukutuku Stream Gully and the rolling hillscape in and around Hall Road. The undulating landscape provides natural drainage slopes that feed into both the Waikato River and Mangakotukutuku Stream with other minor catchments occurring across the landscape. Ground water levels typically vary across the site with shallow depths (0m to 2m) related to the Hinuera formation, swamp deposits and recent alluvium, with deeper levels associated with Puketoka/ Karapiro Formation.

Stormwater drainage and management has been developed to respond to the undulating topography and variable soil types. These factors have influenced the design and form of drainage system, but stormwater management aims at providing an integrated design solution to manage water quality. The map (Figure A-355) indicates the likely location of stormwater devices, which will use kerb and channel to direct water from bridges and roads to swales and wetlands for treatment prior to the water being discharged into streams and river. It is anticipated that during the detail design stage of the Project, adjustments to the size and location may occur to best suit the ground conditions, topography and residential development.

It is expected that other stormwater management devices will be incorporated into the Peacocke Structure Plan area to service urban development.

KEY

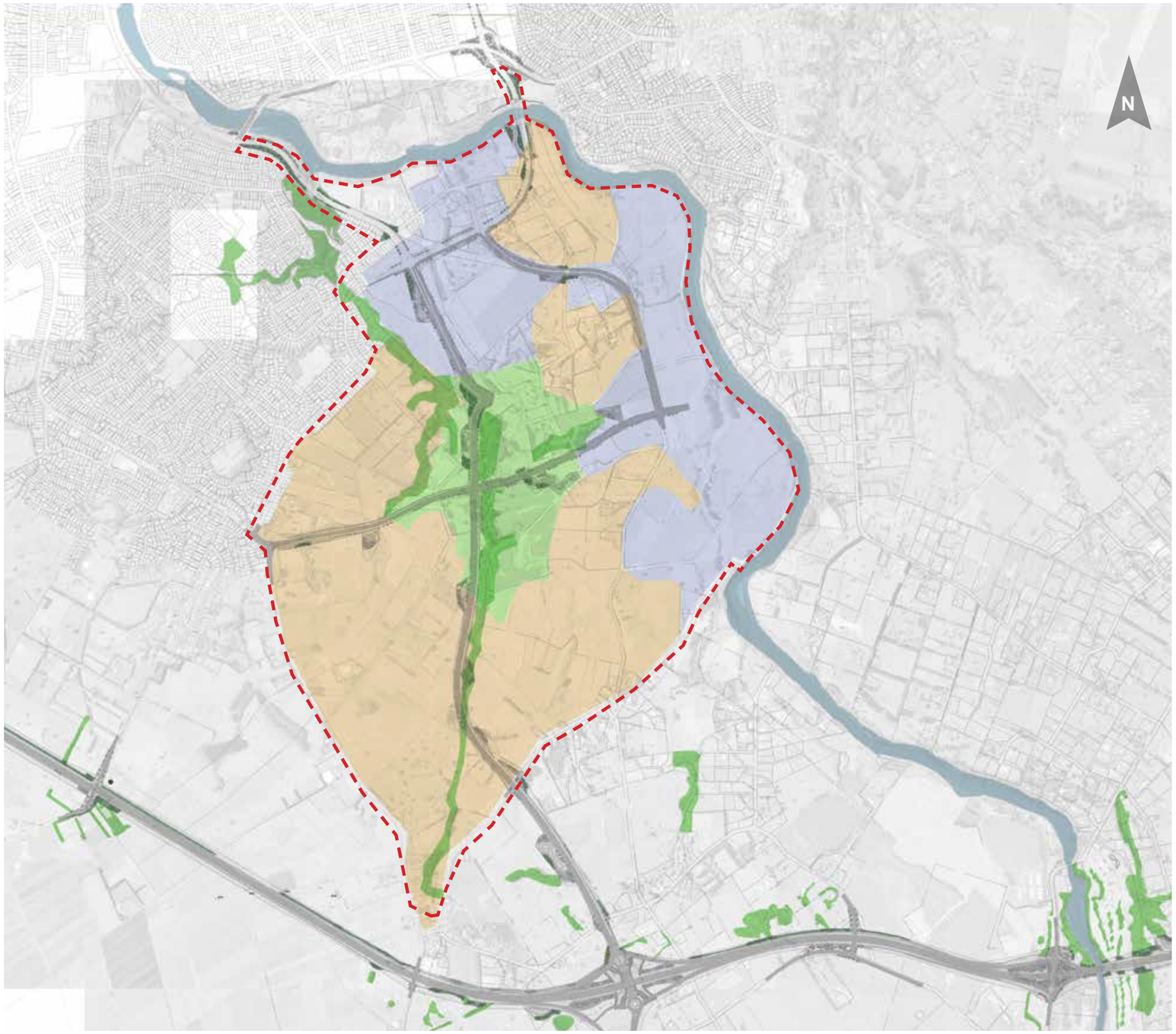
- EXISTING VEGETATION
- EXISTING PARKS & RESERVES
- EXISTING PEAT LAKES
- EXISTING GULLY
- POTENTIAL STORMWATER POND & WETLANDS
- SOUTHERN INKS STORMWATER DEVICES
- PEACOCKE STRUCTURE PLAN AREA

(Figure A-355) Topography and Stormwater Devices

3.5.6 Landscape Character Areas

The Peacocke Structure Plan identified three broad character areas, which include terrace, gully and hills as shown in Figure A-356 (For cross reference, refer to Structure Plan Volume 2, Appendix 2, figure 2.3).

The area adjacent to the Waikato River comprises predominantly of flat terrace environment. The gully environment is typically associated with the Mangakotukutuku Stream and gully environment which runs in approximately a north to south direction. Two areas of hill environment occur to the north with the southern area of the Peacocke area being rolling hill environment. Currently land use and vegetation types vary across the area, but is predominantly pastoral with hedgerows and shelter belts that predominantly contain large exotic trees. Native vegetation is typically associated with the gully system, although some remnant stands of kahikatea are scattered across the landscape. Views vary depending on topography and vegetation, but more expansive views can be obtained from the rolling hills to the south.



(Figure A-356) Landscape Character Areas

4 Network Design Strategy

4.1 Design Principles

The following broad principles have been developed to align with Hamilton City Council (HCC) and NZ Transport Agency (NZTA) requirements, which also aligns with the Southern Links project and other projects such as the Wairere/Cobham Drive interchange and the Ohaupo/Dixon Road projects:

The Design Principles include:

- Ensure an integrated transport network, linking the Hamilton Ring Road with the current SH1 and future Peacocke area to improve access and safety for all road users
- Integrate adjacent land uses with particular focus on the integration and maintenance of the surrounding open space
- Reduce congestion and improve journey time reliability and provide efficient traffic flows in and around Hamilton
- Support a wider range of transport choices through the provision of safe and user-friendly cycle and pedestrian facilities and bus lanes
- Improved access for public transport users
- Ensure integration with future infrastructure projects
- Incorporate significant cultural aspects of the area into the Project
- Incorporate design treatments that moderate the scale of the Project while providing quality aesthetic design outcomes that contribute and reinforces the character of the area, and
- Contribute to the ecological enhancement to increase habitat and improved water quality

4.2 Landscape and Urban Design Objectives

To support the vision and design principles the following objectives have been developed for the Project. Although the Project area has it has its own specific context and features, the design strategies and objectives remain consistent with the Southern Links ULDF requirements and will be carried through to the detail design stage.

The design approach to developing the urban and landscape design elements will ensure the Project achieves a robust and integrated transport network that is attractive, coherent, durable and innovative. Secondary elements and detailing are part of the integrated design and will be key in contributing to the area's character.

Objectives include:

- Ensure high design quality of the transport network in terms of amenity, aesthetics of the experience, accessibility, safety and landscape context
- Create a transport network that is sympathetic to the wider landscape and integrates with the landscape and land uses
- Urban design treatments of bridges and abutment structures will contribute to the character of the area
- Design earthworks and structures to complement the surrounding landform
- Relate to the future development proposal within the area
- Connect, retain and improve access between the existing built environment, open spaces and future development
- Integrate storm water design and ecological planting in an informal/'natural' manner
- Incorporation of a safe, user friendly cycling and pedestrian network that links to existing and proposed facilities
- Provide a robust and integrated planting design that is ecologically beneficial, attractive, coherent, durable and innovative
- Ensure secondary elements and detailing are part of the integrated design
- Consideration and integration of local community, cultural and heritage aspects
- Integration of highway and open space furniture, for example street lights, seating and signage, and
- Consideration to both short and long-term maintenance requirements

(Figure A-41 Example of Integrated Design Approach

4.3 Crime Prevention Through Environmental Design (CPTED)

The Project will encompass CPTED principles with the aim of providing a safe environment that minimises the incidence and fear of crime. The key areas where CPTED principles will be applied relate to public paths and cycling facilities and open spaces where users are most vulnerable.

The CPTED principles that will be applied include access, surveillance and sightlines, layout, activity mix, sense of ownership, quality environments and physical protection have been incorporated into the Project. The following provides a brief description on how these will be incorporated into the Project:

1. Access:
Clear and logical entrance and exit points with a hierarchy of paths that include HCC signage/wayfaring markers at key entrance points

2. Surveillance and Sightlines:
Where possible vegetation type and location will be arranged to provide views/passive surveillance from the transport network and adjacent residential properties. Paths will include forward views and low growing plant species to minimise concealment opportunities

3. Layout:
Path layouts and open space will be intrinsically linked to ensure long views, alternate 'escape' points and clear route options. Path nodes will be located to afford surveillance from adjacent areas with lighting included on primary paths. Wayfaring signage is also integrated at key locations.

4. Activity Mix:
Where possible, paths and adjacent facilities/properties will be considered to provide a mix of activities and provide visual links where possible to provide a sense of security.

5. Sense of Ownership:
The Project will incorporate Hamilton City's suite of furniture to ensure robustness plus ease of maintenance/replacement. Key areas include pocket parks located near the carriageway with multiple path routes coming through the space. The incorporation of cultural themes in and around the project will also aim at creating a distinct place that people can connect with.

6. Quality Environments:
Well considered plant selection will be incorporated into the scheme to create a quality environment. Furniture will be located in visible locations providing good surveillance from the road. Paths will be developed in conjunction with HCC to enable maintenance vehicle access for maintenance and upkeep.

7. Physical Protection:
Key cycle and pedestrian routes (main linking/commuter routes) will be lit with areas near the carriageway benefitting from light spill from street lighting. At this stage CCTV has not been included with the aim of good design avoiding the requirement. The bridge structures and abutments will have anti graffiti coatings to enable ease of maintenance/removal of graffiti.

(Figure A-43) Example of quality, active public open space that promotes CPTED principles

4.4 Tangata Whenua Cultural Opportunities

4.4.1 Cultural Design Themes

During the development of the CLMP for the Wairere/Cobham Drive Interchange a number of TWWG meetings and workshops helped develop a cultural theme and designs. The narrative aimed at providing an overarching framework that would set the cultural theme for the Southern Links area. The theme is based around expressing the cultural activities that traditionally occurred in the area and encompass gardening and settlement patterns and the associated trade and transport networks.

The Waikato area has a long and rich heritage of both Maaori and European settlement and associated activities. Movement across the land and by river has changed from tracks to rail and road. The use of the land has changed from hunting to gardens and cropping, from the flax industry to agriculture and mineral extraction, and to an ever-increasing built environment.

However, there are physical and spiritual marks on the land which needs to be carefully read and managed as part of the Project. To this extent it is proposed to re-establish this heritage and connection where these threads can be drawn to the surface through liaison and collaboration with iwi stakeholders.

The cultural narrative for the Southern Links Project area, aims at 'celebrating the cultural activities, movement and trade networks that are associated with the area'. The narrative recognises the importance of the area based on local settlement, food gardening activities and the associated movement and trade routes that would have traversed the local landscape. Additionally, the narrative allows the integration of Matauranga Maaori and kaitiakitanga and will enable good environmental outcomes to be achieve a strong vibrant self-sustaining ecosystem that supports a strong vibrant mauri.

To support the narrative, the following aims at capturing components of these processes and cultural influences within the Project (and across future development of the Southern Links Project).

Settlement and Gardening Patterns
Archaeological reports and Maaori knowledge provides information on the extent and distribution of pa and settlement activities in and around the area. The pathways and trade routes were means of supporting settlement and gardening activities that have occurred across the Hamilton area with subsequent European settlement adding further layers of cultivation patterns.

To reflect these aspects particularly of Maaori settlement, opportunities to add an additional layer of narrative into Southern Links can be undertaken in relation to these garden activities and may include aspects of the following:

- The incorporation of plants that are important as rongaa medicine or have traditional uses such as weaving and implement making
- Paved nodal areas that utilise paving patterns to illustrate convergence of paths, stopping points or to distinguish key points/locations and other relevant activities
- The development of street furniture potentially including seating, fence/railings, markers that reflects some of the traditional implements, materials and patterns associated with the area, and
- Use of palisade fencing forms to represent settlement areas and 'fence' protection of crops

Trade and Transport
The recognition of traditional path networks and confluence points provide the overarching cultural story that celebrates the connectivity of places, landmarks and settlement. To express this narrative the incorporation of wayfaring markers in the forms of mass native tree planting (reflecting remnant tree stands), nodes along transport routes that utilise paving patterns and interpretive signage and standalone art work will be integrated to 'tell' the area's story of paths and networks.

Guardians of the Land
Maaori relationship with the land and traditions are rich and important parts of the Waikato area and provide additional opportunities to add further cultural layers to the area. To express the aspects of kaitiakitanga the project aims at reinforcing the natural processes, landforms and vegetation cover in the form of mass native tree planting with ecological interventions to promote biodiversity. Management of water in terms of swales and wetlands will be developed and located across the landscape.

The inclusion of art work and patterns into the Project, particularly associated with cultivation (Rongo Maa Taane), sky father (Ranginui), earth mother (Papatuuaanuku) and navigation etc provide the opportunity to 'weave' a complete cultural narrative into the landscape.

(Figure A-441) Images of Cultural Influence

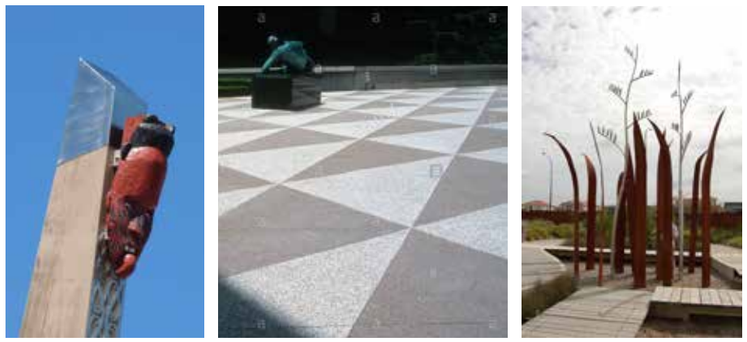
4.4.2 Cultural and Heritage Opportunities

The cultural maps (Figure B-442 and C-442) have been developed in consultation with the TWWG and identifies important locations and possible cultural patterns and interventions to be integrated into the Project.

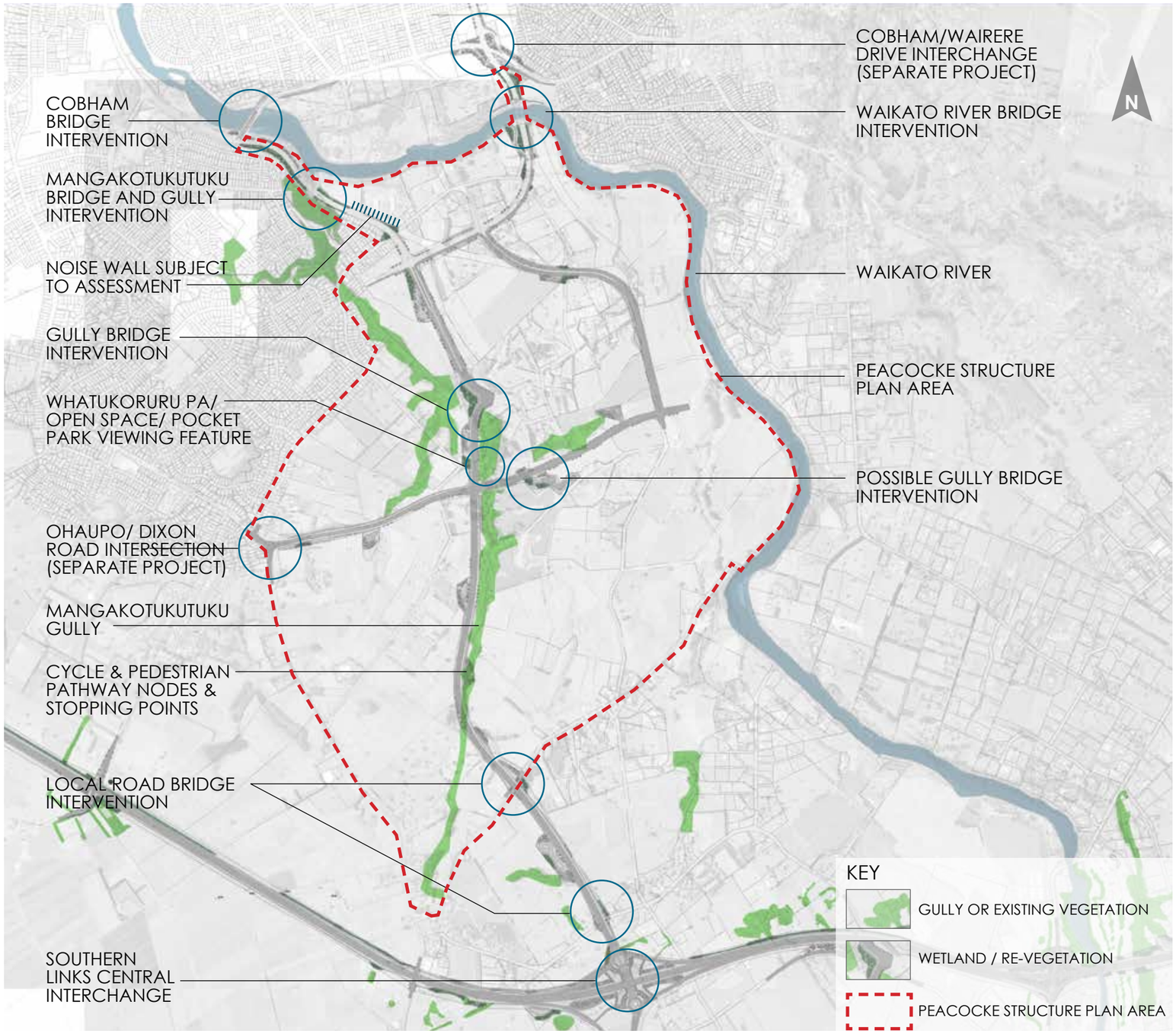
Design Strategy

Cultural design interventions that aim at revealing the overarching narrative may include the following:

