

Urban design strategy

MR674 Hillsborough Road duplication

September 2022



Transport
for NSW



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PTY LTD

Report prepared for:



On behalf of:



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Cover image: Looking west along Hillsborough Road towards
Hillsborough Dog Showground

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CONTENTS

1.0	INTRODUCTION	1
1.1.	Purpose of the report	1
2.0	HILLSBOROUGH ROAD UPGRADE PROPOSAL	2
2.1.	Project features	2
2.2.	Transport for NSW's objectives	2
3.0	CONTEXTUAL ANALYSIS	3
3.1.	Regional context	3
3.2.	Local context	4
3.3.	Vegetation	5
3.4.	Planning framework	5
4.0	URBAN DESIGN STRATEGY	7
4.1.	Principles and objectives	7
4.2.	Liveable communities	8
4.3.	Landscape theme	9
4.4.	Urban design concept	11
4.5.	Concept for retaining walls	14
5.0	LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT	19
5.1.	Landscape character assessment methodology	19
5.2.	Landscape character zones	20
5.3.	Landscape character impact assessment	21
5.4.	Visual impact assessment methodology	25
5.5.	Representative viewpoints	26
5.6.	Visual impact assessment	31
5.7.	Conclusion and mitigation measures	32
6.0	REFERENCES	33

1.0 INTRODUCTION

1.1. Purpose of the report

The NSW Government is proposing the upgrade of Hillsborough Road Hillsborough to improve traffic flow, safety and accessibility for all road users. The extent of the proposal is the duplication of about 1.8 kilometres from the Newcastle Inner City Bypass to the west of Crockett Street. Refer Figure 1.

The purpose of this report is to consider and inform the urban design strategy for the concept design for the Hillsborough Road upgrade.

The Urban design strategy provides:

- An introduction and background of the proposal.
- A contextual analysis of the study area providing an overview of the regional and local context of the area.
- Urban design objectives and principles for the proposal.
- Urban design strategy for the proposal.
- Definition of the landscape character zones that relate to the study area and assessment of impact on the landscape character of the proposal.
- Identification of representative viewpoints and assessment of visual impact of the proposal.
- Provision of mitigation measures in response to landscape character and visual impacts.

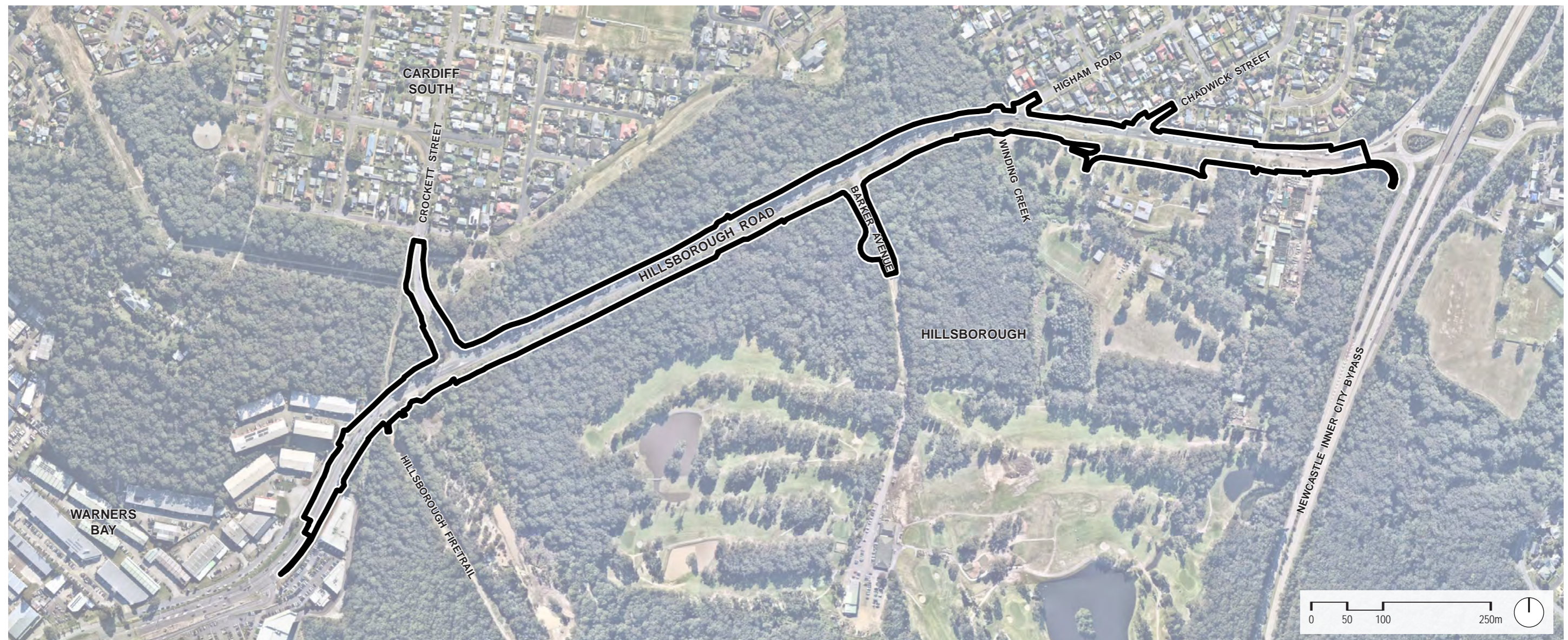


Figure 1 – Hillsborough Road - Extent of proposal - Newcastle Inner City Bypass to west of Crockett Street
Base aerial image - GHD 2021

2.0 HILLSBOROUGH ROAD UPGRADE PROPOSAL

2.1. Project features

Transport for NSW is planning the duplication of about 1.8 kilometres of Hillsborough Road, from Medcalf Street in Warners Bay to the Newcastle Inner City Bypass in Hillsborough. Around 35,000 motorists use Hillsborough Road daily and this upgrade would improve traffic flow, safety and accessibility for all road users.

Project features include:

- Duplication of about 1.8 km of Hillsborough Road.
- Two lanes in each direction with a central median.
- Posted speed limit of 60 km/hr.
- Traffic control signals at Crockett Street intersection.
- Traffic control signals at the Barker Avenue intersection and a u-turn facility on Barker Avenue.

- Traffic control signals at Chadwick Street intersection.
- Modification of Higham Road and Hillsborough Road intersection incorporating a T turning head and left out only from Higham Road to Hillsborough Road.
- Shoulder with provision for cyclists in both directions.
- On road cycle lanes in both directions
- Off road shared path on the northern side of Hillsborough Road providing for both cyclists and pedestrians.
- Retaining walls at the western extent of the proposal.
- Culvert widening on Winding Creek
- Culvert widening between Crockett Street and Baker Avenue
- New entry and exit accesses for the combined Newcastle Canine Club showgrounds.
- Left in / left in out only from existing businesses fronting Hillsborough Road, east of the CNCC showground.

2.2. Transport for NSW's objectives

The project's objectives set out by Transport for NSW are:

- Develop and present an integrated engineering and urban design outcome that fits sensitively into the built, natural and community environments through which it passes, is well designed and contributes to the character and functioning of the area.
- Contribute to the accessibility and connectivity of people within regions and communities.
- Contribute to the overall quality of the public domain for the community and all road users.

- Incorporate good urban design meaning a safe, robust design and a diverse, sustainable landscape, whilst deterring graffiti and vandalism.
- Undertake urban design collaboratively with Transport and to be considered early in the concept design phase, integrated into projects at the initiation phase and continued through the development, implementation and finalisation phases of projects.



Figure 2 – Hillsborough Road upgrade
Source: GHD 2022

3.0 CONTEXTUAL ANALYSIS

3.1. Regional context

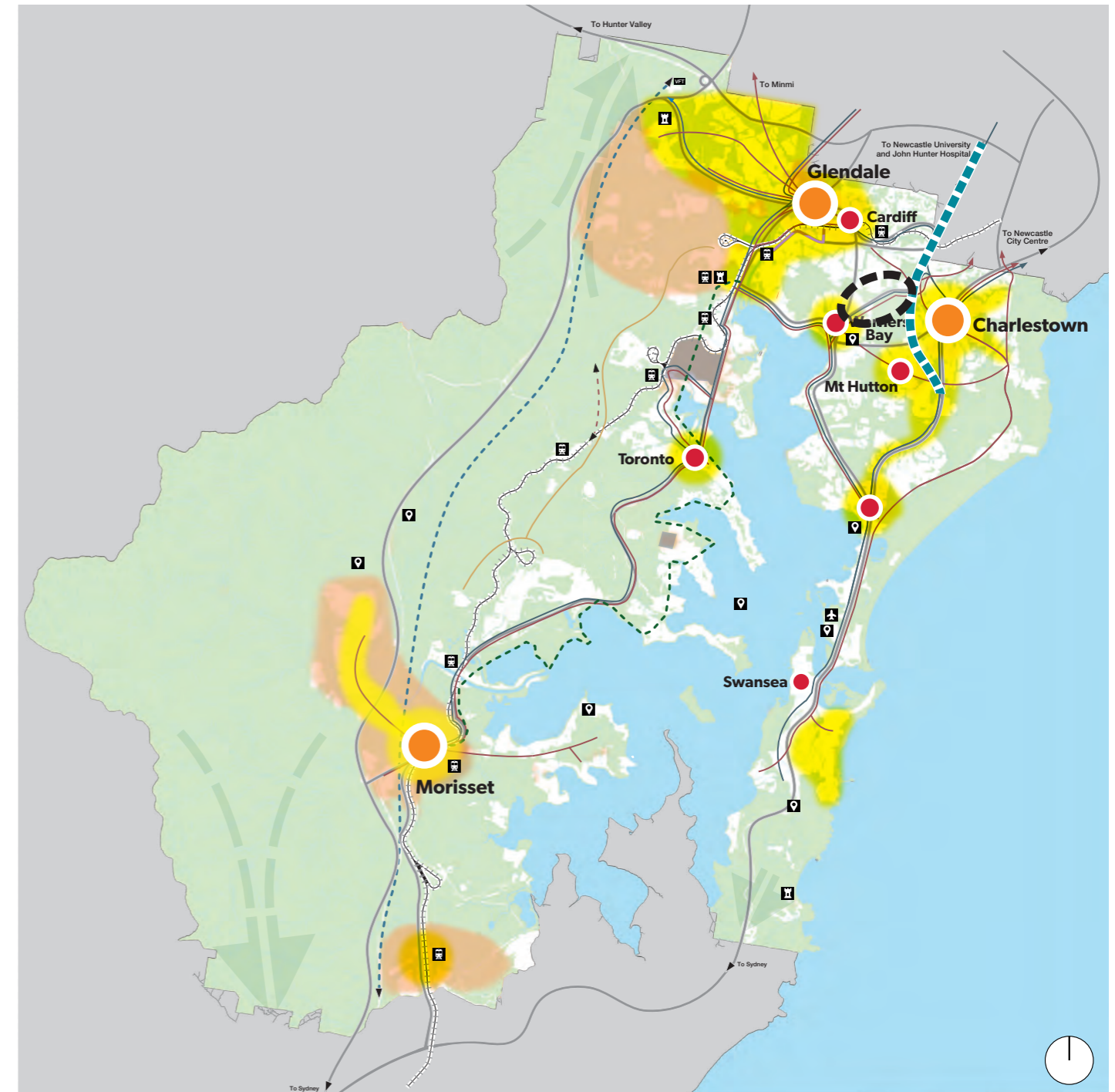
Lake Macquarie's strategic document, Shaping the Future, identifies the area from Charlestown to Belmont will offer opportunities for significant growth. The economic centres of Charlestown, Belmont, Mount Hutton and Warners Bay will continue to evolve and intensify, providing a wide range of housing, employment and services.

The Hunter Regional Plan 2036 includes a Direction to Enhance interregional linkages to support economic growth. It identifies Warners Bay as a centre of local significance.

This includes Improvements to transport corridors will be needed to maintain efficiencies in the network, particularly for freight, and to allow for future growth. Planning is under way to extend the M1 Pacific Motorway to Raymond Terrace and to complete the Newcastle Inner City Bypass.

Improvements are being made to the planning and delivery of Greater Newcastle's active transport network. This includes the CycleSafe proposal, an initiative that aims to connect 90 kilometres of existing cycle paths with a 140-kilometre network of new construction to deliver a system of safe, easy-to-follow walking and cycling connections throughout Newcastle and Lake Macquarie.

The upgrade of Hillsborough Road being an important connector providing a transport link between the Newcastle Inner City Bypass to the suburbs of Hillsborough and Warners Bay will assist in meeting the above objectives of Lake Macquarie Council and the NSW State Government.



LEGEND

Study Area Newcastle Inner City Bypass

Figure 3 – City structure and opportunity map (NTS)

Source: Lake Macquarie City Council 2020

CONTEXTUAL ANALYSIS (cont.)

3.2. Local context

As previously identified, Hillsborough Road is a connector providing an important transport link between the Newcastle Inner City Bypass to the suburbs of Hillsborough, Cardiff South and Warners Bay.

Hillsborough and Cardiff South are residential areas comprising low density housing and supporting services such as open space. The residential area of Hillsborough is visible from Hillsborough Road with some dwellings fronting or backing onto Hillsborough Road. Cardiff South is not visible from Hillsborough Road as it is located to the north and screened by the extensive vegetation along Hillsborough Road. Hillsborough Road is an important connector for these areas as it provides links to Warners Bay and the Newcastle Inner City Bypass.

Offroad cycleways and pathways are incorporated in the residential areas linking to the onroad cycleway on Hillsborough Road.

Other uses include the Hillsborough Dog Showground, the Whalan's Nurseries and Shed Quarters, which are visible from Hillsborough Road. The Charlestown Golf Course is accessible from Hillsborough Road but is not visible.

Hillsborough Road connects to Warners Bays to the west, which is identified as an economic centre in the Lake Macquarie Local Government Area. The Warners Bay Economic Centre incorporates a business park and supports large format indoor recreation and entertainment facilities.

Features of the Warners Bay Economic Centre identified by Council include:

- The centre transitions from its existing largely single-level character to high quality multistorey residential and commercial development.
- Hillsborough Road Business Park precinct will deliver large format indoor recreation/entertainment, bulky goods retailing and creative and innovative spaces.
- High quality public spaces to be developed within the centre.
- Existing residential areas are redeveloped for additional housing density, supported by active transport infrastructure.
- Pedestrian and cyclist networks through and around the centre are improved and extended to the waterfront and recreational facilities.
- The centre's core to incorporate high amenity and prioritised pedestrian movement.
- Night time activity and tourism to create a lively location.
- The relationship between the centre and the foreshore is improved through appropriate urban design and transport management.
- There is an interchange point for local buses to high-frequency, high-capacity 'spine' services to major destinations and interchange points.

