



COUNCIL MEETING

ATTACHMENTS UNDER SEPARATE COVER

7.00 PM, TUESDAY 21 JULY 2020

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ATTACHMENTS UNDER SEPARATE COVER

CM/7.7/20.07 Draft Waverley Local Character Statements - Exhibition

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WAVERLEY
COUNCIL

A detailed line drawing of a residential street scene. It shows a row of houses with various rooflines, balconies, and fences. In the foreground, there's a stone wall and a path leading towards the houses. The style is a sketchy, hand-drawn illustration.

DRAFT WAVERLEY LOCAL CHARACTER STATEMENTS 2020

ACKNOWLEDGEMENT

We acknowledge the Bidjigal and Gadigal people who
traditionally occupied the Sydney coast.

We also acknowledge Aboriginal Elders past, present and
emerging.

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NOTE: Unless stated all photographs and graphics are authored by Waverley Council.



1 EXECUTIVE SUMMARY

“Waverley: connecting the city and the sea. A welcoming and cohesive community that celebrates and enhances our spectacular coastline, vibrant places, and rich cultural heritage” (Waverley Community Strategic Plan vision)

1.1 What is local character?

Local character is what makes one area distinctive from another. It is the way an area ‘looks’ and ‘feels’. Character is created through the interrelation of distinctive natural and built elements in the public and private domains, including topography, vegetation, streetscape, built form, activity types, as well as the emotional and cultural experience of a place.

All areas in the Waverley local government area (LGA) have character, however in some, the character may be more identifiable, more unusual, or more attractive and what is important in one area might be different in another – from vibrant local centres, leafy streets, consistent dwelling typologies and architectural styles, to areas and items of heritage significance, and access to coastal views and open space.

This character makes the Waverley LGA an attractive place to live, work and visit. Consequently, the area is subject to ongoing redevelopment pressures and change, such as:

- Alterations and additions to existing dwellings, including second-story and parking structure (e.g. enclosed garage) additions, rooftop additions comprising apartment dwellings or consolidation of apartments,
- Replacement of existing dwellings with ‘higher-value’ dwellings and densities, such as residential flat buildings (RFBs) or dual-occupancies, and
- Exempt and Complying Development undertaken in accordance with State Environmental Planning Policies (SEPPs), for example the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* (Codes SEPP).

If not managed, areas may be impacted by new development, which may be insensitive to the area’s existing character, in terms of building height, landscaped areas and car parking provision etc.

Respecting local character does not mean that change cannot occur, rather, it means that good planning and design needs to be implemented to ensure new development is well-considered and complements the characteristics of an area. Built form, bulk, scale and height as well as landscaping and materiality all play a part in ensuring the character of an area is maintained and / or enhanced whilst still allowing for new development to occur. Accordingly, it is important that Council and the community create a shared vision for an area and how it will change over time, including identifying existing characteristics to be maintained and / or enhanced.

1.2 Local character study and statements

The *draft Waverley Local Character Statements 2020* (draft Local Character Statements) form part of Phase 4 of the Comprehensive LEP Review process and deliver on Action 7.3 of the Waverley Local Strategic Planning Statement (LSPS) and Action 5.1 of the Waverley Local Housing Strategy (LHS). The local character work will also deliver on the NSW Government’s direction (following 2016 planning reforms) to elevate the consideration of local character in planning and decision-making.

The draft Local Character Statements form part of a suite of environmental studies that provide an evidence base to strengthen the integration of local character considerations into the Waverley planning framework. This will occur first as part of the strategic

6 planning process and then through its translation into statutory controls, in the comprehensive review of the Waverley Local Environmental Plan 2012 (WLEP) and the Waverley Development Control Plan 2012 (WDCP). Specifically, this work will help Council prioritise place-based planning and local character when assessing Planning Proposals (PPs) and Development Applications (DAs).

Elevating the consideration of local character in planning and decision-making requires a comprehensive examination of the character of an area through qualitative and quantitative assessment. Synthesising information from a variety of State and local sources, the local character study identifies and describes the high-level social, environmental and economic characteristics of 23 defined areas across the Waverley LGA (with the exception of Bondi Junction). Characteristics include housing type and architectural style, density and height, heritage and culture, parking, public / private domain interface, open space, topography and tree canopy. The 23 areas provide a narrowed focus for the local character

study (see Figure 1). The local character study has informed the preparation of a written and graphic statement for the 23 areas. Each statement comprises a high-level description of the area's existing characteristics and key character attributes as well as desired future character objectives.

This is the first time that Council has undertaken a local character study for the whole LGA. The study seeks to complement the work on local character already undertaken in the WDCP, and other strategic studies including, the Waverley LHS, *draft Waverley Village Centres Strategy (VCS)*, *draft Waverley Council Heritage Assessment 2020* and the Bondi Junction Urban Design Review Update 2020. It does not seek to duplicate the detailed description and actions for areas outlined within these studies, for example Waverley's village centres. The study has been informed by the DPIE's 'Character Assessment Toolkit' and 'Local Character Wheel' documented in the *Local Character and Place Guideline* (2019).

1.3 Community influence in identifying local character

'The community' is any individual, group or organisation that identifies or has an interest in a place. It includes, residents, landowners, business owners, community organisations, visitors and workers, government agencies and statutory bodies.

The character of an area is subjective in nature. The community use and experience a place differently, and what are important characteristics to some may be different to others, making the planning for the future of an area more difficult. Effective consultation with the community is required to hear how places across the Waverley LGA are experienced and valued and to set an agreed vision for how an area may change or evolve over time.

Council undertook extensive community consultation for the preparation of the Waverley Community Strategic Plan (CSP), Waverley LSPS, Waverley Local Housing Discussion Paper and draft Waverley VCS. The feedback received as part of these consultations, including that documented in the Community Strategic Plan Engagement Report 2018 and Village Centres Strategy Consultation Summary Report – Engagement August-September 2019, have informed the preparation of the local character study and draft Waverley Local Character Statements 2020.

The character study and statements are a starting point to identify and describe the existing and future character of an area. Community feedback will be used to refine these documents and inform potential changes to the WLEP and WDCP. Where changes are proposed, the community will have further opportunities to provide feedback.



Have Your Say!

You can provide your feedback by making a formal submission to the General Manager of Waverley Council by emailing info@waverley.com.au or connecting directly with Council staff working on this project via the Waverley Have Your Say webpage.



Figure 1 - Draft Local Character Areas map

1.4 Local character and heritage

“Heritage and local character are often intrinsically linked, and individual places can be heavily influenced by their existing built or natural environment, creating a rich tapestry from which to build. Rather than create a distinction between past and present, heritage can be used as a foundation of local character” (Justin Hewitt, Local Character and Place Collection, 2019, p.19).

The intrinsic relationship between heritage and character is acknowledged, however there remain important differences between areas or items of heritage significance and areas of local character, in terms of the assessment process and current legislative status, within the planning system.

A Heritage Conservation Area (HCA) is an umbrella term with specific Conservation Areas sitting below them. For example, an ‘Urban Conservation Area’ (a HCA with special architectural or historic interest that includes built form) and a ‘Landscape Conservation Area’ (a HCA that contains significant landscape / parklands etc.) Heritage items are buildings, archaeological remains, trees etc. that is an exemplar of its type.

HCAs or heritage items are assessed against the criteria set out in the NSW Heritage Manual, with reference to the national best-practice standards contained in the Burra Charter (Australia ICOMOS, 2013), to determine whether it has heritage significance and therefore warrants listing. Areas and items of heritage significance within the Waverley LGA are identified in Schedule 5 of the WLEP.

If a building is included within a HCA or if it is individually heritage listed, it does not mean that works proposed to the building are not possible. What it does mean is that any proposed changes to the building may require a heritage exemption or a Development Application (DA) to Council with a Heritage Impact Statement included, as specified in cl.5.10 of the WLEP and Part B9 of the WDCP. It also means that Exempt and Complying Development, for example under the Codes SEPP, cannot be undertaken on a building within a HCA or that is individually listed.

Local character is much broader than heritage. Each Council is free to choose how to undertake a local character study, using the DPIE’s Local Character and Place Guideline as a guide. Local character considerations go beyond historic and built form considerations to include all elements that contribute to the look and feel of an area including the public and private domains, including topography, vegetation, streetscape and activity types. Character elements of an area could be wide verges, leafy streets, dwelling typologies, styles or materials, consistent setbacks, significant views, etc.

Further, each Council can choose how to integrate the consideration of local character into the planning framework. Currently, character areas may be included within a standalone local character statement or within a Council’s DCP. A DA to Council for new development, if located in a character area, would be required to consider the DCP objectives and controls relating to that area. The opportunity for inclusion of a local character area within a Council’s LEP, as a local character overlay (LCO) is still being determined by the DPIE (refer to Part 3 for further information). Further, the opportunity for the exclusion or local exemption of a character area from Exempt and Complying Development would be subject to agreement by the DPIE (refer to Part 3 for further information). Therefore, a character area does not have the same legislative weight as a HCA or heritage item.

Identifying an area of local character is not an alternative form of heritage listing. The local character study has drawn from the detailed body of work undertaken as part of the draft Waverley Council Heritage Assessment 2020. It does not seek to duplicate the detail of this assessment, however, utilises the historic narrative to inform the local character statements and to identify areas of character.

1.5 Local character and Exempt and Complying Development

State Environmental Planning Policies (SEPPs) are state-legislated plans prepared by the NSW Government. They specify planning controls for certain areas and / or types of development. SEPPs have greater weight than Council's plans and policies. Common SEPPs that apply to the Waverley LGA are the Codes SEPP, Seniors SEPP, ARHSEPP and the *State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017* (Education SEPP).

Some SEPPs, where they apply, enable Exempt Development, being development that can be undertaken without approval, and Complying Development, being development that requires a Complying Development Certificate approved by an accredited Certifier under a fast-track assessment process. Types of development can include:

- Construction of a new building (e.g. a dwelling, secondary dwelling, school)
- Alterations and additions to an existing building
- Demolition of a building
- Internal alterations (fit-out) of commercial / retail premises.

Exempt and Complying Development does not require a Development Application to Council. Therefore, local design objectives and controls in Council's LEP and DCP do not apply. This includes local character considerations.

Whilst Exempt and Complying Development allows 'minor impact development', the application of some design controls is seen to create a potential conflict with the character of an area, in terms of building height, landscaped areas, car parking provision, materiality etc. For example, many streets in Waverley are characterised by their lack of driveways and on-site car parking, providing for larger landscaped frontages and mature street tree planting. Application of generic design controls in these areas could be detrimental to the character of these streetscapes.

Where an area's character has been identified as being highly valued in the local character study and through community consultation, there may be the opportunity to, in limited circumstances, introduce local variations to or seek a local exclusion from part of a SEPP, subject to the agreement of the Department of Planning, Industry and Environment (DPIE). It is noted that this approach will not be warranted for all character areas, or even the entirety of a character area.

For certain character areas, the introduction of a local variation would enable for certain character areas, the ability to introduce alternative controls within a SEPP for attributes that strongly affect the character of the area. For example, requiring a certain roof design (gable in Federation suburb), or no on-site car parking or driveway crossover. A local exclusion would exclude an area, which requires variation to the controls beyond the scope of a local variation, from part(s) of a SEPP, for example the LRMDHC. Local variations and exclusions are existing mechanisms within the state policy.

Further investigation and analysis are required to determine where the application of SEPPs, particularly the Codes SEPP, may result in development that is incompatible with an area's existing character, document the design controls that would result in this incompatibility, and propose alternative controls. This analysis would inform any request to the DPIE for local variations or exclusions. Requests would need to address and satisfy a state-wide set of clear criteria. Any variations or exclusions would be subject to agreement by the DPIE. Further, Council will continue to advocate for greater consideration of local character within State policy.

10 1.6 Recommendations

The local character study and statements have identified a number of recommendations for further investigation (see **Table 1**). These recommendations may support priorities and actions from other strategic studies including the Waverley LSPS and Waverley LHS.

Figure 2 identifies the investigation areas that warrant further review.

It is noted that the draft Local Character Areas include Waverley's village centres. These centres contribute to the social and economic character of each area. However, the draft Local Character Statements do not seek to duplicate the detailed description and recommendations of the draft VCS, including the desired future character of each centre. The draft Statements seek to complement the draft VCS, rather than duplicate significant work already undertaken. Both documents will inform the review of the Waverley LEP and DCP.

Table 1 - Key recommendations

Recommendation
1 Research and analysis
1.1. Undertake a further review of preliminary local character investigation areas (see Figure 2) to identify areas of high character value that may warrant more tailored planning objectives and controls in the WLEP and / or WDCP, or exemption from the Codes SEPP.
1.2. Consider policy development for particular types of development or areas, for example alterations and additions to Inter-War RFBs, local centres.
2 Review of local planning policy
2.1. Undertake a review of WLEP to identify inconsistencies (if they exist) between existing character and desired future character in respect of the zone objectives and development standards, including height of building and floor space ratio.
2.2. Undertake a review of the WDCP to ensure current development objectives and controls align with the local character study outcomes, for example protection of view corridors, alterations and additions to existing dwellings, adaptive reuse, vegetation coverage etc.
2.3. Undertake a review of existing WDCP to determine relevancy of existing character areas and investigate the inclusion of amended or new character areas, with associated planning objectives and controls (refer to recommendation 1.1)
3 Review of State planning policy
3.1. Undertake a review of the applicability of the Codes SEPP, including the LRMDHC, within the Waverley LGA to determine: <ul style="list-style-type: none"> • Application of the Code across the LGA (this may involve mapping of Complying Development hotspots, or mapping where the LRMDHC could apply), • Inconsistencies between the Code and Council's controls, that may result in an erosion of local character, • Whether Council's controls need to be updated to reflect the LRMDHC to promote a Development Assessment pathway, and • Whether local variations or exemptions from the Code is warranted.
3.2. Undertake a review of the applicability of the Seniors SEPP within the Waverley LGA to: <ul style="list-style-type: none"> • Identify opportunity sites that may warrant tailored planning objectives and controls, and • Investigate the application of new controls including zone objectives in the WLEP to encourage seniors housing that is consistent with desired future character.
4 Advocacy
4.1. Continue to work with the DPIE and advocate for greater consideration of local character within State policy, including local variations and exemptions where warranted.

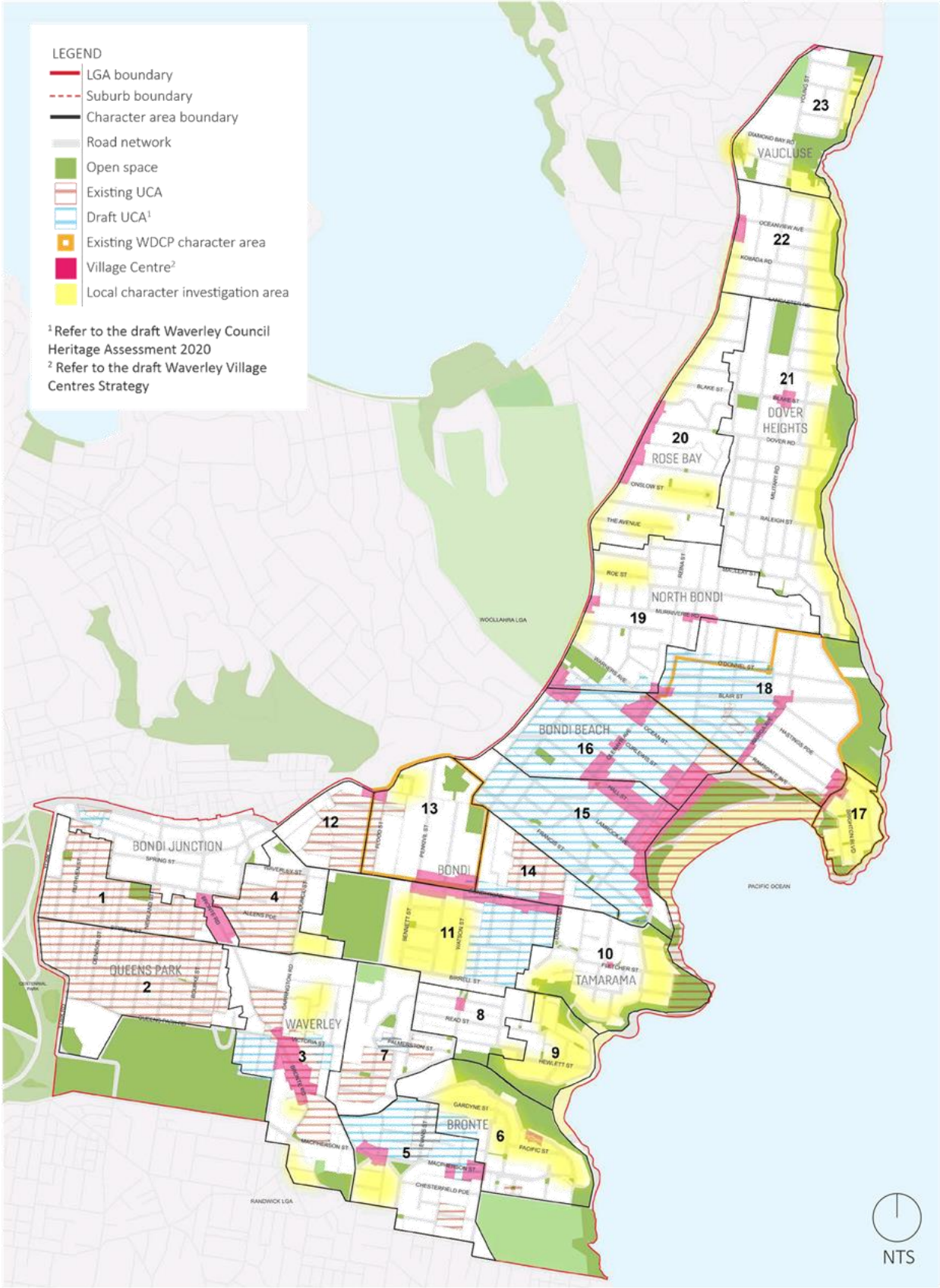


Figure 2 - Investigation Areas map (Waverley Council, 2020)



2 DRAFT LOCAL CHARACTER STATEMENTS

“Through these descriptions of place, we can get a sense of the layering of social, natural and built elements that make that place distinct from any other. It is this layering of elements that creates a place’s individual local character” (Local Character and Place Collection, 2019)

2.1 Methodology

Synthesising information from a variety of State and local sources, the local character study identifies and describes the social, environmental and economic characteristics of 23 defined areas across the Waverley LGA (see Figure 3). Characteristics include housing type and style, density and height, heritage and culture, parking, public / private domain interface, open space, topography and tree canopy.