- Bridge features including abutment, railing design and bridge pier locations
- Pedestrian and cyclist safety railing design
- Pedestrian and cyclist underpass art interventions/design
- Cycleway node locations and open space
- Retaining wall pattern design
- Roundabout paving design
- Plant species selection (embankment planting, re-vegetation, wetlands and swales, cycleway node and stopping points)
- Identification of pou/marker locations and designs
- Input into locating and development of interpretative signs
- Naming of bridges, paths and parks, and
- Demarcation of Pa and archaeology sites
- Consistent stories/ messages along walking and cycling routes

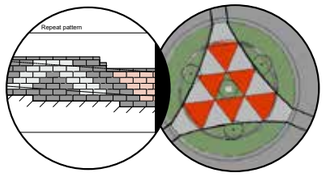


(Figure A-442) Examples of Cultural Design Interventions



(Figure B-442) Cultural Opportunities Map

NODES AND MARKERS



ART INSTALLATION OR MARKER AT GULLY REFLECTING NATURE (I.E. TUNAROA SCULPTURE)

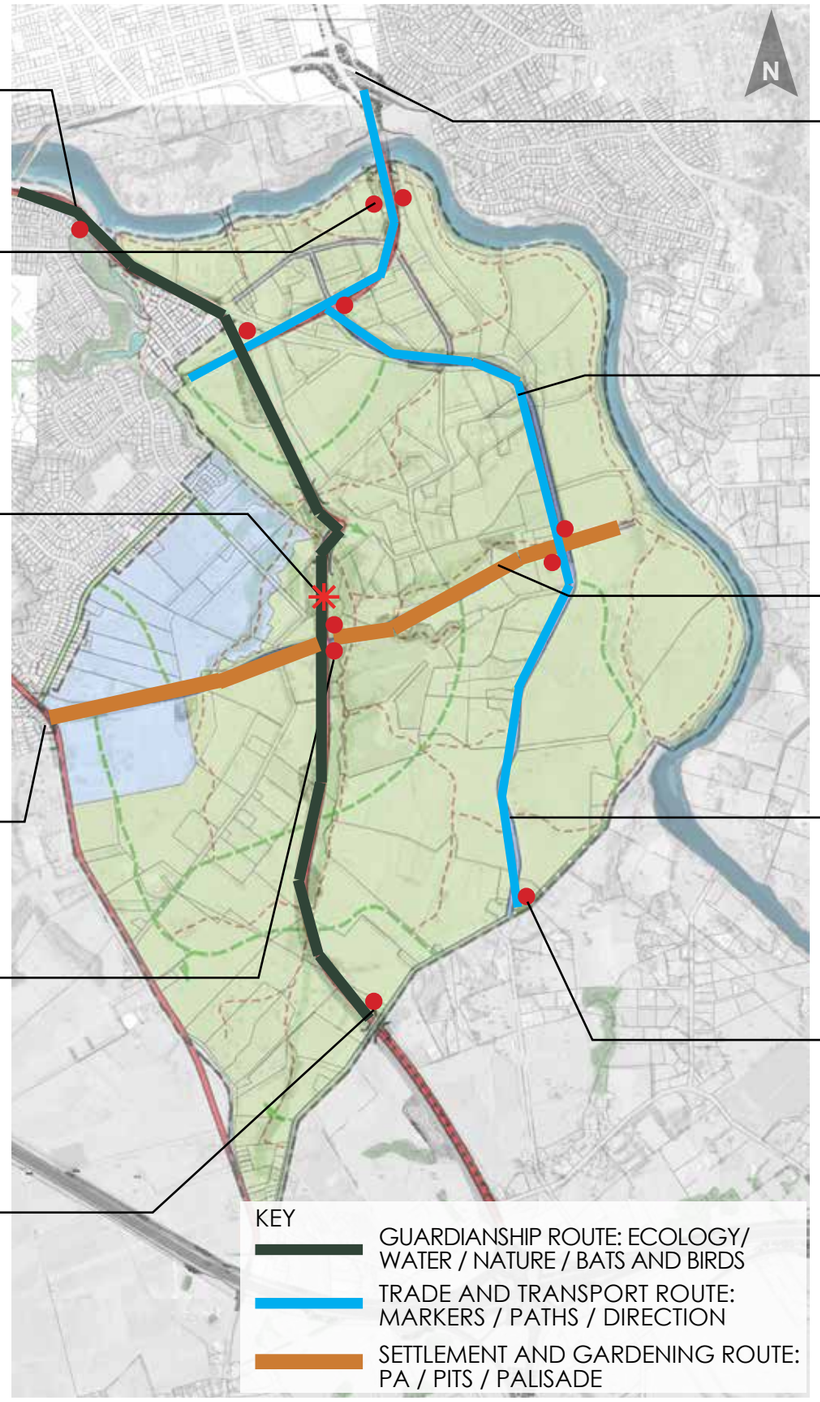
MARKER NEAR RIVER TO DENOTE WAKA LANDING LOCATION

STOPPING POINT WITH POSSIBLE DECK LOOK OUT OVER GULLY INCLUDING INTERPRETATION BOARDS AND POU MARKERS

PAVING PATTERN TO DENOTE RELATION TO TE WANANGA O AOTEAROA (GROWTH AND ASPIRATION)

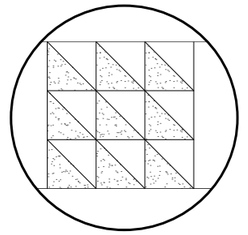
SCULPTURE OR WAYFARING MARKER RELATING TO NATURE/ GULLY NATURAL ENVIRONMENT

WAYFARING POU MARKER RELATING TO NATURE/GULLY NATURAL ENVIRONMENT

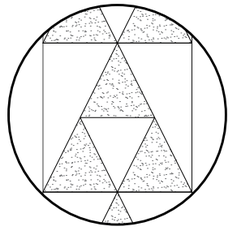


WAYFINDING SYMBOLS

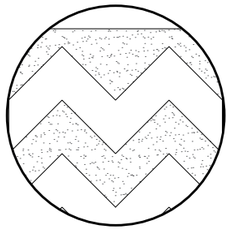
PAVING PATTERN INTERVENTION AT CYCLE/ROAD JUNCTION TO DENOTE TRADE THROUGH A KETE WEAVE PATTERN



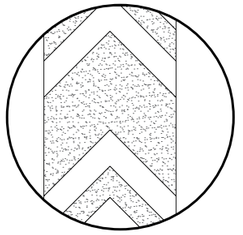
PAVING PATTERN ALONG ROUTE AT JUNCTIONS AND STOPPING POINTS TO DENOTE MOVEMENT AND DIRECTION



PAVING PATTERN TO DENOTE KUMARA GARDENING PATTERNS AT INTERSECTIONS AND STOPPING POINTS



PAVING PATTERN ALONG ROUTE AT JUNCTIONS AND STOPPING POINTS TO DENOTE NATURE AND GROWTH



MARKER OR POU TO REFLECT TRADE AND TRANSPORT

1:2000 @ A3 0 20 40 60 80 m

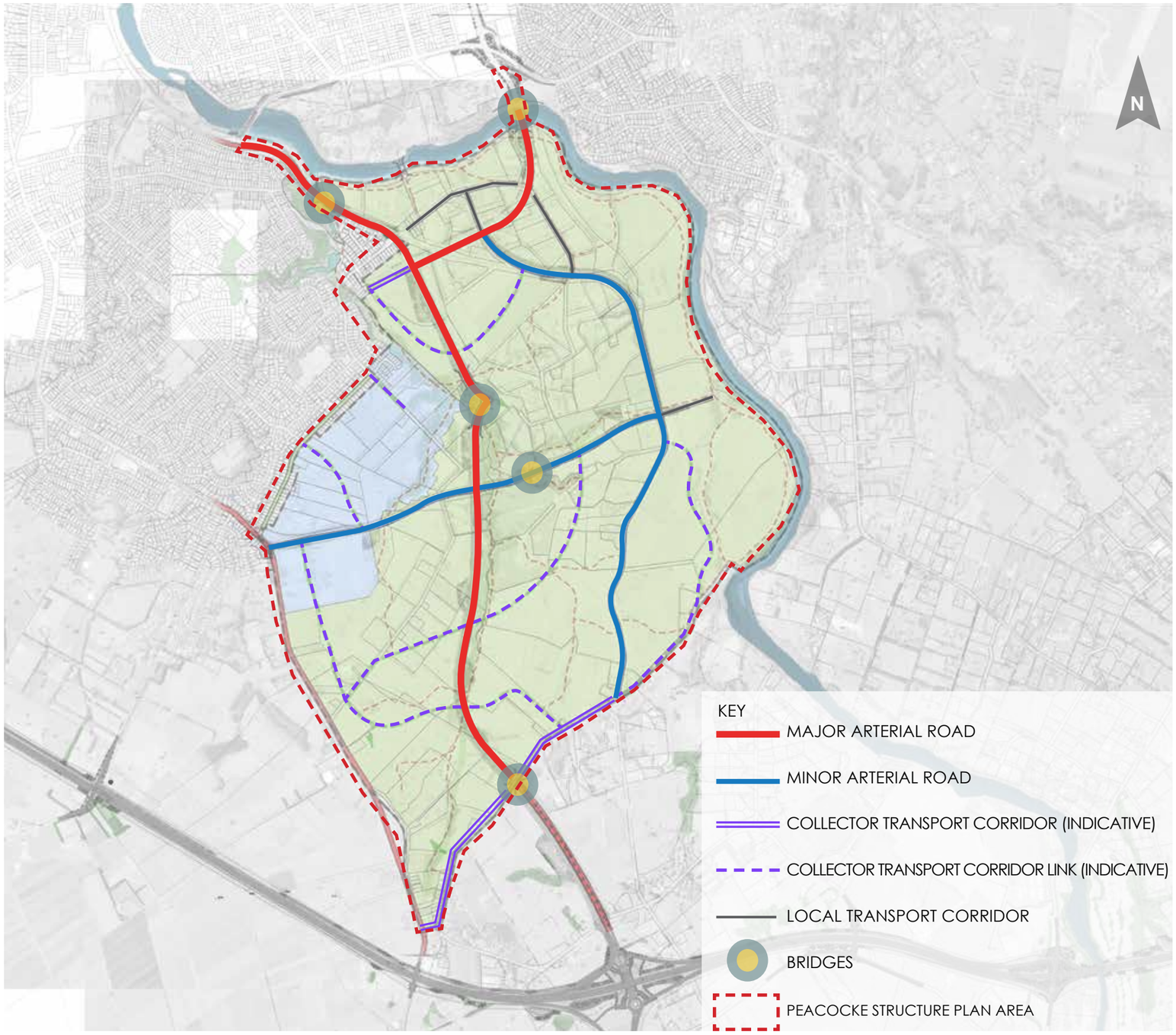
(Figure C-442) Cultural Design Opportunities Map

4.5 Road Network Hierarchy

The vision for the Peacock area is to provide a high performing strategic road network that delivers the best possible service for all users. The road hierarchy is based on HCC's Section 15.5 Transport Corridor Hierarchy Plan and Definitions of District Plan

The key features of the network are:

1. 'City Link' Major Arterial route which traverses north-south through the central portion of Peacocke and links with Cobham Drive (at the Cobham Bridge), providing a direct route to the Central City. Beyond the Peacocke structure plan the major arterial route will continue south and form part of the 'Southern Links' network that will connect with the future Expressway road network
2. 'Eastern Link' Major Arterial route which branches from the City Link route and crosses the proposed Waikato River Bridge and links with Cobham/Wairere Drive Interchange (and the Hamilton Ring Road), thus providing a direct route to the eastern side of the City
3. Minor arterial network that provides a link between the western and eastern sides of the growth cell, and the main north-south corridor for the eastern part of the growth
4. Collector road network (indicative) that links individual residential neighbourhoods with each other and with the arterial network
5. Walkway and cycleway routes linking all parts of Peacocke to the Central City
6. Provide for mode-neutral transport modes, and
7. Ensure user friendly and safe crossing points (either at grade or grade separated) to promote connectivity between neighbourhoods and access to neighbourhood facilities.



(Figure A-450) Road Network Map

4.5.1 Major Arterial

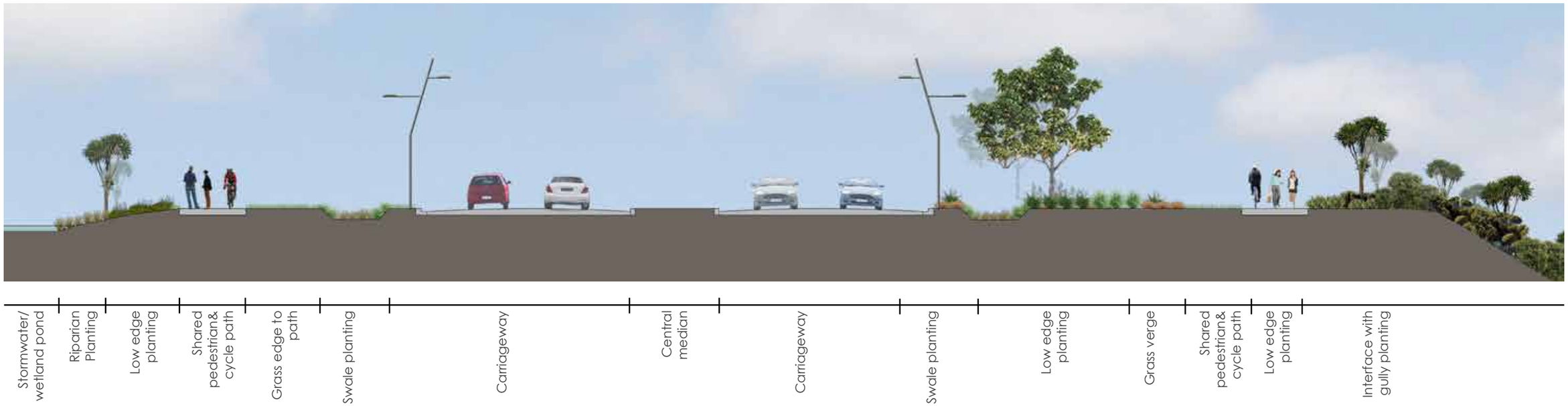
The Major Arterial transport corridor will provide four lanes with hard shoulder, which aligns with HCC definition of function being principally for the movement of significant levels of goods and people between parts of the City and beyond.

The carriageway will include kerb and channel to manage and capture stormwater flows and include HCC standard lighting requirements, which are now more ecologically friendly LED units. Property access will not be achievable directly from the Major Arterial, which aims at avoiding local traffic with the main traffic flows.

Off road pedestrian and cycling facilities will be provided with on road commuter facilities provided on the hard shoulder, although these will link with the off-road facilities. Allowance for mode neutral transport facilities within the central median has been allowed for within the corridor to facilitate future transport options.

Due to the urban character of the Main Arterial, barriers and wire rope facilities will not be incorporated into the road. A planted median may be incorporated, but is subject to HCC Transport, Parks and Open Spaces input and requirements.

(Figure A-451) Typical Major Arterial Cross Section (in cut)



(Figure B-451) Typical Major Arterial Cross Section (close to grade)

4.5.2 Minor Arterial

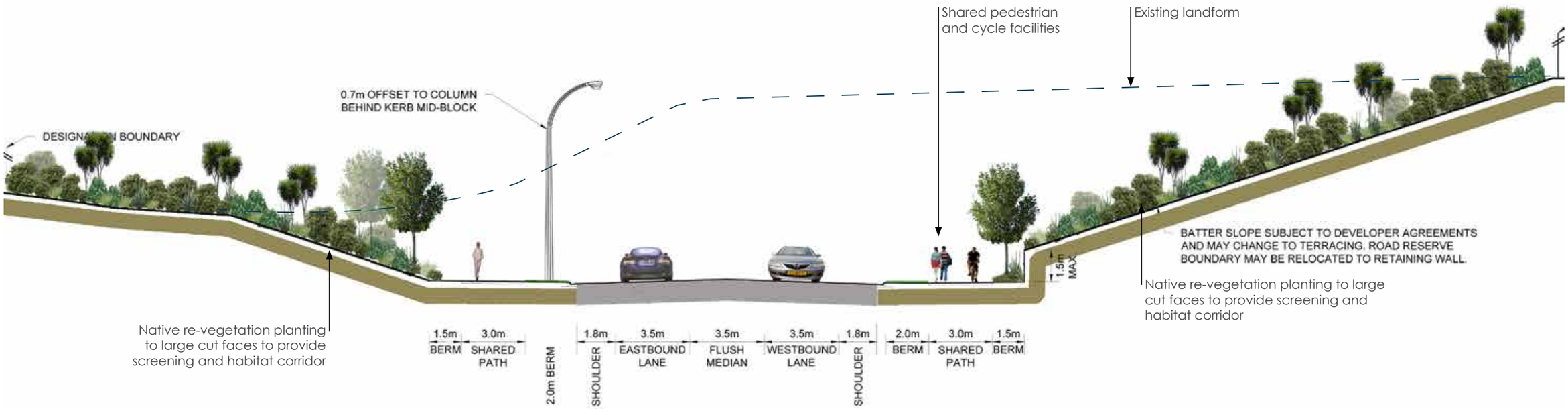
The 'minor arterial' transport corridor's principal function is to connect between the Major Arterials to allow the movement of high levels of vehicles and people. Typically, residential property access will be managed via collector roads interfacing with the Minor Arterials, although where appropriate direct access will likely be provided to support development. Where possible, housing should be located to 'front' the Minor Arterial in order to promote an active streetscape and promote visual surveillance.

Pedestrian and cycle facilities will be included as part of the streetscape and will respond to Hamilton City's design requirements, which will be confirmed during the detail design stage. The preference is to utilise off road facilities set within a landscaped environment that incorporates, stormwater devices, street tree and ecological planting where practicable. Consideration shall be given to provide suitable crossing points (at grade or grade separated) to ensure connectivity between neighbourhoods and neighbourhood facilities.

The form/width of the Minor Arterials will be consistent across the Project, but a number of variations in terms of access from the Minor Arterial may occur and will be determined by the existing topography and final ground levels of adjacent development land.

4.5.3 Collector Transport Corridor

Collector roads are associated with residential development and will primarily be defined by the topography and development proposals, and therefore the consenting process. They will enable movement and property access and connect back to the Major and Minor Arterials. They will have kerb and channel, street tree and shrub planting and pedestrian/cycle paths.