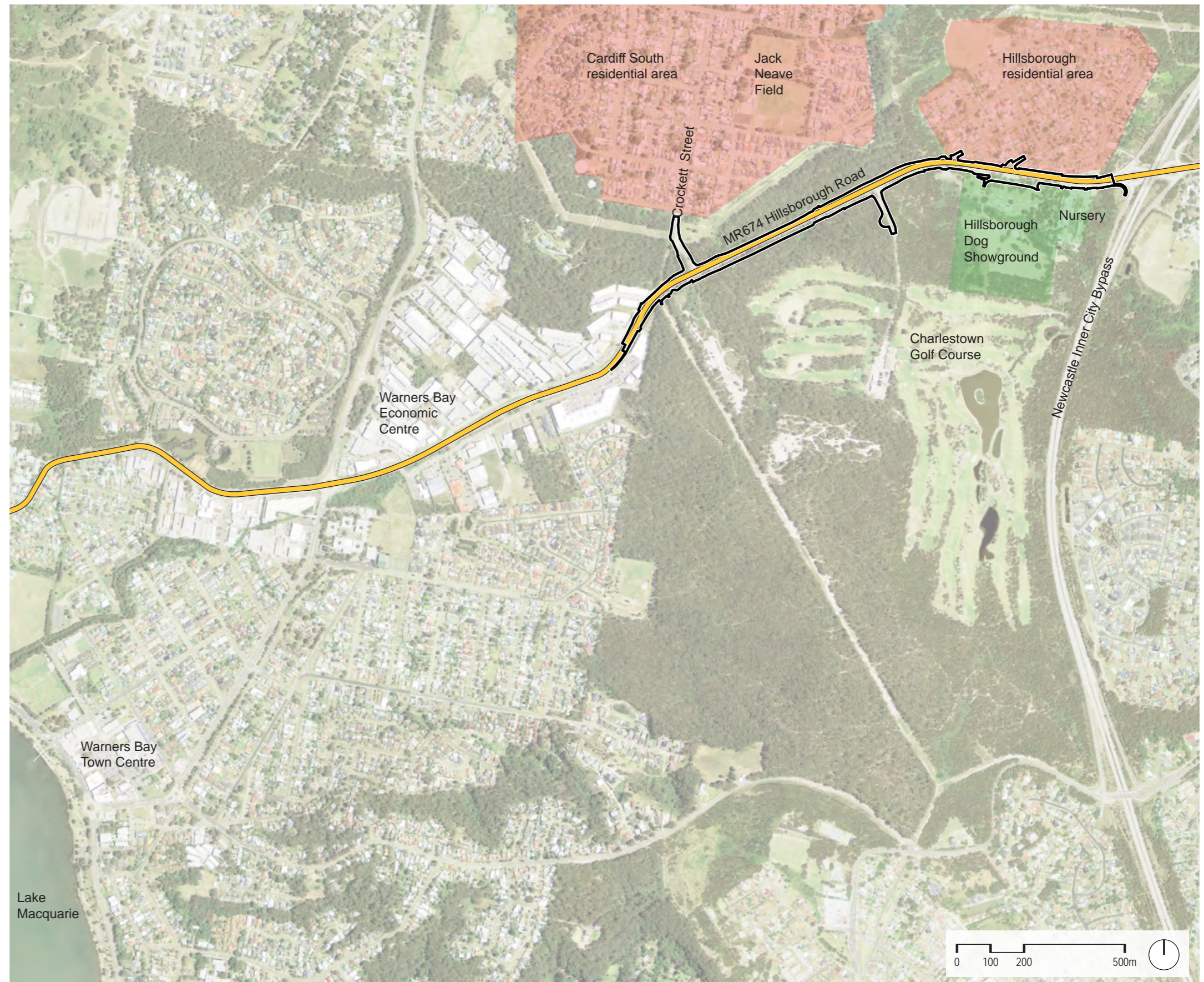


Figure 4 – Contextual plan
Base aerial image - Sixmaps 2022

CONTEXTUAL ANALYSIS (cont.)

3.3. Vegetation

The study area is situated in an extensively cleared urban landscape where roadside vegetation and small to medium scattered bushland remnants form the bulk of the remaining vegetation. The vegetation surrounding Charlestown Golf Course forms one of the largest areas of native vegetation within the Lake Macquarie LGA.

The Biodiversity Assessment identifies three Plant Community Types (PCTs) in the study area based on floristic composition, soil substrate and landscape position:


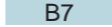










- Smooth-barked Apple – Turpentine – Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast (PCT 1627)
- Smooth-barked Apple – Red Bloodwood – Scribbly Gum – grass /shrub woodland on lowlands of the Central Coast (PCT 1638)
- Smooth-barked Apple - Red Mahogany - Swamp Mahogany - Melaleuca sieberi heathy swamp woodland of coastal lowlands (PCT 1649).

3.4. Planning framework

The following planning categories have been reviewed in order to provide an understanding of the potential limitations and future development potential that may affect urban design proposals. This information assists in the development of appropriate urban design solutions within the surrounding local context.

Zoning

Hillsborough Road is a classified road and is zoned SP2 Infrastructure under the Lake Macquarie Local Environmental Plan 2014. At the eastern extent, land is zoned for residential purposes to the north and open space and small primary production to the south. Travelling west, land on both sides of Hillsborough Road is zoned for environmental conservation. This comprises Winding Creek and the large mature vegetation on both sides of the road. At the western extent of the study area, land is zoned for Business Park and this comprises the Warners Bay Economic Centre. Refer Figure 5.

LEGEND	
	Study Area
	B7 Business Park
	E2 Environmental Conservation
	E4 Environmental Living
	R2 Low Density Residential
	R3 Medium Density Residential
	RE1 Public Recreation
	RE2 Private Recreation
	RU4 Primary Production Small Lot
	RU6 Transition
	SP2 Infrastructure
	DM Deferred Matter

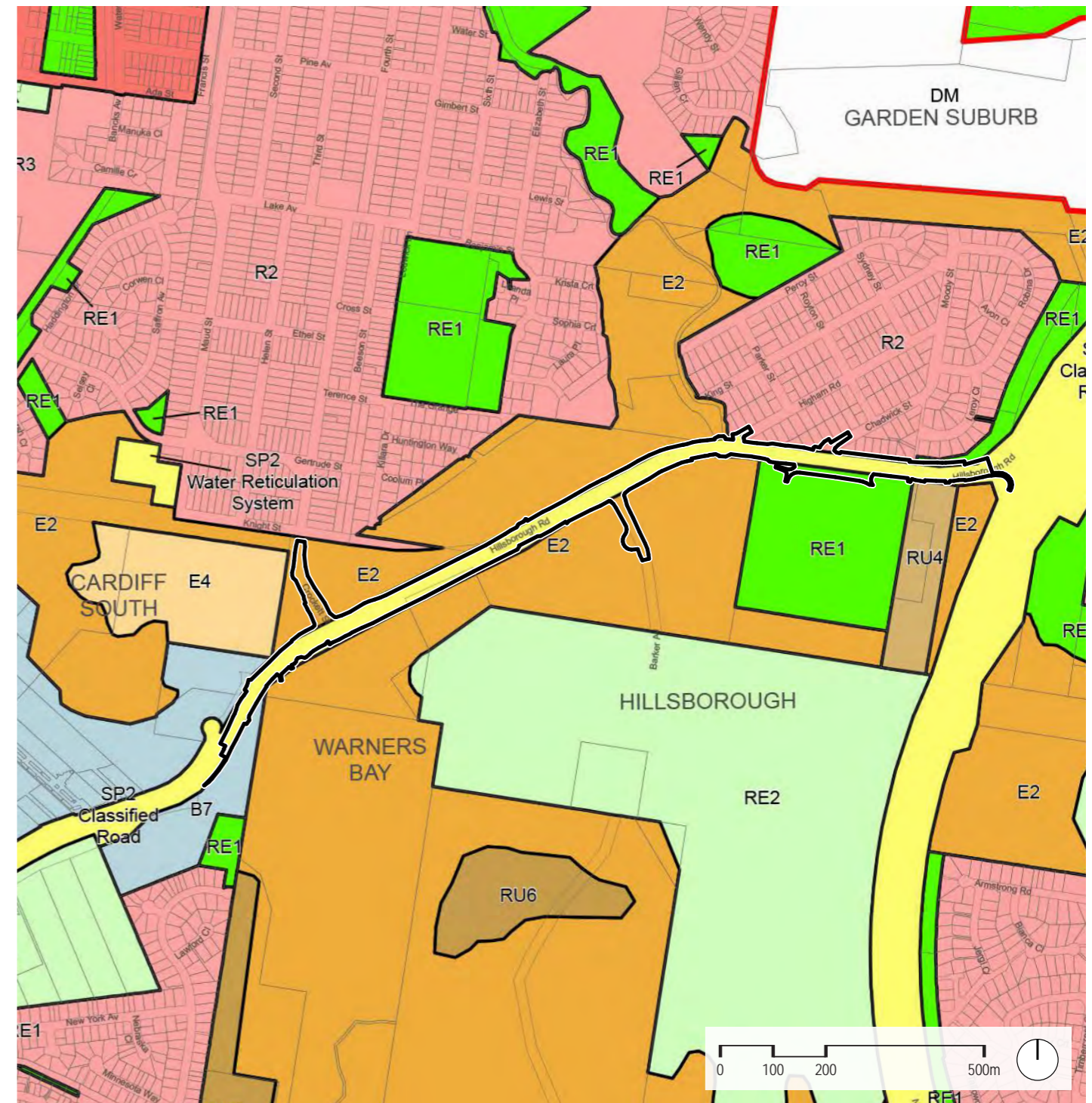


Figure 5 – Zone map
Source: Lake Macquarie Local Environmental Plan 2014

CONTEXTUAL ANALYSIS (cont.)

Planning framework (cont.)

Flood liable land

The proposal area is generally flat land with the outer areas being slightly elevated. This causes rainwater being directed towards the road corridor.

There are several creeks located within the study area, the most prominent being Winding Creek and its tributary, which crosses the study area before turning north west and continuing into Cockle Creek (and ultimately into Lake Macquarie which is located approximately two kilometres to the southwest). (Source: Preliminary Environmental Study).

Acid Sulphate Soils

Class 5 Acid sulphate soils (ASS) is identified within the western portion of the study area as shown on Figure 7.

Bushfire

The majority of the study area is identified as bushfire prone land as shown on Figure 8.

Landscape species need to be considered taking into account the flood liable land, acid sulphate and bushfire prone land.

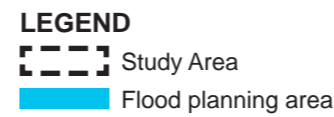
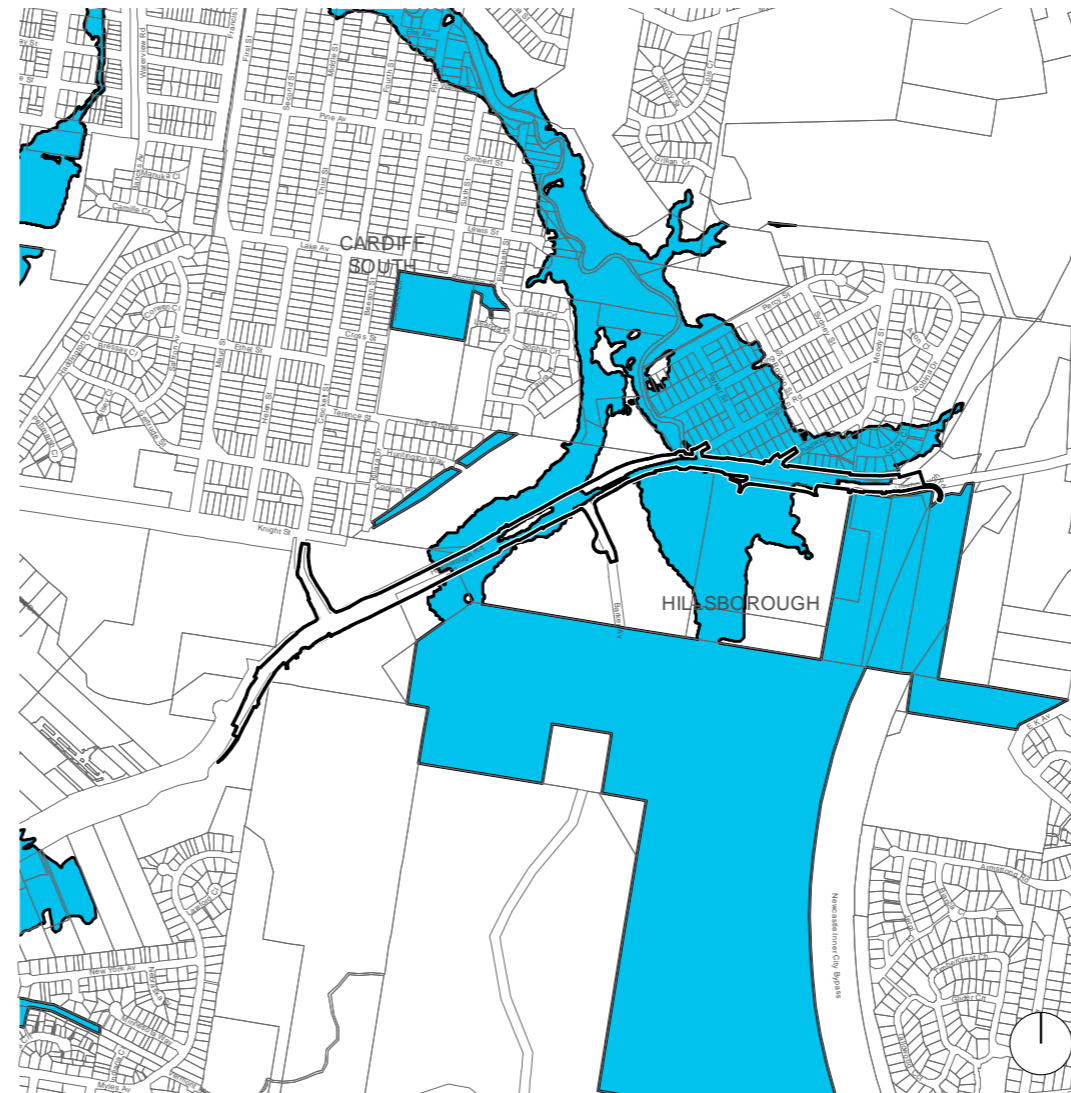