The boundaries of each area have been informed by natural features, open space, primary roads, change in land use of building typologies, existing and former character areas and / or suburb boundaries. The 23 areas provide a narrowed focus for the local character study.

The Bondi Junction Strategic Centre has been excluded from the character study. A number of studies and strategies have been completed for Bondi Junction in the past decade or so, including the Bondi Junction Complete Streets Project (2013), Bondi Junction Commercial Centre Review (2017) and the Bondi Junction Urban Design Review (2020). It is considered that the existing documents holistically and sufficiently address the existing and desired future character of the Bondi Junction centre. To avoid duplication of significant work, the centre has been excluded from this local character study.

The local character study has informed the preparation of a written and graphic statement for the 23 areas. Each statement comprises:

- A high-level description of the area’s existing characteristics, using text, photos and maps. The existing characteristics include the history, configuration and connectivity, built form, public and private interface, natural environment and recent development within an area,
- A rating of the area’s key existing character attributes (see Table 2), and
- A desired future character statement and objectives for the area.

2.2 Limitations

The local character study was undertaken using qualitative and quantitative data sources, each with their own limitations. Review and interpretation is subject to a degree of personal bias, as the character of an area is subjective in nature. Consultation with the community and other stakeholders will be important in validating the character statements and desired future character objectives.

Further, the study was undertaken at a relatively high-level across each area. Therefore, the statements, including the desired future character objectives, comprise a level of generality, focusing on types / groups of development, trends etc. as opposed to individual sites or dwellings.



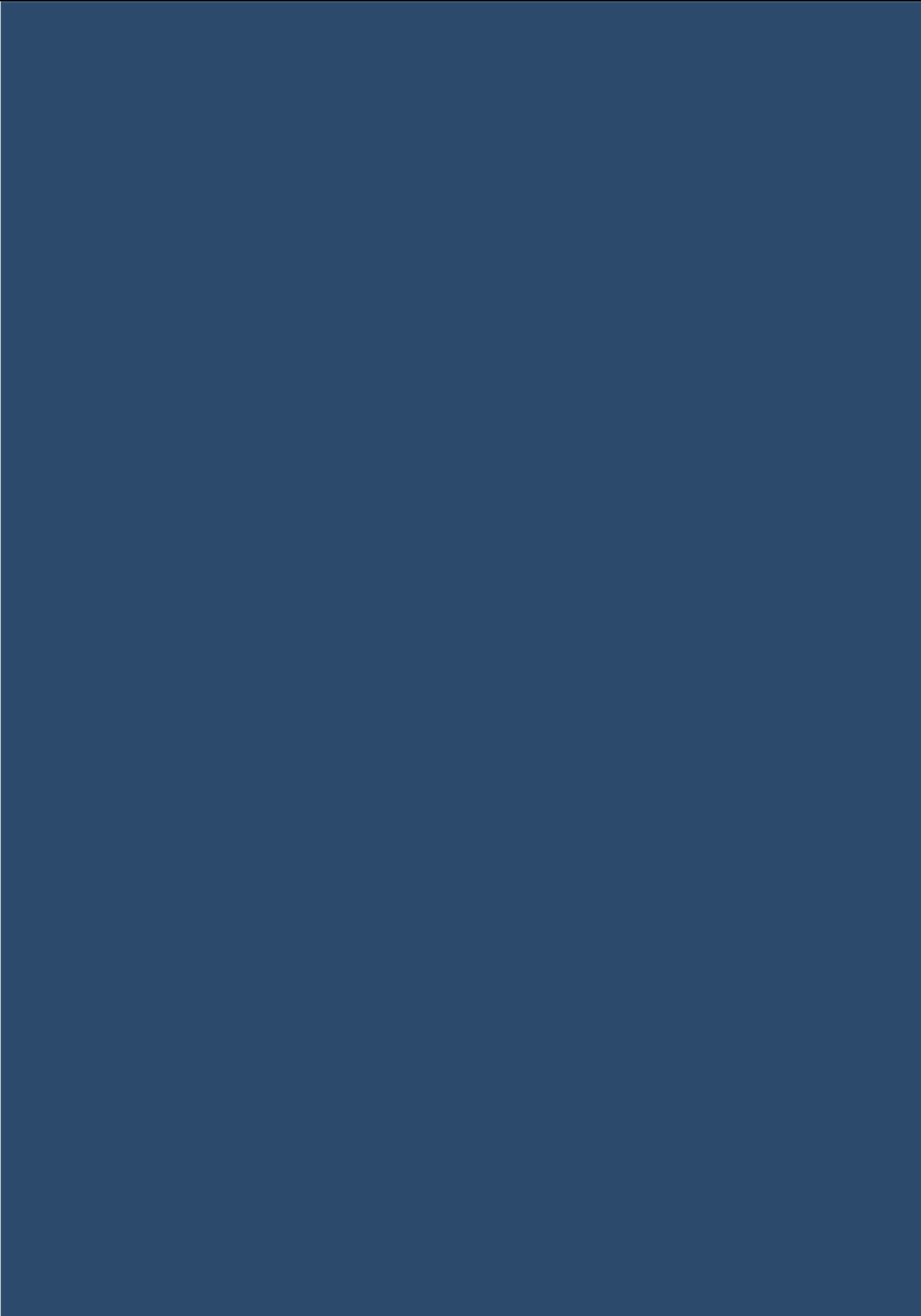
Figure 3 - Draft Local Character Areas map

Table 2 - Existing character attributes

Attribute	Description	Indicator
Built form	Refers to the typology and architectural style of buildings within an area	Inconsistent - Consistent
Height of buildings	Refers to the prevailing building height within an area	Low-rise (1-2 storeys)- high-rise (8+ storeys)
Subdivision pattern	Refers to the interaction between the public and private domain, connecting building and street within an area i.e. width of street corridor and verges, drive-way crossovers, sense of enclosure or openness, front setback depth (i.e. the distance between property boundary and front building line), visibility of building façade, fence treatment, front landscaping, parking structures	Small lots - large lots
Public and private domain interface	Refers to the level of vegetation coverage within an area i.e. mature canopy, street trees, density of vegetation, type of vegetation	Inconsistent - Consistent
Vegetation coverage	Refers to quantum of open space within an area i.e. beaches, parks, playgrounds and significant landscape features within an area i.e. topographical changes, coastline, cliffscapes	Low coverage (not leafy) - High coverage (leafy)
Open space and landscape features	Refers to quantum of open space within an area i.e. beaches, parks, playgrounds and significant landscape features within an area i.e. topographical changes, coastline, cliffscapes	Low - High
Views	Refers to the availability of views to and from an area	Low - High
Access and connectivity	Refers to the level of access and connectivity to and from an area by the road network, public and active transport	Poorly connected - well connected
Heritage significance	Refers to urban and landscape conservation areas and / or general, landscape, archaeological and aboriginal items within an area	Low - High
Diversity of uses	Refers to the variety of land uses, for example residential, commercial, retail, educational, religious, open space within an area	Low - High

Existing character attributes example...





CHARACTER AREA

1



CHARACTER AREA – 1

“The area is defined by its historic streetscapes, arranged in a linear north-south grid, comprising predominantly low-rise, closely-set, late-Victorian and Federation-style terraces, detached and semi-detached dwellings; limited driveways, regular street trees; proximity to Bondi Junction and significant public open space”.

The study area is generally bound by the rear of properties fronting Oxford and Ebley streets to the north, the rear of properties fronting Bronte Road to the east, Birrell Street to the south and York Road to the west.



Figure 1-1 - Local character area #01 map



Figure 1-2 - Heritage-listed terrace dwellings, St James Road



Figure 1-3 - Modern terrace dwellings, Hough Street

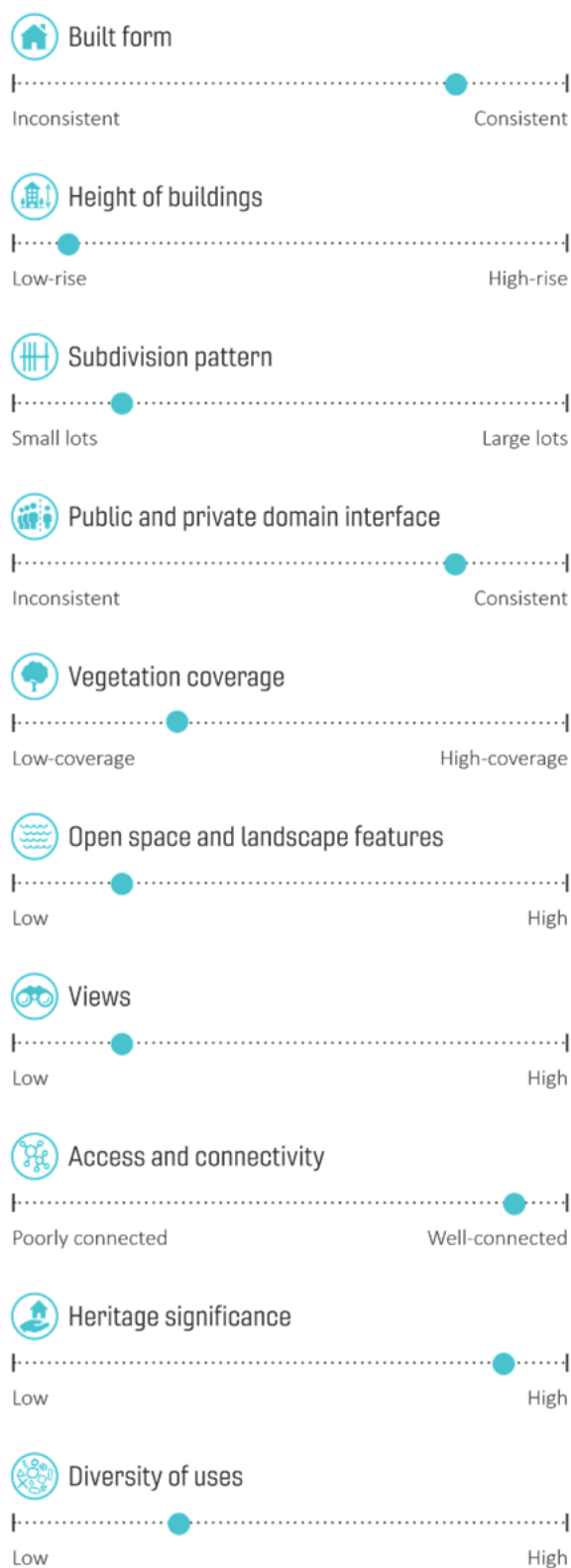


Figure 1-4 - Heritage-listed terrace dwellings, Ruthven Street



Figure 1-5 - Clemenston Park

Existing character attributes



Desired future character

Vision

The desired future character of the area is defined by well-maintained historic streetscapes of Federation-style dwellings, amidst avenues of leafy trees and vegetation.

Objectives

The objectives for development on land identified within the character area are as follows:

- To ensure an appropriate physical and visual curtilage is provided for Centennial Park, including its skyline, and nearby historic streetscapes / areas,
- To preserve the heritage items and the integrity of the Urban Conservation Area,
- To maintain the historically distinctive fine-grain pattern of subdivision and associated terrace housing typology,
- To maintain the predominant 1-2 storey height character of the area,
- To discourage demolition and promote sympathetic additions that retain the scale and massing of front elevations and the original roof form as viewed from the primary street frontage,
- To ensure new development respects the historic patterns, original built form, architectural styles, materials and details of the area,
- To ensure a transition between the Bondi Junction commercial core and residential dwellings within the area, for example Denison Street,
- To ensure front fences and landscaping relate to the period and architectural style of the dwelling, and maintain visual connection between the dwelling and street,
- To limit new driveway crossovers and car parking within the front setback, by retaining vehicle access from rear lanes,
- To maintain and enhance the quality of urban plazas and parks, particularly solar access,
- To maintain and grow the canopy and provide increased opportunities for urban greening.

20 Existing character description

History

The area’s character is derived from the forms, streetscapes and social relationship of industry, worker housing and commerce in the early years of the Waverley municipality. Initial land grants of the 1830s-1840s were used for dairying, animal husbandry, quarrying and flour milling. The grid pattern of the early grants and initial streets established along their boundaries provided the basis for later subdivisions, which are reflected in the configuration of the area today. Improvements in transport and the rapid expansion of suburban Sydney between 1880-1915 saw the consolidation of Bondi Junction as a commuter suburb resulting in the development of the area for worker housing. Linear blocks were divided into deep, narrow-fronted allotments. The area remains predominantly residential with limited commercial, retail, educational and transport uses throughout.

Key uses / landmarks

Clemenston Park forms part of an important local community hub, which includes the Mill Hill Early

Education Centre, The GRACE Child Care Centre and Waverley Community Garden. The area also benefits from close proximity to Waverley Library and Mill Hill Centre in Bondi Junction. These places provide social and cultural programs and services supporting the wider Waverley community.

Configuration and connectivity

Blocks are typically arranged in a linear north-south alignment, across the area’s topography which slopes from the natural ridgeline along Oxford Street, south towards Queens Park. A well-defined and connected street network comprises primary through-streets, inner streets and rear laneways. York Road, Birrell, Newland, Denison and Ruthven streets provide access to, from and through the area. The area benefits from its close proximity to Bondi Junction, where heavy rail and bus services provide access to the coast, Sydney CBD and surrounding areas.

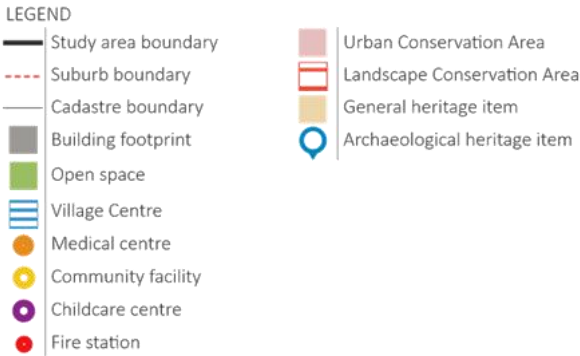
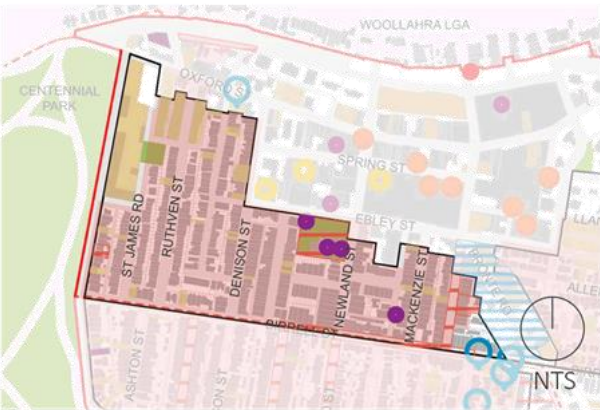


Figure 1-6 - Built form and uses area #01

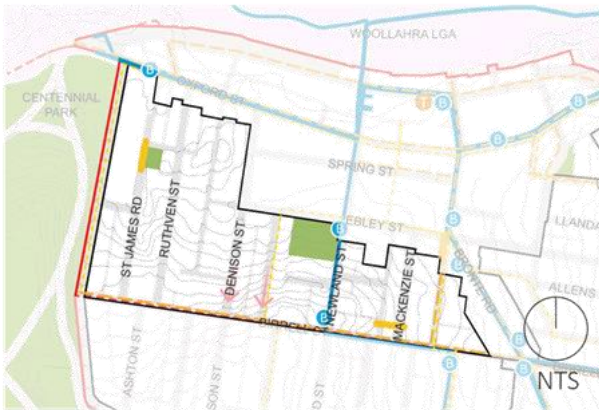


Figure 1-7 - Road network and movement area #01

Built form

Substantial development of the area between 1880-1915 has resulted in consistent streetscapes characterised by predominantly Late-Victorian and Federation-style terraces, semi-detached and detached dwellings of 1-2 storeys. Terraces are typically of face brick, stone and rendered masonry with chimneys, decorative plaster, timber and iron filigree detailing. Upper balconies are common. Notable terrace groupings include heritage listed 2-36 St James Road, 12-42 Ruthven Street and 43-55 Denison Street (see Figure 1-2, Figure 1-4 and Figure 1-8). Federation-style detached, and semi-detached bungalows are characterised by low gabled terracotta tiled roofs, with timber verandah posts, decorated timber or ironwork gable trim, window awnings and chimneys. An example is the western side of St James Road. Grander detached Federation dwellings characterise the western edge of the area, fronting York Road, overlooking Centennial Park. Historical shopfronts are set at street corners and within housing rows with post-supported and cantilevered verandahs. Ecclesiastical buildings including churches and manses are also evident throughout the area. Heritage listing of the area as the Mill Hill Conservation Area has retained the character of these early streetscapes, however alterations including second-storey additions, as well as later infill development, has impacted their integrity. Later development of Mid-century, late 20th century and 21st century styles, is prominent along St James Road, Ruthven Street and Hough Street. These dwelling typologies result in a population density of approximately 87 persons/ha.