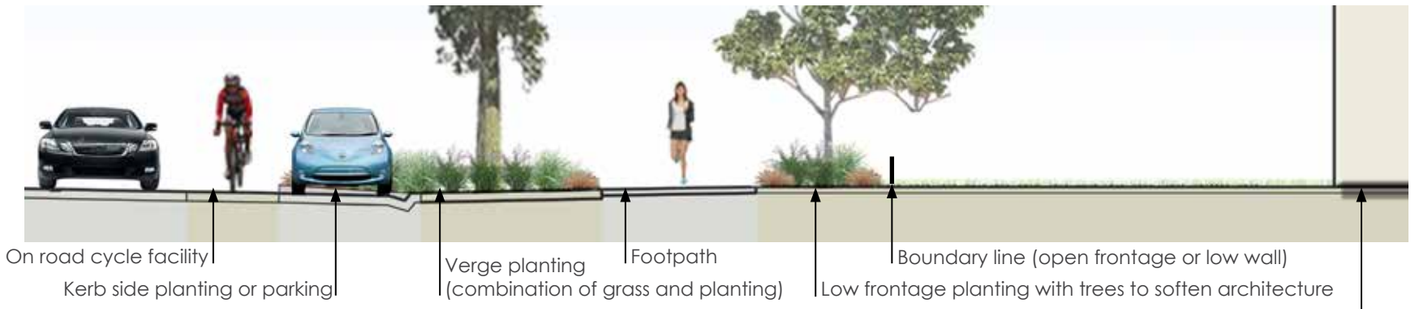
(Figure E-452) Typical Minor Arterial Cross Section (West to East connection)

(Figure A-452) Minor road layout (Peacockes Road)- Concept Option 1
Plan (Access from minor road and on street parking). Scale: NTS

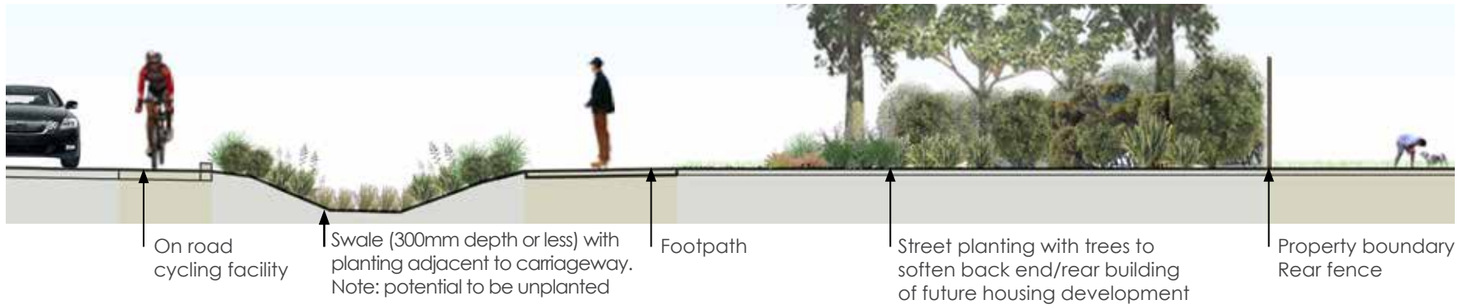
CONCEPT OPTION 1
This option illustrates the potential layout for locations where property access is achievable directly from the Minor Arterial. The layout incorporates on street car parking, stormwater swales and separate cycle (on shoulder) and pedestrian facilities. Pedestrian facilities are set back from the road edge to allow to avoid conflict/provide sufficient space for cars to wait before exiting onto the street.

Key considerations:

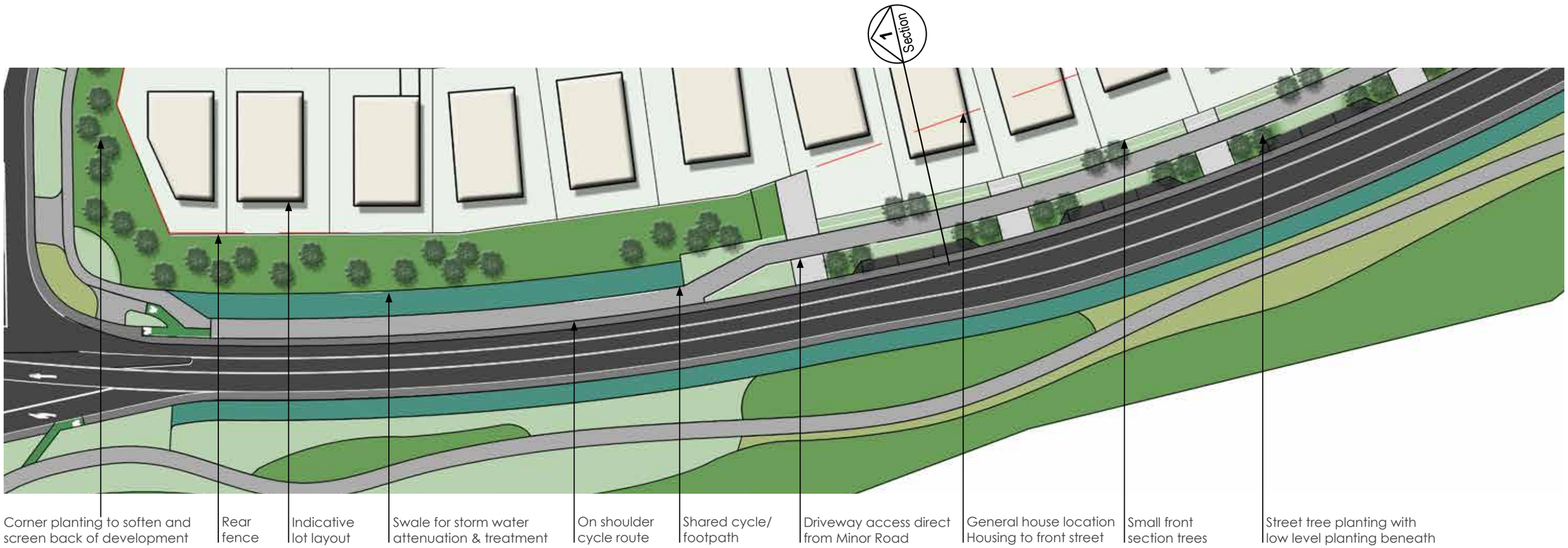
- Integration of sufficient planting on corner locations to help soften back of development and privacy fencing
- Avoid on street parking in close proximity to intersections to maintain road efficiency and safety
- Requirements of stormwater system(s), especially the integration of swales and/or rain gardens
- Integration of street tree planting, low shrub planting and grass verges to provide visually interesting streetscape
- Provide grass verges adjacent to on street car parking to allow clear area for people to access parked vehicles
- Aim to have either no front fence or a low boundary fence to allow housing to contribute to the street character and provide passive surveillance



(Figure A1-452) Minor road layout - Concept Option 1
Section-1 (Access from minor road and on street parking) Scale: NTS



(Figure A2-452) Minor road layout - Concept Option 1
Section-2 (Access from minor road and on street parking) Scale: NTS



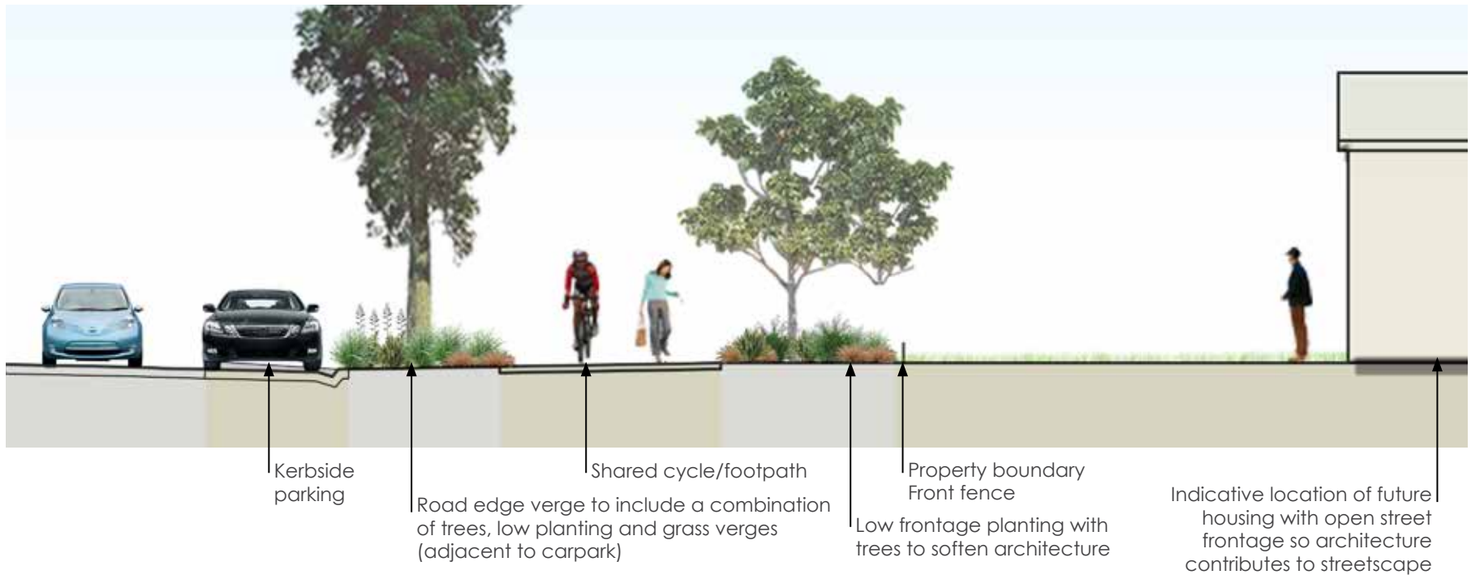
(Figure B-452) Minor road layout - Concept Option 2
Plan (Access from minor road and on street parking). Scale: NTS

CONCEPT OPTION 2

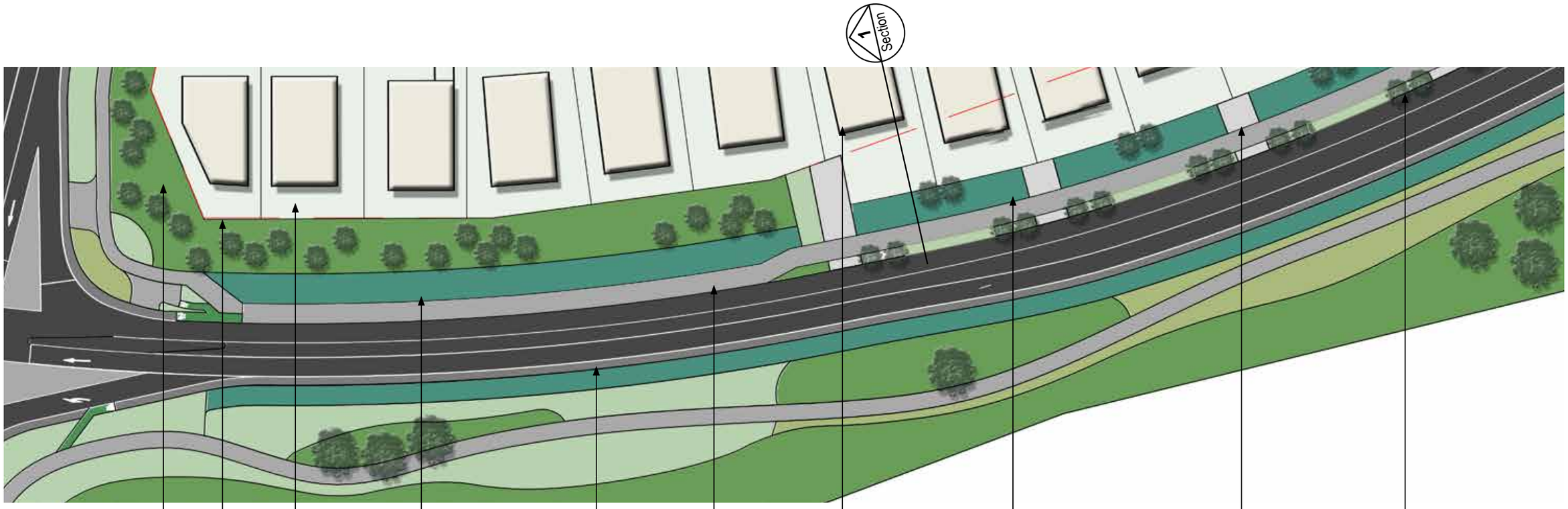
This option illustrates the potential layout for locations where property access is achievable directly from the Minor Arterial. The layout incorporates on street car parking, stormwater swales and off-road shared cycle and pedestrian facilities. Pedestrian and cycle facilities are set back from the road edge to allow to avoid conflict/provide sufficient space for cars to wait before exiting onto the street.

Key consideration:

- Integration of sufficient planting on corner locations to help soften back of development and privacy fencing
- Avoid on street parking in close proximity to intersections to maintain road efficiency and safety
- Consideration to the requirements of stormwater system requirements, especially the integration of swales and/or rain gardens
- Integration of street tree planting, low shrub planting and grass verges to provide visually interesting streetscape
- Provide grass verges adjacent to on street car parking to allow clear area for people to access parked vehicles
- Aim to have either no front fence or a low boundary fence to allow housing to contribute to the street character and provide passive surveillance



(Figure B1-452) Minor road layout - Concept Option 2
Section-1 (Access from minor road and on street) Scale: NTS

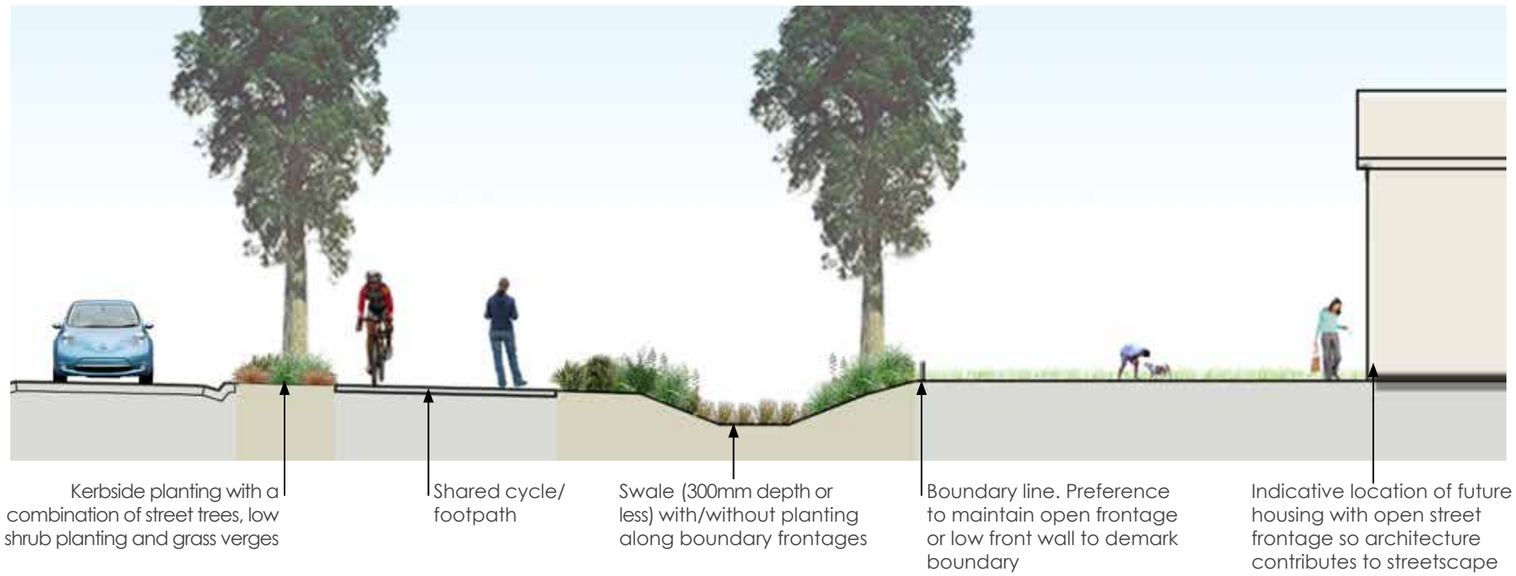


(Figure C-452) Minor road layout - Concept Option 3
Plan (Access from minor road, no on street parking). Scale: NTS

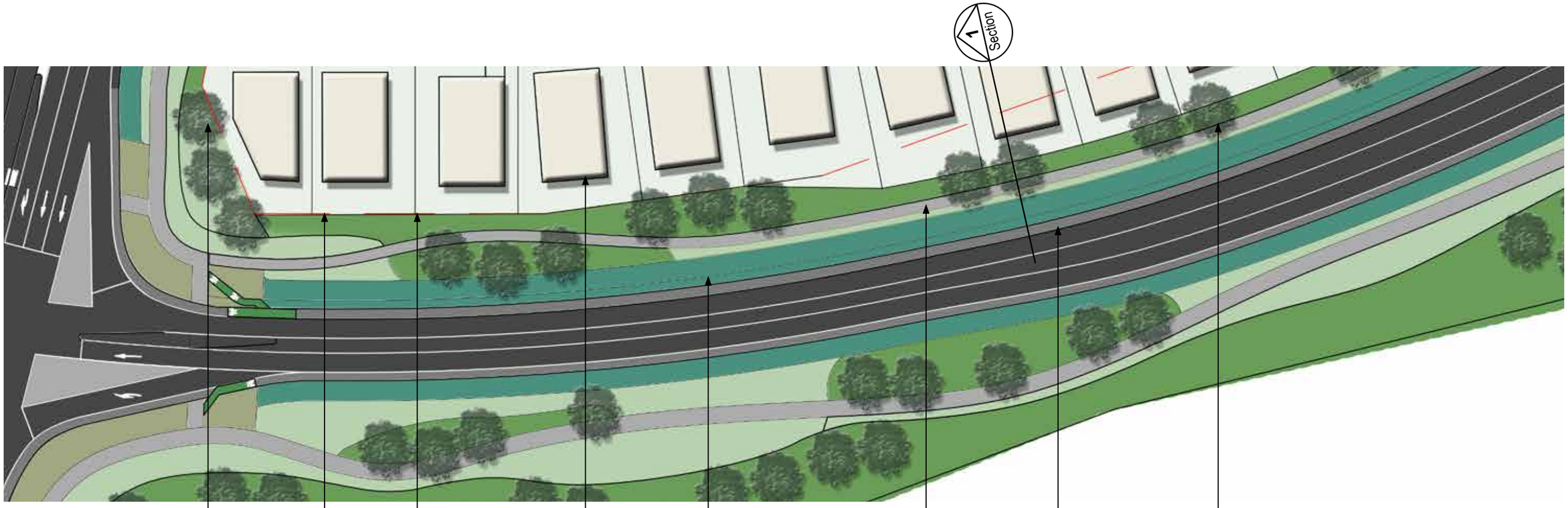
CONCEPT OPTION 3
This option illustrates the potential layout for locations where property access is achievable directly from the Minor Arterial. The layout incorporates a continuous stormwater swale and off-road shared cycle and pedestrian facilities. Pedestrian and cycle facilities are set back from the road edge to allow to avoid conflict/provide sufficient space for cars to wait before exiting onto the street.