Figure 6 – Flood planning map (NTS)
 Source: Lake Macquarie Local Environmental Plan 2014

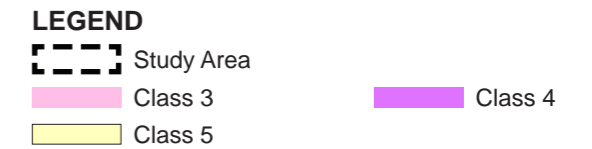


Figure 7 – Acid sulphate soils map (NTS)
 Source: Lake Macquarie Local Environmental Plan 2014

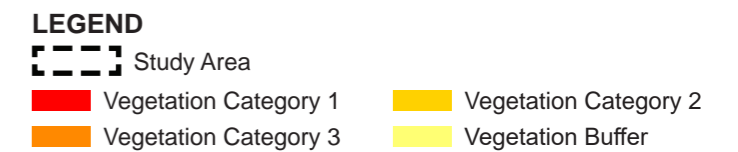
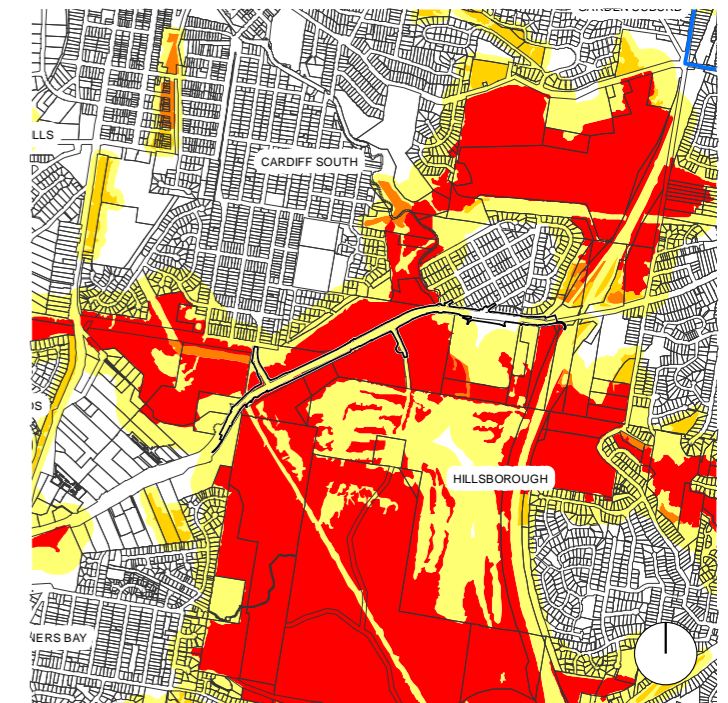


Figure 8 – Bushfire prone land map (NTS)
 Source: NSW Rural Fire Service 2018

4.0 URBAN DESIGN STRATEGY

4.1. Principles and objectives

The urban design principles from *Beyond the Pavement* have been considered in determining the objectives and design for the proposal including:

- Principle one* – *Contributing to urban structure, urban quality and the economy*
- Principle two* – *Fitting with the built fabric*
- Principle three* – *Connecting modes and communities and promoting active transport*
- Principle four* – *Fitting with the landform*
- Principle five* – *Contributing to green infrastructure and responding to natural systems*
- Principle six* – *Connecting to Country and incorporating heritage and cultural contexts*
- Principle seven* – *Designing an experience in movement*
- Principle eight* – *Designing self-explaining roads that safely respond to their role and context*
- Principle nine* – *Achieving integrated and minimal maintenance design*

Beyond the Pavement supports the broader government objectives described in Better Place.

The urban design objectives and principles for the Hillsborough Road upgrade to inform the concept design are:

Objective 1. Ensure the Hillsborough Road corridor upgrade sits sensitively within its varied setting from the Warners Bay employment lands through the enclosed forest canopy to the open residential area.

Strengthen the presence and visual quality of the adjoining native bushland.

Use natural and local materials and vegetation to ensure the proposal sits well in its surroundings.

Collaborate with the local Aboriginal people to understand the place and incorporate local meaning into the design initiatives where relevant.

Incorporate landscape treatment to mitigate the impacts of the proposed additional pavement.

Addresses *Beyond the Pavement Principles one, two, four and six.*

Objective 2. Ensure the proposal responds to its adjoining land uses.

Incorporate strategies that help improve the existing built form and landscape amenity and are also sympathetic to the existing character.

Ensure vehicle access to properties is maintained including any upgrading of cross overs where required and noting active transport priority across them is recognised.

Create easy, legible and distinct access to employment and recreational land uses.

Incorporate an appropriate treatment at the end of Higham Road to visually indicate how the road connection works for its users.

Connect pedestrian/cycle ways between the existing land uses.

Addresses *Beyond the Pavement Principles one, two and three.*

Objective 3. Ensure better connectivity and improved safety for pedestrian/cycle connections.

Provide better pedestrian/cycle connections between the existing residential land uses with the surrounding recreational uses and the Warners Bay economic centre.

Ensure the pedestrian/cycle connections are designed and located to be pleasant and safe from vehicle movements and to ensure maximum use.

Ensure pedestrian/cycle ways connect with existing connections through the residential areas and other areas if relevant.

Locate bus stop infrastructure in close proximity to users and incorporate appropriate bus stop infrastructure to meet current accessibility and Council standards.

Addresses *Beyond the Pavement Principle three and seven.*

Objective 4. Maintain and enhance Hillsborough Road as the key connector between the Inner City Bypass and Warners Bay.

Assist in defining Hillsborough Road as a major connector providing legible connections to the local road network and adjoining land uses.

Incorporate appropriate treatments for retaining walls establishing a theme that is distinct to the area.

Addresses *Beyond the Pavement Principle four, seven and eight*

Objective 5. Design for low maintenance

Ensure plant species are hardy and low maintenance.

Utilise robust, hard wearing materials that are fit for purpose, resistant to vandalism and will not require frequent maintenance or replacement.

Addresses *Beyond the Pavement Principles five and nine*

URBAN DESIGN STRATEGY (cont.)

4.2. Liveable communities

The proposal is being broadly guided by the principles within the Transport for NSW *Transport contributing to liveable communities: roads as links to places*.

There are seven considerations that were considered as part of the concept design as noted below:

1. Connectivity into and through surrounding environments

This refers to the general availability of movement corridors for pedestrians and road users through an area. Blocking streets, laneways and their footpaths and the creation of 'cul de sac' type street layouts would effect this type of connectivity (Beyond the Pavement).

Upgrading of Hillsborough Road assists in the viability of the transport corridor by alleviating existing vehicle congestion from the introduction of additional vehicle travel lanes.

The signalisation of Chadwick Street will assist in the change of traffic movement within Higham Road. The part closure of Higham Road to consider appropriate treatment to direct users.

The upgrade would improve existing pedestrian and cycle movement patterns through new facilities such as widened pavements, improved bus stop locations and facilities, and provision of pedestrian signalisation.

2. Connectivity between transport modes

Connections between different transport modes are an important component of the liveability of a place, in particular between walking and other modes. The effect, or opportunities, on bus stops, cycle routes, car parks and train stations would be investigated (Beyond the Pavement).

Connectivity would be addressed through the provision of new on-road and / or off-road shared pedestrian and cycle footpaths.

New footpaths and pedestrian lights would provide better connectivity to nearby bus stops and generally within the local area for pedestrians and cyclists. Ensure bus stops are visible from the nearest crossing points.

3. Connectivity across the road

Consider where people want to cross the road and the effect, or opportunities, of the project on the location and quality of that crossing point (Beyond the Pavement).

Any distance that a crossing deviates from the shortest route (desire line) would result in a reduction in people using that crossing point. As a rough guide 'most pedestrians would not walk more than 150 to 200 feet (approx 45 to 60m) to cross the street at an intersection' (Planning and urban design standards, American Planning Association). This means that if the current crossing point provides a journey between destinations of around 45 metres, then an addition to this distance could have a significant effect.

The proposed pathway system is on the residential side of Hillsborough Road. Proposed signalised intersections are located at the two key road connections with the residential areas, which provides pedestrian connections. The Chadwick Street signalised intersection is also in close proximity to the showgrounds.

The proposed road upgrade would provide increased capacity and legibility for pedestrians, cyclists and vehicles.

4. Accessibility

Related to connectivity consider ease of access to all town centre facilities such as shops, offices, public buildings and parks. Reducing access points such as bus stops, car parking, and other entry points would affect liveability. Visual accessibility is also important and would be considered in relation to the ability for business and public facilities to be easily seen from the road corridor.

Access to the businesses at the Warners Bay Economic Centre to the west is via the service roads located on both sides of Hillsborough Road. Direct access is not currently available to the businesses from Hillsborough Road. The proposal does not alter the existing arrangement for access to the businesses from Hillsborough Road at Warners Bay.

Visibility of properties in the Warners Bay Economic Centre would be maintained where appropriate.

A new signalised intersection is proposed at the Hillsborough Road/Barker Avenue intersection. This provides access to the Charlestown Golf Course from both travelling lanes along Hillsborough Road. A u-turn facility is proposed on Barker Avenue for users of Hillsborough Road.

Access to the nursery and sheds facility and the showground would be from the western travelling lanes. A new signalised intersection at the Hillsborough Road / Chadwick Street intersection, the new u-turn facility on Barker Avenue located to the west of these land uses and the existing interchange for the Newcastle Inner City Bypass located to the east would assist in accessing these land uses.

5. Safety and security

Many Transport for NSW projects involve improvements to safety, however all aspects of safety would be considered. Pedestrian safety, the feeling of safety, security and the perception of security (eg avoiding enclosed hidden spaces) would be considered (Beyond the Pavement).

A shared pedestrian / cycleway is proposed along the northern extent of the road corridor adjoining the Hillsborough residential area. Whilst the shared pedestrian/ cycleway is located adjoining the road network, the design should ensure safety from moving vehicles as well as ensuring vegetation and other infrastructure does not create any hidden spaces along the route.

6. Amenity

How comfortable or pleasant a place is to use. The smoothness and gradient of the footpaths and spaces, the provision of shade and seating for rest and durability and resistance to vandalism all contribute to liveability.

The current amenity of the road corridor would be maintained or improved through the use of footpaths that utilise the existing gradient, eg steps are not being introduced as part of the design.

Bus shelters would provide shade and seating for further amenity.

All new design elements would be robust and designed to meet graffiti/vandal resistant standards.

Review opportunities to improve amenity within the native vegetation areas and along the creek lines.

Where practical, incorporate trees as they would provide shade amenity along the road corridor near the residential dwellings.

7. The quality of built and vegetated form

The quality and attractiveness of the townscape, architecture, public art, local built materials and urban landscape can contribute to creating liveable communities.

The design would integrate the road with the surrounding built and natural landscape wherever possible. This would incorporate removal of weeds and planting of native vegetation.

Materials used for retaining walls would be distinctive to the locality.

URBAN DESIGN STRATEGY (cont.)

4.3. Landscape theme

Plant typologies have been developed for the proposal responding to the landscape character, environmental conditions and physical constraints inherent to each area. Plant typologies and location also address Lake Macquarie Council's relevant design considerations as follows. Landscape plantings will be revised at the detailed design stage to incorporate vegetation types consistent with the proposals Biodiversity Offset Strategy where practical.

Landscape design for road reserves

- Conserve significant landscape features and include in design.
- Consider street and site factors when selecting tree species for streets.
- Integrate with open space networks and natural drainage lines.
- Position street trees to maximise shade opportunities for pedestrians and car parking and minimise disturbance to service lines.
- Ensure that public landscapes are easily and economically maintained and create no liabilities for Council.
- Use or reinstate native grasses or ground covers where possible to minimise maintenance and reduce sediment runoff. Where roads are being used as a hard barrier to bushland, use of weed free mulch and local indigenous species is required on the bushland side of the road.
- Where roads dissect wildlife corridors, plant species should be of a type to narrow gaps between roadside vegetation and facilitate arboreal wildlife movements.
- Do not use Kikuyu or Rhodes grass in roadside rehabilitation or soil stabilisation works adjoining bushland. Native plants are preferred and are now available in turf and seed form

Turf + Grasses

The turf variety is to be a native drought tolerant species consistent with that used within the existing and adjoining areas.

Grasses should be selected from the vegetation types within proximity to the particular area.

Type 1 - Scribbly Gum Forest

This typology includes planting associated with the bushland generally along the southern boundary of Hillsborough Road on the western extent of the proposal. This planting includes reinstatement of the trees and vegetation drawn from the identified plant community located in this area being Smooth-barked Apple - Red Bloodwood - Scribbly Gum Grass - shrub Woodland.

Trees:

Allocasuarina littoralis Black She-oak
Angophora costata Sydney Red Gum
Corymbia gummifera Red Bloodwood
Eucalyptus haemastoma Scribbly Gum

Shrubs:

Banksia spinulosa Hairpin Banksia
Pittosporum revolutum Yellow Pittosporum
Polyscias sambucifolia Small Basswood

Grasses, groundcovers, ferns:

Dianella revoluta Blueberry Lilly
Entolasia stricta Wiry Panic
Hibbertia aspera Rough Guinea
Imperata cylindrica Cogon Grass
Lepidosperma laterale Variable Swordsedge
Lomandra obliqua Twisted mat-rush
Pteridium esculentum Bracken Fern

Trees



Angophora hispida Dwarf Apple



Callistemon salignus Willow Bottlebrush



Corymbia gummifera Red Bloodwood



Eucalyptus piperita Sydney Peppermint



Eucalyptus haemastoma Scribbly Gum



Glochidion ferdinandi Cheese Tree

URBAN DESIGN STRATEGY (cont.)

Landscape theme (cont.)

Type 2 - Open Woodland Forest

This typology includes planting associated with the bushland generally along the northern and southern boundaries of Hillsborough Road apart from the western extent (refer Plant Type 1) and the drainage corridor running north south through the project (refer Plant Type 3). This planting includes reinstatement of the trees and vegetation drawn from the identified plant community located in this area being Smooth-barked Apple - Turpentine - Sydney Peppermint Heathy Woodland including native grasses.