Figure 1-8 - Heritage-listed terrace dwellings, Ruthven Street

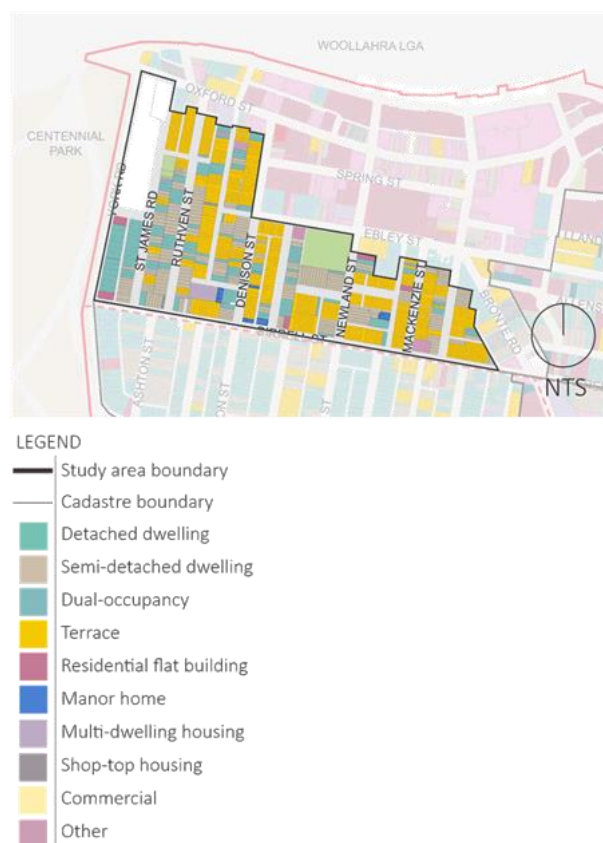


Figure 1-9 - Dwelling typologies area #01

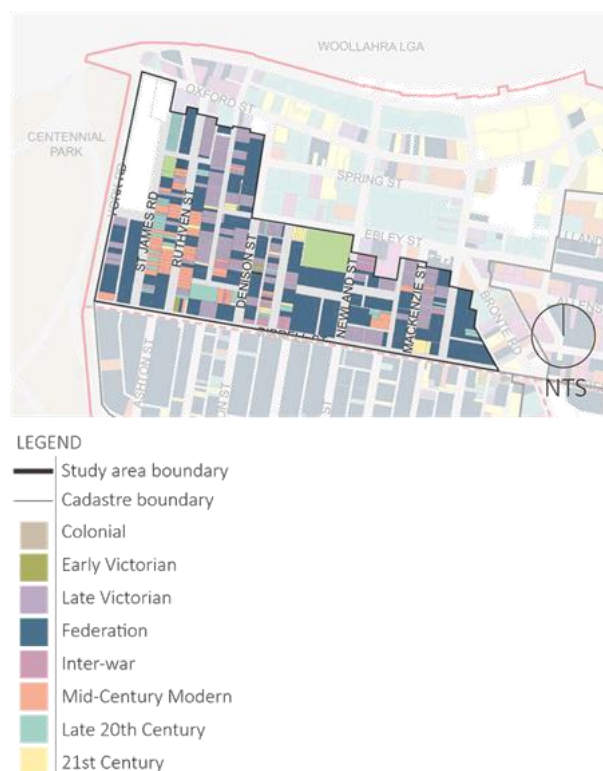


Figure 1-10 - Architectural styles area #01

22 Existing character description cont.

Public and private domain interface

The interface between the public and private domains varies across the area, dependent on street and dwelling typologies. Through-streets are characterised by a wider carriageway, relatively narrow verges and smaller, less dense street plantings. Inner streets typically have wider verges, accommodating more street trees. Brisbane Street is characterised by an avenue of significant fig trees. The narrow, corridor-like rear lanes are dominated by garage doors, high fences and walls, landscape screening and a variety of building setbacks. Shallow setbacks and low cast iron or timber fences, result in dwellings being highly visible from the public domain. In some cases, higher rendered brick fences reduce visibility. Front landscaping is generally limited. Continuous built form creates a sense of enclosure. Setbacks and landscaping increase on larger lots.

Most dwellings within the area are not serviced by off-street parking due to the prevalence of narrow front setbacks and limited rear lanes. This creates a consistent streetscape not interrupted by driveway crossovers, for example Walter and Kieran streets (see Figure 1-14). Where deeper front setbacks or sloping topography allows, car-parking is integrated within the dwelling or accommodated within hard-stand, carports or garages at the boundary. This occurs predominantly in newer infill development, for example Ruthven Street (see Figure 1-15).



Figure 1-11 - Terrace dwellings, Ruthven Street



Figure 1-12 - Rear garages and fences, Thompson Lane



Figure 1-13 - Garage frontages, Birrell Street



Figure 1-14 - Wide-grassed verges, Kieran Street



Figure 1-15 - Semi-detached dwellings, Ruthven Street

Natural environment

Open space is limited within the study area comprising of St James Reserve and Clemenston Park (see Figure 1-16 and Figure 1-5). Notwithstanding, the area adjoins regionally significant Centennial Park and benefits from easy access to nearby Queens Park, which offer passive and active recreation opportunities. Green links aid connectivity. Private open space is also limited due to narrow allotments with built form extending almost the full length. Vegetation coverage is predominantly low across the area due to densely set built form, narrow setbacks and varying street tree planting. These conditions result in a low-medium heat vulnerability.

Recent development

Recent development history comprises alterations and additions to existing dwellings, including second-storey additions, carports / garages, attic conversions; limited construction of secondary dwellings, such as loft / studio over rear garages; and limited construction of new 2-storey detached dwellings. Indicative of a trend toward maintaining the existing built form, increasing floor space and car-parking, whilst respecting the character of the Mill Hill Conservation Area.



Figure 1-16 - St James Reserve



Figure 1-17 - Kieran Street, looking west

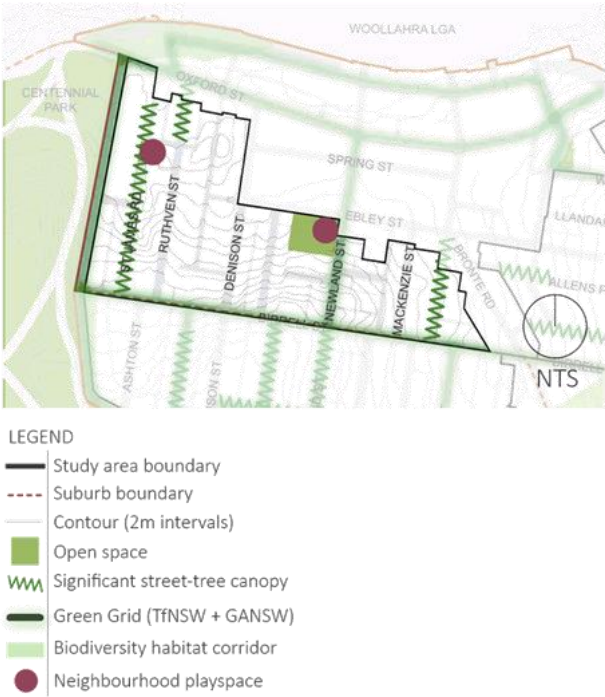
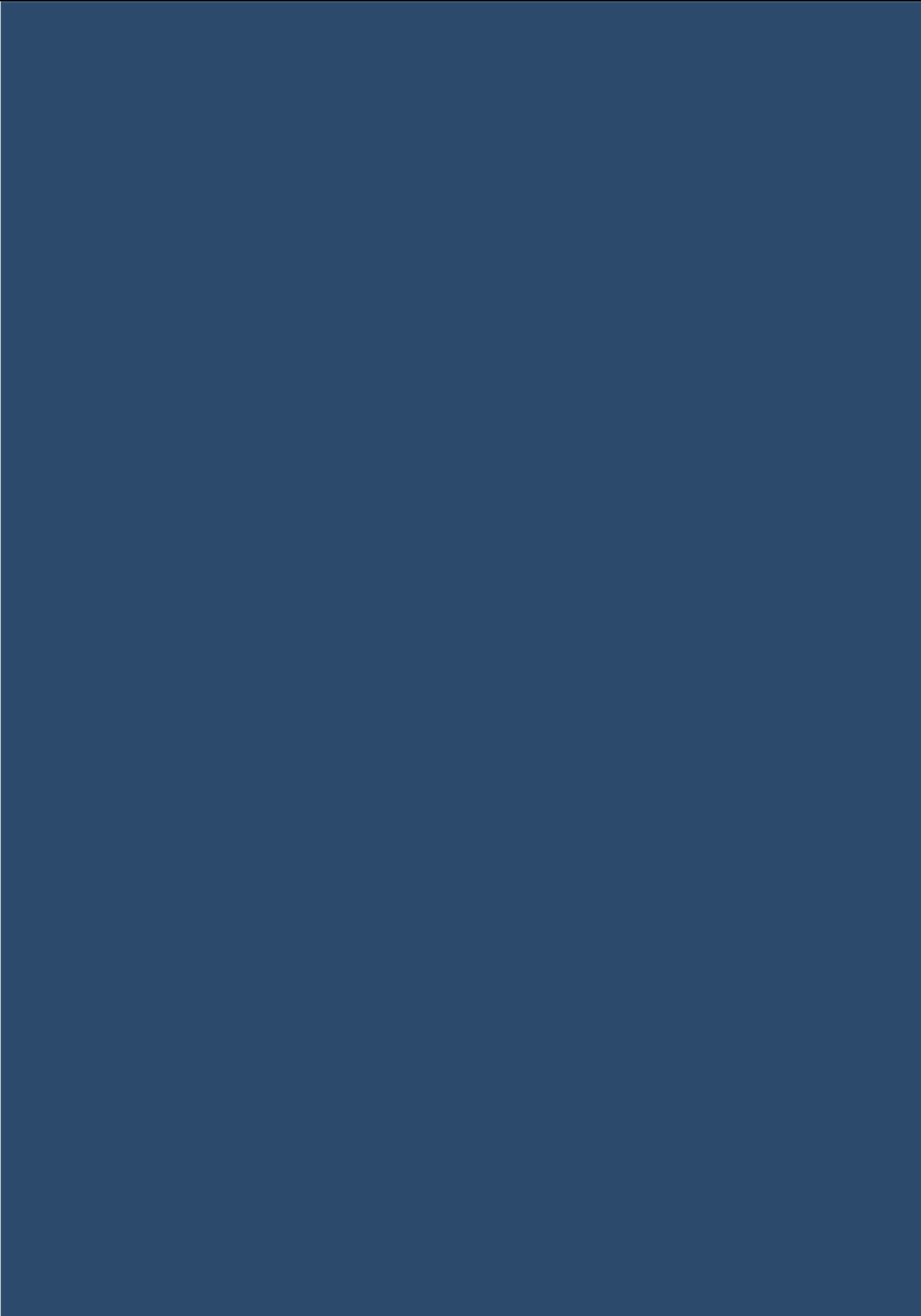


Figure 1-18 - Open space and vegetation area #01

Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

2



CHARACTER AREA - 2

"The area is defined by its historic streetscapes, arranged in a linear north-south grid, comprising predominantly low-rise, Federation-style terraces, detached and semi-detached dwellings; limited driveway cross-overs; avenues of green, leafy tree, contrasting the openness of adjacent Queens Park and Centennial Park".

The study area is generally bound by Birrell Street to the north, the rear of properties fronting Bronte Road to the east, Queens Park Road to the south and York Road to the west.



Figure 2-1 - Local character area #02 map



Figure 2-4 - Newland Street streetscape



Figure 2-2 - Detached Federation-style dwellings, Alt Street



Figure 2-5 - Terrace dwellings, Cuthbert Street

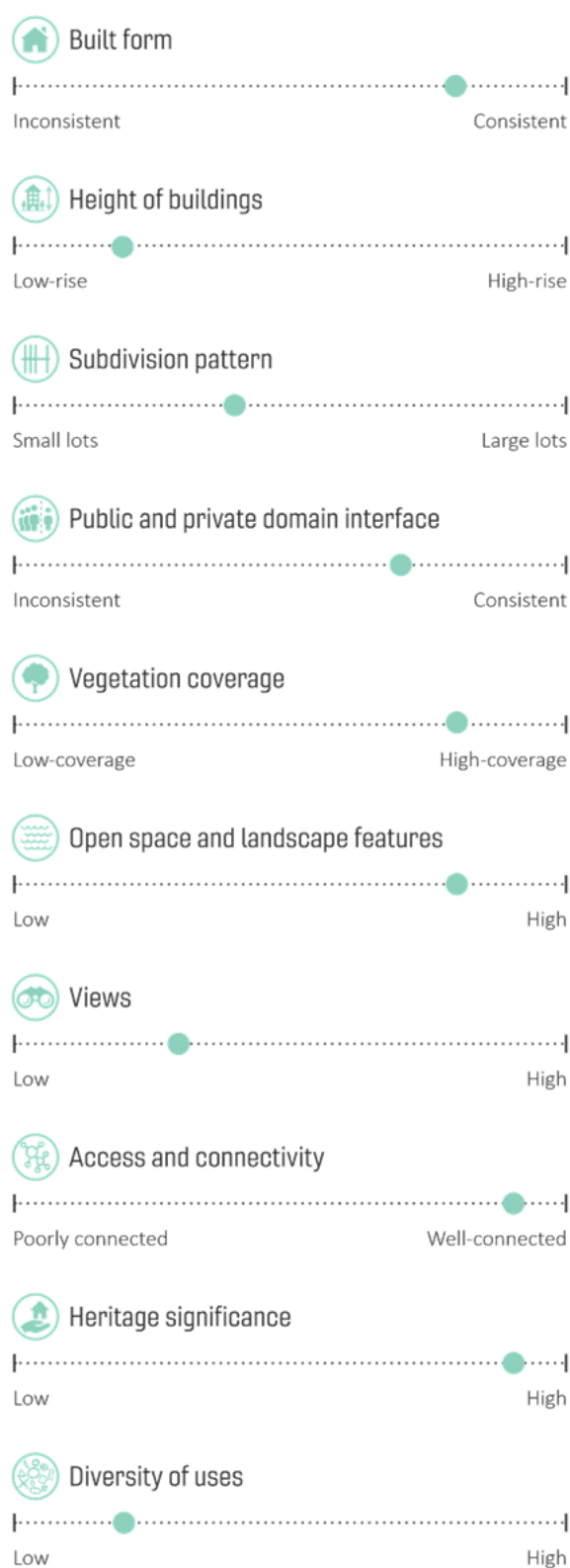


Figure 2-3 - Rear garages, Newland Lane



Figure 2-6 - Rawson Avenue streetscape

Existing character attributes



Desired future character

Vision

The desired future character of the area is defined by well-maintained historic streetscapes of Federation-style dwellings, amidst avenues of leafy trees and vegetation.

Objectives

The objectives for development on land identified within the character area are as follows:

- To ensure an appropriate physical and visual curtilage is provided for Centennial Park, including its skyline, and nearby historic streetscapes / areas,
- To preserve the heritage items and the integrity of the Urban Conservation Area,
- To maintain the historically distinctive pattern of subdivision and associated terrace, semi-detached and detached dwelling typologies,
- To maintain the predominant 1-2 storey height character of the area,
- To reinforce the consistent and unified Federation-style dwelling elevations and frontages to the streets, including pitched roofscape and front setbacks,
- To promote sympathetic additions and new development that respects the historic patterns, architectural styles, heights, materials and details of existing dwellings,
- To ensure secondary dwellings and ancillary development enhance rear laneways and maintain a high standard of residential amenity for surrounding dwellings,
- To ensure front fences and landscaping relate to the period and architectural style of the dwelling, and maintain visual connection between the dwelling and street,
- To promote landscaping at the rear of dwellings, to soften transition to rear laneways,
- To maintain and enhance the significant landscape features of the area, including the large street tree canopy,
- To limit new driveway crossovers and car parking within the front setback, by retaining vehicle access from rear lanes.

28 Existing character description

History

The area has evolved from the subdivision and development of 1840s land grants located at the edge of two early service villages, being Tea Gardens, now known as Bondi Junction and Maddens Corner, now known as Charing Cross. Early estates within the area included the Fitzgerald and Pearce estates. Improvements in transport and the rapid expansion of suburban Sydney between 1880-1915 saw the consolidation of these villages and the area developed for housing. The grid pattern of the early grants and initial streets established along their boundaries and remanent built form are reflected in the configuration of the area today. The area remains predominantly residential with limited commercial, retail and educational uses.

Configuration and connectivity

Blocks are arranged in a linear north-south alignment, across the prevailing slope, which falls from the north and north-east. The natural topography formed the upper catchment of the Lachlan / Botany Aquifer. Extensive sand deposits set above sandstone and shaped by former stream flows underlie the current built environment. A well-defined and connected street network comprises primary through streets, inner streets and rear laneways, extending north-south, with limited east-west connections. Birrell Street, York Road and Queens Park Road provide the primary access to and from the area. The area benefits from its close proximity to Bondi Junction and Bronte Road, where heavy rail and bus services provide access to the coast, Sydney CBD and surrounding areas.



Figure 2-7 - Built form and uses area #02



Figure 2-8 - Road network and movement area #02

Built form

Progressive subdivision and development of the area has resulted in three categories of lot size, reflecting the dominant dwelling typologies in the area. Small sized lots (typically 100m² to 250m²) dominate the north-eastern part of the area. These lots typically contain 1-2 storey terrace dwellings. In the central and southern parts of the area, lots tend to be larger (typically 200m²-400m²) comprising 1-2 storey semi-detached or detached style dwellings. The largest lots (500m²-800m²) located on the western and southern edges of the area, fronting York and Queens Park roads, comprise 1-2 storey detached dwellings and a small number of 3-4 storey residential flat buildings (RFBs). These larger lots are a result of the Centennial Parklands sales in 1904-1905 and the influence of the Garden Suburb Movement. Lots are typically aligned east-west.

The area is characterised by a variety of architectural styles reflective of the periods of development, including the predominant Federation period (1890-1915), with early-late Victorian terraces, Federation terraces and semi-detached dwellings as well as larger Federation and later Inter-War bungalows evident in the area. Exemplar dwellings include the late 19th century stone terraces at 1-2 Fitzgerald Street, workers cottages at 93 Birrell Street, Victorian Italianate semi-detached dwellings at 2-8 Fitzgerald Street, Federation terraces at 164-166 Denison Street, Federation bungalows at 41 York Road, 55 and 63 Alt Street and Inter-War bungalows at 1-7 and 2-12 Yenda Avenue. Building design was largely speculative with builder rather than architects designed dwellings, which resulted in streetscapes characterised by consistent groupings of styles and typologies. Distinctive property features that contribute to the

character of the area include tuck-point face brick, terra cotta Marseilles tile, timber fretwork, casement windows, gable fronted bays, rough cast chimneys and low fence lines.