Key consideration:

- Integration of sufficient planting on corner locations to help soften back of development and privacy fencing
- *No* on street parking provision, particularly where traffic levels will be high
- Requirements of stormwater system, especially the integration of planted swales and/or rain gardens
- Integration of street tree planting, low shrub planting and grass verges to provide visually interesting streetscape
- Aim to have either no front fence or a low boundary fence to allow housing to contribute to the street character and provide passive surveillance



(Figure C1-452) Minor road layout - Concept Option 3
Section-1 (Access from minor road, no on street parking) Scale: NTS



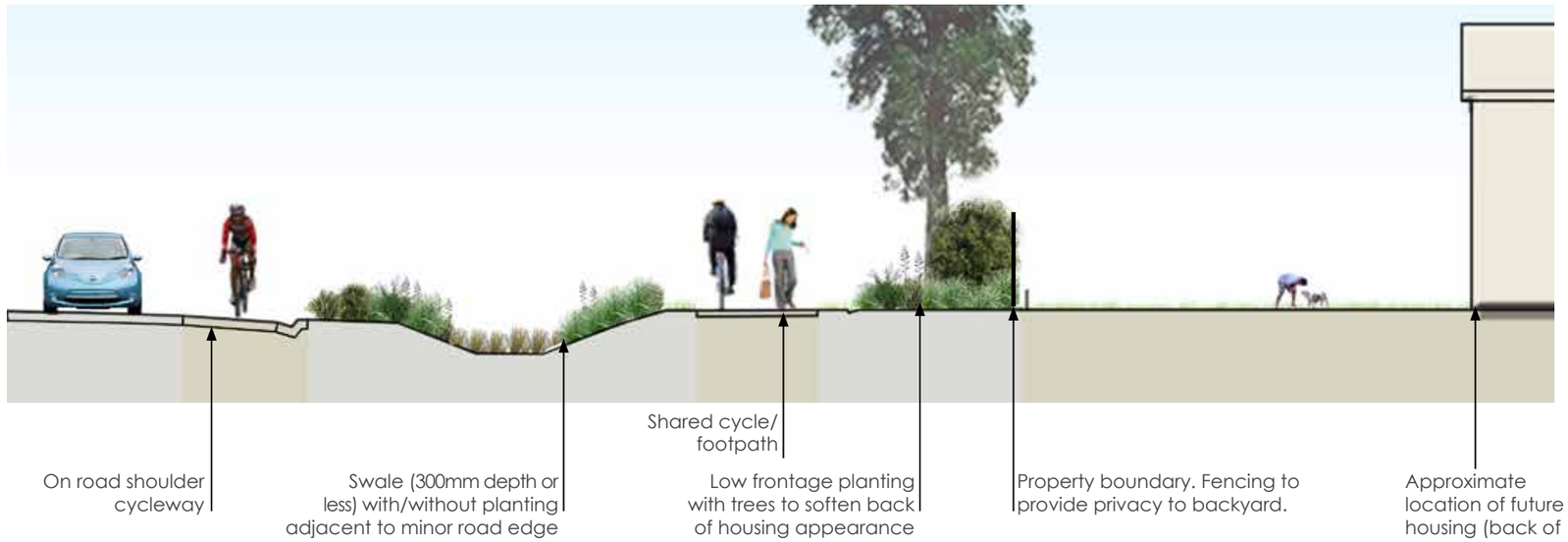
(Figure D-452) Minor road layout - Concept Option 4
Plan (No access from minor road) Scale: NTS

CONCEPT OPTION 4

This option illustrates the potential layout for locations where no property access is achievable directly from the Minor Arterial. The layout incorporates a continuous stormwater swale, either on road/shoulder cycling facility or off road shared cycle and pedestrian facilities. Off road facilities are set back from the road edge to allow the incorporation of swale/rain garden systems to be integrated into the streetscape.

Key consideration:

- Integration of sufficient planting to help soften back of development and privacy fencing
- *No* on street parking provision, particularly where traffic volumes will be high or topography prevents property access
- Requirements of stormwater system, especially the integration of planted swales and/or rain gardens
- Integration of street tree planting, low shrub planting and grassed edges to path to provide visually interesting streetscape



(Figure D1-452) Minor road layout - Concept Option 4
Section 1 (No access from minor road) Scale: NTS

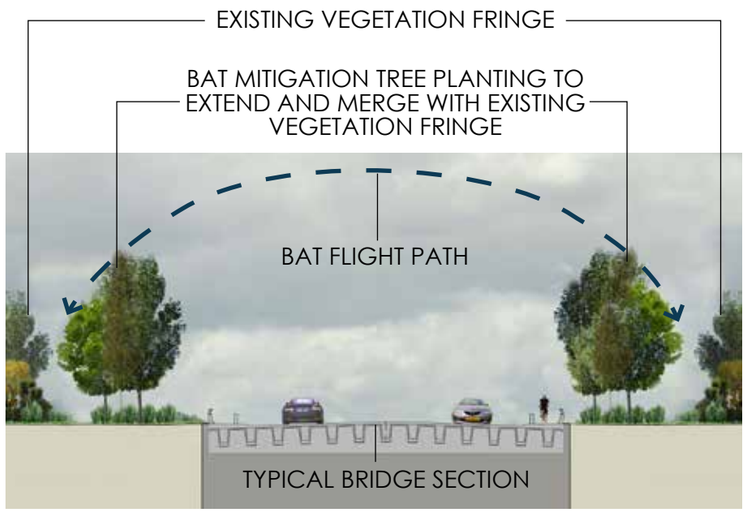
4.6 Bridge Structures

The proposed design approach to bridge structures presented below aims at providing simple, clean open structures that utilises a 'family of elements' to achieve a consistent approach across the Project. Maximum advantage will be taken of the opportunity to encompass cultural design interventions within abutment faces and wing-walls to achieve significant urban design benefit (at minimal incremental cost) through careful and appropriate choice of materials, colour, finish and detail.
Footpath and cycle facilities are to be incorporated on all bridge structures where required, with suitable height and set back distances of abutments to allow pedestrian and cycle facilities to be successfully integrated into the project.

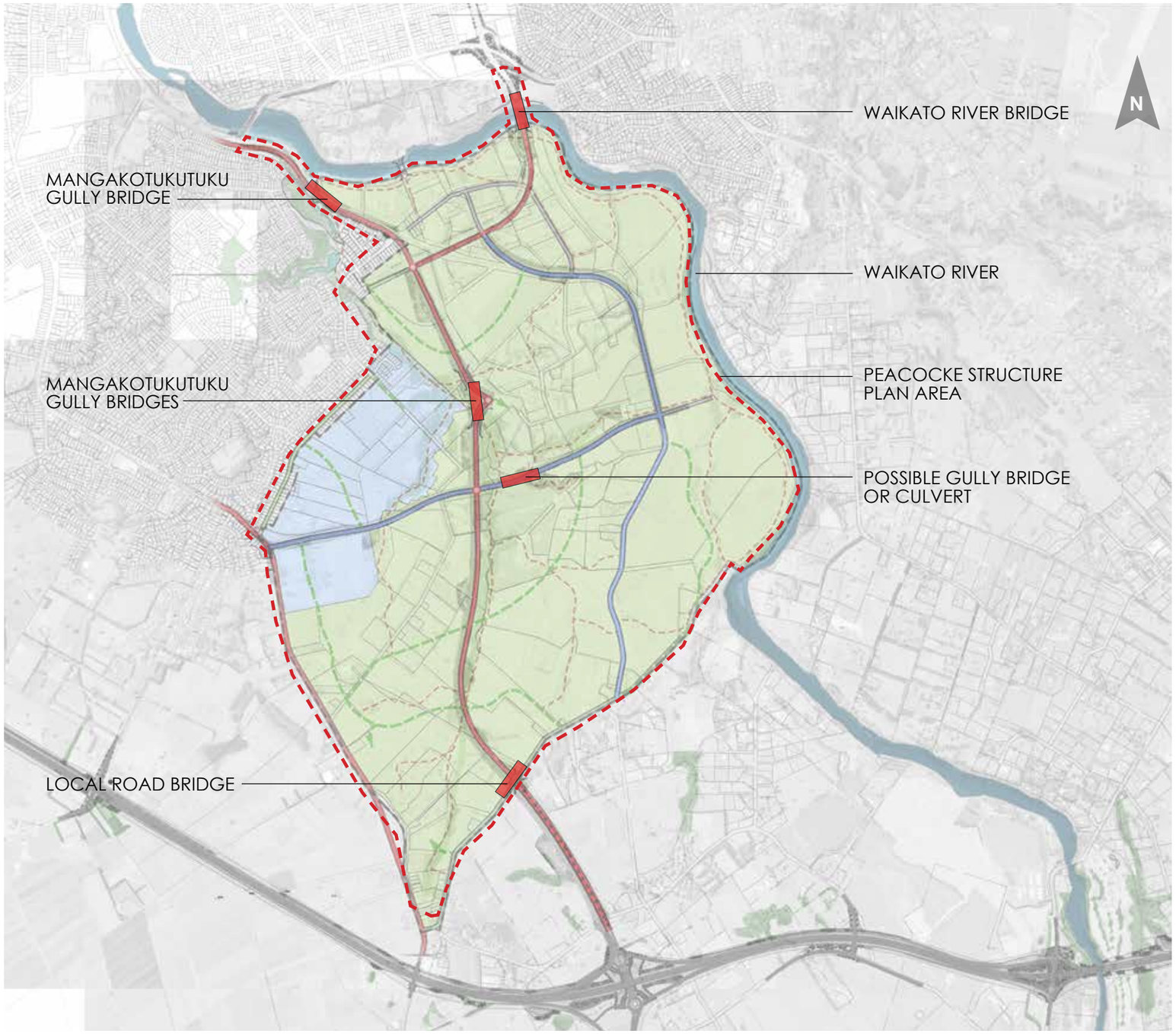
The EMMP wildlife and bat habitat mitigation recommendations will be incorporated into the bridge design response where appropriate and integrate with the planting proposals to minimise the effect on wildlife habitat.

Bridge structures occur at a number of locations including:

- Waikato River Bridge
- Mangakotukutuku Gully (twin bridges)
- Mangakotukutuku Gully crossing (two locations)
- Future Peacockes Road Overbridge (outside of project scope but part of 'family' of bridges)



(Figure B-460) Typical Bat Hop Over



(Figure A-460) Bridge Structure Locations

Design Strategy

The following design principles will be applied to all bridges:

- Design of structures shall utilise form, scale and finishes to achieve a consistent 'family' of bridge design solutions along the alignment (exception of the Waikato River Bridge which should be designed to provide a landmark)
- Bridges shall complement their context by considering factors including surrounding land use and topography
- The relative proportion of the structural elements shall be considered when developing and selecting bridge solutions to minimise the bridge profile and achieve a simple and elegant design solution
- Barriers at the edges of all bridge decks shall be provided with a down-stand skirt (teardrop barrier) to conceal the deck slab and any drainage pipes or other utility service ducts from view. Barrier terminations and connections to off-bridge barriers shall be detailed to achieve a well-integrated approach. Open bridge railings will be utilised where possible to maintain views across the landscape to contribute to the vehicle user experience
- Bridge structures that eliminate the need for cap beams (headstocks) by using simple, elegant girder to pier connections are preferred. Where cap beams are required, the length of cap beam beyond the last girder shall be minimised, and the extension shall be detailed to enhance aesthetic impact
- All pile caps and alternative connections between piles and supported pier stems shall be fully below finished ground level
- Abutment retaining walls and earthworks are expected to extend beyond the edges of bridge deck structures, but should minimise the extent of vegetation loss. Abutment wall elevations shall be carefully proportioned, designed and detailed to ensure they provide scale to the bridge structure. Abutment walls shall utilise either concrete panels within an integrated relief pattern or key stone facing with design pattern to break up large expanses of wall area
- Lighting and lighting masts will be located on the bridge to co-ordinate with the overall appearance/aesthetic of the bridge form. Lighting will need to be considered in relation to the EMMP requirements in relation to bats
- Where bridges are required to incorporate pedestrian and cycle facilities, consideration shall be given to finishes in and around the structure to provide an interesting and safe environment for these users, and
- The full extent of piers, MSE walls and barriers shall be coated with a clear, matte anti-graffiti coating to prevent patchy application and appearance in service, irrespective of whether this extent exceeds the minimum extent required for other reasons.

The following descriptions at specific selected bridge locations illustrate how these principles will be implemented.

4.6.1 Waikato River Bridge

The proposed Bridge will provide a new link across the Waikato River and will be a strategic link between the Hamilton East residential area and the Peacocke development area. The bridge will be a significant landmark feature and will be designed with an appropriate high level of aesthetic design. Recommendations made in the EMMP will be incorporated into the bridge design, particularly in relation to lighting and vegetation removal and reinstatement.

The bridge will be approximately 300m long and over 10m above the river providing four lanes with pedestrian and cycle facilities on both sides.

(Figure C-460) Concrete beam bridge with open railing to bridge barrier

(Figure D-460) Simple form

(Figure E-460) Cobham Drive interchange overbridge sets 'family' of bridge type

Design Strategy

The design intent remains consistent with the approach described in the Southern Links ULDF, where the design approach melds the aesthetic, functional and buildability factors together.

At this stage the design suggests an extradose form of bridge wherein the support pylon provides a balance to the steep sided northern edge of the river. However, during the design development stage an optioneering study will provide options and assessment of the final bridge form/design.

Other considerations in relation to developing the bridge type include:

- Provide for a distinct landmark bridge
- A scale that reflects the incised river environment and landmark bridge status, where the structure provides a strong identity to the bridge, and
- A bridge form that responds to the land and the river and creates a strong sense of place

Design Principles

- A bridge that complements its setting rather than detract from the serene river environment. A shallow deck and minimal vertical support to maintain views beneath the bridge deck up and down the river
- Ensure no piers are placed in the main river channel with consideration to cultural, ecological and visual aspects
- The design should reinforce the rich history and culture of the region and assist in building an identity for the bridge. All bridge elements including utility services should be fully integrated into the structure
- Take account of the views from key vantage points on land and water to determine the final location of bridge pylon / pier support
- Provide a creative underside treatment of the bridge to provide interest to the walking / cycling experience and offset the dominance of the bridge structure at the southern end
- The bridge design will encompass the ecological requirements of the EMMP, particularly to lighting requirements in association with bats, and
- There will be considerable extent of ramps to enable cycle and disabled access from the bridge to the river trail along the river shore. The design needs to take into consideration CPTED principles to provide a safe and useable cyclist and pedestrian environment.

(Figure A-461) Example bridge structure

(Figure B-461) Example bridge structure

(Figure C-461) Example bridge structure

(Figure D-461) Example bridge structure

4.6.2 Mangakotukutuku Gully and Stream Crossings

The project involves the placement of three bridge structures across the Mangakotukutuku stream and gully, which are ecologically sensitive environments. The bridges need to be designed with consideration to both vehicle and pedestrian/ cyclist users, where the latter will potentially pass both over and under the bridge structure. Recommendations made in the EMMP will be incorporated into the bridge design, particularly in relation to lighting and vegetation removal and reinstatement.

Mangakotukutuku Bridge

The main Mangakotukutuku Bridge (adjacent to the Waikato River) will incorporate a pair of two lane bridges, which will allow light through the structure improving the user experience under the bridge and to help maintain the gully's ecological environment. To this extent recommendations of the EMMP will also be factored into the design.

At this stage, haunched girders could be considered to create a more elegant form rather than single depth beams:

- The two bridges will be separated to minimise the ecological effects with columns to avoid the water course.
- The outer bridge barriers should conceal junctions of bridge deck edge and maintain a high standard of visual amenity
- Clean substructure with services and drainage pipes located and concealed under the bridges. Embankment slopes to follow outline of existing profile with slopes to be re-vegetated
- Set back vertical abutments so bridge launches from gully edge therefore minimising intrusion into the gully, and
- Good direct connecting links to the pedestrian and cycle routes with allowance for headroom below where feasible/ constructable

Gully / Stream Bridges

The design proposal is for single span bridges close to grade at the gully crossing points that will include pedestrian and cycling facilities with open railings to maintain views into the gully.

Design Strategy

- Bridge approach gradients will be gradual and close to existing grade with an integrated abutment to retain the natural characteristics of the gully environment
- Concrete barriers are to be kept as low as possible with transparent railings atop to provide a visually connection to the gully/surrounding environment
- Set back vertical abutments so bridge launches from gully edge therefore minimising intrusion into the gully
- Ensure minimum disturbance to the existing gully vegetation, and
- Allow for headroom for pedestrian and cycle facilities beneath the bridges

4.6.3 Local Road Bridge

The local road bridges will not form part of the Peacocke network, but the design approach will form part of the broader 'family' of bridges. The local road bridges will be visible to network road users and adjacent residential properties and are located along the ridge lines of the rolling landforms. The design should complement other overbridges along the route by maintaining consistency and aesthetic design standards.

The bridges are located in an undulating landform and mark the transition to the urban area. The Arterial cutting to enable access beneath the local overbridges will play an important role to integrate the bridges into the landscape. Cuts should have gradients to match the surrounding slopes, with toe and top batters having a rolled transition to give a 'natural' appearance.

Design Strategy

- The bridge will be visually light relative to span by ensuring shallow deck structure relative to span and barriers
- Two span bridge with columns in the central median
- Columns to be slender to minimise visual obstruction
- Spill through abutments with appropriate cultural design interventions are the desirable option to complement the rolling topography and to maintain openness and views beneath bridge, and
- Barriers to conceal junctions of bridge deck edge and maintain a high standard of visual quality e.g. utilise a 'teardrop' sectional form

(Figure A-462) Example of bridge with piers avoiding stream

(Figure B-462) Example of cultural pattern & open railing

(Figure C-462) Example of local overbridge with spill through abutment

4.7 Open Spaces

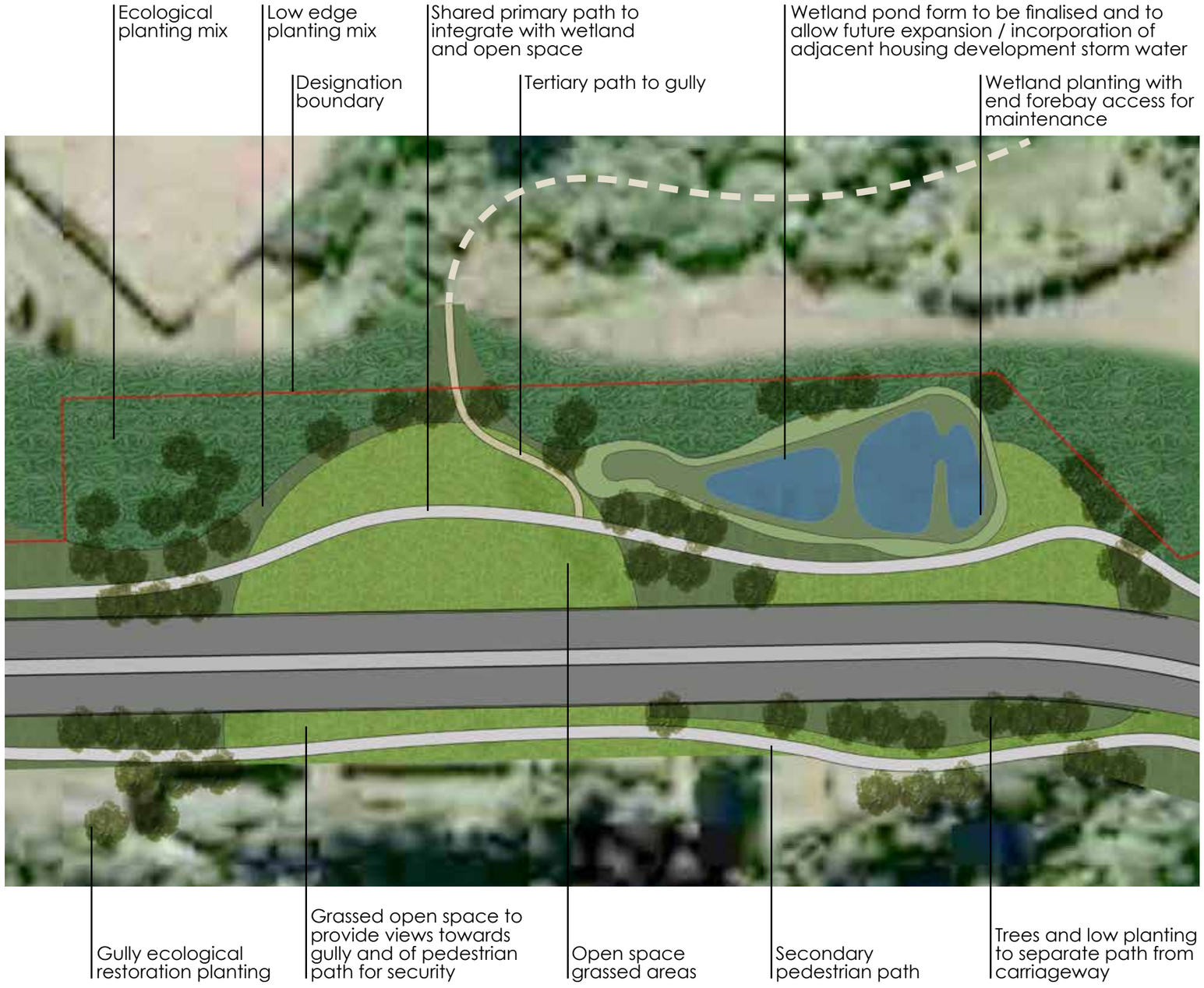
Design Strategy

The Project presents opportunities to encompass and create character and a sense of place by integrating the transport network with the open spaces. The location of the road alignment adjacent to the gullies, combined with wetland features, cycle and pedestrian facilities and the ecological landscape planting will aim at creating a distinct character for the area. The intent is to develop a more informal environment where the transport network feels as though it has been woven through the open spaces and gully environment. To this extent the planting will predominantly utilise native planting, with a variety of vegetation types to enrich the ecology of the area. Trees and shrub planting will be used in a more informal way with planting used to separate cycle and pedestrian facilities from the road, plus define views and provide visual interest.