Trees:

Allocasuarina littoralis Black She-oak
Angophora costata Sydney Red Gum
Corymbia gummifera Red Bloodwood
Eucalyptus piperita Sydney Peppermint
Eucalyptus haemastoma Scribbly Gum
Eucalyptus capitellata Brown Stringybark
Glochidion ferdinandi Cheese Tree

Shrubs:

Acacia terminalis Sunshine Wattle
Banksia spinulosa Hairpin Banksia
Dodonaea triquetra Common Hop Bush
Lambertia formosa Mountain Devil
Leptospermum polygalifolium Yellow Tea Tree
Leptospermum trinervium Paperbark Tree
Persoonia levis Broad-leaved Geebung

Grasses, groundcovers, ferns:

Billardiera scandens Apple Berry
Dianella caerulea Blue Flax-lily
Entolasia stricta Wiry Panic
Imperata cylindrica Cogon Grass
Lomandra obliqua Twisted mat-rush
Panicum simile Two Colour Panic
Pteridium esculentum Bracken Fern
Pultenaea pedunculata Matted bush-pea
Themeda australis Kangaroo grass

Southern boundary of Hillsborough Road - eastern extent
 (access to the Showground)

Replace trees to be removed with species from the same plant community Smooth-barked Apple - Turpentine - Sydney Peppermint Heathy Woodland. Trees to be placed randomly considering existing tree locations, clear zones, access arrangements and sightlines.

Angophora costata Sydney Red Gum
Corymbia gummifera Red Bloodwood
Eucalyptus piperita Sydney Peppermint
Eucalyptus haemastoma Scribbly Gum
Eucalyptus capitellata Brown Stringybark
Glochidion ferdinandi Cheese Tree

Type 3 - Coastal Swamp Forest

This typology includes planting associated with the shallow drainage line running north south in the central portion of the proposal. Planting includes reinstatement of the trees and vegetation drawn from the identified plant community located in this area being Smooth-barked Apple - Red Mahogany - Swamp Mahogany - *Melaleuca sieberi* heathy swamp woodland of coastal lowlands

Trees

Angophora costata Sydney Red Gum
Eucalyptus piperita Sydney Peppermint
Eucalyptus resinifera Red Mahogany
Melaleuca linariifolia Snow-in Summer

Shrubs:

Callicoma serratifolia Black Wattle
Melaleuca nodosa Prickly-leaved Paperbark
Parsonsia straminea Common Silkpod

Grasses, groundcovers, ferns:

Calochlaena dubia Soft Bracken
Gahnia clarkei Tall Sawsedge

Shrubs



Acacia terminalis Sunshine Wattle



Banksia spinulosa Hairpin Banksia



Melaleuca nodosa Prickly-leaved Paperbark

Grasses/Ferns



Dianella revoluta Blueberry Lilly



Entolasia stricta Wiry Panic



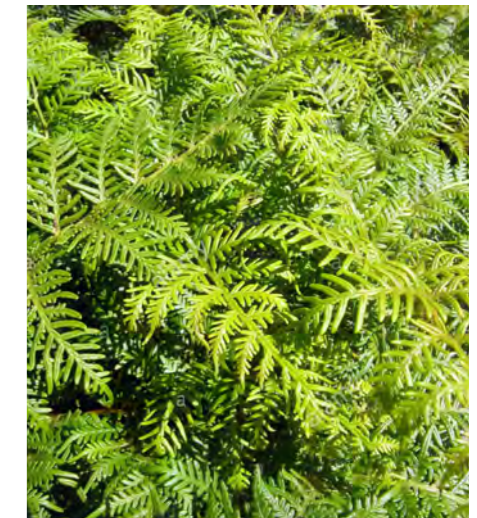
Hibbertia aspera Rough Guinea



Imperata cylindrica Cogon Grass



Lomandra obliqua Twisted mat-rush



Pteridium esculentum Bracken Fern

URBAN DESIGN STRATEGY (cont.)

4.4. Urban design concept

Key urban design concepts:

- Visually integrate the retaining walls at the western end of the corridor with the natural bushland character.
- Incorporate contextually appropriate colours and textures to discourage graffiti and vandalism.
- Landscape treatment to complement the proposed retaining walls and maintain views of the surrounding bushland and the Warners Bay economic centre.
- Integrate interpretive and/or gateway material with the retaining wall treatment.
- Reinstate the native Woodland Forest in the bushland areas.
- Maintain pedestrian /cycle access between the Warners Bay economic centre and surrounding residential areas.
- Maintain vehicle and pedestrian access and visibility to the Warners Bay economic centre's businesses and uses.

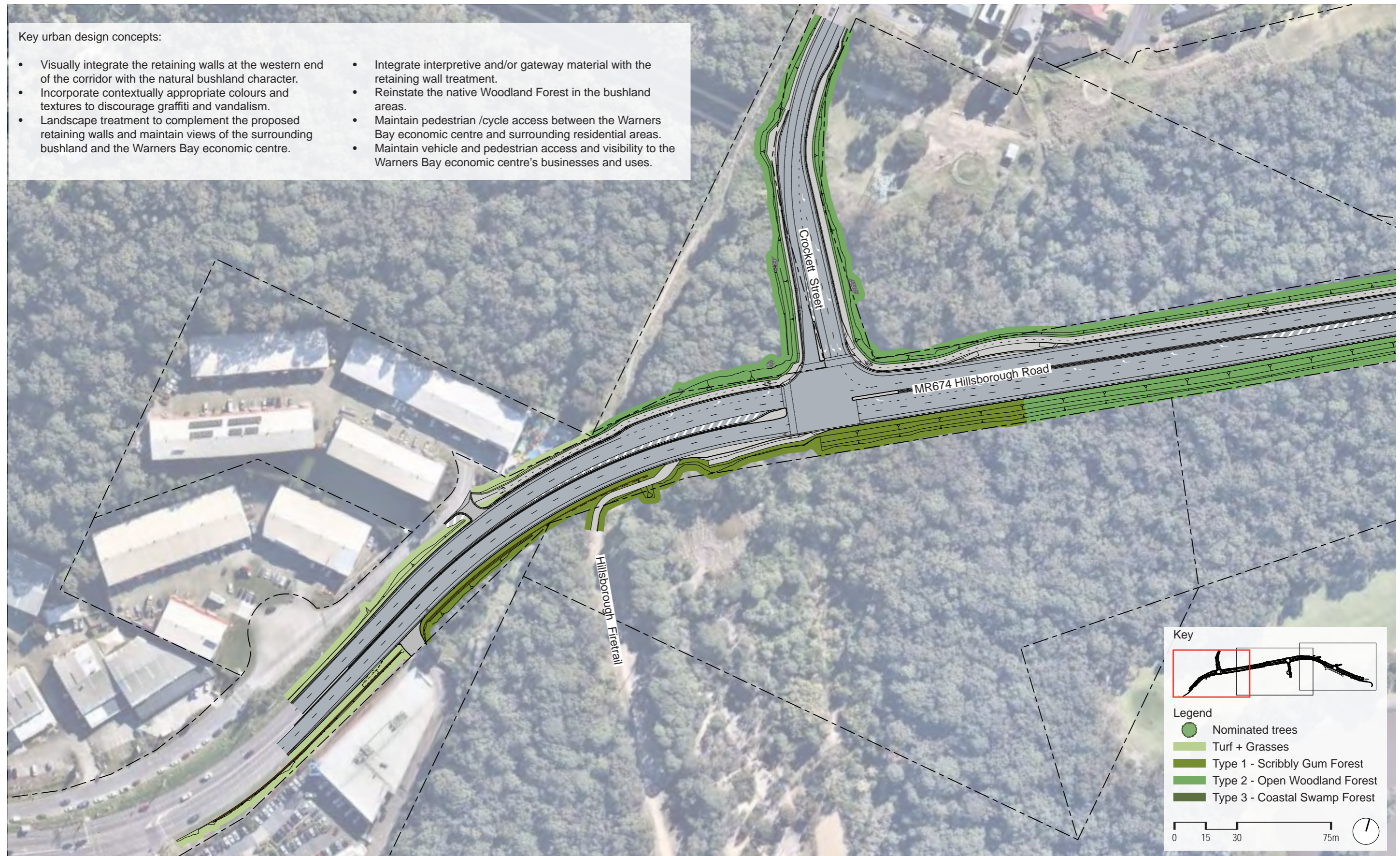


Figure 9 – Urban design concept
Base: GHD 2022

URBAN DESIGN STRATEGY (cont.)

Urban design concept (cont.)



Figure 10 – Urban design concept
Base: GHD 2022

URBAN DESIGN STRATEGY (cont.)

Urban design concept (cont.)



Figure 11 – Urban design concept
Base: GHD 2022

URBAN DESIGN STRATEGY (cont.)

4.5. Concept for retaining walls

Retaining walls are proposed at the western extent of the upgrade of Hillsborough Road as shown on Figure 12 and include:

- MW02: Type 'F' safety barrier with RMS pedestrian fence
- MW03: Concrete retaining wall with a height ranging from approximately 400mm to 2,200mm.
- MW04: Concrete retaining wall with a height ranging from approximately 400mm to 1,000mm.

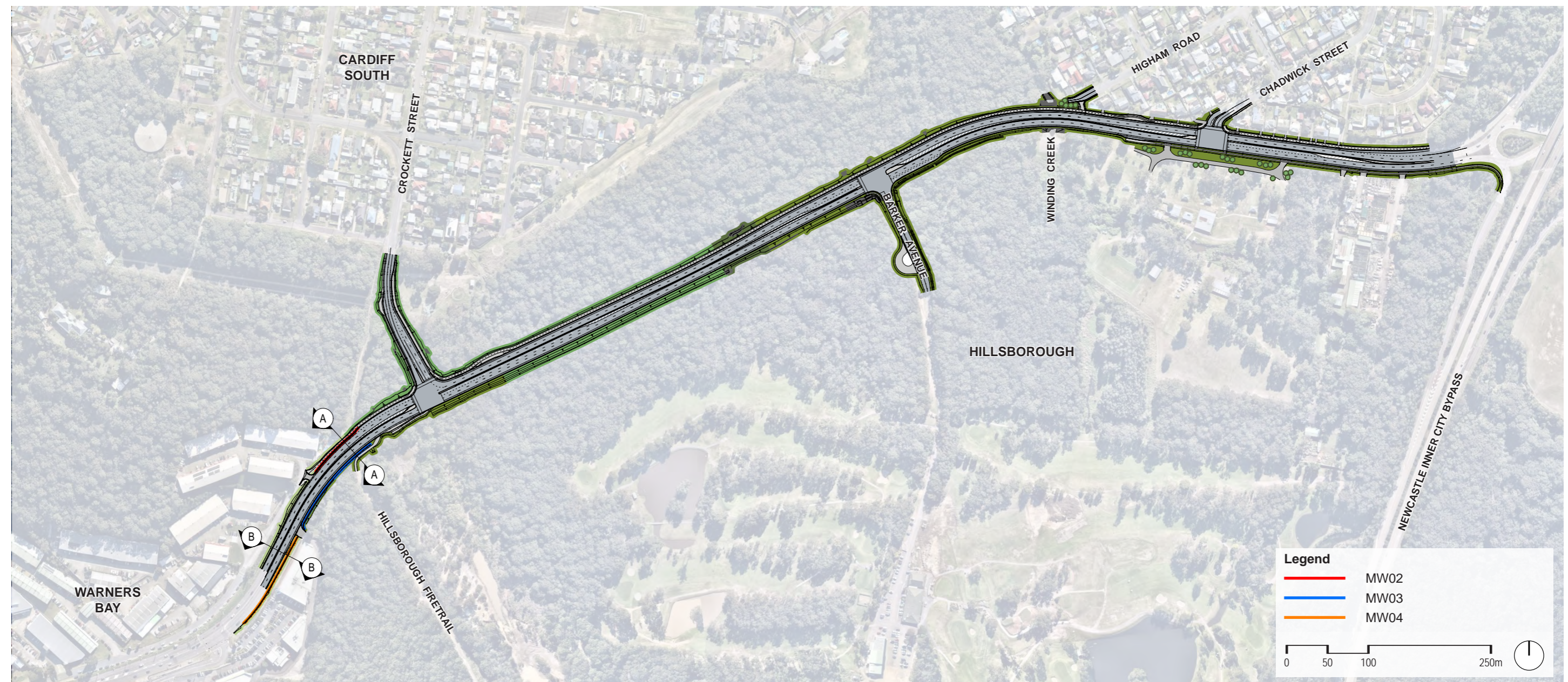


Figure 12 – Hillsborough Road upgrade
Source: GHD 2022

URBAN DESIGN STRATEGY (cont.)

Concept for retaining walls (cont.)

Urban design concepts for the retaining walls have been developed and incorporate:

- Appropriate materials, colours and textures for retaining walls along the corridor to add visual interest and discourage graffiti and vandalism.
- Establishment of a bushland theme to complement the existing natural bushland environment.

The types of treatment proposed for the retaining walls are as follows.

Retaining Wall MW02

MW02 is a Type F barrier with a RMS pedestrian fence adjoining the concrete shared path (Figure 13). This retaining wall is located at the western extent of the proposal along the northern boundary adjoining the Warners Bay industrial / business land uses. This type of wall is required due to the limited space available.

Further consideration for the design of this wall should be undertaken as part of detailed design and include:

- If additional area is available, investigate the opportunity to incorporate a similar retaining wall to that proposed on the southern boundary of Hillsborough Road. This would assist in delivering a gateway treatment for the Warners Bay economic centre.
- Fence to be a palisade fence and colours should be complementary with the background to reduce visual impact from the road network.
- Retain existing vegetation where possible.

Retaining Walls MW03 and MW04

MW03 and MW04 are similar retaining walls (Figures 14 and 15) and are located on the southern boundary of Hillsborough Road at the western end of the project. The walls range in height from 400mm to 2,200mm. MW03 adjoins the bushland area and MW04 adjoins the business/industrial land uses.