Heritage listing of the area as the Queens Park and Yenda Avenue conservation areas has retained the character of these early streetscapes, however alterations including second-storey additions, as well as later infill development, has increased the vocabulary of the area. Later development of Mid-century, late 20th century and 21st century styles, can be seen along York Road, Queens Park Road, Rawson Avenue, Denison Street and Blenheim Street. These dwelling typologies result in a population density of approximately 64 persons/ha.



Figure 2-10 - Heritage-listed workers cottage, Blenheim Street

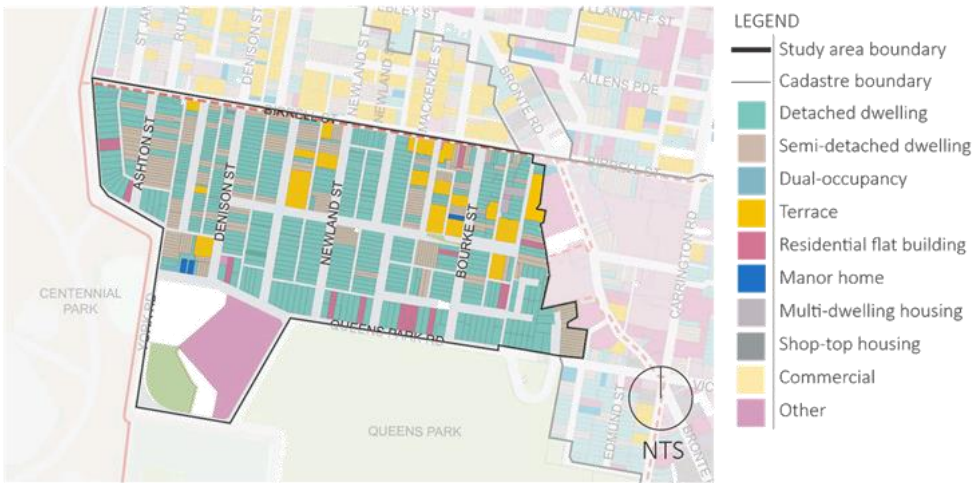


Figure 2-9 - Dwelling typologies area #02

30 Existing character description cont.



Figure 2-11 - Architectural styles area #02



Figure 2-12 - Heritage area #02

Public and private domain interface

The interface between the public and private domains varies across the area, dependent on street and dwelling typology. Through-streets are characterised by a wider carriageway, relatively narrow verges and smaller, less dense street plantings. Inner streets typically have wider verges, accommodating more street trees. The narrow, corridor-like rear lanes are dominated by garage doors, high fences and walls and landscape screening (see Figure 2-3). Shallow setbacks and low cast iron fences are characteristics of terrace dwellings, resulting in high visibility of the dwellings from the public domain. In some cases, higher brick fences reduce visibility. Front landscaping is generally limited. Semi-detached and detached dwellings typically have deeper front setbacks, with low brick or timber picket fences (see Figure 2-2). Visibility of the

dwelling remains high, however screening by front landscaping is common. Nil to narrow side setbacks result in continuous built form which creates a sense of enclosure.

Most dwellings within the area are serviced by off-street parking due to the prevalence of rear lanes, originally conceived for garbage collection, with later additions of hard-stand, carport or garage parking. This results in a consistent streetscape uninterrupted by driveway crossovers (see Figure 2-4). Whilst not common, where deeper front setbacks or sloping topography allows, car-parking is integrated within the dwelling or accommodated within hard-stand, carports or garages at the boundary.

Natural environment

The area benefits from access to significant public open space including the adjoining Centennial and Queens parks. The parks are of landscape and archaeological significance. Distinctive natural sandstone outcrops form part of the eastern edge of Queens Park and also appear in Cuthbert and Arnold streets. Former quarry workings are also evident in Arnold, Cuthbert and Stanley streets. North-south view axes provide views south through the area to Queens Park. The upper-eastern area benefits from views west over the parklands to the city.

Vegetation is an important element, giving the area an attractive, cool, green and leafy character. Formal plantings of mature figs are a distinguishing characteristic of the inner streets, for example Newland, Manning and Cuthbert (see Figure 2-13). Many of these streets are heritage-listed Landscape Conservation Areas. The avenues of mature trees create a sense of enclosure. Remnant heath vegetation is in Queens Park and the Moriah College grounds. Vegetation coverage reduces in the private domain due to narrow setbacks and high site coverage. These conditions result in a low-medium heat vulnerability.

Recent development

Recent development history comprises alterations and additions to existing dwellings, including second-storey additions, carports / garages, attic conversions; construction of secondary dwellings, such as loft / studio over rear garages; and limited construction of new 2-storey detached dwellings. Indicative of a trend toward maintaining the existing built form, however increasing floor space and car parking, whilst respecting the character of the Queens Park Conservation Area.



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?

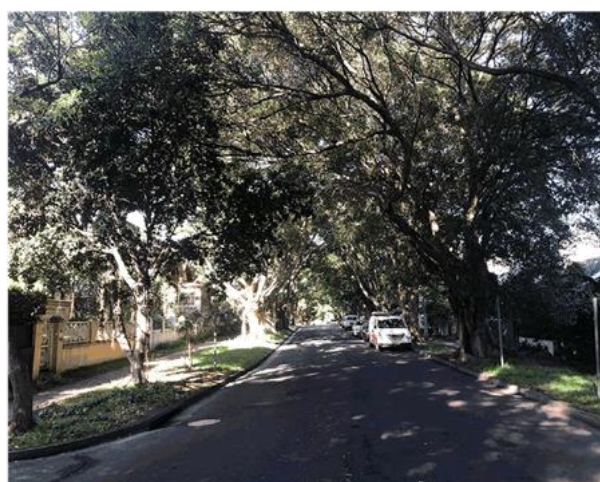


Figure 2-13 - Tree canopy, Newland Street



Figure 2-14 - Open space and vegetation area #02



CHARACTER AREA

3



CHARACTER AREA - 3

"The area is characterised by an irregular street grid, comprising a patchwork of dwelling typologies and styles, with low-rise dwellings within the Botany Conservation Area, transitioning to medium- high rise dwellings at the northern boundary, creating an inconsistent streetscape of varying styles, materials and vegetation coverage".

The study area is generally bound by Bondi Road to the north, Paul Street and St Marys Avenue to the east, Birrell Street to the south and Adams Lane and Hollywood Avenue to the west.

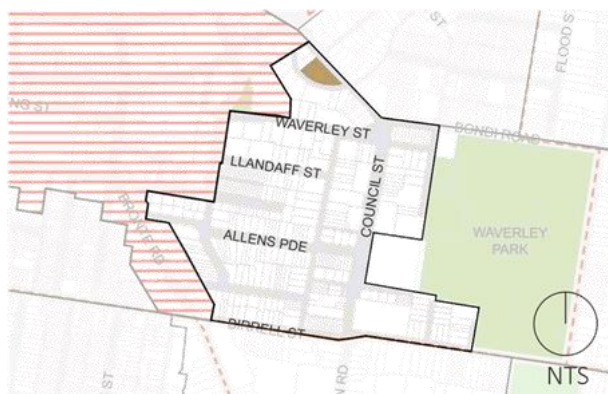


Figure 3-1 - Local character area #03 map



Figure 3-4 - Bondi Road built form, looking south-west



Figure 3-2 - RFBs, Waverley Street

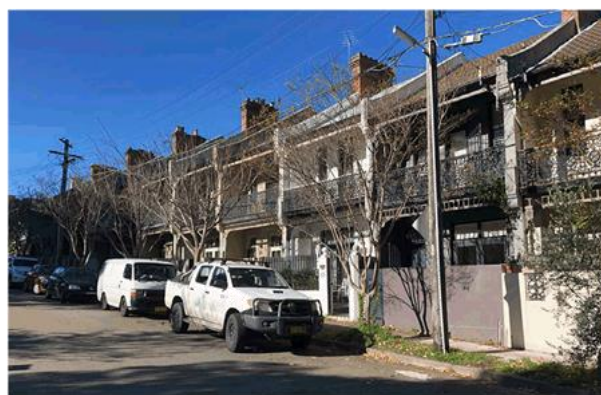


Figure 3-5 - Terrace rows, Llandaff Street

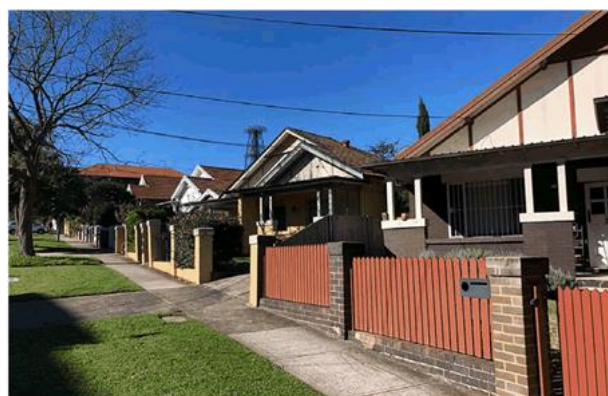
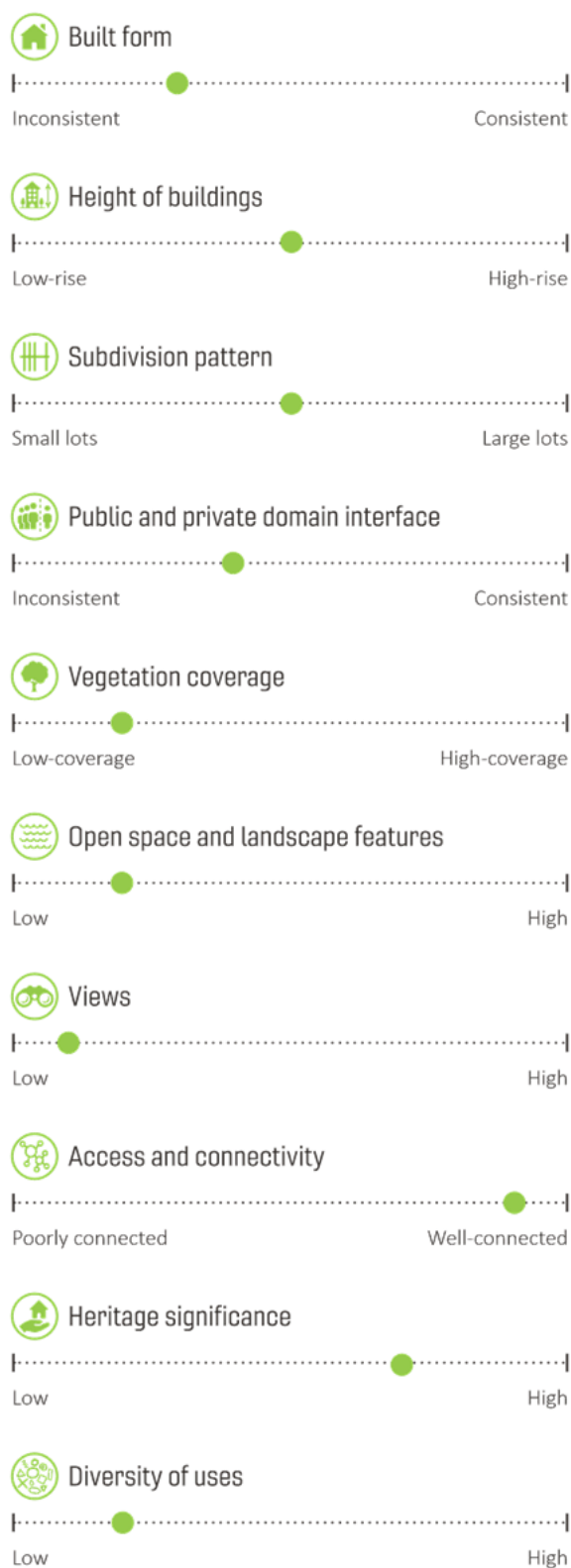


Figure 3-3 - Detached dwellings, Allens Parade



Figure 3-6 - RFBs, Hollywood Avenue

Existing character attributes



Desired future character

Vision

The desired future character of the area is a pleasant residential neighbourhood that provides a pleasant and interesting transition in scale from Bondi Junction to the Botany Conservation Area. The key walking streets are safe and easy to find, attractive and well-shaded.

Objectives

The objectives for development on land identified within the character area are as follows:

- To provide a transition in built form from the Bondi Junction Strategic Centre to the Urban Conservation Area,
- To preserve the heritage items and the integrity of the Urban Conservation Area,
- To maintain the predominant 1-4 storey height character within the Urban Conservation Area,
- To preserve the diversity of dwelling typologies, architectural periods and heights in the area by retaining buildings from the Late Victorian, Federation and Inter-war periods,
- To promote sympathetic additions and new development that respects the historic patterns, architectural styles, heights, materials and details of existing dwellings,
- To ensure an integrated approach and consistent treatment of groupings of dwellings, including terraces and semi-detached dwellings,
- To maintain the large street tree canopy over Porter Street, Hollywood Avenue, Allens Parade and Dalley Street,
- To grow the urban tree canopy and provide increased opportunities for urban greening,
- To promote landscaping at the rear and side of larger dwellings to provide screening between buildings,
- To ensure that carparking structures or entries do not dominate or adversely impact on the streetscape,
- To reduce conflicts between pedestrians and vehicles,
- To recognise Waverley Street as a key walking street between Bondi Beach and Bondi Junction and to improve the amenity for pedestrians.

36 Existing character description

History

The area has evolved from the subdivision and development of early land holdings along Old South Head Road, at the periphery of two service villages, being Tea Gardens, now known as Bondi Junction and Maddens Corner, now known as Charing Cross. The primary land holding was Barnett Levey's 60-acres granted in 1826. Levey was the third grantee of land in the Waverley municipality. Levey's Waverley Crescent Subdivision was advertised on 30 January 1828 in *The Australian*, comprising 68 allotments. Waverley House, formerly located near Waverley Crescent, was the earliest Villa in Waverley completed in 1828 and demolished in 1906. Improvements in transport and the rapid expansion of suburban Sydney between 1880-1915 saw the consolidation of Bondi Junction and the area developed for housing. The area remains predominantly residential with limited commercial, retail and educational uses.

Configuration and connectivity

An irregular street grid reflects progressive subdivision of the area up until the early 1920s. Internal streets are typically aligned east-west, connected by north-south streets, Hollywood Avenue, Botany Street and Council Street. Lots of varying sizes are predominantly aligned north-south. No-through streets result in varying inter-block connectivity. Pedestrian access and connectivity are maintained by multiple through-block links. Bondi Road, Birrell Street and Council Street provide the primary access to and from the area. The area benefits from its close proximity to Bondi Junction and Bronte Road, where heavy rail and bus services provide access to the coast, Sydney CBD and surrounding areas. The area also benefits from the commercial, retail and social services offered at these locations.



Figure 3-7 - Ebley Street, looking west

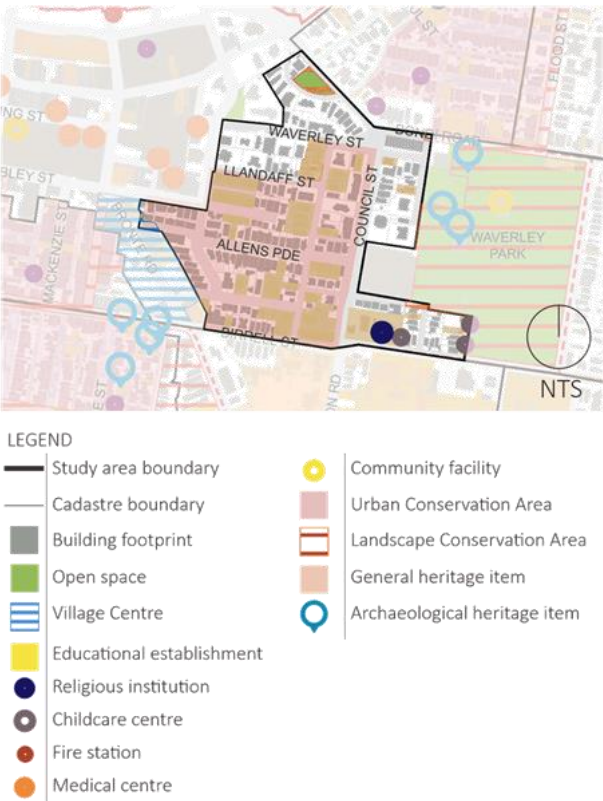


Figure 3-8 - Built form, uses and heritage area #03

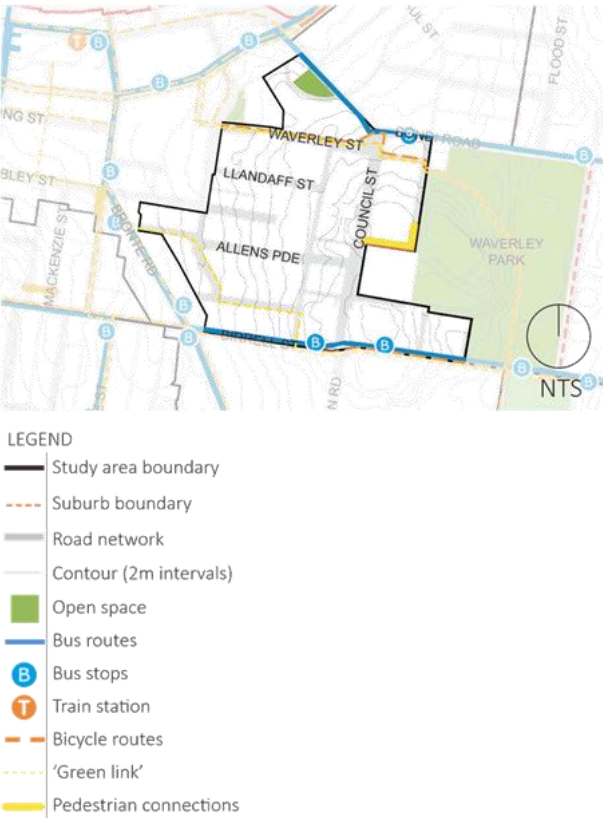


Figure 3-9 - Road network and movement area #03

Built form

The area is characterised by a patchwork of dwelling typologies and styles reflective of its progressive development. Clusters of late Victorian-style terraces and semi-detached dwellings, Federation-style terraces, semi-detached and detached dwellings, Inter-War style detached dwellings and residential flat buildings (RFBs) as well as Mid-century, late 20th century and 21st century style RFBs are evident in the area. Exemplar dwellings include the heritage-listed terrace rows at 208-236 Birrell Street, 3-39 Llandaff Street and 126-162 Ebley Street, RFBs at 9-15 Botany Street and 27 Allens Parade, detached and semi-detached dwellings in Porter Street and St Marys Anglican Church at 240 Birrell Street. Most of the area is heritage-listed as the Botany Street Conservation Area. Dwellings are predominantly 1-4 storeys in height, however, increase to 7-10 storeys in the north-east and north-west of the area. Many streets reflect a sudden transition between low-rise and high-rise dwellings, for example Llandaff Street. These dwelling typologies result in a population density of approximately 88 persons/ha, with the dominant tenure type being private rental.