Design Principles

The development of the Open Space will encompass the following:

- Define, maintain and enhance vistas and views including the Waikato River, the Mangakotukutuku Gully plus Mount Pirongia and Maungatautari
- Protect and enhance the visual amenity for local road users and protect and enhance views in relation to future residential development areas
- Reinforce the existing patterns of openness and enclosure through the corridor with the landscape planting to complement and reinforce existing gully and landscape planting
- Provide a hierarchy of cycle and pedestrian facilities that are set within an attractive and safe environment, which activates the open space areas while providing connections to the gully environments
- Define significant points along the corridor and include stopping points with interpretive wayfinding signage as part of the pedestrian and cycle network with signage reflecting the historic, cultural and environmental narratives of the area
- Integrate stand-alone public art into the open space and integrate art finishes within the form and finish of structures to celebrate the historic, cultural and environmental narratives of the area, and
- Utilise wetlands as features, allowing pedestrian and cycle paths to integrate and connect physical and visually allowing people close access and connection.



(Figure A-470) Concept Open Space integrated with shared path and planting.

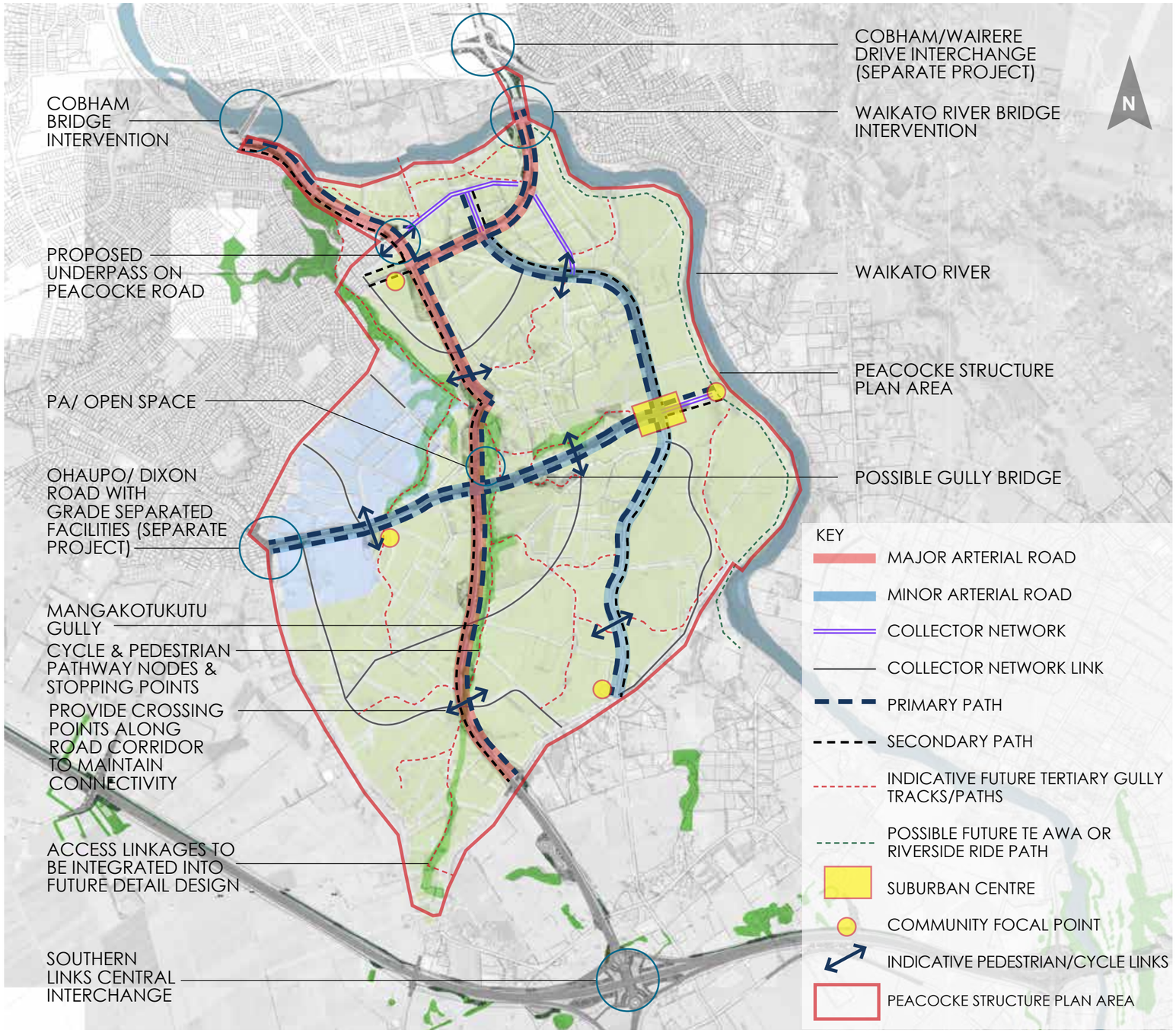
4.8 Cycle and Pedestrian Network Strategy

Design Strategy
The vision for pedestrian and cycle facilities within the Peacocke area aims at supporting the HCC cycling strategy and to provide a fully-connected, comfortable, attractive and high-quality pedestrian and cycling network, suitable and safe for use by people of all ages and ability that encourages greater use.

A combination of on road cycling facilities and off-road cycling and pedestrian paths shall be integrated into the Project.

Design Requirements

- Design aligns with RITS requirements and encompasses CPTED with clear and logical orientation of paths and signage with open views to allow surveillance to provide a safe environment for cyclists and pedestrians
- Provide a hierarchy of paths that tie into existing and proposed neighbourhoods and facilities
- Facilities will integrate with transport and other facilities (open space, parks, neighbourhood centres etc) to provide an efficient and safe environment
- Integrate landscape planting and open space to create an attractive and enjoyable environment for walking and riding
- Durable materials with long-life expectancy suitable for high pedestrian and cyclist volumes
- Facilities will accommodate a variety of users and will be easily accessible
- Integrate crossing points (at grade or below grade) across roads to maintain connectivity between neighbourhoods and to allow access to neighbourhood facilities
- Where possible shared facilities will be separated away from the carriageway and provide adequate space for landscape treatment around transitions
- Path alignment and appropriate planting treatment to enable forward visibility and minimising potential for pedestrian-cyclist conflicts
- On road cycling facilities will include a shoulder for commuter cyclists along the major arterial. Facilities will include integrated access points to allow commuter cyclists to move easily and safely between the on and off-road facilities. To facilitate this, flush thresholds will be included and include ground markings. Design requirements will be developed to meet HCC service levels and may include separated on road facilities
- Lighting standards of main routes will be to P3 standards and will also be subject to EMMP considerations, and
- Paths shall ensure ease of maintenance access and operations



(Figure A-480) Indicative Pedestrian and Cycle Hierarchy

Pathway Parameters

Construction requirements and details for cycle and pedestrian facilities shall accord with HCC current level of service requirements. For additional detail information Auckland Transport Code of Practice also provide good guidance on Footpaths and Pedestrian Facilities, plus Cycling Infrastructure.

In general the following general standards will apply:

MINIMUM OFFSET

- The path alignment should allow for a minimum 500mm clearance from all existing site features (i.e. existing trees, furniture, vegetation etc), and
- All landscape elements (furniture, retaining, vegetation and barriers, etc) along path edge must be offset a minimum of 500mm from primary/shared path zone. Where seats or furniture occur adjacent to the path, then the path shall extend out to provide a permanent base to these facilities

PATH FALLS

All paths shall provide positive drainage of surfaces to avoid standing water and potential user deviation from paths, and

- Reference the RITS for detailed requirements
- Standard desirable long grade will be 1 in 33 with the steepest desirable slope being 1 in 14 (a maximum slope). A 1 in 12 (maximum 25m duration) in steep environments may be acceptable on HCC approval), and
- Paths should be as flat as practical, but include a cross fall to ensure rainwater runoff can be achieved. Cross falls for impervious surfaces are to be 1:50 (2%)

Safety From Falling

Provision must be made to eliminate the risk of falling from the path. The following general rules will apply to various fall heights:

- A balustrade barrier will be provided for all falls over 900mm - Refer to balustrade design section.
- A barrier will be provided for all falls 300mm - 900mm and/or where a slope greater than 1:2 exists less than a meter from the path, and
- A vegetated barrier (low edge planting) will be provided where a steep slope exists but is less than 1:2.

Surface Treatments

- The predominant material for the Peacocke path network will be brushed concrete with feature areas of exposed aggregate (with black oxide to reduce glare) to reflect the river environment, as these materials tie in with those used for River Path projects currently proposed by Council.
- Path intersections will utilise a combination of chicane barriers and patterned paving textures to indicate a change/provide a warning for a change of environment
- Trail or tertiary paths, such as gully tracks will utilise DoC standard paths utilising permeable gravel surface, while communicating to users that the path is not for all modes/ walking only, and
- The design and placement of drainage covers will be situated to minimise hazard risks to cyclist

ON-ROAD MARKINGS

Evergreen painted surface is proposed for all road markings with appropriate with slip resistance and flush thresholds.

PATH MARKINGS - CULTURAL

The path surface represents an opportunity for creative cultural expression. There are a range of methodologies and applications that can be considered, Including: Exposed aggregate, Etched / sandblasted concrete and metal inlays.

BALUSTRADES/BARRIERS

Metal and timber balustrades and barriers adjacent to fall zones

EXPOSED AGGREGATE

Insitu concrete pavement with 35% river stone inclusion / Firth mix to be used for bands / pattern.

Insitu concrete pavement to be utilised at entrance / exit points and intersections to contrast with primary surface treatment and provide visual cue to help alert users of the path of a potential upcoming hazard.

BRUSHED CONCRETE

Insitu concrete pavement with 10% black oxide forms the majority of the path surface.

BOLLARDS

Removable hardwood bollards within the shared path.

Cycleway Furniture

Cycleway furniture will be integrated into the design to aid safety but also consider functionality. Careful design and positioning of cycle furniture will be undertaken to avoid in discriminant placement of bollards and barriers.

Bollards

Bollards will be utilised only where necessary at path terminals points to prevent access of vehicles onto cycle facilities or into open space (preferred methods of termination include markings, signage, colour and texture changes). Bollard criteria include the following:

- Locate bollards at a point where speeds are naturally low and add in supplementary measures alongside the path where it is required to prevent motor vehicle access
- Off set or provide supplementary posts, fences or other devices at least 450mm from the edge of the path rather than utilising bollards within the path
- Provide longitudinal and transverse markings to provide a warning that an obstacle is approaching and guide the rider away from it
- Make bollards as visible as possible, contrasting with the surrounding environment, and
- Ensure that removable bollards for maintenance access are flush mounted with the surface and do not leave a protruding root from the pavement surface

Where bollards are deemed necessary, they will be robust and visible to both road users and cyclists.

Handrails

Hold hand-rails will be provided at major road crossings to allow rest while waiting to cross the road. These shall be in accordance with the Regional Infrastructure Technical Specification (RITS) i.e. simple white painted tubular steel with reflective tape.

Lighting

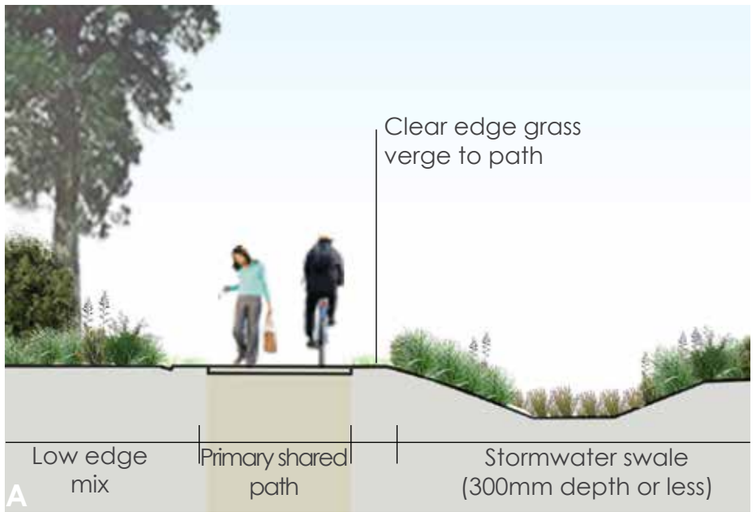
Lighting will be provided for primary shared cycling facilities and be in accordance with NZTA and RITS Specifications. Where possible lighting for the cycleway should aim at using outreach arms attached to road lighting columns (to reduce costs and future maintenance). Otherwise standard pathway lighting columns and luminaries (soft LED) shall be utilised to provide a consistent level of lighting. Light LUX levels along the main shared cycle/ pedestrian routes will be to P3 standards. Recommendations made in the EMMP in relation to lighting will be incorporated into the Project design, particularly in relation to lux levels, lens types and light canopy/light distribution requirements.

(Figure B-480) Typical shared path integrated with street furniture and planting.

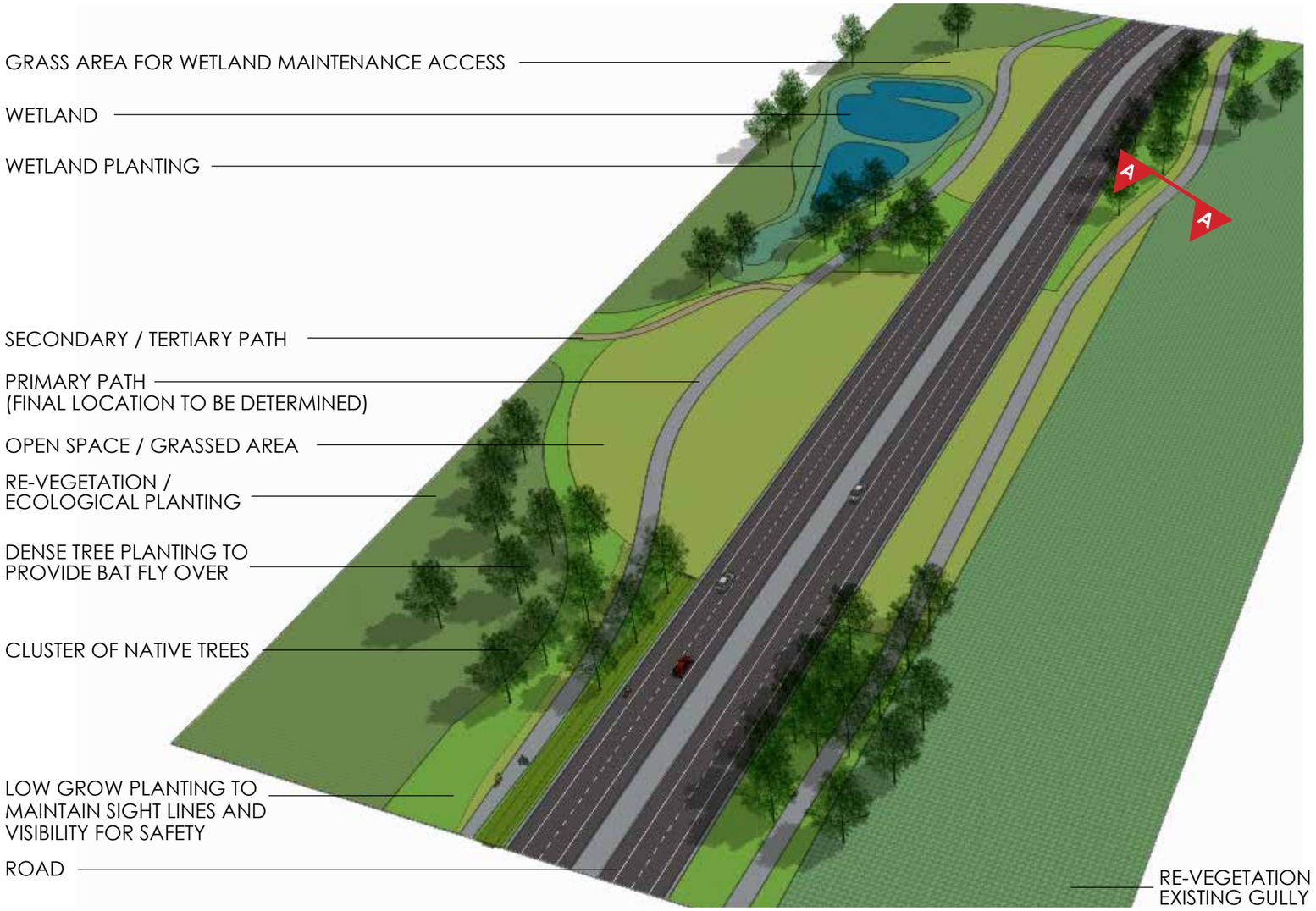
(Figure C-480) Hamilton City Council standard signage design.