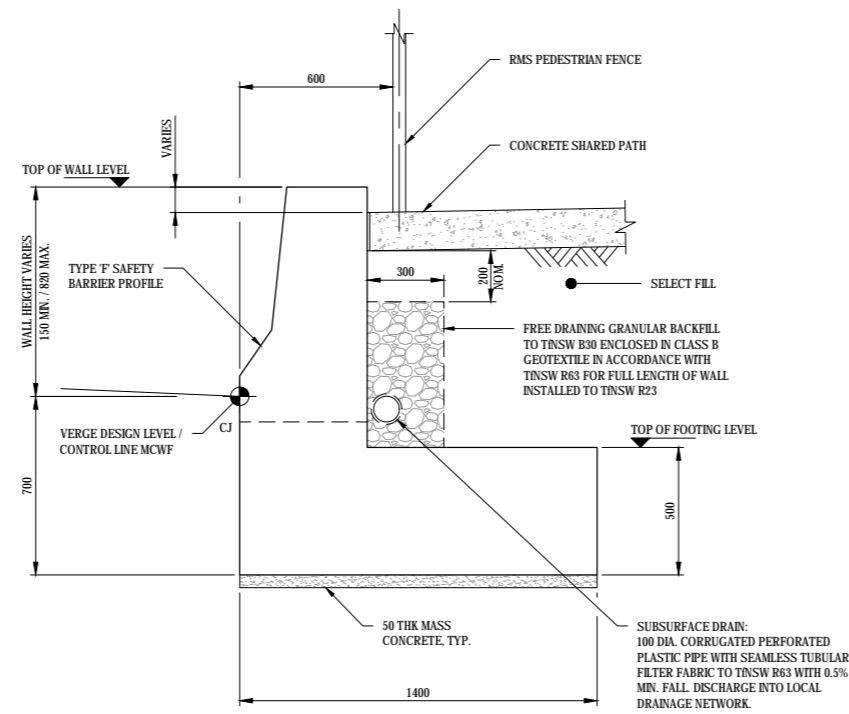


Figure 13 – MW02 detail
Source: Base GHD 2022

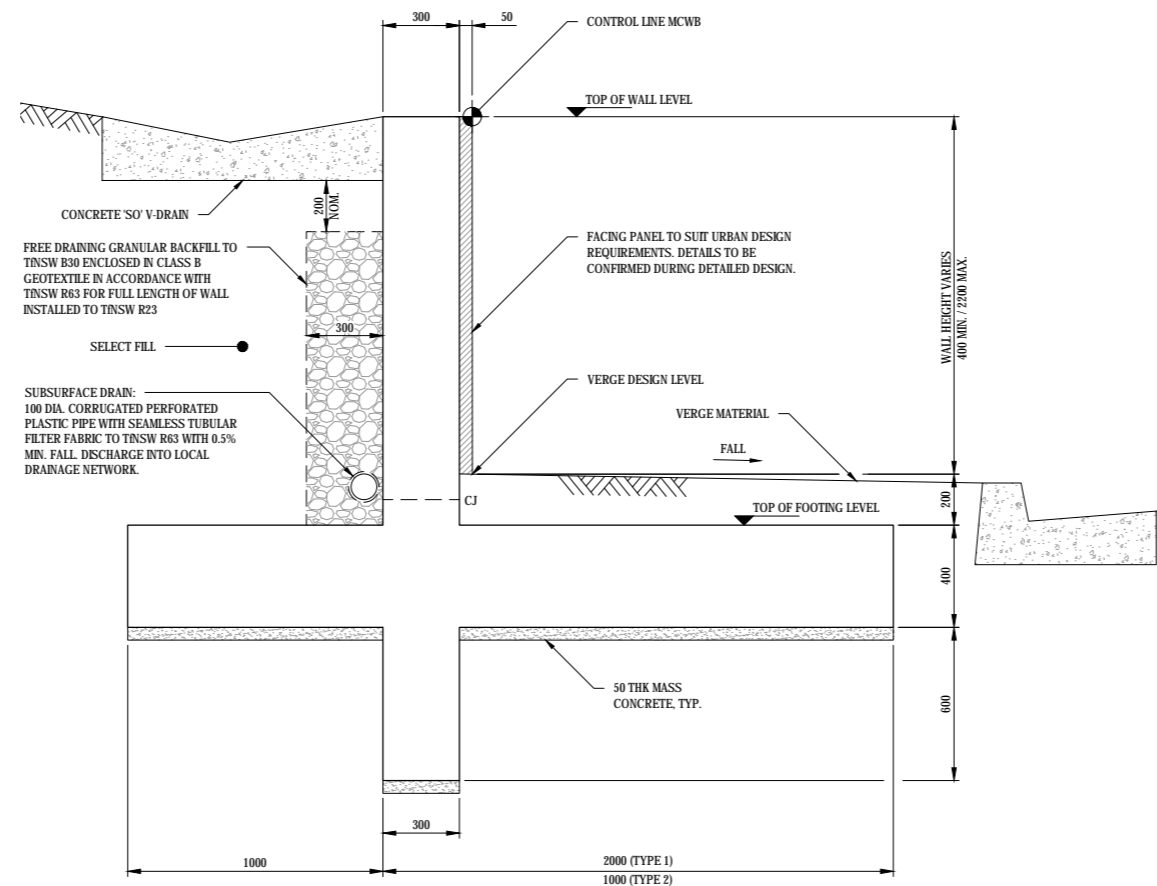


Figure 14 – MW03 detail
Source: Base GHD 2022

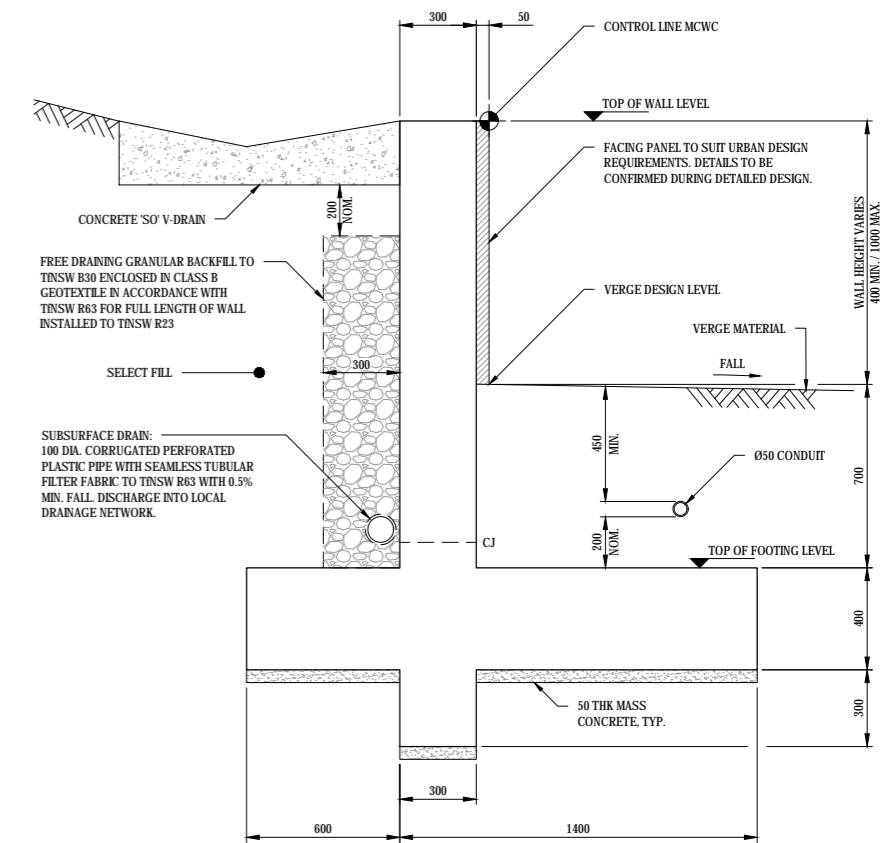


Figure 15 – MW04 detail
Source: Base GHD 2022

URBAN DESIGN STRATEGY (cont.)

Concept for retaining walls (cont.)

Retaining Wall MW03

Retaining wall MW03 ranges in height from 400mm to 2,200mm. MW03 adjoins the conservation area on Hillsborough Road on its approach to Warners Bay. The backdrop to the wall is generally dense bushland and steps back from the wall where the fire trail is located. The conservation area separates the residential area of Hillsborough and Warners Bay.

Urban design outcomes:

- Create a sense of arrival to Warners Bay.
- Take advantage of the retaining wall and conservation area to create visual interest and identify the arrival to Warners Bay.
- Construction of the retaining wall with an abstract pattern using a motive reflecting the tree trunks and bark of the surrounding bushland.
- Planting of native grasses such as *Dianella cerulea* Blue Flax-Lilly and *Themeda australis* Kangaroo Grass at the front of the wall representing the understorey of the adjoining bushland.
- Planting at the base of the retaining wall would deter people from this space and reduce the potential for graffiti.
- Reinstate trees, shrubs and grasses from the vegetation communities within the conservation area.
- At detailed design, explore extending the retaining wall with the wooden textured finish above the existing fire trail and guard rail.

The sense of arrival into Warners Bay could incorporate appropriate words describing the area. This could also include dual naming of the area using the Awabakal and English name or descriptor words that are representative of the surrounding area and its landscape.

Lake Macquarie has undertaken dual naming for its cultural facilities. Lake Macquarie dual named the Warners Bay Theatre, baramayiba. "The word baramayiba means "cockle place" in Awabakal and refers to the original place name of Cockle Bay. Baramayiba is also the cultural name given to Warners Bay Theatre."

Connecting with Country outlines that the meaning of first placenames is to learn more about Country. First place names universally describe the physical character and purpose of Country. Adding a sense of arrival could also be by using the names of the surrounding landscape. According to the Learning Awabakal Dictionary, the landscape could be described as:

Taruralong - Gum Tree
 Kararkarmatara - Banksia
 Tarkarlong - Forest Oak
 Boyikoon - Fern

Connecting and designing with Country would need to be undertaken by engaging with the First Nations People and Lake Macquarie Council.

Refer Figures 16 to 19.

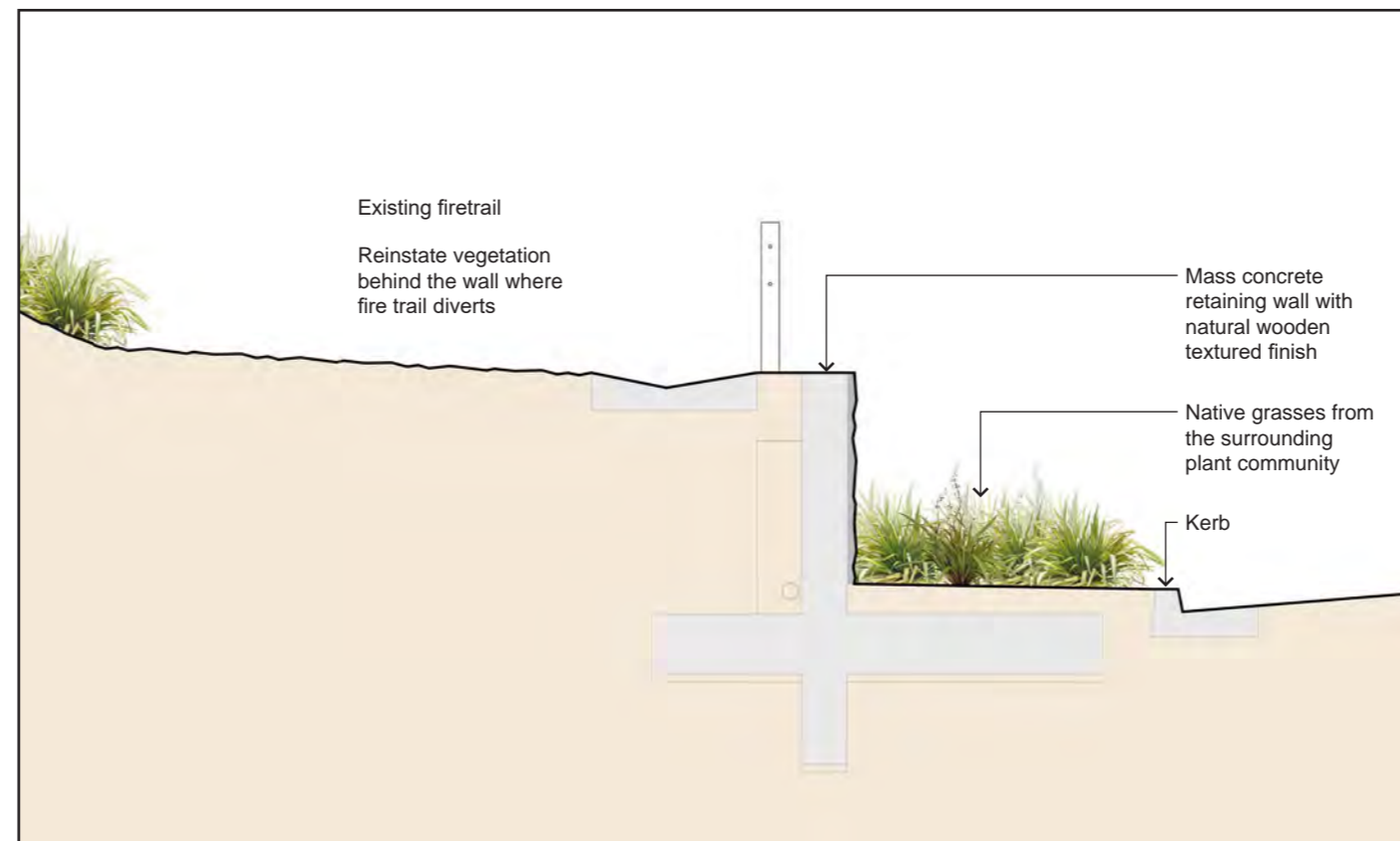


Figure 16 – MW03 Detail (1:50)
 Source: Base GHD 2022

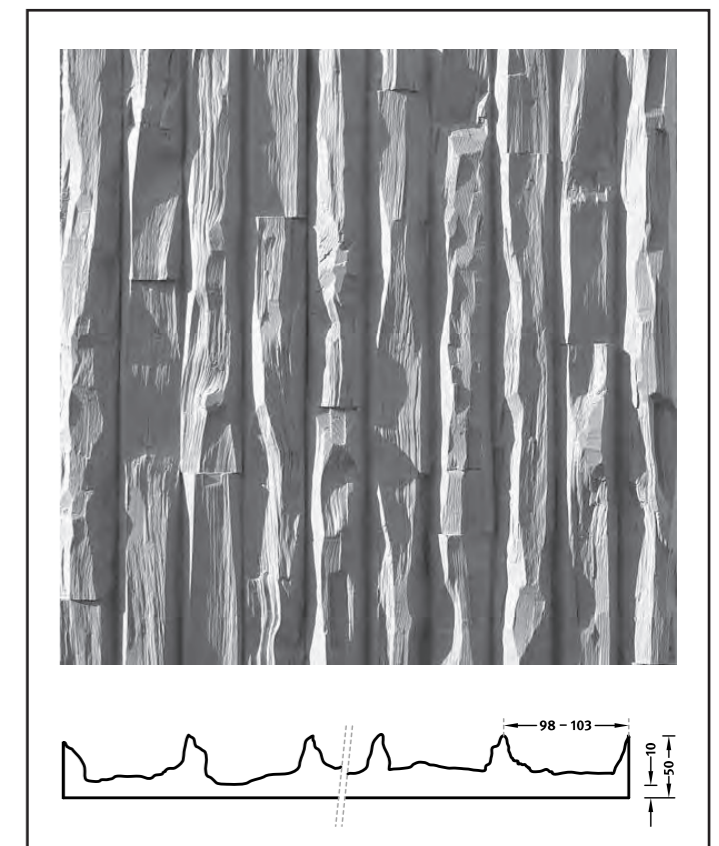


Figure 17 – Liner texture (Reckli 1/03 Fehmarn)
 Source: Reckli 2022

URBAN DESIGN STRATEGY (cont.)