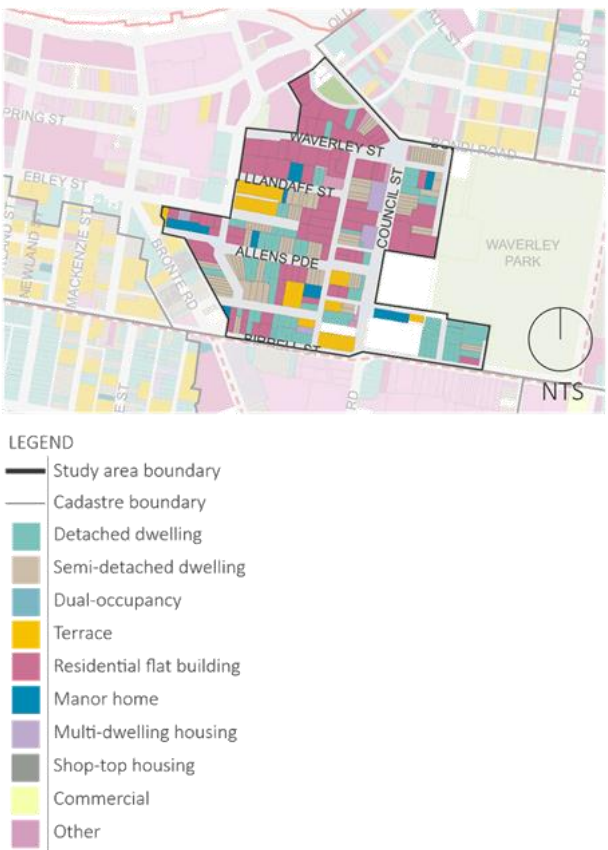


Figure 3-11 - Dwelling typologies area #03

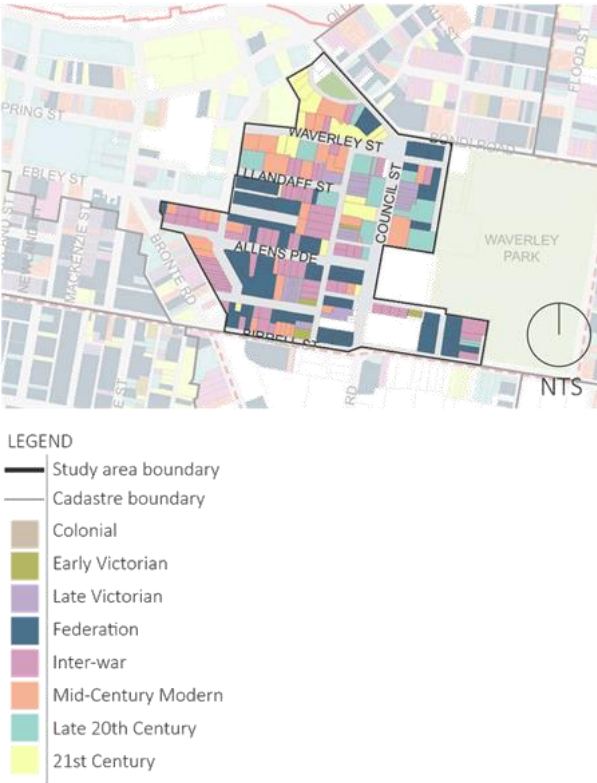


Figure 3-10 - Architectural styles area #03

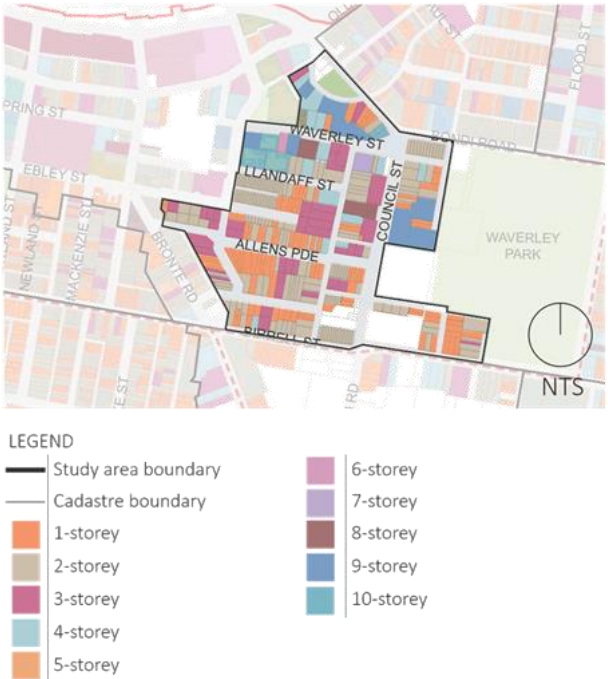


Figure 3-12 - Building height in storeys area #03

38 Existing character description cont.

Public and private domain

The streetscape reflects a variety of styles, materials and distribution of built form. The interface between the public and private domains varies as a result. Terraces, detached, and semi-detached dwellings are typically closely set, with narrow front setbacks. Front landscaping and fence materiality and height vary, influencing the visibility of the dwelling from the public domain, for example Ebley Street (see Figure 3-13). Later additions of a carport or enclosed garage at the boundary detract from the streetscape and further obscure the dwelling. Terraces typically have upper-level balconies which overlook the public domain. Rear lanes are dominated by garage doors, high fences and walls and landscape screening. Inter-War RFBs also typically comprise narrow setbacks and limited landscaping, with a solid brick façade (facades vary), small window openings and entry presenting to the street, for example Allens Parade (see Figure 3-15). Nil to narrow side setbacks result in continuous built form which creates a sense of enclosure. Mid-late 20th century RFBs comprise greater setbacks and are typically raised above street level, for example Waverley Street. Upper balconies overlook the public domain. Dwellings are predominantly serviced by off-street parking, through a combination of hard-stand parking in the front setback, ground-level enclosed or open garages and rear lane garages. Where carparking and servicing is provided below street-level, large openings dominant the streetscape.



Figure 3-13 - Terrace rows, Ebley Street



Figure 3-14 - Semi-detached dwellings, Ebley Street



Figure 3-15 - RFBs, Allens Parade

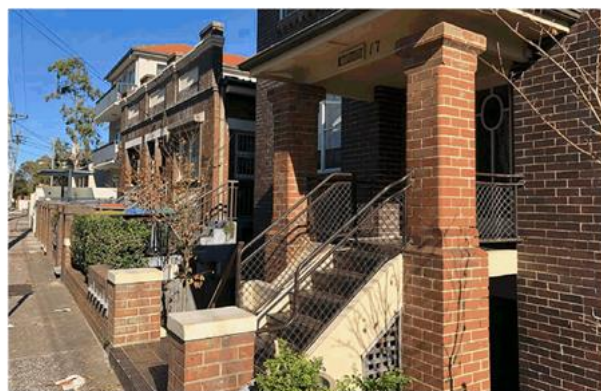


Figure 3-17 - RFBs, Botany Street



Figure 3-16 - RFB and terrace row, Porter Street

Natural environment

The area benefits from access to significant public open space including Waverley Park, which offer passive and active recreation opportunities. The area's relatively flat topography, sloping gradually to the west, and through-block links, promote walkability. Vegetation coverage is predominantly low across the area, as a result of closely set development which limits the opportunity for significant private open space in the front or rear yards as well as the varying capacity of the street verge to accommodate planting. Mature fig trees characterise Porter Street (see Figure 3-19) and Allens Parade (see Figure 3-20). These conditions result in a low-medium heat vulnerability in the eastern portion of the area, increasing the medium-high in the western portion of the area.

Recent development

Recent development includes alterations and additions to existing dwellings such as second or third storey additions, hard-stand parking, carports, limited demolition of existing detached and semi-detached dwellings and construction of new 2-storey dwellings, and limited demolition and amalgamation of land for the construction of new 3+ storey RFBs. This indicates a trend toward maintaining existing built form within the Botany Street Conservation Area and intensification of valuable land.



Figure 3-18 - Open space and vegetation area #03



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



Figure 3-19 - Tree canopy, Porter Street, looking east



Figure 3-20 - Cnr Allens Parade and Hollywood Avenue



CHARACTER AREA

4



CHARACTER AREA - 4

"The area is defined by its civic character, comprising a variety of uses, including educational establishments and the distinctive Charing Cross village centre, peripheral streets extend from historic Bronte Road creating long north-south blocks of inconsistent streetscapes comprising layered built form, materiality and limited vegetation".

The study area is generally bound by Birrell Street to the north, Henrietta and Leichhardt Streets to the east, Varna, Wallace and Albion Streets to the south and Carrington Road and Henry Street to the west.



Figure 4-1 - Local character area #04 map



Figure 4-3 - Terrace row, Bronte Road



Figure 4-4 - Semi-detached dwellings, Zarita Avenue

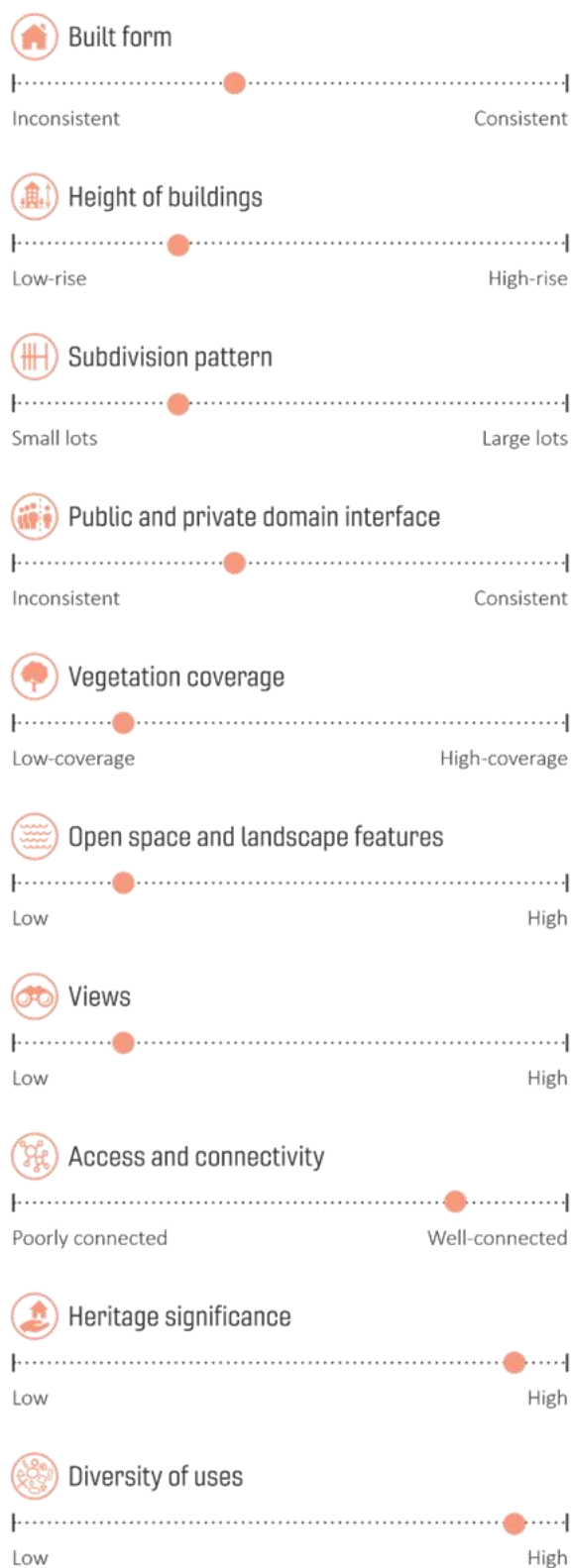


Figure 4-2 - Terrace shopfronts, Bronte Road



Figure 4-5 - Wiley Street, looking south

Existing character attributes



Desired future character

Vision

The desired future character of the area is an attractive and well-maintained historic centre, with a range of civic, commercial and residential uses that exist harmoniously.

Objectives

The objectives for development on land identified within the character area are as follows:

- To promote the significant contribution of the area during the early years of the Waverley municipality,
- To celebrate the history of the area through urban design and activations that promote local heritage,
- To recognise and maintain the diversity of uses in the area,
- To maintain the visual prominence of landmark buildings, including the Robin Hood and Charing Cross Hotels, Mary Immaculate and Grahame Memorial churches and War Memorial Hospital,
- To protect regional and local views from and within the public domain,
- To protect the curtilage of institutional heritage buildings including churches and school to enable visual appreciation of buildings in their campus-style setting,
- To maintain the predominant 1-3 storey height character of the area,
- To protect the high-street nature of Bronte Road, maintain and enhance distinctive pattern of continuous terrace and semi-detached shopfronts, prioritise active street frontages and provide no new vehicle crossovers,
- To preserve the diversity of dwelling typologies, architectural periods and heights in the area by retaining buildings from the Late Victorian, Federation and Inter-war periods,
- To promote sympathetic additions and new development that respects the historic patterns, architectural styles, heights, materials and details of existing dwellings,
- To ensure an integrated approach and consistent treatment of groupings of dwellings, including terraces and semi-detached dwellings, for example pitched roofscape and front setbacks,
- To increase pedestrian wayfinding and accessibility to nearby open space,
- To maintain and grow the canopy coverage as a defining feature when viewed from Centennial Parklands.

44 Existing character description

History

The area’s character is predominantly derived from the forms, streetscapes and social relationship of industry, worker housing and commerce in the early years of the Waverley municipality. Development began in the 1800s, with subdivision of early land grants providing the site of Maddens Corner, now known as Charing Cross, which served as a rural village on the route from Old South Head Road to Coogee and La Perouse (now Bronte Road). Further subdivision and configuration of the area was influenced by the establishment of the Vickery’s Tannery (1866), religious / educational institutions on large allotments, introduction of horse drawn omnibuses (1860s) and later steam, then electric trams along Bronte Road. This results in an irregular block pattern and complex road network comprised of primary arterial roads, secondary local streets and service laneways.

Configuration and connectivity

Following the natural ridgeline, Bronte Road provides the primary north-south connection through the study area. The topography slopes gradually to the west at Queens Park and south-east at Varna Park. District views are available to the west across Centennial Park and the CBD. Local roads extend from primary roads following the topography resulting in long north-south blocks of residential development, with limited east-west connections. The area is well-served by multiple bus routes along Bronte Road, Birrell Street and Carrington Road, which provide access to surrounding centres including Bondi Junction, to the north, and the Randwick health and education centre, to the south-west.

The area was, and remains, defined by its civic character, comprising religious institutions, educational establishments, small industries, community services, and retail and commercial uses, with surrounding residences. Church schools emerged from the 1850s, with St Catherine’s School Sydney, originally known as Clergy Daughter’s School, opening in 1856. The study area now includes some 5 schools and multiple childcare centres. The War Memorial Hospital (1922), located on the former Victorian ‘Edina Estate’ represents the early provision of medical services to the community. It continues to provide accommodation, medical and social services. Today, the Charing Cross village centre accommodates a diverse range of commercial and retail tenancies.