4.8.1 Primary Shared Paths Characteristics

Primary shared paths aim at providing connectivity from suburbs or town centre areas and connect with Hamilton City or to other major facilities (schools, shops and parks or commuter routes such as Te Awa River Ride). Where possible, the path should be moved away from the road edge and into open space. Entry and exit between on-road and off-road facilities will be provided with smooth thresholds and painted surfaces to denote the locations. The facilities are to be lit (with consideration to EMMP) and will include HCC direction wayfinding signage, bins and seating. Consideration of node/stopping points will be included at suitable locations along the path, particularly at points of interest.



(Figure B-481) Typical Layout Section A-A'

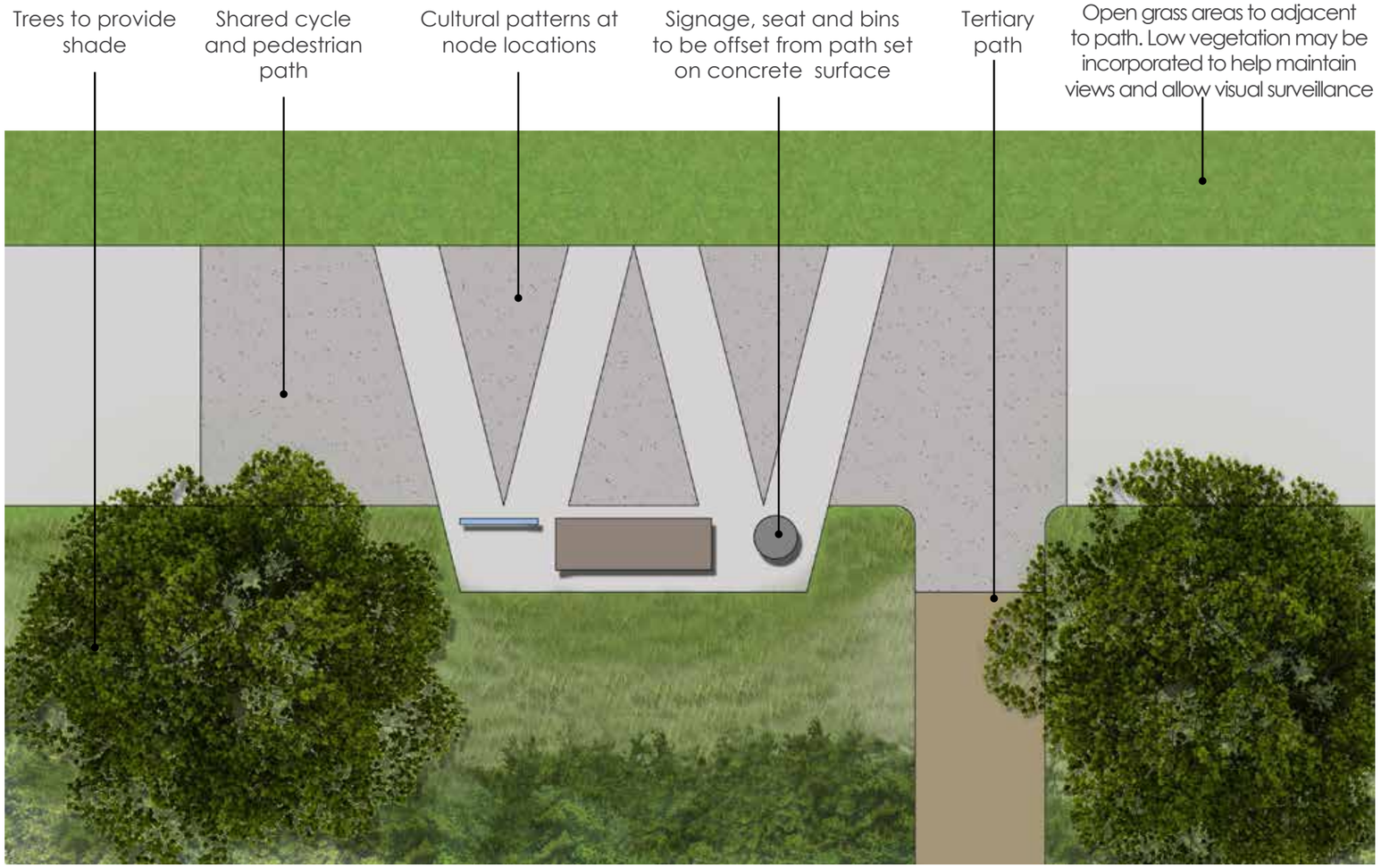


(Figure A-481) Concept shared path integrated with open space and wetland environment

4.8.2 Secondary Pedestrian Path Characteristics

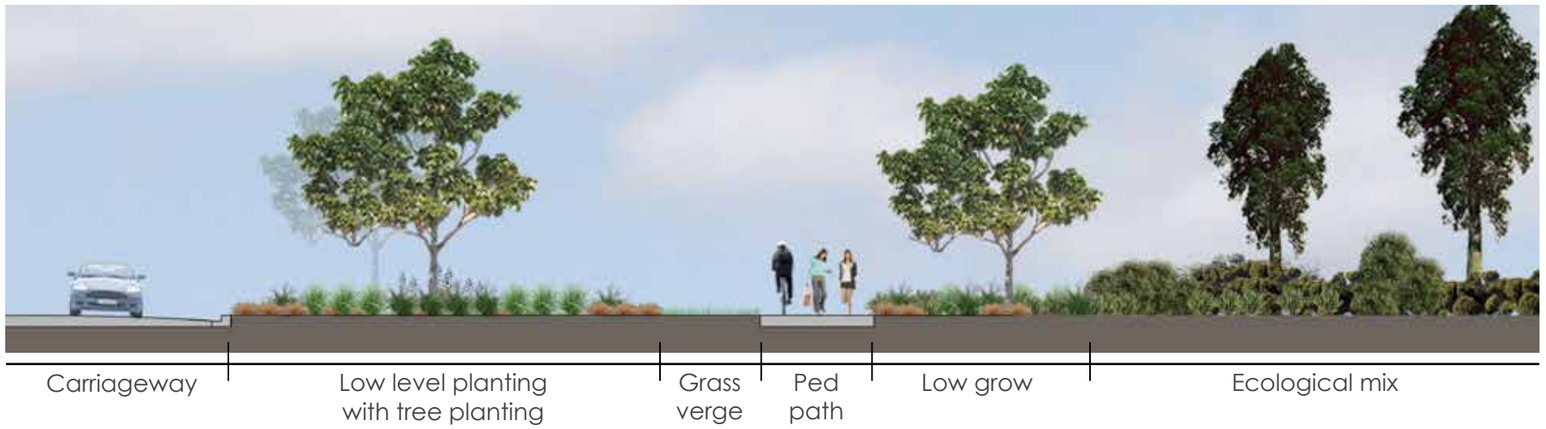
Secondary paths are aimed at pedestrian use, but also are sufficiently wide for cyclists, but are not strictly a shared cycle path. Paths may relate to open space environments or link between residential areas and the primary shared paths. Paths should have a high amenity and will include seating and planting.

Seating and signage locations will be defined in co-ordination with HCC. At these locations paved 'cultural patterns' will be integrated to denote a change in character and warn cyclists of pedestrian priority.



(Figure A-482) Typical Secondary Pedestrian Path Plan

(Figure C-482) Typical Secondary Path with Street Furniture



(Figure B-482) Typical Secondary Path Cross Section

4.8.3 Tertiary / Trail Path Characteristics

Although tertiary paths will not form part of the Project (to be determined by HCC at a later stage), consideration of potential connectivity in relation to primary and secondary paths and connectivity across gullies is required. The development of tracks will also consider providing maintenance access to gullies, which may require widening at some locations to accommodate maintenance vehicle access.

Tertiary paths are intended primarily for walking and recreation and are more akin to a bush walk than a shared path and are typically associated with gullies or a connection between main facilities.

Surface to be compacted gravel with timber edging and may require benching into gully slopes. Steps may be required along these paths, which will typically be unlit with the route being denoted by simple coloured timber markers. Boardwalk construction may consider the use of composite materials that have a proven track record for durability and meets HCC requirements.

The location and extent of tertiary paths will be in co-ordination with the EMMP requirements, as some gullies will remain isolated from pathways/human intervention to help promote the habitat values.

(Figure A-483) Examples of gravel path and timber boardwalk designs appropriate for gully tracks

(Figure B-483) Typical Tertiary / Trail Path Cross Section

4.8.4 Underpasses

Underpasses may be utilised to provide a continuous cycling link along primary shared paths. The design and articulation of any underpasses will be critical in terms of providing a quality environment that is appealing and promotes a safe environment.

Design Principles

Key elements that will be included within underpasses include:

- Provide a quality design finish with a structure that is as large as possible to provide an open environment with splayed abutment ends to provide good forward sightlines
- The underpass will be well integrated with surrounding components such as earthworks, structures, stormwater, landscape measures and public art
- Consider elevating the carriageway above to minimise the change in level of the cycle/pedestrian path to keep it as close to grade with the surrounding land and therefore maintaining visibility
- The paths leading to the underpass will be direct and straight to maintain clear visibility
- Incorporate the use of internal paint finishes with local artist mural with a treatment of anti-graffiti protection paint to aid maintenance
- Include lighting recessed into the structure to prevent vandalism (avoid bulk head light units) and to achieve a high level of light
- Use exposed aggregate paving to denote a change in environment, and
- Fall protection railings will be designed to complement the overall theme

(Figure A-484) Landscape planting and lighting to maintain views and provide a feeling of safety

(Figure B-484) Mural to internal environment (with anti-graffiti paint finish)

(Figure C-484) Splayed and open underpass provides clear views

(Figure D-484) Splayed underpass with cultural design interventions and to provide an attractive environment

4.8.5 Cycleway/Pedestrian Nodes

A number of stopping or node points have been identified along the primary path routes. These are associated with open space areas and provide an out look to a point of interest. They will contain durable well positioned street furniture and will include bins and interpretation boards with consideration of drinking fountains. Surfacing will typically be a combination of brushed concrete and exposed aggregate and will include cultural motif designs that support the overall theme for the Peacocke area.

Planting will include trees and shrubs to create an inviting environment with trees to provide shade once established. Cultural interventions such as interpretation boards and other art work (such as pou) will be developed in conjunction with TWWG for these spaces.

(Figure A-485) View platform to gully - located near Pa site

(Figure B-485) Example of cycle node point with integrated cultural art

(Figure C-485) Interpretation boards

(Figure D-485) Seating and paving patterns

(Figure E-485) Cycle node point with integrated cultural art

4.9 Stormwater and Drainage

Design Strategy

Integrated stormwater solutions including the use of swales and wetland ponds will be provided along the transport network, which will be located in low-lying and former wetland areas where possible. The devices will allow an integrated approach, providing the treatment of stormwater to maintain water quality as well as providing opportunities for planting to support a diversity of habitat and consider visual amenity within open spaces.

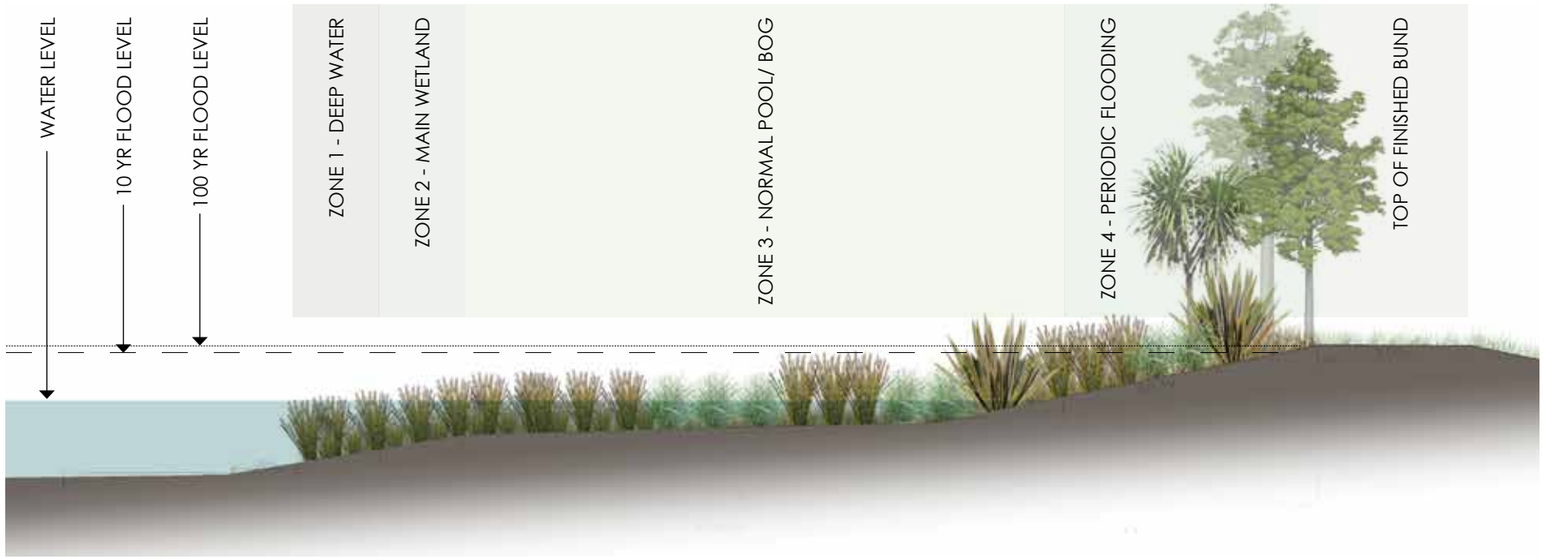
4.9.1 Wetland Pond

A number of wetland ponds will be required across the network and will be designed by Stormwater Engineers in combination with the project Landscape Architect. The wetland ponds and swales will not only manage water quality but offer an opportunity to enhance wildlife habitat and food sources, and therefore, the design requirements will also take into consideration any recommendations from the EMMP.
The wetlands will provide treatment of stormwater runoff with attenuation prior to releasing water back into local streams (Mangakotukutuku). Where possible wetlands will be designed to provide a 'natural' form that also includes shelving to accommodate a variety of plant mixes that will maximise biological uptake of dissolved pollutants and settlement of suspended solids.

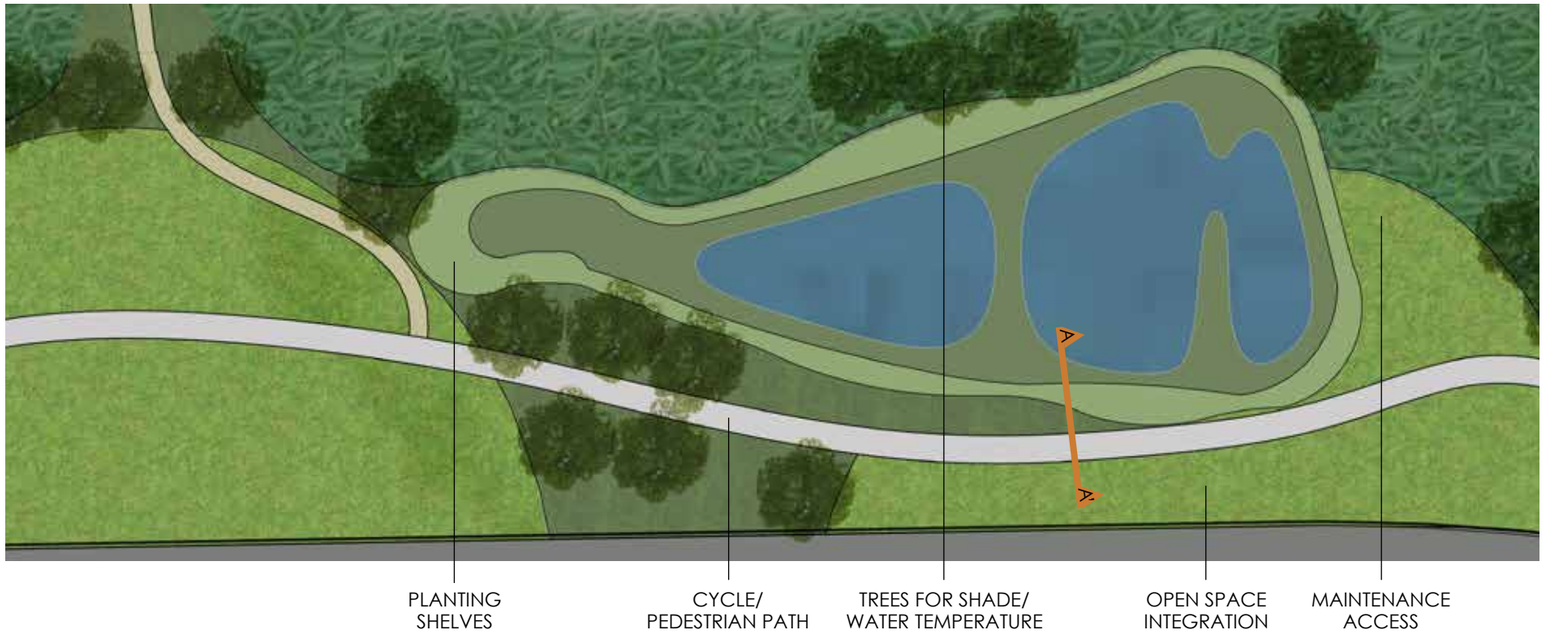
Design Principles

Wetlands will comply with the relevant design standards, which currently require;

- Will meet the requirements of the RITS (final design to be confirmed via Regional Council consent process)
- Allow for a natural form that includes shelving and benching to allow for a variety of planting types (wetland and riparian species), and
- The inclusion of an access track to allow for maintenance of the forebay area



(Figure B-491) Typical Wetland Pond Cross Section 'A - A'



(Figure A-491) Typical Wetland Pond Plan

4.9.2 Stormwater Swale / Rain Garden Drainage

Where utilised, stormwater swales will be located adjacent to the carriageway or at the base of fill batters to minimise the extent of earthworks/embankment requirements. Where practicable the swale system will be utilised to both convey and treat stormwater runoff to achieve good water quality. Some swales may be for conveyance only (not planted) with swale depths to be less than 300mm deep.

Alternatively, where slopes or space is constrained then the use of rain gardens could be considered. Appropriate soil mixes and plant selection will be integrated into the design to help absorb and filter contaminants before stormwater flows to surrounding ground pipes, drains and streams.

Design Principles

Longitudinal stormwater treatment swales will be integrated where possible adjacent to carriageways as they provide both stormwater conveyance and treatment while minimising long term maintenance.

Bridge runoff will be collected and treated off the bridge decks only where the combination of bridge length and vertical alignment would otherwise compromise performance. In such cases stormwater will be intercepted in catch pits, piped and collected beyond bridge abutments, and directed to appropriate devices for treatment.

4.9.3 Culverts

Where culverts are to be utilised and are visible from surrounding areas then the following principles will be applied:

Headwall
The Project will aim at minimising culvert lengths by maximising fill batter gradient for fill embankments across streams and ephemeral watercourses, which may include gradients of 1h:1v, achieved by reinforced earth techniques.