Concept for retaining walls (cont.)

Retaining Wall MW03

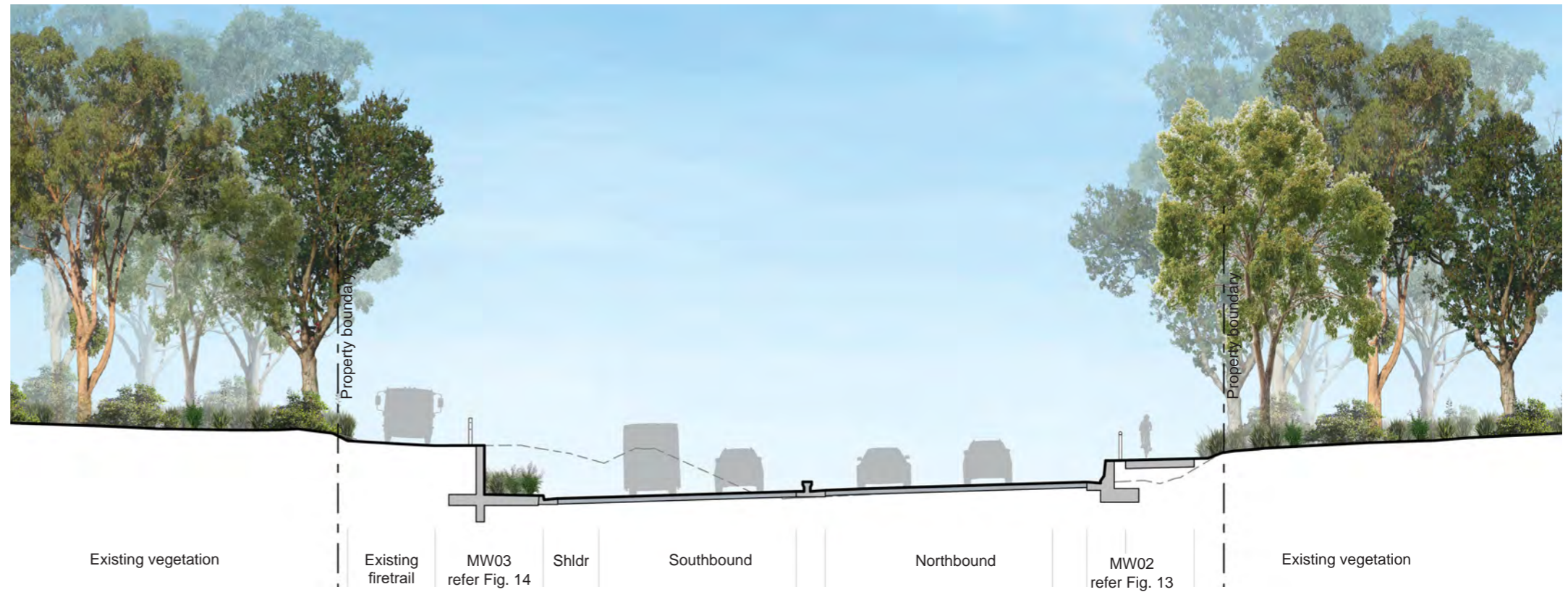


Figure 18 – Cross section AA (near CH3470)(1:200)
Source: Base GHD 2022



Figure 19 – MW03 Elevation (NTS)
Source: Base GHD 2022

URBAN DESIGN STRATEGY (cont.)

Concept for retaining walls (cont.)

Retaining Wall MW04

Retaining wall MW03 ranges in height from 400mm to 1,000mm. MW04 adjoins the Warners Bay economic centre, which includes a range of buildings, service roads and car parking areas. Landscape treatment is limited to turfed areas, low hedges and grasses.

Urban design outcomes:

- Create a sense of arrival to Warners Bay.
- Continue a similar treatment of retaining wall MW03 to create visual interest and identify the arrival to Warners Bay.
- Construction of the retaining wall with an abstract pattern using a motive reflecting the tree trunks and bark of the surrounding bushland.
- Planting of smaller native grasses such as *Lomandra longifolia* Tanika and *Lomandra confertifolia* Mat Rush at the front of the wall due to the height of the wall and representing the urban nature of the area. Plant similar native grasses at the top of the wall maintaining the visual presence of the land uses.
- Planting at the base of the retaining wall would deter people from this space and reduce the potential for graffiti.

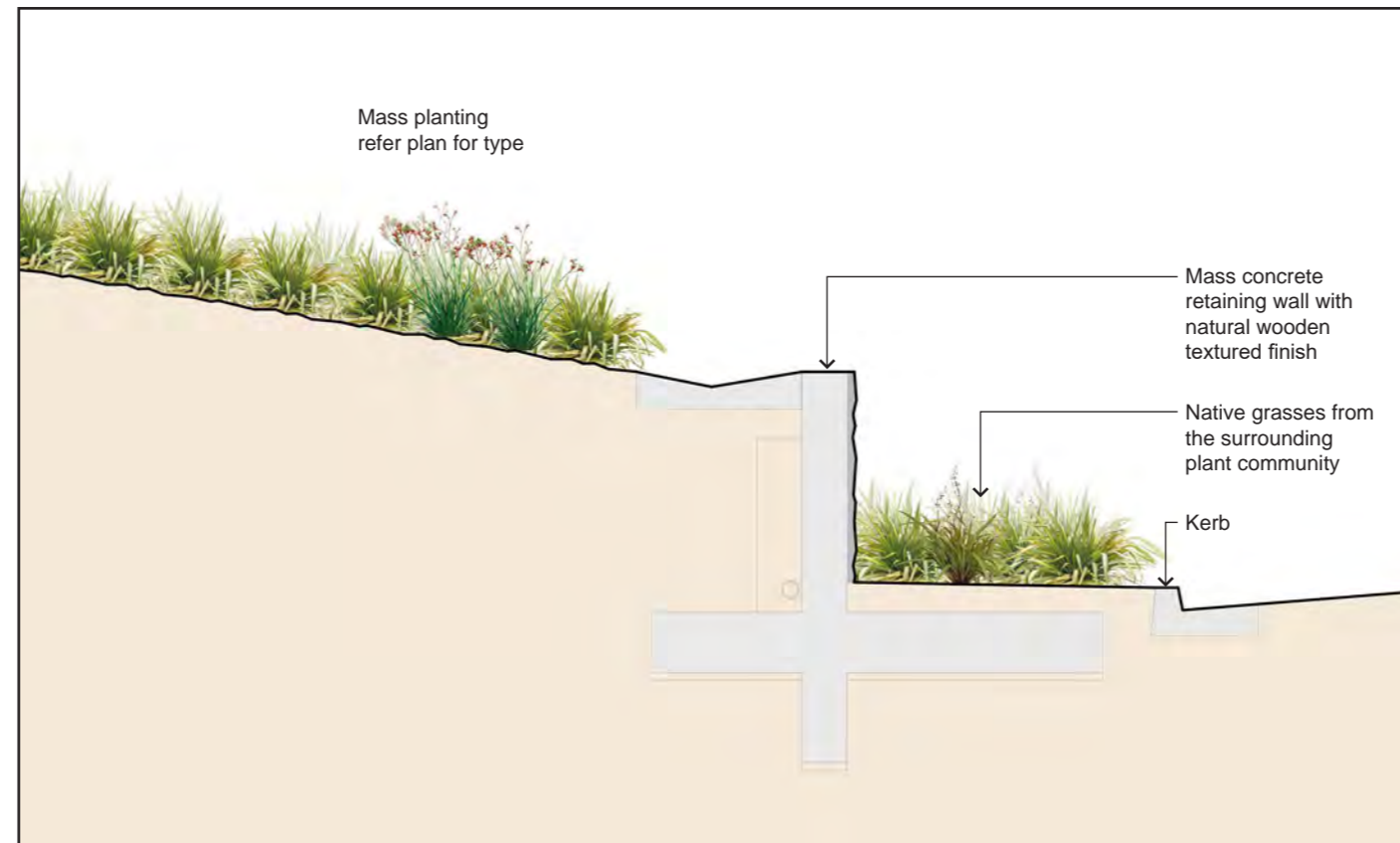


Figure 20 – MW04 Detail (1:50)
Source: Base GHD 2022

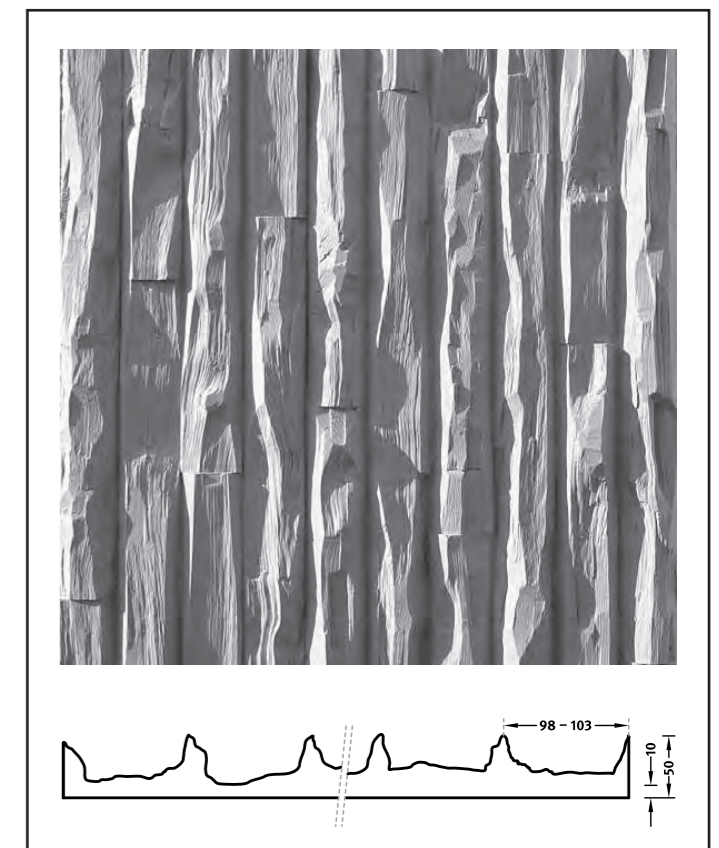


Figure 21 – Liner texture (Reckli 1/03 Fehmarn)
Source: Reckli 2022



Figure 22 – Cross section BB (near CH3625) (1:200)
Source: Base GHD 2022

5.0 LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

5.1. Landscape character assessment methodology

The methodology for the landscape character impact assessment is in accordance with the Transport for NSW's Guideline for landscape character and visual impact assessment.

Sensitivity and magnitude provide measures to assess impacts from the proposal on the landscape character. The sensitivity and magnitude for landscape character are as follows:

Sensitivity: refers to how sensitive the character of the setting is to the proposed change and its capacity to absorb the change.

Combined with magnitude, sensitivity provides a measure of impact. Visual sensitivity relates to the direction of view and the composition of the view.

Magnitude: refers to the scale, form and character of a development proposal.

The rankings outlined in Table 1 will be used to determine the magnitude of the proposal on each Landscape Character Zone (LCZ).

Landscape character impacts can be positive and/or negative depending on a number of variables. For the assessment, it is Peter Andrews + Associates Pty Ltd's interpretation of values that determine the rankings for the landscape character assessment.

Table 1 - Magnitude grading matrix

Negligible	Very minor loss or alteration to one or more key elements/features/characteristics of the landscape character and/or introduction of elements that are consistent with the existing landscape character.
Low	Minor loss of/or alteration to one or more key elements/features/characteristics of the landscape character and/or introduction of elements that are consistent with the existing landscape character.
Moderate	Partial loss of/or alteration to one or more key elements/features/characteristics of the landscape character and/or introduction of elements that may be prominent but not considered to be substantially uncharacteristic.
High	Substantial to total loss of key elements/features/characteristics of the landscape character and/or introduction of elements considered to be totally uncharacteristic.

The combination of sensitivity and magnitude provides an overall impact rating for the proposal on the landscape character based on Table 2 prepared by Transport for NSW outlined in the Landscape character and visual impact guidelines.

An assessment has been undertaken to measure the impact of the proposal on the landscape character zones. The LCZs are outlined below and an assessment has been carried out for each LCZ.

Table 2 - Landscape character impact grading matrix

		MAGNITUDE				
		High	Moderate	Low	Negligible	
SENSITIVITY	High	High	High-Moderate	Moderate	Negligible	
	Moderate	High-Moderate	Moderate	Moderate-Low	Negligible	
	Low	Moderate	Moderate-Low	Low	Negligible	
	Negligible	Negligible	Negligible	Negligible	Negligible	

(Transport for NSW, 2020)

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

5.2. Landscape character zones

The landscape character zones (LCZ) identified for the study area and surrounding areas are shown on Figure 23 and as follows.

- LCZ 1 - Warners Bay light industrial and bulky goods retail
- LCZ 2 - Closed Woodland
- LCZ 3 - Showground and nursery
- LCZ 4 - Low density residential

The landscape character assessment considers and reviews the areas within and surrounding the study area as shown on Figures 24 to 27.