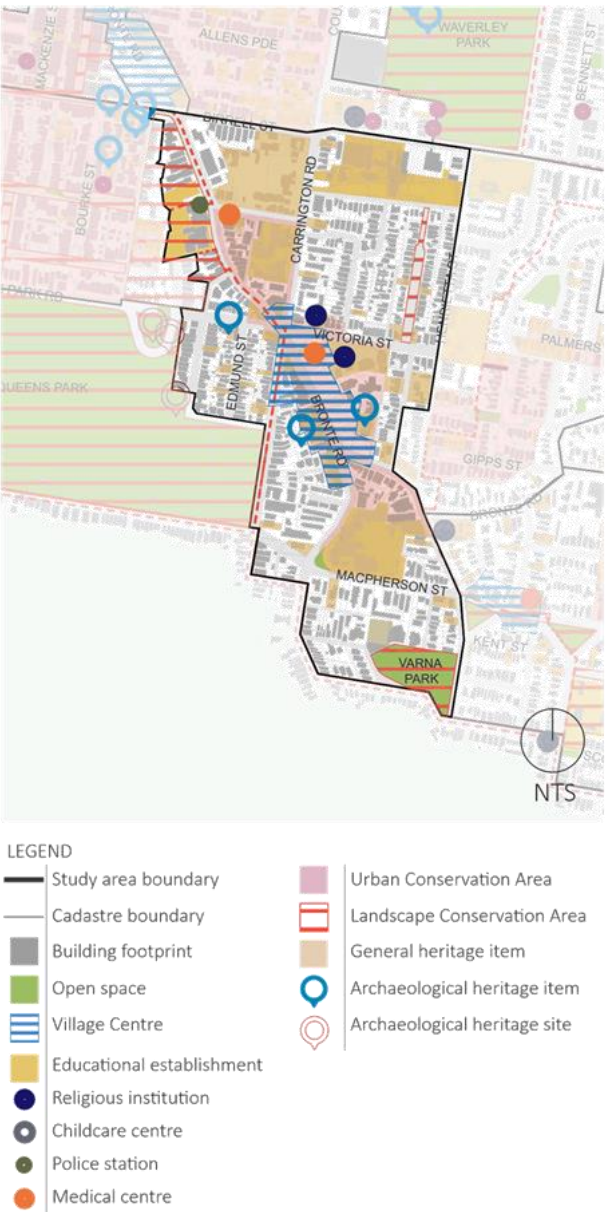


Figure 4-6 - Built form, uses and heritage area #04



Figure 4-7 - Intersection Bronte Road and Carrington Road

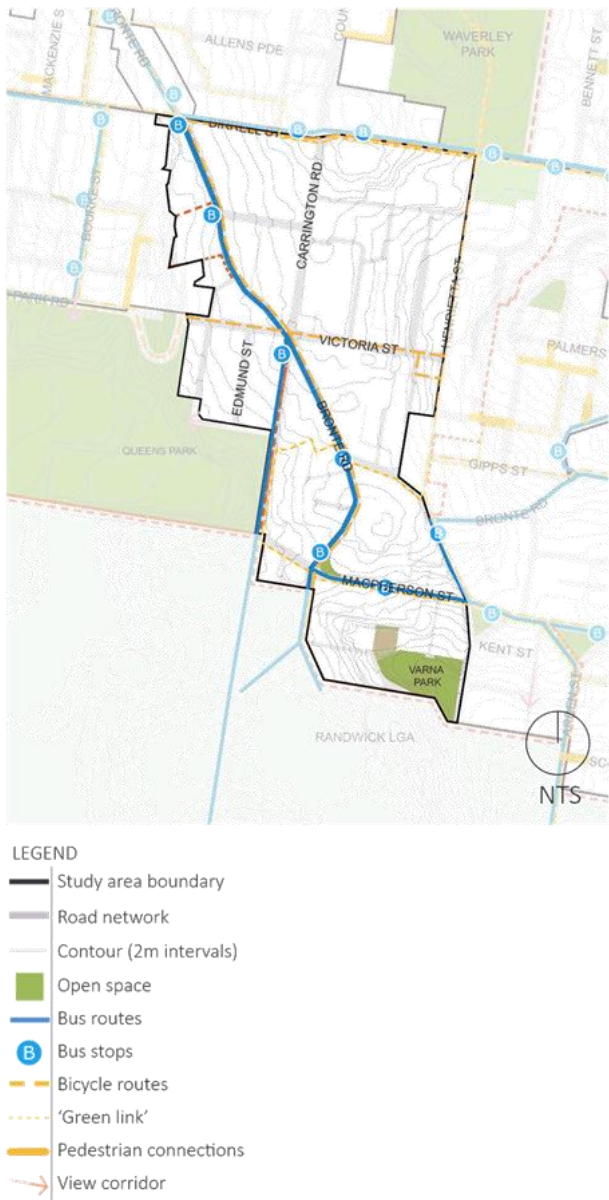


Figure 4-8 - Road network and movement area #04

Built form

Layered built form is indicative of the area’s early and continued development. The village centre is characterised by a distinctive ‘high street’ of 1-2 storey brick-fronted retail facades of late Victorian, Federation and Inter-War styles interspersed with mid-late 20th century development and modern additions (see Figure 4-2). Significant buildings include the Robin Hood and Charing Cross Hotels, former Waverley Post Office, Mary Immaculate and Grahame Memorial churches. Peripheral residential streets exhibit a predominantly 1-2 storey character with near-complete rows of late Victorian and Federation-style terraces, detached and semi-detached bungalows. Buildings are typically of face brick, stone and rendered masonry with decorative plaster, timber and iron filigree detailing. A number of large freestanding Victorian Villas remain generally unaltered, for example 74 Victoria Street and 348 Bronte Road, or within educational campuses. The ‘Glenrock Terraces’ on High Street provide a lasting example of mid-Victorian sandstone workers cottages in timber and stone, formerly part of the early Vickery Tannery. Inter-War development replaced earlier construction. Notable groupings of 1-3 storey Inter-War residences include the distinctive setting of Santa Marina Avenue (see Figure 4-10), 352-358 Bronte Road, Wallace Street (see Figure 4-9) fronting Varna park and Wills Ave. Heritage listing of much of the study area as the Charing Cross Conservation Area has retained the character of these early settings, however alterations, including second-storey and car-parking additions, have impacted their integrity. Mid-late 20th century and 21st century residential flat buildings (RFBs) are dispersed throughout the study area, however, are primarily located adjacent main roads including Albion, Macpherson and Birrell Street. These dwelling typologies account for a medium-high population density, with approx. 74 persons/ha.

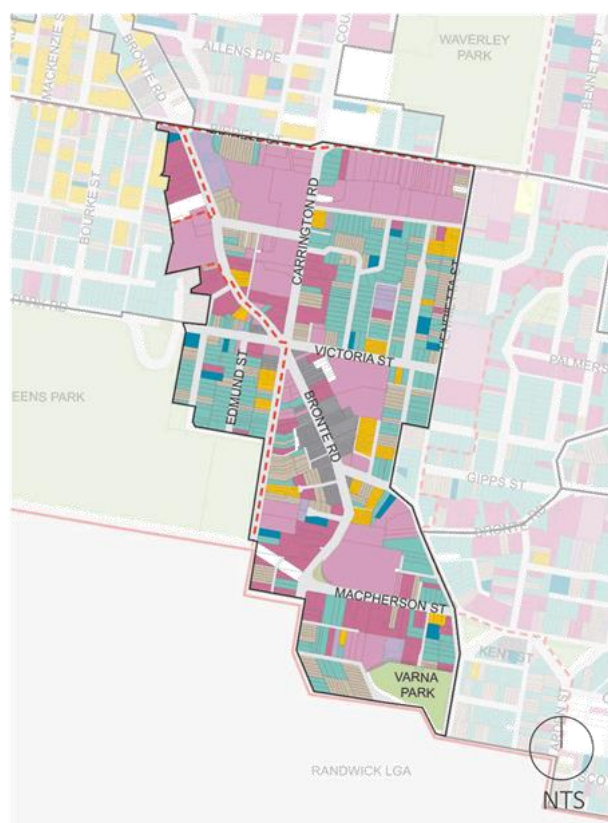


Figure 4-9 - Semi-detached dwellings, Wallace Street



Figure 4-10 - RFBs, Santa Marina Avenue

46 Existing character description cont.



LEGEND

Study area boundary	Multi-dwelling housing
Cadastral boundary	Shop-top housing
Detached dwelling	Commercial
Semi-detached dwelling	Other
Dual-occupancy	
Terrace	
Residential flat building	
Manor home	

Figure 4-11 - Dwelling typologies area #04



LEGEND

Study area boundary	Mid-Century Modern
Cadastral boundary	Late 20th Century
Colonial	21st Century
Early Victorian	
Late Victorian	
Federation	
Inter-war	

Figure 4-12 - Architectural styles area #04

Public and private interface

The public and private interface varies throughout the area, dependent on use, dwelling typology and street frontage. Terraces, detached and semi-detached bungalows are typically closely set, with narrow front setbacks and limited landscaping (see Figure 4-3 and Figure 4-4). The dwelling is highly visible from the street. Varying fence height and materiality creates an inconsistent streetscape character. The later addition of car-parking within the front setback, either hard-stand, carport or enclosed garage at the boundary, detracts from the streetscape and can obscure the dwelling. Inter-War RFBs also typically

comprise narrow setbacks and limited landscaping, with a solid brick façade (facades vary), small window openings and entry presenting to the street. Mid-late 20th century RFBs are raised above street level incorporating ground-floor carparking. Upper balconies overlook the public domain. Educational / hospital campuses comprise clusters of buildings with varied setbacks, often obscured from the public domain by buildings at the frontage, mature vegetation and landscaping. Through the village centre, fine-grain shopfronts abut the public domain, creating a highly visible, active frontage. Laneways provide off-street parking, typically with high fence lines and enclosed garages.

Natural environment

The area is located in close proximity to local and regional open space including Varna Park in the south, Queens Park to the west (see Figure 4-14), Waverley Park to the north and Bronte Beach to the east, which provide active and passive recreation opportunities. 'Green Links' aid with connectivity. The closely set nature of development reduces the opportunity for significant private open space in front or backyards. Vegetation coverage varies throughout the area, as a result of dense urban development and the varying capacity of the street verge to accommodate planting. Coverage is particularly low along Bronte Road through the village centre, contributing to heat vulnerability and a high Urban Heat Island effect. Coverage improves adjacent Varna Park and along

vegetated streetscapes and properties including Wiley and Blenheim Streets (both Landscape Conservation Areas) and the War Memorial Hospital site.

Recent development


Recent development history includes alterations and additions to existing terraces, detached and semi-detached dwellings and commercial premises such as, second or third storey additions, hard-stand parking, carports; limited construction of new 2-storey dwellings. Indicative of a trend toward maintaining existing built form and respecting the Charing Cross Conservation Area, whilst achieving more floor space and on-site car-parking.



Figure 4-13 - Open space and vegetation area #04



Figure 4-14 - Views west across Queens Park from Henry Street



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

5



CHARACTER AREA - 5

"The area is characterised by distinct pockets of development, set in an irregular grid pattern; predominantly low-rise detached and semi-detached dwellings with medium-rise residential flat buildings fronting primary roads; irregularly placed street-trees and driveway cross overs; and views to the coast and surrounding areas".

The study area is generally bound by Bronte Road and Murray Street to the north, St Thomas Street to the east, Boundary and Varna Street to the south and Leichhardt Street to the west.



Figure 5-1 - Local character area #05 map



Figure 5-4 - Detached dwellings, Evans Street



Figure 5-2 - Detached / semi-detached dwellings, Yanko Avenue



Figure 5-5 - Detached dwellings, Barclay Street

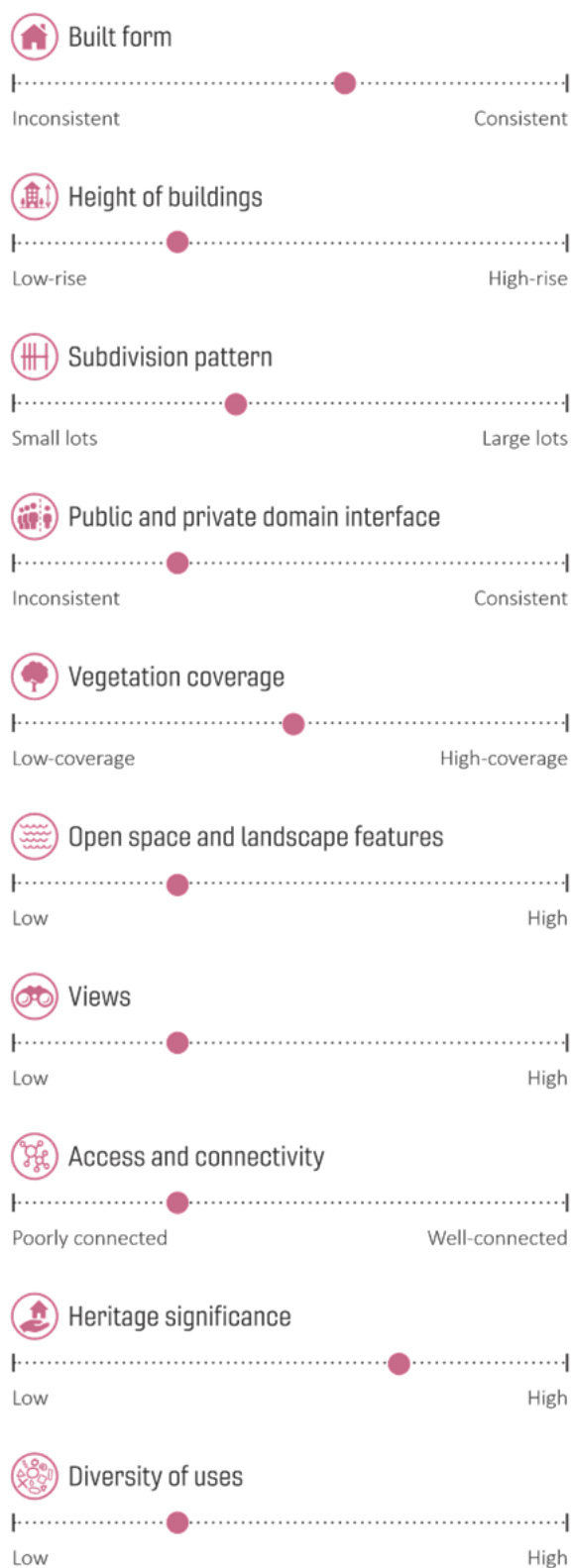


Figure 5-3 - RFBs, Macpherson Street



Figure 5-6 - RFB, Lugar Street

Existing character attributes



Desired future character

Vision

The desired future character of the area is a diverse residential area that is safe and walkable with access to attractive boutique neighbourhood shops.

Objectives

The objectives for development on land identified within the character area are as follows:

- To recognise Macpherson Street as a neighbourhood shopping street, and maintain a low scale built form with regular shopfronts,
- To recognise and maintain the diversity of uses within the Macpherson Street local centres,
- To maintain the historically distinctive pattern of subdivision and associated dwelling typologies,
- To maintain the predominant 2-3 storey height character of the area, noting that buildings on sloping sites should adjust the relative level and height to follow the natural topography and avoid excessive excavation,
- To preserve the diversity of dwelling typologies, architectural periods and heights in the area by retaining buildings from the Late Victorian, Federation and Inter-war periods,
- To promote sympathetic additions and new development that respects the historic patterns, architectural styles, heights, materials and details of existing dwellings,
- To ensure the roofscape maintains the streetscape character of the area. Flat roof forms are permitted to minimise bulk and where the visual impact to the street and adjoining dwelling is minimised,
- To ensure secondary dwellings and ancillary development enhance rear laneways and maintain a high standard of residential amenity for surrounding dwellings,
- To maintain the large street tree canopy over Chesterfield Parade,
- To reduce vehicle conflicts on Chesterfield Parade and Chesterfield Lane, and improve pedestrian safety,
- To retain and increase street tree plantings on all streets to enhance the streetscape character,
- To maintain views and vistas from the public domain.

52 Existing character description

History

Development of the area evolved from a setting of large Marine Villas, with established grounds in the 1850-1880s, Prominent estates included Lugar Brae, Yanko and Chesterfield. Subdivisions during the land boom of 1875-1890 saw the grounds of the Villas reduced, with most Villas demolished by the 1920s and the land further subdivided for new housing. Introduction of tram services via Charing Cross to Waverley Cemetery in 1890 and Bronte Beach in 1911 saw village centres develop around tram stops along Macpherson Street, and further supported the delivery of housing. The prevailing character of the area can still be traced to the extant subdivision patterns, street names and built form of these periods.

Configuration and connectivity

Following the natural ridgeline, Macpherson Street provides the primary east-west connection through the study area. Bronte Road and Arden Street provide the primary north-south connection to and from, however internal north-south connections are limited. Buses service these routes. Local streets and laneways extend from the through-roads creating distinct pockets of development, set in an irregular grid pattern. No-through streets result in varying inter-block connectivity. North of Macpherson Street an elevated plateau offers easterly views to the coast. The topography slopes to the south of Macpherson Street. View openings and vistas exist from the public and private domains including St Thomas Street, Marroo Street, Busby Parade, Macpherson and Simpson Parks.

The area is characterised by residential development with supporting clusters of retail and commercial uses along Macpherson Street, childcare centres, Clovelly Public School and aged care provider St Vincents Care Services Bronte. The Macpherson Street village centres are characterised by a diversity of uses, independent businesses, community services and retail offerings catering to local and visitor needs.