Design Principles

- Construct sloping culvert portals to the same gradient as adjacent fill batters
- Where armouring is required, the use of greywacke rock in gabion type structures installed at the same gradient as adjacent fill batters
- Integrate timber post and rail fall barriers to headwalls where required

Energy Dissipation and Fish Passage

The EMMP will be utilised to determine whether fish passage requirements need to be included into any culvert design. Where fish passage is required then the following approach will be utilised:

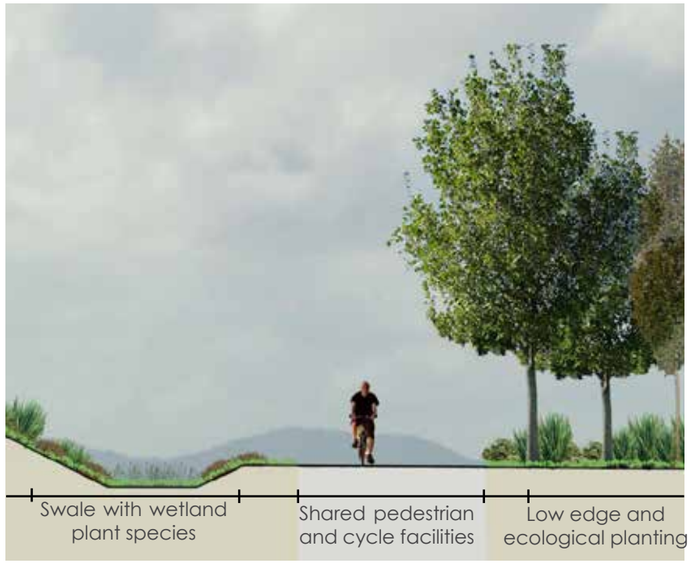
Design Principles

- Construct culverts to 'fish friendly' principles where directed within relevant ecological reports or the EMMP
- Set culverts to a shallow gradient
- Install below natural bed of stream to enable natural material to build up on base of culvert
- Insert concrete baffles within base of culvert to assist build-up of natural material and to provide fish passage following storms
- Construct rock ladders below downstream portal to prevent scouring and to avoid perched culverts

(Figure A-492) Rain garden

(Figure B-492) Example of swale profile sketch

(Figure C-492) Example of swale planting



(Figure D-492) example cross section of swale integrating with pedestrian and cycle facilities (open space environment)

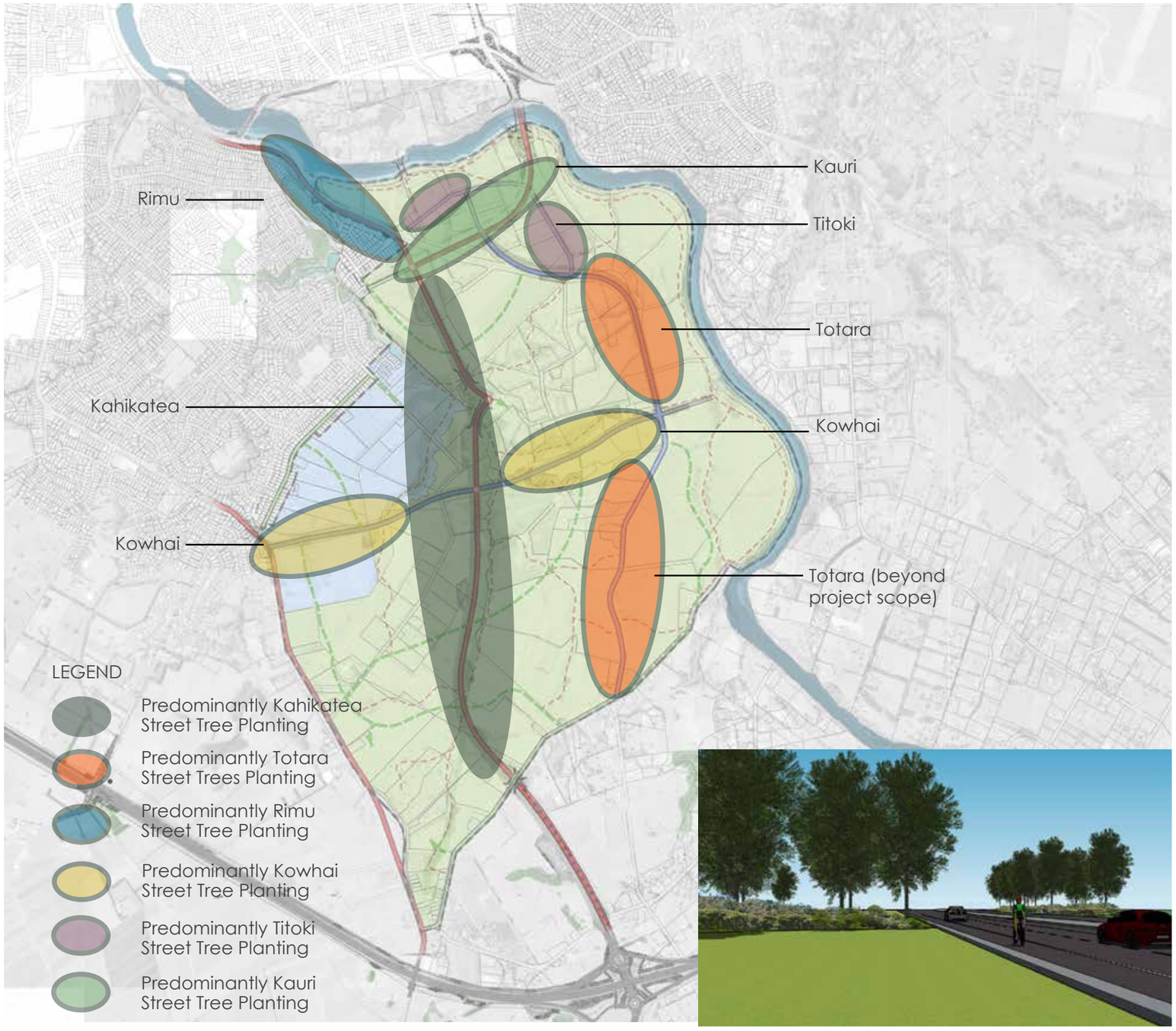
4.10 Ecology Planting Strategy

To uphold the landscape design principles, planting species will, where applicable be sourced from the Waikato Ecological District to uphold the Waikato ecological integrity. The plant selection shall follow the HCC requirements and NZTA Guidelines for Highway Landscaping with the selection of plants to provide appropriate low maintenance requirements and achieve the long-term objective of successional planting where possible.
Hamilton City Gully Restoration Guidelines and recommendations from the EMMP will be integrated into the landscape proposals and restoration requirements. Ecological enhancements will not be limited to just planting requirements, but will also include other interventions such as insect log stack hotels, eel hotels and bat boxes.

4.10.1 Ecological Planting Integration

The overall planting strategy is to promote ecological enhancement and biodiversity of the area, which will utilise a variety of plant palettes that include successional plant species. Plant mixes will include both amenity planting and include ecological enhancement planting with emergent species that will persist within an 8 to 10 year period.

- The mitigation, restoration and offset requirements of the EMMP will be incorporated into the Project, particularly around bat and invertebrate habitat maintenance and enhancements (interventions may include more that just planting requirements)
- Reflect the differing character areas (terraces, rolling land, escarpments and gullies) that will contribute to the Southern Links/Peacocke ecology
- Complementing existing vegetation that use a variety of planting matrixes to provide a range of habitats and improve bio-diversity
- Retain existing vegetation where appropriate, particularly where it is considered important (bat) habitat
- Where possible extend existing gully vegetation patterns as close to the carriageway as practicable
- Retention and enhancement of stream habitats, where appropriate including the use of riparian and margin species
- Planting of tree and shrub species appropriate to the local soil and climatic conditions, which will include eco-sourced native plants, and
- Enhance and link ecological habitat (including bat 'hop overs') with appropriate species and plant communities, particularly in relationship to bat flight paths and habitat



(Figure A-410) Street Tree Planting Strategy

(Figure B-410) Example of clustered street tree planting

4.10.2 Planting Design Principles

The following design requirements will be integrated into the project as follows:

- Recognition of the need for landscape treatment appropriate to the speed and scale of the viewer. That is, smaller scale detail treatment relative to pedestrian and cycle ways with bolder, broader scale treatment relative to vehicle traffic
- Integration of the road network by utilising indigenous planting to cut and fill slopes. Slopes greater than 1v:3h will be top soiled, planted and bark mulched
- Softening of structures such as noise walls, headlight glare fences and retaining walls
- Maintain openness/views and respond to the existing open environments, particularly to gully and open space environments
- Following recommendations of CPTED, particularly in association with public space, footpath and cycle facilities, and
- Minimise long term maintenance requirements with the use of appropriate plant mixes

ERMS- ECOLOGICAL REVEGETATION SHADE MIX (planted in groups of 7 to 11)

Common name	Botanical name	% age	Min. size	Min. Density (plants/m2)
Toetoe	Austroderia fulvida	5	1l	1/m²
Crown fern	Blechnum discolor	2	1l	1/m²
Kiokio	Blechnum novae-zelandiae	3	1l	1/m²
Karamu	Coprosma robusta	5	1l	1/m²
Cabbage tree	Cordyline australis	5	1l	1/m²
Putaputaweta	Dicksonia squarrosa	5	1l	1/m²
Akeake	Carpodetus serratus	10	1l	1/m²
Koromiko	Hebe stricta	8	1l	1/m²
Puahou/five finger	Pseudopanax arboreus	10	1l	1/m²
Manuka	Leptospermum 'Electric Red'	10	1l	1/m²
Flax	Phormium tenax	10	1l	1/m²
Karo	Pittosporum crasifolium	5	1l	1/m²
Totara	Podocarpus totara	5	1l	1/m²
Red Matipo	Myrsine australis	10	1l	1/m²
Miro	Prumnopitys ferruginea	2	1l	1/m²
Kowhai	Sophora microphylla	5	1l	1/m²
Total				

ERMD - ECOLOGICAL REVEGETATION DRY MIX (planted in groups of 7 to 11)

Common name	Botanical name	% age	Min. size	Min. Density (plants/m2)
Toetoe	Austroderia fulvida	5	1l	1/m²
Akeake	Dodonaea viscosa	5	1l	1/m²
Corokia	Corokia x virgata 'Geenty's Green'	5	1l	1/m²
Cabbage tree	Cordyline australis	5	1l	1/m²
Wheki-ponga (spread though mix)	Dicksonia fibrosa	2	1l	1/m²
Koromiko	Hebe stricta	10	1l	1/m²
Kapuka	Girselina 'Broadway Mint'	5	1l	1/m²
Rewarewa	Kightia excelsea	5	1l	1/m²
Puahou/five finger	Pseudopanax arboreus	10	1l	1/m²
Purple five finger	Pseudopanax lessoni 'Nigra'	5	1l	1/m²
Manuka	Leptospermum 'Electric Red'	10	1l	1/m²
Flax	Phormium tenax	10	1l	1/m²
Karo	Pittosporum crasifolium	5	1l	1/m²
Red Matipo	Myrsine australis	10	1l	1/m²
Miro	Prumnopitys ferruginea	3	1l	1/m²
Kowhai	Sophora microphylla	5	1l	1/m²
Total				

(UPM) ECOLOGICAL UNDERPLANTING MIX

Common name	Botanical name	% age	Min. size	Min. Density (plants/m2)
Kiokio	Blechnum novae-zealandiae	10	1l	1/m²
Rangiora	Brachyglotis repanda	15	1l	1/m²
Karamu	Coprosma grandifolia	20	1l	1/m²
Crown fern	Blechnum discolor	5	1l	1/m²
Koromiko	Hebe stricta	5	1l	1/m²
Kanuka	Kunzea robusta	15	1l	1/m²
Kawakawa	Macropiper excelsum	10	1l	1/m²
Mapou/Red Matipo	Myrsine australis	20	1l	1/m²

(Figure A-4102) Indicative Plant List


Kahikatea


Totara


Rimu


Titoki


Kowhai


Kauri


Embankment ecological planting


Wetland pond planting

(Figure B-4102) Examples of planting types

4.10.3 Amenity Planting/Open Space/ Streetscapes

The intent is to utilise amenity planting to visually enhance the network and open space environments, while linking potential wildlife habitats where possible.
Where practicable intersections and roundabouts will be planted to minimise the long-term maintenance requirements and provide a high level of amenity. Low growing plant mixes that maintain visibility and sightlines will be utilised in these areas, although where appropriate taller trees may be required to support bat fly-over points. Careful placement of specimen trees to visually emphasise intersections and roundabout areas will be incorporated as appropriate.

A variety of predominantly native street trees will be utilised, which will vary in accordance with the road type to help define the character and wayfaring of each road type. Trees will typically be arranged in informal groups to provide a more resilient street tree environment and to aid ecological enhancement (where single trees will be limited in achieving this). Where appropriate underplanting of trees will be incorporated to assist ease of maintenance.

The use of low edge mixes will be used to provide an easy to maintain edge, minimise maintenance around signage/furniture and maintain sight lines. In addition, the low grow edge mix will improve the visual appearance of the planting with a gradual step to the taller planting beyond, providing a more naturalistic look to the planting. The use of the low grow mixes will be incorporated typically along the edge of the carriageway, pedestrian and cycle paths and on the edge of landscape restoration planting, plus in and around highway furniture.

Where steeper cut or fill embankments occur, then these will be planted with a combination of low grow edge mixes adjacent to the carriageway with taller ecological re-vegetation planting beyond.

MASS INDIVIDUAL PLANT SPECIES

Common name	Botanical name	Code	Min. size	Min. Density (plants/m2)
Oioi	Apodasmia similis	Apo sim	1l	1/m²
Coprosma	Coprosma 'Kirkii'	Cop kir	1l	1.25/m²
Iris	Dietes grandiflora	Die gra	1l	1.8/m²
Turutu	Dianella nigra	Dia nig	1l	2/m²
Hebe	Hebe 'Inspiration'	Heb ins	1l	1/m²
Lomandra grass	Lomandra tankii	Lom tan	1l	1/m²
Manuka	Leptospermum 'Nanum Kiwi'	Lep nan	1l	1.25/m²
Harakeke/flax	Phormium cookianum 'Emerald Gem'	Pho eg	1l	1/m²
Golf ball pittoporum	Pittosporum 'Golf Ball'	Pit gol	1l	0.64/m²
Total				

LGE(A) - LOW GROWING EDGE MIX 1 (plant in groups of 5 to 7)

Common name	Botanical name	% age	Min. size	Min. Density (plants/m2)
Bidibidi/piripiri	Acaena inermis purpurea	5	1l	1/m²
Oioi	Apodasmia similis	10	1l	1/m²
Carex	Carex virgata	5	1l	1/m²
Coprosma	Coprosma acerosa 'Kirikii'	20	1l	1/m²
Turutu	Dianella nigra	15	1l	1/m²
Pohuhue	Muehlenbeckia astonii	20	1l	1/m²
Harakeke/flax	Phormium cookianum 'Emerald Gem'	15	1l	1/m²
Pittosporum sps	Pittosporum 'Little Burger'	10	1l	1/m²
Total				

LGE(B) - LOW GROWING EDGE MIX 2 (plant in groups of 5 to 7)

Common name	Botanical name	% age	Min. size	Min. Density (plants/m2)
Coprosma	Coprosma repens 'Poor Knights'	10	1l	1/m²
Sand coprosma	Coprosma acreosa	10	1l	1/m²
Turutu	Dianella nigra	10	1l	1/m²
Iris	Dietes grandiflora	10	1l	1/m²
Hebe	Hebe 'Wiri Charm'	10	1l	1/m²
Compact Manuka sps	Leptospermum 'Wiri Kerry'	15	1l	1/m²
Lomandra grass	Lomandra tankii	15	1l	1/m²
Flax	Phormium 'Emerald Green'	15	1l	1/m²
Dwarf Kowhai	Sophora 'Dragons Gold'	5	1l	1/m²
Total				

(Figure A-4103) Indicative Plant List

(RVM) - ROAD VERGE MIX (plant in groups of 5 to 7)

Common name	Botanical name	% age	Min. size	Min. Density (plants/m2)
Oioi	Apodasmia similis	10	1l	1.55/m²
Coprosma	Coprosma acerosa 'Hawera'	20	1l	1.55/m²
Coprosma Taiko	Coprosma Taiko	25	1l	1.55/m²
Turutu	Dianella nigra	15	1l	1.55/m²
Prostrate Manuka sps	Leptospermum 'Mercury Island'	20	1l	1.55/m²
Pohuhue	Muehlenbeckia astonii	10	1l	1.55/m²
Total				

EXOTIC SPECIMEN TREES (OPEN SPACE AREAS)

Common name	Botanical name	Code	Min. size	Min. Density (plants/m2)
Chestnut	Castanea sativa	Cas sat	Pb95	spot location
Katsura	Cercidiphyllum japonicum	Cer jap	Pb95	spot location
Walnut	Juglans reptans	Que pal	Pb95	spot location
Red Oak	Quercus rubra	Que rub	Pb95	spot location
London Plane	Platanus x acerifolia	Pla ace	Pb95	spot location
Claret Ash	Fraxinus angustifolia 'Raywoodii'	Fra ray	Pb95	spot
English Beech tree	Fagus sylvatica	Fag syl	Pb95	spot location
Linden tree	Tilia cordata	Til cor	Pb95	spot location
Tulip tree	Liriodendron tulipifera	Lir tul	Pb95	spot location

NATIVE SPECIMEN TREES (SPACED WITHIN PLANTING MIXES)