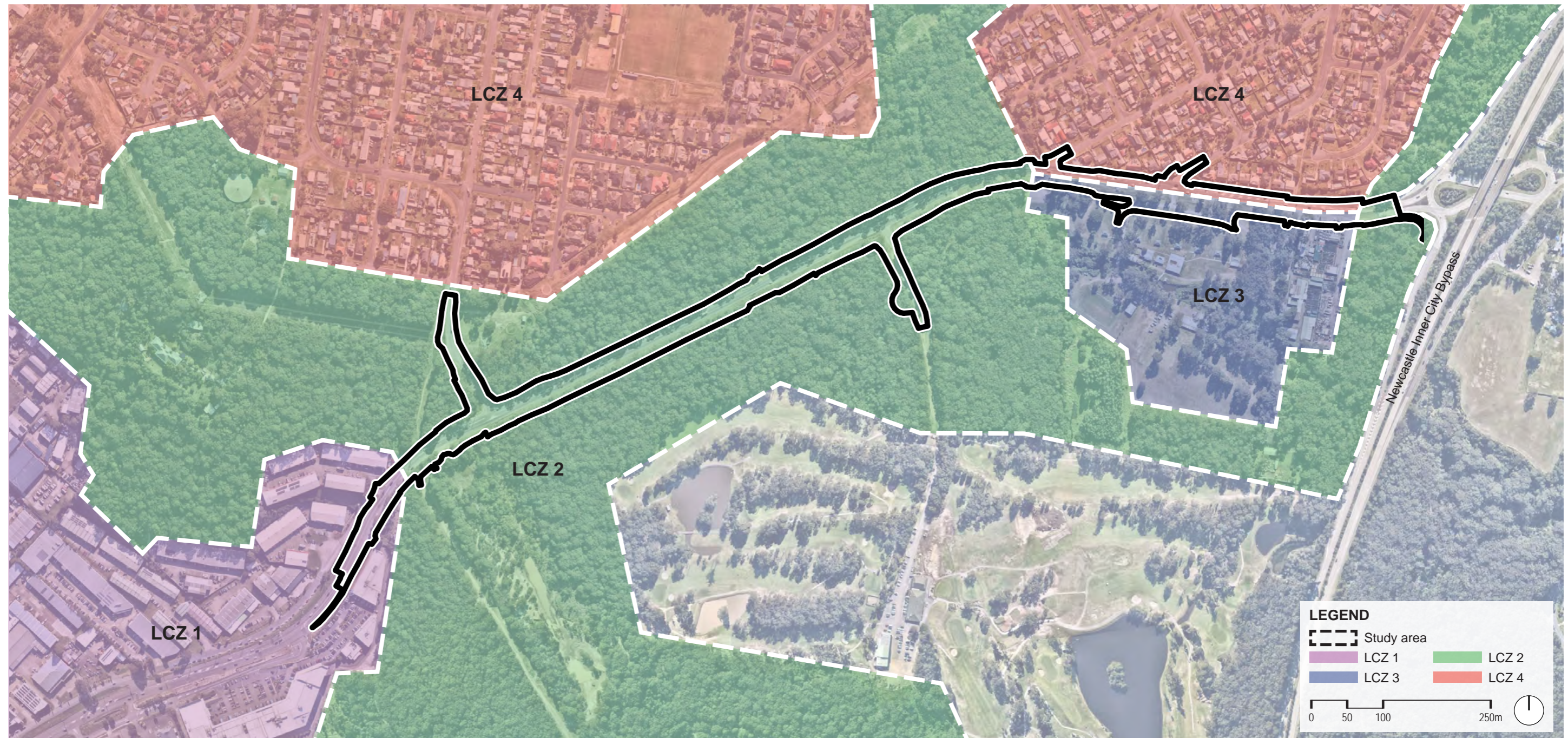


Figure 23 – Landscape character zones
Base aerial image - GHD 2021

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

5.3. Landscape character impact assessment

Landscape character zone 1 - Warners Bay retail and industrial area

Summary	Warners Bay is identified by Lake Macquarie Council as an economic centre. The part of Warners Bay that is included in the study area incorporates bulky goods retailing, industrial land uses and large format indoor recreation/entertainment.
Landform and drainage	The adjoining land is elevated from Hillsborough Road.
Vegetation	Very limited vegetation apart from turf and a few small street trees either on the road verge or in private property. Large mature vegetation is visible at the rear of properties.
Landscape features	A large open area with businesses visually linked to users of Hillsborough Road through various signage and colours. View of Lake Macquarie along the road corridor and a treed landscape background at the rear of properties.
Land use / built environment	The built form is generally large format single storey buildings incorporating a range of uses from bulky goods, industrial land uses and recreation/entertainment facilities. The buildings are elevated and set back from Hillsborough Road. In some cases, there are two rows of buildings. The land uses are generally accessible from the access roads off Hillsborough Road.
Spatial quality of zone	The LCZ has an open spatial quality along Hillsborough Road and the access roads to provide direct visual links to the employment land uses.
Infrastructure - scale/pattern	Hillsborough Road becomes two travel lanes in each direction on entering Warners Bay from the east. Access roads provide access from Hillsborough Road to the land uses and various carparking areas. Overhead power lines, light poles, bus shelters and various retaining walls from informal to formal as part of the economic land uses. Various signage including temporary and fixed.
Major economic components	Warners Bay is a major economic centre for the Local government area of Lake Macquarie providing a range of services and employment opportunities for its residents.

Table 3 - Measurement of impact - LCZ 1

Sensitivity	Negligible	Comments
Magnitude	Low	The Warners Bay economic centre will want to retain easy access and visual links to the buildings, signage, carparks and the access roads to maximise liveability for this community. Any infrastructure and landscape treatment should retain these sight lines. There is an opportunity to create a gateway treatment for the Warners Bay economic centre through the selection of a palette of colours and materials for pavements and retaining walls and low level landscape treatment.
Impact	Negligible	



Access road looking north west towards industrial area



Hillsborough Road looking north to industrial area



Hillsborough Road looking north at intersection with access road



Hillsborough Road looking south towards retail / bulky goods outlets

Figure 24 – LCZ 1 - Warners Bay retail and industrial area
Source: Google Earth Pro 2021

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

Landscape character impact assessment (cont.)

Landscape character zone 2 - Closed woodland

Summary	Large area of native mature vegetation.
Landform and drainage	<p>The area is generally flat land with some areas being slightly elevated above the road level. This causes rainwater being directed towards the road corridor and the creek lines.</p> <p>There are several creeks located within this LCZ, the most prominent being Winding Creek and its tributary, which crosses the study area before turning north west and continuing into Cockle Creek (and ultimately into Lake Macquarie located approximately two kilometres to the southwest).</p>
Vegetation	<p>The Biodiversity assessment identifies the vegetation surrounding Charlestown Golf Course and adjoining Hillsborough Road forms one of the largest areas of native vegetation within the Lake Macquarie LGA. The northern section of Hillsborough Road has an overhead power easement, which is routinely cleared and trimmed to protect the power lines.</p> <p>The main plant community types identified in this LCZ include:</p> <ul style="list-style-type: none"> • Smooth-barked Apple – Turpentine – Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast (PCT 1627) • Smooth-barked Apple – Red Bloodwood – Scribbly Gum – grass /shrub woodland on lowlands of the Central Coast (PCT 1638) • Smooth-barked Apple - Red Mahogany - Swamp Mahogany - Melaleuca sieberi heathy swamp woodland of coastal lowlands (PCT 1649) <p>The small riparian areas adjoining Winding Creek and close to Hillsborough Road have been previously cleared for construction of the road and drainage structures. These areas are now dominated by <i>Typha orientalis</i>, and dense weeds particularly Morning Glory.</p> <p>Other planted native / exotic vegetation were also present adjacent to the frontage to Hillsborough Road and along the Newcastle Inner City Bypass. The remainder of vegetated areas are classed as highly disturbed areas - road verges, table drains, road embankments, slashed road verges.</p>
Landscape features	Hillsborough Road is framed by intensive densely vegetated areas adjoining both sides of the roadside. Some vegetation is setback due to power lines. Breaks within the landscape due to access roads and fire trails only.
Land use / built environment	Limited to roadside and business signage.
Spatial quality of zone	Enclosed spatial quality due to the extent of vegetation on both sides of Hillsborough Road.
Infrastructure - scale/pattern	Roadside infrastructure and overhead powerlines.
Major economic components	Barker Avenue provides access to the Charlestown Golf Course, although the golf course is not visible from Hillsborough Road or forms part of this LCZ.

Table 4 - Measurement of impact - LCZ 1

Sensitivity	Low	Comments
Magnitude	Moderate	Removal of vegetation should be minimised where possible. Whilst the road corridor will be widened, the extent of vegetation within the area would still enclose the road corridor. The proposal does however give the opportunity for the removal of weeds and rubbish.
Impact	Moderate-low	



Winding Creek looking north from Hillsborough Road



Hillsborough Road looking south west towards Golf Course access road (Barker Avenue)



Hillsborough Road looking south at unnamed creek crossing

Figure 25 – LCZ 2 - Closed Woodland
Source: Google Earth Pro 2021

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

Landscape character impact assessment (cont.)

Landscape character zone 3 - Showground and Nursery

Summary	Land zoned for small lot primary production and recreational land uses. The area incorporates the Whalan's Nursery and the Hillsborough Dog Showground.
Landform and drainage	Topography is fairly flat and level with Hillsborough Road.
Vegetation	The Biodiversity assessment identifies the plant community type along Hillsborough Road at this LCZ as Smooth-barked Apple – Turpentine – Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast (PCT 1627). Although, this plant community type has been modified with the understorey cleared and these areas maintained as turf.
Landscape features	Large open spaces with mature vegetation with large mature vegetation in the background.
Land use / built environment	Whalan's nursery, shed Quarters and the Hillsborough Dog Showground.
Spatial quality of zone	Various parts are open onto Hillsborough Road, however large mature vegetation can be seen in the rear of the Nursery enclosing the space.
Infrastructure - scale/pattern	Business signage, overhead power lines, turning lanes.
Major economic components	Nursery, sheds and recreational uses.

Table 5 - Measurement of impact - LCZ 1

Sensitivity	Low	Comments
Magnitude	Low	Retention of access to these land uses should be maintained.
Impact	Low	It is envisaged that the nursery and sheds facility would require retention of the sight lines with the road corridor to retain the visual links for users of Hillsborough Road. Some vegetation would be removed.



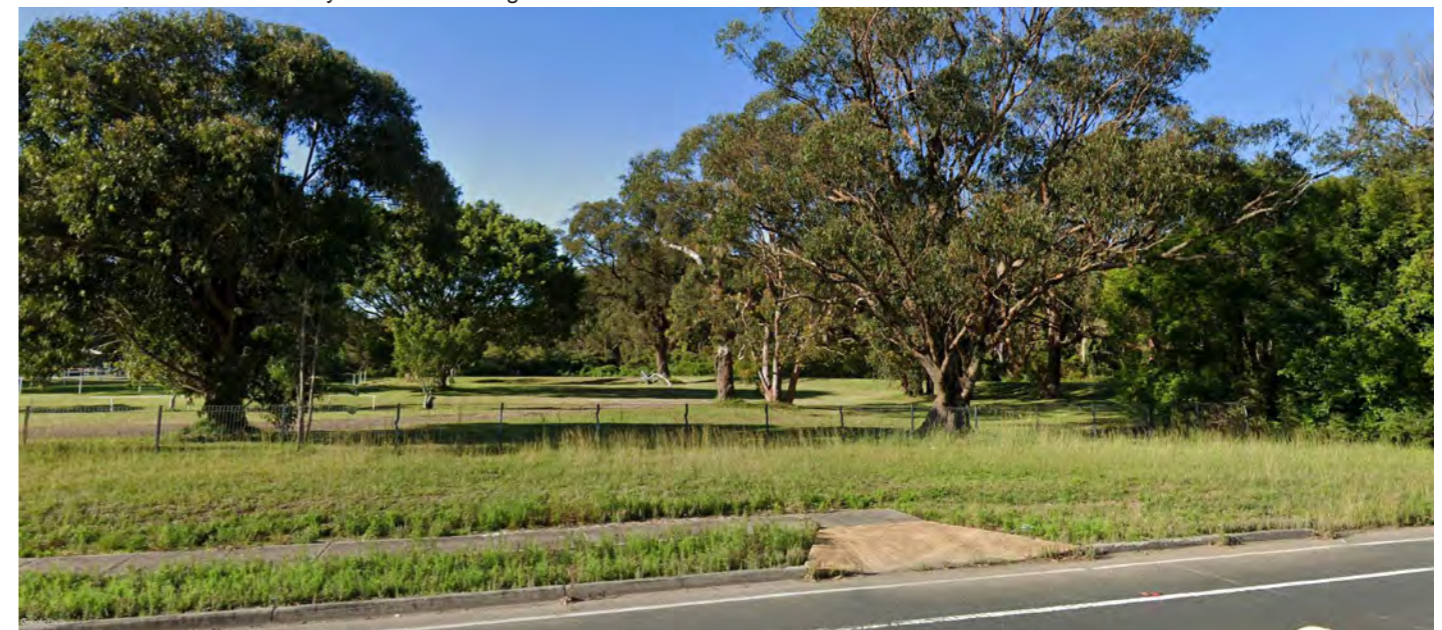
Main entry to nursery from Hillsborough Road



Side access to rear of nursery from Hillsborough Road



Entry to Showground from Hillsborough Road



View of Showground from Hillsborough Road looking south

Figure 26 – LCZ 3 - Showground and Nursery
Source: Google Earth Pro 2021

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

Landscape character impact assessment (cont.)

Landscape character zone 4 - Low density residential

Summary	Hillsborough and Cardiff South are residential areas comprising low density housing and supporting services such as open space. The residential area of Hillsborough is visible from Hillsborough Road with some dwellings fronting or backing onto Hillsborough Road. Cardiff South is not visible from Hillsborough Road as it is located to the north and screened by the extensive vegetation along Hillsborough Road.
Landform and drainage	Fairly flat and level with Hillsborough Road.
Vegetation	Limited street trees. Vegetation within private properties.
Landscape features	General residential area with some mature canopies and recreational infrastructure.
Land use / built environment	Low density housing and associated recreational infrastructure.
Spatial quality of zone	Open spatial quality.
Infrastructure - scale/pattern	Local road infrastructure, kerb and guttering, limited formal pathways, bicycle / walking route.
Major economic components	Residential area.