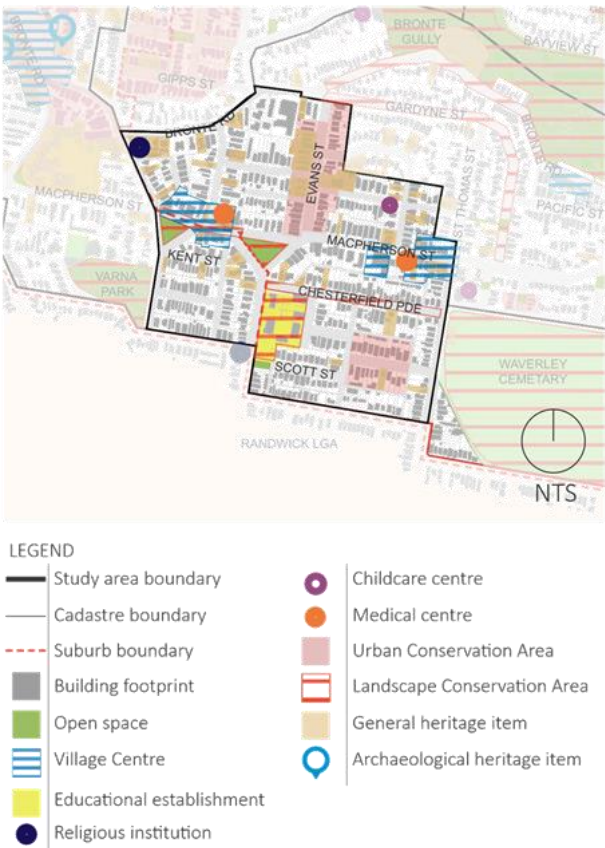


Figure 5-7 - Built form, uses and heritage area #05

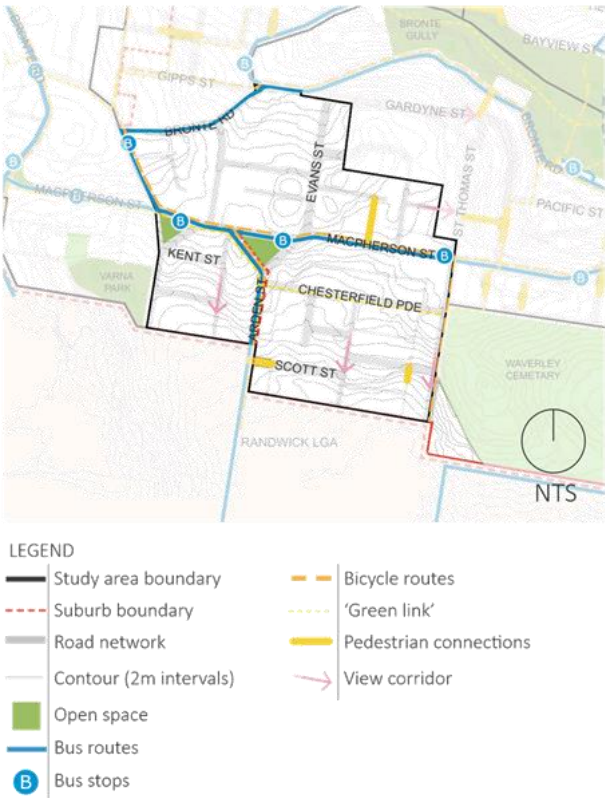


Figure 5-8 - Road network and movement area #05

Built form

The area exhibits a predominantly 1-2 storey character with detached or semi-detached dwellings of Victorian, Federation or Inter-War styles, reflecting the prominent periods of development. The styles are interspersed, resulting in a general lack of consistency across the area, however notable groupings and small consistent streetscapes remain evident. To the north streetscapes of Victorian villas and cottages influenced by the Victorian Italianate and Gothic styles and Federation bungalows are evident on Evans Street, Brae Street and Violet Street, located within the draft Yanko-Lugar Brae Urban Conservation Area. A notable grouping of Victorian Classical-style terraces is located at 6-24 Brae Street. Buildings are typically of face brick, stone and rendered masonry with decorative plaster, timber and iron filigree detailing. Inter-War bungalows are prominent throughout the area with notable clusters fronting Lugar Brae Avenue, Barclay Street, Macpherson Street, Inverness Street, Scott Street and Boundary Street. Bungalows of this period are characterised by low gabled roofs, thick masonry verandah posts and timber decorated gable trim. Alterations to early dwellings including second-storey and car-parking additions, are common. Mid-late 20th century and 21st century 3-4 storey residential flat buildings (RFBs), on large lots, replaced earlier construction and are predominantly located fronting Bronte Road, Lugar Street and Macpherson Street. Buildings of four or more storeys are outliers and are inconsistent with the prevailing height character of the area, for example the Oceanview tower on Macpherson Street. These dwelling typologies account for a low-medium density, with approx. 70 persons/ha.



Figure 5-9 - RFBs, Brae Street

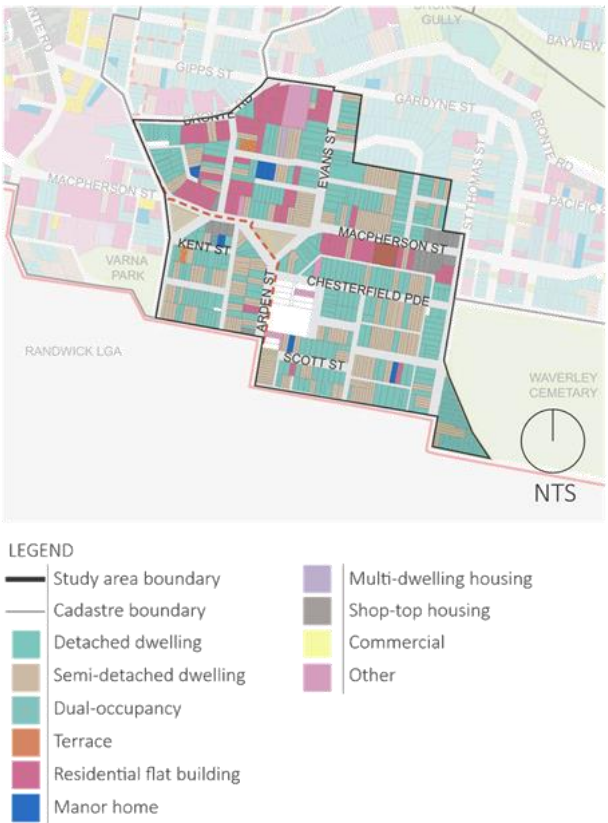


Figure 5-10 - Dwelling typologies area #05

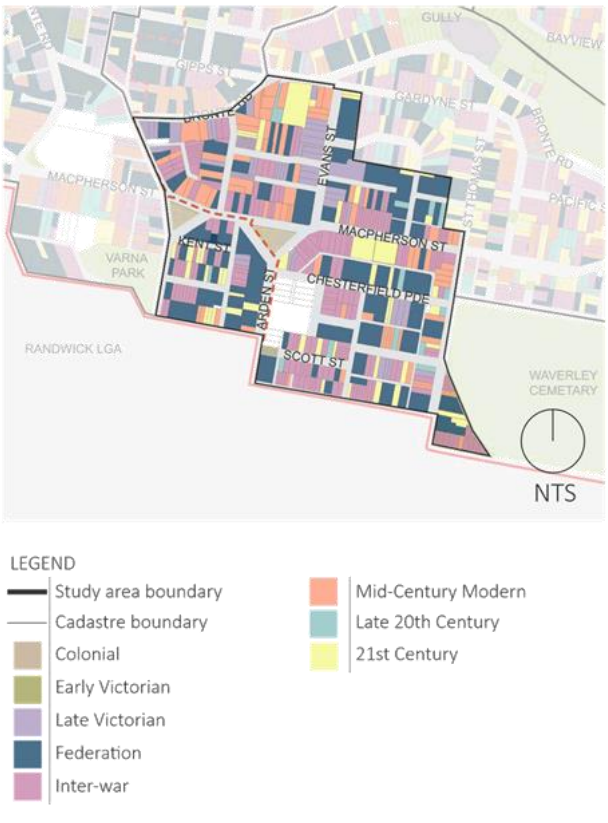


Figure 5-11 - Architectural styles area #05

54 Existing character description cont.

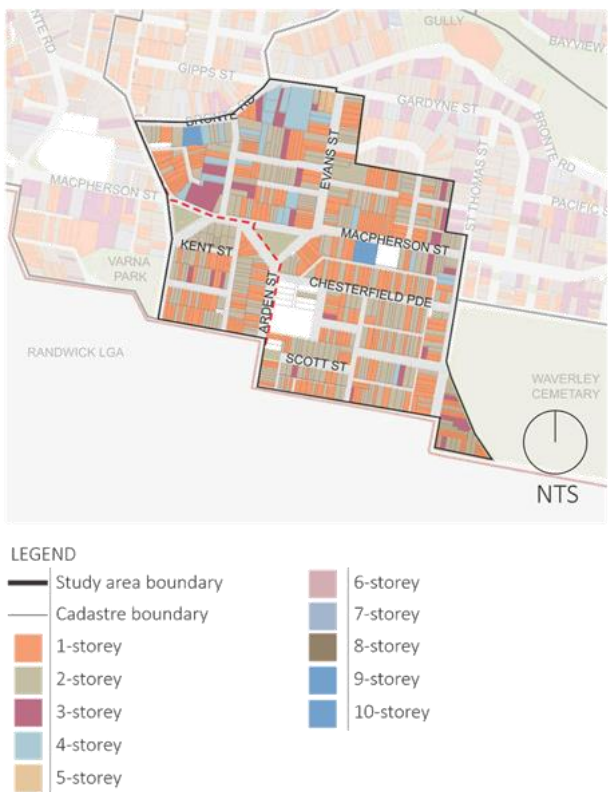


Figure 5-12 - Building height in storeys area #05

Public and private interface

The public and private interface differs considerably throughout the area as a result of varying street widths and depths of front setbacks, for example Lugar Brae Avenue compared to Evans Street. Lots typically have a narrow front setback resulting in proximity of the dwelling to the public domain. Varying fence height and materiality, for example low iron or high brick and front landscaping, creates a varying streetscape character and alters the visibility of the dwelling façade, for example Brae Street. Sloping topography south of Macpherson Street typically results in a high and low side of street. Dwellings on the high side are typically raised overlooking the public domain, with integrated garages at street level, for example Scott Street. Dwellings on the low side are partially obscured, for example Kent Street. Mid-late 20th century RFBs are raised above street level incorporating ground-floor carparking, for example Evans Street (see Figure 5-16). Upper balconies overlook the public domain. The topography and built form bring a sense of enclosure to the streets. At the time of construction, many dwellings would not have comprised on-site parking, a result of the dwelling typology, style and the close proximity to tram stops. Later additions of off-street parking in the form of rear laneway garages and hard-stand carport or enclosed garage within the front setback now result in the majority of dwellings in the study area having off-street parking.



Figure 5-13 - Semi-detached dwellings, Brae Street



Figure 5-15 - Carlton Street, looking south



Figure 5-14 - Detached dwelling, Evans Street



Figure 5-16 - RFB, Evans Street

Natural environment

The study area comprises limited open space, the triangular Simpson and Macpherson Parks (both heritage-listed Landscape Conservation Areas) and Scott Street Reserve, however benefits from surrounding local and regional open space including Queens Park to the west and Bronte Park and Beach to the north-east. 'Green Links' aid with connectivity. Vegetation coverage is typically low-medium across the study area, contributing to a medium heat vulnerability. Cover is particularly low along Macpherson Street, however, improves in surrounding streets dependent on the varying capacity of the street verge to accommodate planting, for example Busby Parade compared to Brae Street. Chesterfield Parade (see Figure 5-18), a Landscape Conservation Area, is distinguished by a colonnade of fig trees and supports a biodiversity habitat corridor. Private open space and landscaping varies depending of lot size, dwelling positioning, inclusion of rear parking, pool etc.



Figure 5-17 - Open space and vegetation area #05



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?

Recent development

Recent development includes alterations and additions to existing detached and semi-detached dwellings, such as second-storey additions, double garages; demolition of existing dwellings and construction of new 2-3 storey detached or semi-detached dwellings (including dual occupancy), with integrated garages; limited secondary dwellings including studios above rear garage; limited construction of new RFBs, particularly along Macpherson Street. This indicates a demand for additional floor space and car-parking within the area. It is also observed that Bronte has the fourth highest proportion of dwellings by suburb listed on Airbnb within Australia, indicating a trend of use of private dwellings for short-term rental accommodation.



Figure 5-18 - Tree canopy, Chesterfield Parade



CHARACTER AREA

6



CHARACTER AREA - 6

"The area is characterised by its headland location which forms a prominent corridor of coastal open space; panoramic views to the ocean; curvilinear street network, with irregular blocks comprising predominantly low to medium-rise dwelling typologies and styles; and streetscapes of varying materiality, landscaping and garages".

The study area is generally bound by St Thomas Street through to Gardyne Street to the east, Murray Street and Bronte Park to the north, the Pacific Ocean to the east and Trafalgar Street and Waverley Cemetery to the south.



Figure 6-1 - Local character area #06 map



Figure 6-4 - Headland viewed from Bronte Marine Drive



Figure 6-2 - Detached dwellings, Gardyne Street



Figure 6-5 - Gardyne Street, looking north



Figure 6-3 - Bronte Road village centre



Figure 6-6 - Pacific Street, looking west

Existing character attributes



Desired future character

Vision

The desired future character of the area is a celebrated iconic coastline and nature reserve, with a small strip of historic shopfronts, and sensitive residential development that respects the terrain.

Objectives

The objectives for development on land identified within the character area are as follows:

- To maintain the predominant 2-3 storey height character of the area, noting that buildings on sloping sites should adjust the relative level and height to follow the natural topography, reinforcing the layering of built form when viewed from the coastline,
- To avoid excessive excavation,
- To retain and enhance the historic shopfronts and manage amenity impacts to the surrounding residential dwellings,
- To ensure high-quality design of new contemporary detached and semi-detached dwellings, with appropriate façade and material articulation. Flat roofs are supported for view sharing,
- To ensure alterations and additions read as a cohesive part of the existing dwelling and extension of historic form and materiality,
- To ensure that carparking structures are of a size and materiality that integrate with existing landscape features and do not dominate the streetscape,
- To retain and enhance natural landscape features including the sloping topography, sandstone or bedrock walls,
- To maintain effective landscape buffers between properties abutting Bronte Gully,
- To promote the reduction of hard surfaces and an increase of public and private landscaping,
- To maintain views and vistas from the public domain,
- To minimise the impact on existing views and vistas from the private domain and maintain residential amenity in terms of overlooking and noise,
- To reduce pedestrian and vehicle conflicts and increase pedestrian accessibility.

60 Existing character description

History

Development of the area began following the original land grant to the Colonial Architect Mortimer Lewis (1836-1843) and the construction of Robert and Georgiana Lowe’s Bronte House and Estate in 1840-1845. It was soon followed by other Marine Villa estates in the 1850s. These were subdivided and sold in the building boom of the late 1800s. These land sales continued through the Federation period of the early 1900s, supported by the introduction of tram services via Charing Cross and Macpherson Street to Bronte Beach in 1911. Bronte House remains a fine example of Regency-style architecture, with a large manicured garden merging into Bronte Gully. Whilst the area is predominantly residential, the Bronte Road village centre (see Figure 6-3), fronting Bronte Park at the former tram, now bus terminus, provides an active cluster of restaurants, cafes and retail tenancies catering to local and visitor needs. Another small cluster of commercial premises is located at the intersection of Murray Street and Bronte Road.

Configuration and connectivity

The topography slopes steeply to the north-east from the coastal plateau and headland to Bronte Gully, creating an “amphitheatre” offering wide, panoramic views of the coastline, ocean and surrounding areas. Subdivision and development of the area’s steep topography resulted in a curvilinear street network and irregular blocks and lots of varying size. Lot alignment is typically north-south, east-west despite the irregular layout. Topographical “ameliorations” and interventions provide suitable grades for streets and tram corridors result in terraced sites and streets, stone retaining walls and exposed sandstone bedrock.

Bronte Road and Macpherson Street provide the primary connection to and from and through the study area. Secondary east-west streets, Albert, Pacific and Trafalgar Streets, support internal vehicle and pedestrian connectivity. North-south streets are limited to St Thomas, Gardyne Streets and Yanko Avenue. Connectivity is offset by multiple through-block pedestrian links, for example Bronte Road to Gardyne Street, Pacific Street to Tipper Avenue and Macpherson to Trafalgar Street. North-south vehicular connectivity to and from the study area is further impeded by the Bronte Gully and Waverley Cemetery. Public transport connectivity is also limited, with the area serviced by a single bus route along Macpherson Street and terminating at Bronte Beach.

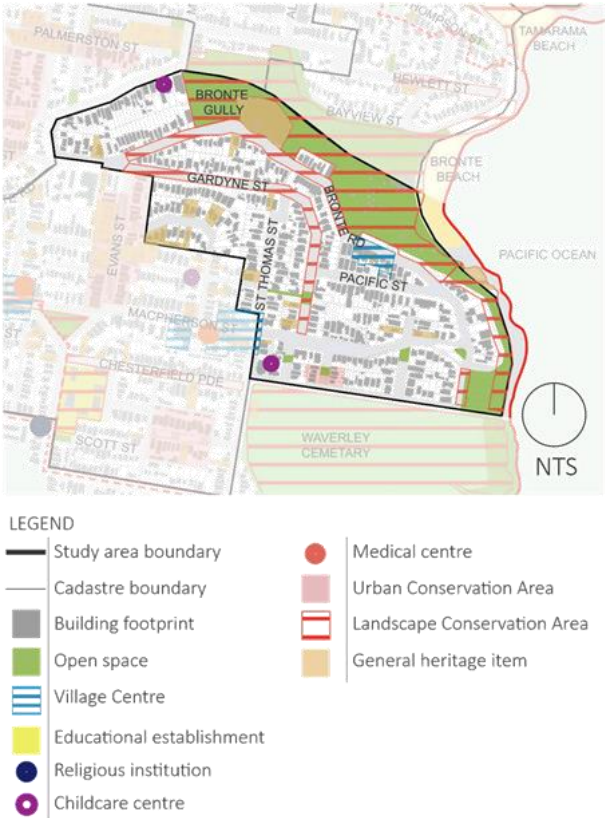


Figure 6-7 - Built form, uses and heritage area #06

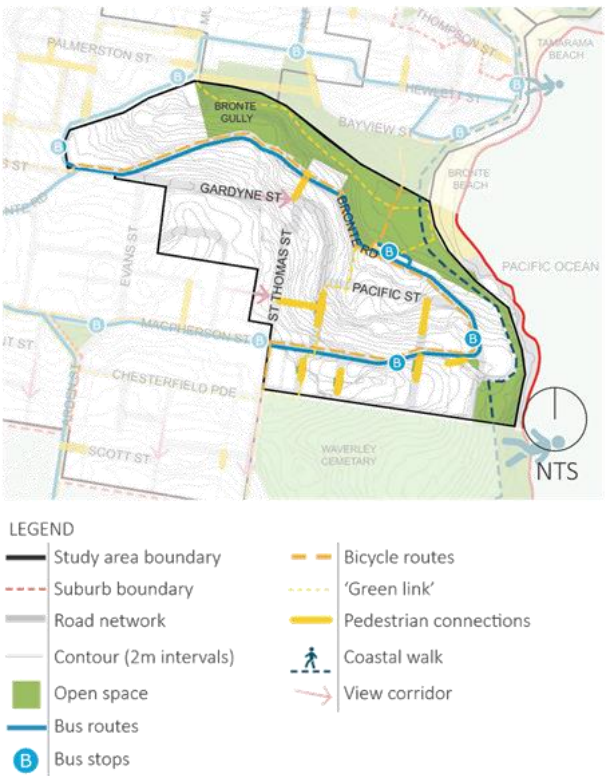


Figure 6-8 - Road network and movement area #06

Public and private domain interface

Streetscapes are characterised by upper and lower sites, each with different features. Dwellings on the upper sites are raised above street level, with built retaining walls, high fences or garage doors fronting the street (Figure 6-10). Front landscaping varies. Car access is difficult with excavation and cutting into the stone walls often required to accommodate garages, for example Gardyne Street (see Figure 6-11). Unsympathetic designs and materiality have in parts altered the street character. Upper balconies typically overlook the public domain and provide views to the ocean. Dwellings on the lower sites are often partially or completely obscured from street level as a result of the sloping topography, vegetation and carports and garages at the boundary, for example Gardyne Street (see Figure 6-13). Where a site abuts two street frontages, for example Gardyne Street and Bronte Road, the rear of the site has typical lower site characteristics with garage frontages and / or dense landscaping. On flatter sites, for example Yanko Ave (see Figure 6-12), Trafalgar Street and Pacific Street, dwelling visibility increases, however streetscapes remain characterised by varying fence height and materiality, front landscaping and garages built to boundary.