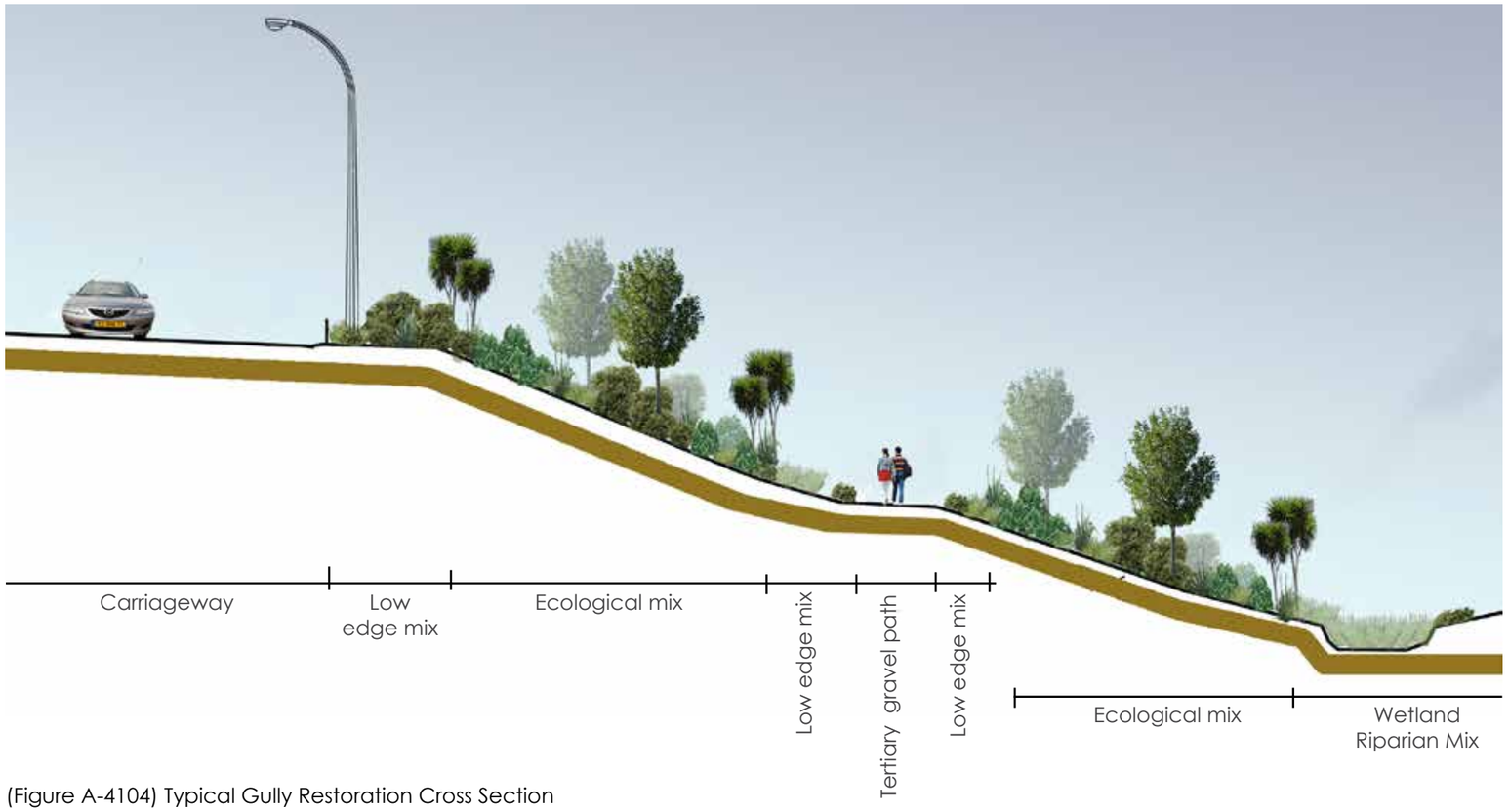
Common name	Botanical name	Code	Min. size	Min. Density (plants/m2)
Kauri	Agathis australis	Aga aus	Pb28	spot location
Titoki	Alectryon excelsus	Ale exc	Pb28	spot location
Kahikatea	Dacrycarpus dacrydioides	Dac dac	Pb28	spot location
Rimu	Dacrycarpus cupressiodes	Dac cup	Pb28	spot location
Rewarewa	Knightia excelsor	Kni exc	Pb28	spot location
Totara	Podocarpus totara	Pod tot	Pb28	spot location
Kowhai	Sophora tetraphylla	Sop tet	Pb28	spot location

(Figure B-4103) Sketch of Open Space Environment

4.10.4 Gully Planting

Landscape gully restoration planting will utilise a range of native plant species to improve gully environments. The planting palette will be utilise the HCC Gully Restoration Guide and will be guided by the EMMP (site specific restoration plans will be prepared as part of implementing the EMMP). The selection of species will aim at providing biodiversity plus wildlife food sources while achieving resilience through diversity within the mixes.

- Stream restoration planting will utilise a combination of wetland and riparian planting species at the base of the gullies to suit the varied water levels and ground conditions.
- Mid to upper slope planting will incorporate an ecological revegetation mixes with the aim of the vegetation to extend onto the flatter areas adjacent to the gullies.
- Quick growing plant species (may include non natives) will be utilised adjacent gully bridge crossings or at locations which have been identified as bat flight routes to assist in pushing bats up and over carriageways and bridges, and
- Where tertiary path occur, a suitable low grow planting mix will be utilised to maintain a degree of openness and visibility on the tracks.



(Figure A-4104) Typical Gully Restoration Cross Section

(Figure B-4104) Example of informal paths and planting (to be co-ordinated with the EMMP requirements)

(Figure C-4104) Insect log stack hotels to be used in gully environments

(Figure D-4104) Bat boxes to be used in gully environments

4.10.5 Swale and Wetland Planting

Planted swales maybe utilised in some locations to filter and treat the stormwater runoff to maintain water quality within the area and will discharge to the wetlands for further treatment and attenuation. A combination of wetland plant species will be utilised to withstand periodic inundation with dry tolerant riparian species situated on the sides of the swales/wetlands.

Stormwater wetlands will be designed with natural forms that incorporate 'platforms' to provide the varying growing environments to support a range of plant species that promote a range of wildlife habitats and adds biodiversity. Where possible appropriate tree species will be included along the upper margins to increase the habitat value of the wetlands and help regulate water temperature, however trees will be placed away from forebay maintenance areas to ensure ease of maintenance.

(Figure A-4105) Integration of open space with swale/wetland areas

WETLAND PLANTING				
Common name	**Botanical name**	**% age**	**Min. size**	**Min. Density (plants/m2)**
(WPM) Wetland Pond Mix				
Rush	Baumea / Machaerina juncea	10	0.5l	2.8/m²
Carex grass	Carex apressa	20	0.5l	2.8/m²
Sedge spike	Eleocharis sphacelata	30	0.5l	2.8/m²
Wiwi	Juncus gregiflorus	20	0.5l	2.8/m²
Giant rush	Juncus pallidus	20	0.5l	2.8/m²
Total				
(WSE) Wetland/Stream Edge Mix (permanent water to moist soils)				
Oioi , jointed wire rush	Apodasmia similis	15	0.5l	2.8/m²
Swamp astelia	Astelia grandis	5	0.5l	2.8/m²
Jointed twig rush	Baumea articulata	15	0.5l	2.8/m²
Carex sedge	Carex secta	15	0.5l	2.8/m²
Sedge	Carex virgata	15	0.5l	2.8/m²
Giant umbrella sedge	Cyperus ustulatus	5	0.5l	2.8/m²
wiwi	Juncus edgariae	15	0.5l	2.8/m²
Jointed rush	Machaerina articulata	5	0.5l	2.8/m²
Kuawa	Schoenoplectus tabernaemontani	10	0.5l	2.8/m²
Total				
(RM) Riparian Mix (periodic wet and dry period)				
Kiokio	Blechnum novae-zelandiae	5	1l	1/m²
Sedge	Carex vigata	10	1l	1/m²
Mingimingi	Coprosma propinqua	15	1l	1/m²
Karamu	Coprosma robusta	5	1l	1/m²
Cabbage tree	Cordyline australis	5	1l	1/m²
Toetoe	Cortaderia fulvida	5	1l	1/m²
Koromiko	Hebe stricta	15	1l	1/m²
Manuka	Leptospermum scoparium	10	1l	1/m²
Red matipo	Myrsine australis	10	1l	1/m²
Harakeke	Phormium tenax	20	1l	1/m²

(Figure C-4105) Indicative Plant List

(Figure B-4105) Examples of wetland and swale planting

4.10.6 Landscape Specification and Maintenance

At the Detailed Design stage, the landscape specification will utilise NZTA's P39 and relevant RITS specifications and will cover vegetation clearance, subsoil preparation works, top soiling, eco-seed sourcing, planting preparation, planting installation of grass and pest control and maintenance.

Planting will be undertaken during the planting season between April and September to help achieve the best outcomes in relation to plant establishment and growth.

Maintenance for all landscape work associated with the Project will accord to the EMMP and the RITS requirements. In accordance with Designation Condition (14.3(l)), maintenance will be carried out for a total of 5 years from the end of practical completion. This will ensure suitable long term weed management program is undertaken and any failures can be replaced during each planting season to ensure canopy closure occurs prior to final handover.

The maintenance activities will include weed removal/ management and plant replacement where failures occur. It is anticipated that the weed management and plant replacement will be more intensive in the initial two years during the establishment period to minimise weed competition to allow plant material to establish and thrive.

Existing Vegetation and Tree Protection

Tree protection fencing requirements will be developed during the detailed design stage of the project. This will include post and mesh wire fencing located at the tree/vegetation drip line and will be installed for the duration of the construction works to ensure construction vehicles and storage of materials are excluded from these areas.

4.10.7 Pest Control

Pest control will be carried out in accordance with the EMMP recommendations for pest control/management program particularly in relation to bats and bat roosts.

4.11 Earthworks

The project traverses a variety of landscape types including river terraces, undulating topography and incised gully environments, which needs to be considered in relation to earthworks to ensure the project 'sits' within the landscape and complements the surrounding landform. To this extent earthworks will achieve a natural look and be responsive to:

- The wider topography
- Any smaller scale localised landforms

Earthworks will aim at minimising the overall footprint of the road to help reduce the visual impact and avoid encroachment into water courses/bodies and areas of indigenous vegetation. In addition, earthwork formations should ensure overland stormwater flows are integrated to provide an efficient means of capturing and treating stormwater run-off.

Design Principles

- Respond to contextual surroundings (rolling landscape and flat terracing) and where appropriate accommodate sufficient depth of topsoil for planting treatment
- Where grassed slopes are to be implemented and will require mowing, then slopes shall be no greater than 1v:4h
- Planting will occur on (but not limited to) slopes greater than 1v:4h
- Where cuts through ridges (Peacockes Road) or slopes occur, these will aim at 1v:3h but may utilise maximum slopes of 1v:2.5h and ensure slopes are reinstated with a suitable depth of top soil, bark mulch and planting
- Cuts and batters steeper than 1v:2.5h will require an integrated/engineered design approach that will achieve a long term stable solution
- Avoid sharp edges to earthworks by utilising rounded tops and toes to contour and tying into adjacent landforms
- Manage topsoil strip and storage to maintain soil quality for re-use on cut and fill faces, and
- Consider earthworks in relation to access of existing and future properties, plus access to future minor arterials

Batters

Batters should be graded to blend with adjacent topography. Planting will further integrate earthworks and will:

- Stabilise cuttings with appropriate treatments as early as possible during construction to reduce erosion and sedimentation
- Place stormwater swales where practicable at the base of batters to minimise the extent of earthworks, and
- Use ground cover plants and grasses where views are desired particularly in relation to open space and shared pedestrian and cycle facilities

Cuts

Cuttings invariably create challenging surfaces to revegetate and frequently require semi-engineered solutions for successful plant establishment. Earthworks will:

- Avoid excessively steep slopes which require engineered solutions and to allow an appropriate environment and top soil depth for planting
- Achieve slopes that relate to the abutment forms associated with bridges
- Avoid benching and retaining structures where possible, although the use of low retaining walls where access is not required may be considered
- Respond to open space views and existing vegetation
- Integrate suitable slope drainage to prevent water logging and slumping
- Integrate planting to integrate the cut into the landscape

4.12 Noise Barriers/Fences

Noise barriers are subject to further noise investigation studies, but are likely to be required in locations adjacent to existing residential properties. Due to space limitations earth bunds are unlikely to be utilised for noise mitigation, and therefore, timber or concrete noise walls will be required, which will be consistent with the urban environment.

Design Strategy

- Relate to the 'family' of materials and forms used across the project to provide consistency
- Are constructed from timber or concrete panel with a 50-year design life and 20 years minimal maintenance
- Run parallel to the edge of the road where possible and where practicable allow sufficient space to the front and rear for landscape treatment
- Have a simple pattern and texture with a focus on an abstract pattern developed in conjunction with TWWG to support the cultural theme for the project.
- Have planting on both sides of the fence to soften and integrate the fence into the landscape where possible
- Fence heights and lengths will align to detailed noise assessment requirements
- The design will integrate with stormwater features to ensure the integrity of noise barrier is maintained

Design Principles

Materials and Colour

The preferred noise walls material will utilise rough sawn timber with overlapping joints, which is a suitably robust and appropriate material for rear gardens and peri-urban environments. The rear wall (railings) will be positioned towards the residential side of the property and will be softened with planting. The fence will have one predominant colour (recessive and dark) but may consider the use of colour to highlight a cultural theme through a simple pattern to provide additional interest within the urban environment.

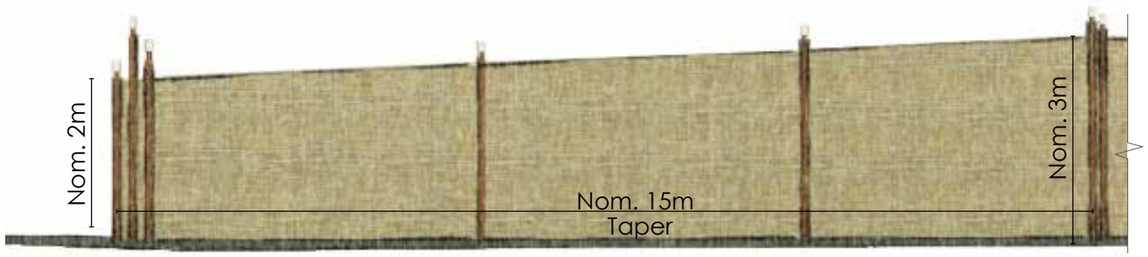
Transitions

The approach to the final wall design will be dependent on the height requirement of the wall/fence. Where an overall height is greater than 2m then the noise wall will transition to a conventional fence height of 2m or less. This will be achieved by a sloping transitional length at the end of each fence (refer to Figure D-412).

(Figure A-412) Example of timber fence with urban design treatment

(Figure B-412) Example of concrete panel wall with urban design treatment

(Figure C-412) Typical Noise Wall Cross Section



(Figure D-412) Typical Noise Wall with Tapered End to Match Residential Fence Height

4.13 Retaining Walls

The use of retaining wall structures provide opportunities for urban design inputs to ensure that they are context sensitive with consideration given to the choice of appropriate materials, colours, finishes and detailing.

Design Strategy
Retaining wall types will include concrete keystone retaining walls or gabion structures to suit the location and surrounding landforms. The structures may be utilised to form or support a gateway environment or emphasise a design feature. Where retaining walls are visible from the road or pedestrian/cycle facilities then the walls will incorporate art work/patterning to tying into cultural and natural landscape elements of the locality.

If vertical structures are to be utilised due to constrained site area, then the use of concrete slabs with an exposed surface treatment or well-designed but simple motif will be included on the panels. MSE panels are to avoid stepping and ensure they are aligned to provide a clean consistent wall form.

Design Principles

- Within the urban environment, such as along cycleway paths or at underpasses then keystone wall units will be utilised. The use of gabion walls will be utilised within gully or river/stream edge environments where they are more suited.
- Keystone walls will utilise a capping unit to provide a quality environment.
- Keystone walls will be constructed with a preference of a sloping top to walls, but where a step is required then these should be no greater than 300mm steps with each step being a minimum of 4m apart.
- Fall protection fencing to be integrated into the design. Fall protection fencing will be in accordance with the railing design requirements (no pool fence fall barrier to be used)
- The use of planting to the top and bottom will form part of the overall design solution to help anchor and soften the retaining walls
- Wall patterns to be developed in consultation with TWWG
- Integrated drainage solutions to be accommodated into structure

(Figure A-413) Example of stone filled gabion retaining walls

(Figure B-413) Example of cultural pattern to retaining walls

4.14 Highway Furniture

All street furniture (barriers, signage, lighting and road markings) will be in accordance with HCC and NZTA guidelines and requirements. Consideration will be given to enable ease and safety of access and maintenance of highway furniture.

4.14.1 Signage Design Strategy

All street signage will be in accordance with HCC and NZTA standards with specific signage layouts provided at the detail design stage.

Design Principles

- Gantries will be constructed so that beams and pillars join at right angles. Preference is for square box section, I-beams and flat steel components
- Construct pillars to prevent unauthorised access without the need for such secondary fittings as barbed wire
- Use simple steel posts for smaller signs installed adjacent to the carriageway
- Paint gantries a metallic colour that complements weathered galvanised steel
- Where possible, signage should be visually contained within the depth of the spanning girder, through integrated design of girders and signage
- Signage for road users shall not be attached to overbridges
- Consideration will be given to providing a concrete skirt base to signage to assist in maintenance, especially where signage is placed in grass areas (concrete to be flush with soil/grass)
- Planting will utilise low growing species in and around signage to maintain visibility and to prevent maintenance issues of excessive plant growth

4.14.2 Street Lighting

Street lighting for each road type will incorporate standard equipment that can be readily sourced for maintenance and replacements. Additional consideration will be given to the lighting requirements outlined within the EMMP, particularly in relation to light levels and spill relating to bat flight paths and habitat areas.

Design Principles

- Columns will be in accordance with HCC and NZTA (M/26) standards
- Lighting columns will be hot dip galvanised steel with a protective epoxy coating to the in-ground section. The upper column will remain unpainted and as such will be maintenance free (excluding issues of accidental impact and vandalism)
- Lamp units will utilise appropriate LED units with suitable lenses to minimise light spill while achieving minimum lux levels.
- Lighting positioning and types in general will consider effects on bats and bat habitat
- Bridge lighting adjacent to gullies will be kept to a minimum to prevent conflict with the gully environment and bat habitat
- Feature lighting will need to be managed in relation to EMMP requirements, and where used to achieve a high aesthetic while considering the effects on the river environment, and
- Light columns on bridges should be avoided if possible, or integrated into the bridge design to achieve a balanced appearance with equal offsets from each end.

4.14.3 Roadside Barriers

The Peacocke area will become increasingly urbanised as development progresses. Therefore, the strategy is to avoid having concrete or wire barriers in order to maintain the urban character.

Design Principles

Concrete TL5 barriers will be incorporated beneath the local road bridges to provide crash protection to the bridge abutments and columns. The design approach will ensure a suitable integration of thrice beam barriers with end protection.

4.14.4 Utilities

Defined utility routes will be established during the detailed design stage to ensure a logic and well considered utility corridor is integrated into the Project.

Design Principles

- Where possible underground service facilities will be located in soft landscape/grassed areas and avoid roads and cycle/ pedestrian facilities
- Planting offsets of trees shall be in 4m in accordance with NZTA guidelines to prevent future conflicts and disturbance of tree root systems
- Substation locations will be offset from the road by a minimum of 5m. Substation areas will ensure they include fencing and landscape planting to soften the visual appearance. A suitable access point will be provided for maintenance crews
- Consideration will be given in relation to planting types (heights) beneath overhead transmission and infrastructure utilities and be in accordance with NZ Electricity regulations.

(Figure A-4141) Example of 'W' barrier to TL5 concrete barrier connection

(Figure B-4141) Example of street light poles

(Figure C-4141) Example of street signage

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25 June 2019

Nathanael Savage
Principal Planner
Southern Links Communication, Consultation and Property Liaison Manager

Dear Nathanael

SOUTHERN LINKS DESIGNATION A106

Thank you for providing the Concept Landscape Management Plan (CLMP) for the balance of the Southern Links Designation — noting that a similar document for the Wairere/Cobham Drive interchange works has previously been certified specific to that area of the Project.

I confirm our Council's receipt and certification of the CLMP.

Yours sincerely

Fraser McNutt
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CITY GROWTH

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