Table 6 - Measurement of impact - LCZ 1

Sensitivity	Moderate	Comments
Magnitude	Low	The road corridor will be widened throughout this LCZ and be closer to the residential area. Additional infrastructure will be incorporated including a shared pathway along the residential edge. An opportunity exists to provide street trees subject to location of services. Creation of a landscaped area at the end of Higham Road with Hillsborough Road to indicate the road is left in / left out for vehicles and improve the visual amenity.
Impact	Moderate-low	



Hillsborough Road looking north west - Dwellings with direct access onto Hillsborough Road



Chadwick Street looking west Hillsborough Road



Higham Road looking west towards Hillsborough Road



Hillsborough Road looking north towards houses on Leroy Close

Figure 27 – LCZ 4 - Low density residential
Source: Google Earth Pro 2021

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

5.4. Visual impact assessment methodology

The methodology for the visual impact assessment is in accordance with the Transport for NSW's Guideline for landscape character and visual impact assessment.

The potential visual impact of the proposal will be assessed in relation to the view analysis and the representative viewpoints. The levels of potential visual impact will be assessed through consideration of the combination of magnitude of visual change in the landscape and its proximity to the viewer and the sensitivity in relation to the quality of the view and how sensitive it is to the proposed change.

The magnitude of visual change is strongly influenced by the level of visibility of the new works resulting from the combination of scale, extent, distance and duration of the views. Visual sensitivity depends on the nature of the existing environment and on the likely response from people viewing the scene. People driving on a busy road and/or at high speeds are likely to be less sensitive to a change in the environment since they are focused on changes in traffic conditions and driving, compared to someone who is enjoying a recreational experience or someone who is viewing the scene from their living room.

The rankings used for magnitude of visibility are defined in Table 7.

Visual impacts can be positive and/or negative depending on a number of variables including the viewer's perceptions. For the assessment, it is PAA Design's interpretation of values that determine the rankings for the visual impact assessment.

Table 7 - Magnitude of visibility

Negligible	Very minor loss or alteration to one or more key elements/features/characteristics of the visual character and/or introduction of elements that are consistent with the existing visual character.
Low	Minor loss of/or alteration to one or more key elements/features/characteristics of the visual character and/or introduction of elements that are consistent with the existing visual character.
Moderate	Partial loss of/or alteration to one or more key elements/features/characteristics of the visual character and/or introduction of elements that may be prominent but not considered to be substantially uncharacteristic.
High	Substantial to total loss of key elements/features/characteristics of the visual character and/or introduction of elements considered to be totally uncharacteristic.

The combination of sensitivity and magnitude then provides an overall impact based on Table 8 outlined in the Transport for NSW's Landscape character and visual impact guidelines.

Table 8 - Visual impact grading matrix

		MAGNITUDE				
		High	Moderate	Low	Negligible	
SENSITIVITY	High	High	High-Moderate	Moderate	Negligible	
	Moderate	High-Moderate	Moderate	Moderate-Low	Negligible	
	Low	Moderate	Moderate-Low	Low	Negligible	
	Negligible	Negligible	Negligible	Negligible	Negligible	

(Transport for NSW, 2020)

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

5.5. Representative viewpoints

The following analyses the visual impact of the proposal from the identified viewpoints. Viewpoints have been determined based on desktop analysis and site investigations. The location of viewpoints are shown on Figure 28 and images provided of the viewpoints.

Table 9 analyses the potential visual impact from the viewpoints based on sensitivity and magnitude.

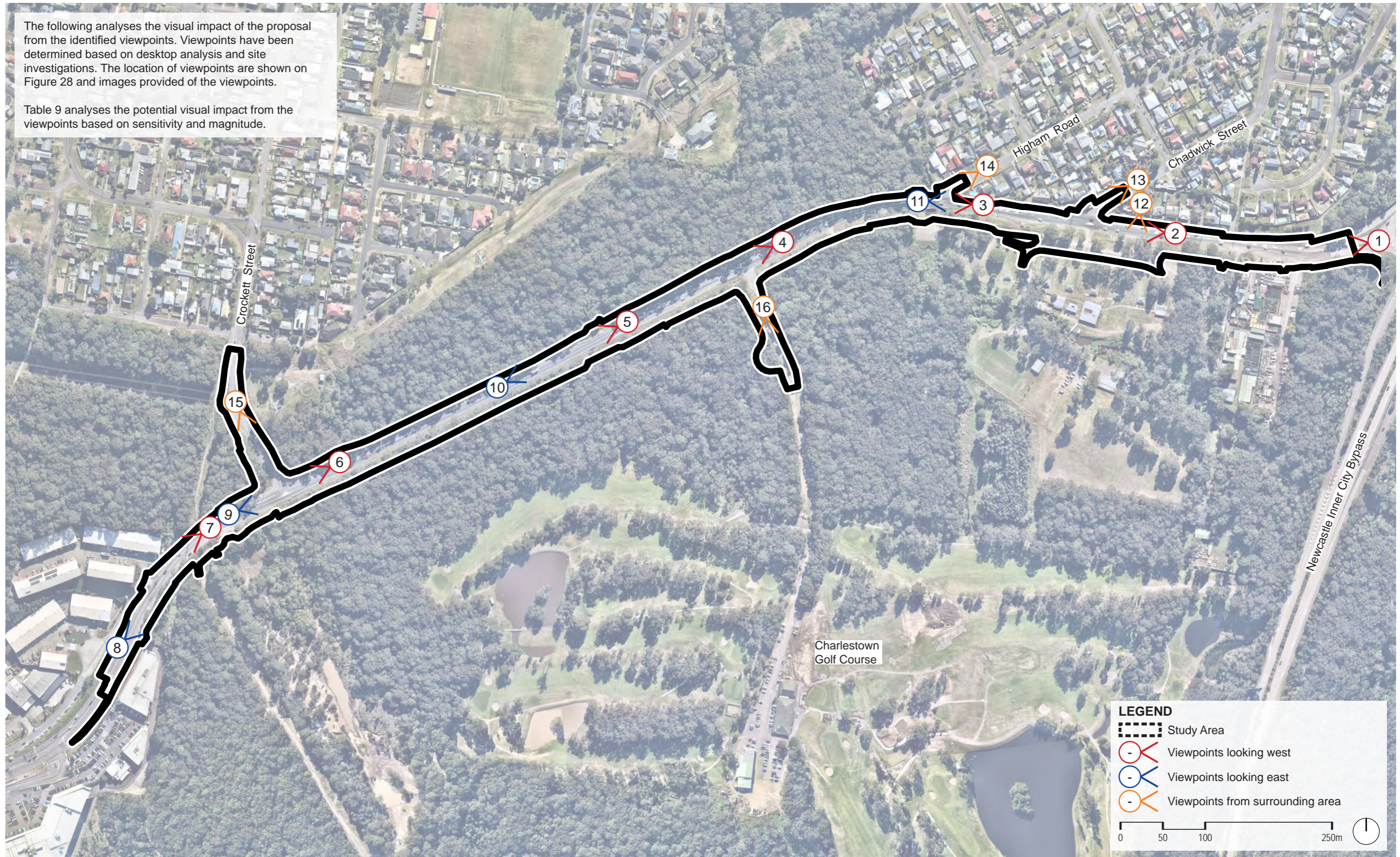


Figure 28 – Key viewpoints
Base aerial image - GHD 2021

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

Representative viewpoints (cont.)



1 Hillsborough Road looking west from intersection with Newcastle Inner City Bypass



2 Hillsborough Road looking west approaching intersection with Chadwick Street



3 Hillsborough Road looking west towards intersection with Higham Road



4 Hillsborough Road looking south west towards intersection with Barker Avenue

Figure 29 – Key viewpoints 1 to 4
Source: Google Earth Pro 2022

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

Representative viewpoints (cont.)



5 Hillsborough Road looking south west at unnamed creek crossing



6 Hillsborough Road looking south west at the intersection with Crockett Street



7 Hillsborough Road looking south west towards Warners Bay light industrial and bulky goods retail area



8 Hillsborough Road looking north east from the Warners Bay light industrial and bulky goods retail area

Figure 30 – Key viewpoints 5 to 7
Source: Google Earth Pro 2022

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

Representative viewpoints (cont.)



9 Hillsborough Road looking north west towards the proposed new Crockett Street intersection



10 Hillsborough Road looking north east



11 Hillsborough Road looking east towards intersection with Higham Road



12 View from 113 Hillsborough Road looking south

Figure 31 – Key viewpoints 8 to 11
Source: Google Earth Pro 2022

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

Representative viewpoints (cont.)



13 View from Chadwick Street looking southwest



14 View from Higham Road looking southwest



15 View from Crockett Street looking southeast



16 View from Barker Avenue looking south towards the proposed u-turn facility

Figure 32 – Key viewpoints 12 to 16
Source: Google Earth Pro 2022

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

5.6. Visual impact assessment

Table 9 - Viewpoint description and visual assessment

Viewpoint	Description of setting	Sensitivity due to:	Visual sensitivity	Magnitude of visual effect	Resultant rating of visual impact	Comments
1	View of the proposal at its eastern extent from drivers and passengers, cyclists and pedestrians.	Change to road geometry and access arrangements.	Negligible	Negligible	Negligible	The road corridor ties in with the existing road network to the east and is legible for the road users.
2	Travelling west bound approaching intersection with Chadwick Street.	New intersection arrangement including traffic signals and potential loss of vegetation.	Low	Low	Low	Whilst a new signalised intersection would be incorporated, the visual impact is considered low as it is an existing intersection within an urban area. There would be a potential loss of some vegetation.
3	Travelling west bound approaching Higham Road.	Change of intersection arrangement and potential loss of vegetation.	Low	Negligible	Negligible	Vegetation would still form a large part of the view due to the extent of existing vegetation. New intersection arrangement would be known to travellers.
4	Travelling west bound at the creek crossing.	Loss of vegetation and change in intersection arrangement.	Low	Negligible	Negligible	Whilst vegetation would be removed, large areas of vegetation would be retained and form part of the view.
5	Travelling west bound at the creek crossing.	Widening of road network and loss of vegetation.	Low	Negligible	Negligible	Whilst vegetation would be removed, large areas of vegetation would be retained and form part of the view.
6	Travelling west bound approaching intersection with Crockett Street.	New intersection arrangement including traffic signals and loss of vegetation.	Low	Low	Low	The new signalised intersection would remove some vegetation. The visual impact is reduced as the area would still be enclosed by the surrounding vegetation. It is an existing intersection and the proposal would assist in traffic movement.
7	Travelling west bound approaching the Warners Bay economic Centre.	Road network widens and retaining walls to be incorporated replacing grassed and/or treed batters.	Low	Moderate	Moderate-Low	Removal of the vegetation and implementation of the retaining wall would change the view on the approach to the Warners Bay economic centre. The proposal provides an opportunity to improve safety and provide interpretive information and/or an entry treatment to the Warners Bay economic centre.
8	Travelling east bound at the eastern extent of the Warners Bay economic centre.	Road network widens and loss of vegetation.	Low	Moderate	Moderate-Low	Removal of the vegetation and implementation of the retaining wall would change the view. The proposal provides an opportunity to improve safety and provide an entry treatment to the Warners Bay economic centre. This would also assist in identifying to the traveller that this is at the eastern extent of the Warners Bay economic centre.
9	Travelling east bound approaching intersection with Crockett Street.	New intersection arrangement including traffic signals and loss of vegetation.	Low	Low	Low	The new signalised intersection would remove some vegetation. The visual impact is reduced as the area would still be enclosed by the surrounding vegetation. It is an existing intersection and the proposal would assist in traffic movement.
10	Travelling east bound at the creek crossing.	Widening of road network and loss of vegetation.	Low	Negligible	Negligible	Whilst vegetation would be removed, large areas of vegetation would be retained
11	Travelling east bound approaching Higham Road.	Change of intersection arrangement and removal of vegetation.	Low	Negligible	Negligible	Vegetation to remain in the background. New arrangement would be known to travellers.
12	View from residential area on Hillsborough Road looking south.	The road network will widen and loss of vegetation.	Moderate	Low	Moderate-Low	New infrastructure would be provided however there would be a loss of the adjoining turfed verge and loss of trees on the opposite road verge and some street trees..
13	View from Chadwick Street looking south west to the intersection with Hillsborough Road.	The new signalised intersection and potential loss of vegetation.	Low	Negligible	Negligible	Road users would be concentrating on the road environment and the loss of vegetation would be minimal and therefore the visual impact negligible.
14	View from Higham Road looking south west to the intersection with Hillsborough Road.	Part closure of the intersection and rearrangement of Higham Road including separate access to private properties and a left turn in and left out arrangement.	Moderate	Moderate	Moderate	The traffic arrangement would be different at this intersection incorporating separate access to properties and the separate left in/left out turn, which may cause confusion without adequate signage.
15	View from Crockett Street looking south to the intersection with Hillsborough Road.	The new signalised intersection and loss of vegetation.	Low	Negligible	Negligible	Road users would be concentrating on the road environment. Whilst there would be loss of vegetation within this immediate area, a large amount of vegetation would be retained and therefore the visual impact negligible.
16	View from Barker Avenue looking south towards the proposed u-turn facility	The new u-turn facility and loss of vegetation.	Low	Low	Low	Road users would be concentrating on the road environment. Whilst there would be loss of vegetation, the surrounding vegetation would be retained and therefore the visual impact low.

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT (cont.)

5.7. Conclusion and mitigation measures

The impacts on the landscape character and visual amenity of the proposal have been assessed as follows. This is based on the current proposal with no urban design and landscape treatment. The impacts may be further reduced should the proposed urban design solutions be implemented as outlined in the Urban design strategy of this report.

The Hillsborough Road corridor proposal would generally have a negligible to moderate-low impact on landscape character and visual amenity. This is largely due to the extent of native vegetation that adjoins both sides of Hillsborough Road. Whilst some vegetation would be removed, the area would still retain a large amount of native vegetation, which still encloses a large part of the road. The proposal would also provide an opportunity to remove the dense weeds within the area.

Appropriate treatment would assist in providing further guidance to the users of Higham Road. This could include signage and landscape treatment to guide road users.

Replacement of the grassed and treed batters with retaining walls at the western end of the proposal provides an opportunity to improve safety and maintenance along Hillsborough Road. The proposed retaining walls also provides an opportunity to create a gateway at this location.

The above measures have been implemented where possible in the urban design of the proposal outlined in Section 4.

6.0 REFERENCES

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