Built form

The study area comprises a variety of dwelling typologies and styles, from detached and semi-detached Federation and Inter-War bungalows to Inter-War and Mid-century Modern residential flat buildings (RFBs). Tipper Avenue, Collingwood, Pembroke and Murray Streets comprise early bungalows. Despite notable architectural styles, early dwellings have been significantly modified over time. Modifications include, second-storey and garage additions.



Figure 6-9 - RFB, Pacific Street



Figure 6-10 - Detached dwellings, Gardyne Street



Figure 6-11 - Detached dwellings, Gardyne Street



Figure 6-12 - Detached dwellings, Yanko Avenue



Figure 6-13 - Detached dwellings, Gardyne Street

62 Existing character description cont.

Inter-War and modern RFBs dominant Pacific Street (see Figure 6-9) and Bronte Road. Progressive change of the area has resulted in the replacement of earlier dwellings with large detached dwellings of late 20th century and 21st century styles, particularly along the coastline. These dwelling typologies account for a low density of approx. 50 persons/ha.

Dwellings are predominantly 1-3 storeys in height. The topography has resulted in the modulation of built form, with the dwelling base (retaining wall or garage) at street level and floors stacked above on upper sites or behind and below for lower sites. The exception being the 3-5 storey RFBs distributed through the area. The height of the building can appear increased due to the raised topography above street level, for example Macpherson Street. Flat roof-scapes are becoming more prominent for new dwellings and alterations to existing dwellings.

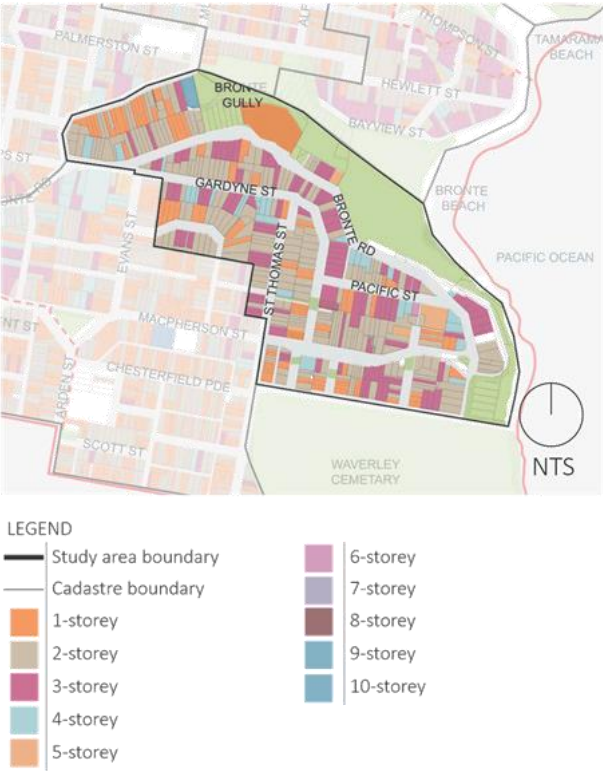


Figure 6-15 - Building height in storeys area #06

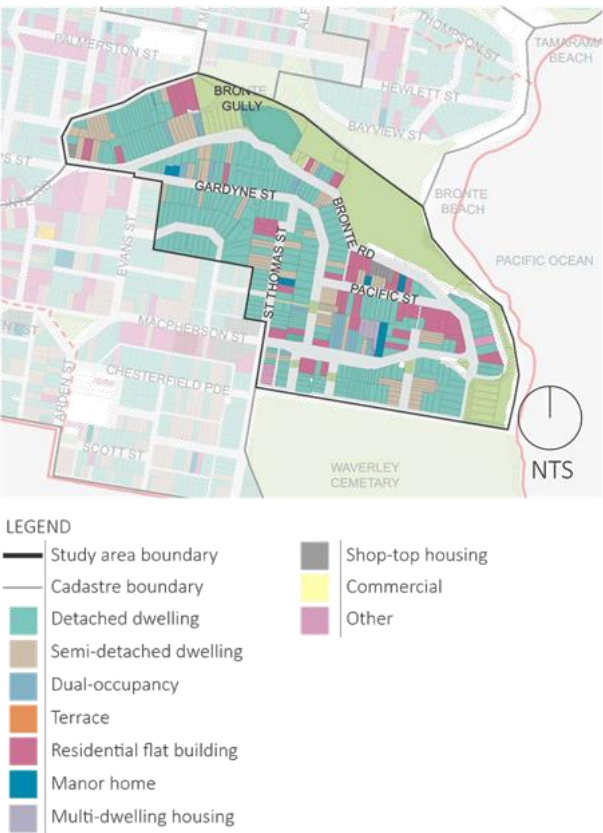


Figure 6-14 - Dwelling typologies area #06

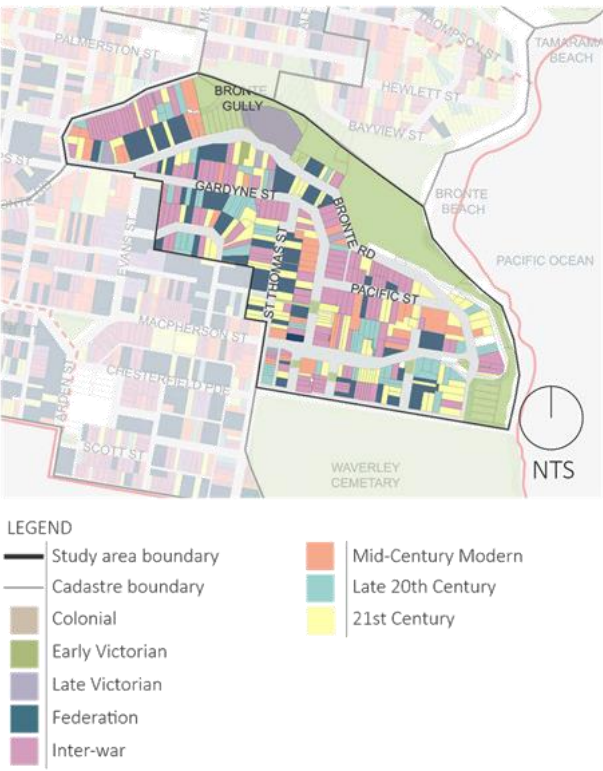


Figure 6-16 - Architectural styles area #06

Natural environment

The character of the study area is defined by its natural landscape setting. The headland, including the Calga Cutting, and the adjacent Waverley Cemetery and Bronte Park and Beach (all heritage-listed as Landscape Conservation Areas) create a prominent corridor of coastal public open space, having significant aesthetic and archaeological value. The corridor is reflective of the area's long history of seaside leisure, offering passive and active recreation opportunities including the Bronte Ocean Pool and the Bondi-Cooee Walk. Bronte Gully and Park (see Figure 6-18) provide a visual and spatial interface with surrounding properties. The area supports a biodiversity corridor. Vegetation coverage in the public and private domains varies across the area, being predominantly low-medium on the upper sites, characteristic of the elevated position and need to maintain views. The area's location provides for prevailing coastal winds from the east, which combined with the open character results in low heat vulnerability. Seen from a distance the area juxtaposes the layers of built form, roofscape and vegetation.



Figure 6-17 - Open space and vegetation area #06

Recent development

Recent development includes alterations and additions to existing detached and semi-detached dwellings, such as second-storey additions, double garages; alterations and additions to RFBs; demolition of existing dwellings and construction of new 2-3 storey detached or semi-detached dwellings (including dual occupancy), with integrated garages; limited secondary dwellings including studios above rear garage. This indicates a demand for additional floor space and car-parking within the area. It is also observed that Bronte has the fourth highest proportion of dwellings by suburb listed on Airbnb within Australia, indicating a trend of use of private dwellings for short-term rental accommodation.

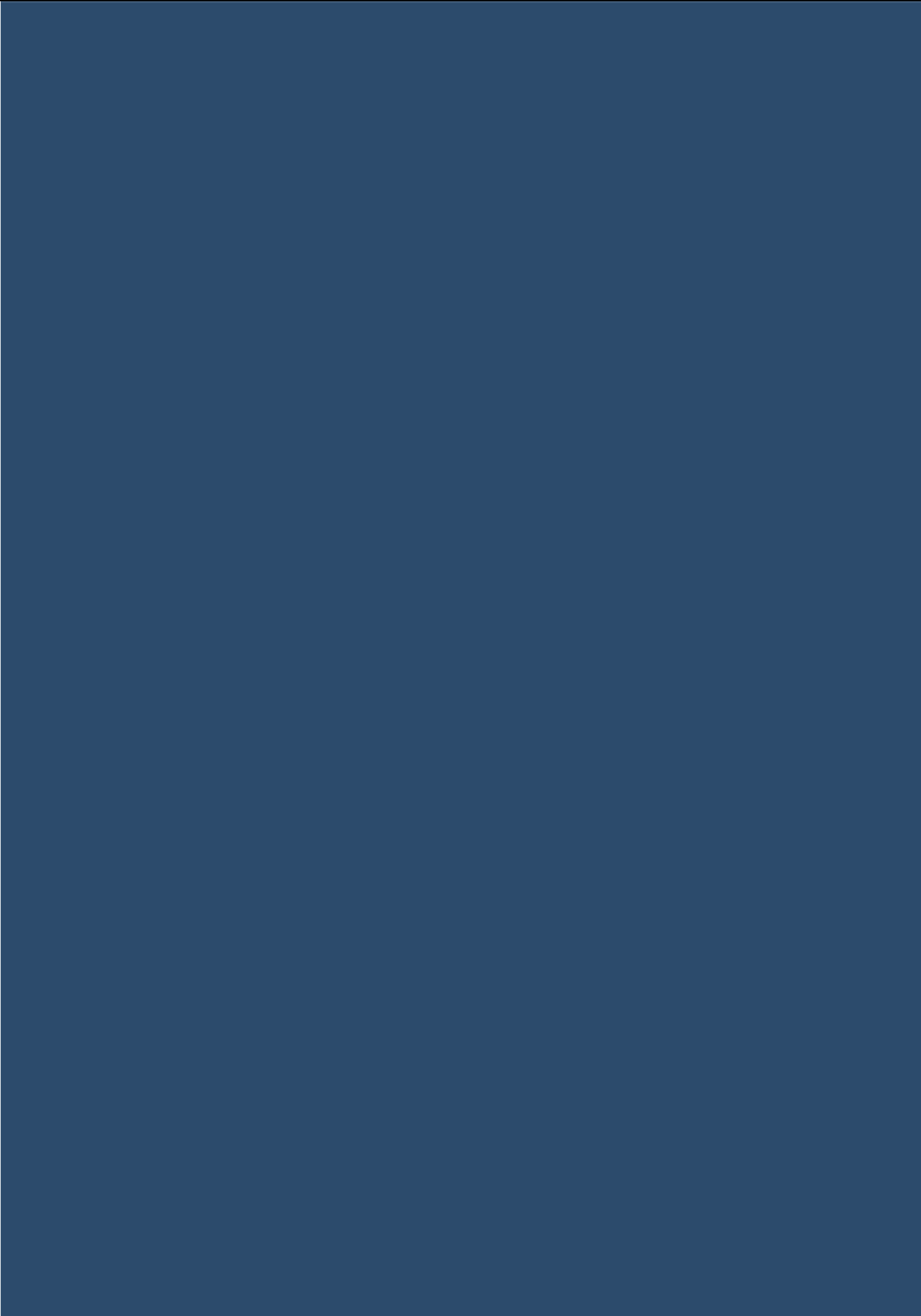


Figure 6-18 - Bronte Gully and Park



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

7



CHARACTER AREA - 7

"The area is neither a main thoroughfare nor a destination, characterised by an irregular block pattern; sloping topography; inconsistent built form comprising low-rise detached dwellings, semi-detached dwellings and medium-rise residential flat buildings; and tree-lined streets and open space".

The study area is generally bound by Birrell Street to the north, Dickson and Murray Streets to the east, Bronte Road to the south and Henrietta Street to the west.



Figure 7-1 - Local character area #07 map



Figure 7-4 - Dwellings fronting Seaview Street



Figure 7-2 - Layered built form viewed from Brown Street



Figure 7-5 - RFB, corner Langlee Avenue and Birrell Street

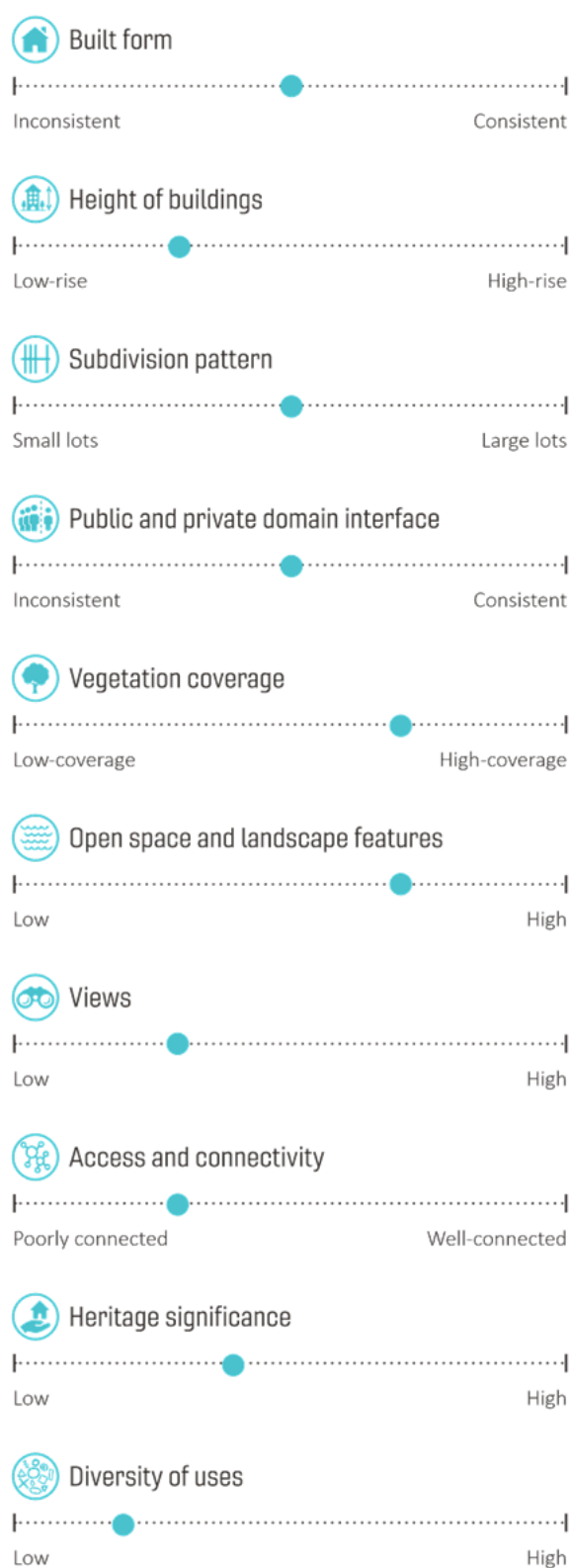


Figure 7-3 - Dwellings fronting Brown Street



Figure 7-6 - Brown Street, looking south

Existing character attributes



Desired future character

67

Vision

The desired future character is a leafy and diverse residential area with easy and safe access to open space.

Objectives

The objectives for development on land identified within the character area are as follows:

- To retain the natural landscape setting of the area, by maintaining low site coverage, enhancing landscaping in the front, rear and side of properties and limiting hard surfaces,
- To retain and extend street tree plantings on all streets to enhance the streetscape character,
- To retain and enhance natural landscape features including the sloping topography, sandstone or bedrock walls,
- To avoid excessive excavation,
- To preserve the diversity of dwelling typologies, architectural periods and heights in the area by retaining buildings from the Late Victorian, Federation, Inter-war periods and Mid-Century periods,
- To ensure alterations and additions read as a cohesive part of the existing dwelling and reinforce the established form, style and materiality of the dwelling,
- To ensure new development responds to the existing built form and predominant street frontages in terms of height, setbacks and street alignment,
- To ensure that car parking does not dominate or adversely impact on the existing landscape or built character of the area,
- To discourage new driveway crossovers,
- To ensure front fences and landscaping relate to the period and architectural style of the dwelling, and maintain visual connection between the dwelling and street,
- To maintain views and vistas from the public and private domains.

68 Existing character description

History

Development of the area has resulted from the subdivision of many original land holdings between the 1890s and 1940s, including the Palmerston, Malborough and Langlee Estates. Vacant land to the west of the Palmerston Estate, in the location of Malborough Reserve to Palmerston Avenue, was utilised as a quarry until the 1940s. The original ‘Palmerston House’ (1855), an early Victorian Villa, remains (albeit modified) at 18 Blandford Avenue. Housing shortages during WWI resulted in many large Federation homes being converted into flats, with flat development continuing through the Inter-War and Post-War periods. The area comprises predominantly residential uses, including aged care facilities, with educational establishments – Waverley College Junior School and Bronte Public School – at the periphery and small pockets of open space throughout. It is in close proximity to other commercial centres including Charing Cross and Bondi Junction.

Configuration and connectivity

The topography slopes from the north-west at Birrell Street, to the south-east of the study area (towards the Bronte Gully). A steep change occurs to the west of the area, at the rear of dwellings fronting Blandford Avenue and Brown Street, leading into a localised depression at the former quarry site. Dwellings on the eastern side of Langlee Avenue and Seaview Street (see Figure 7-2) overlook the lower areas towards the coastline. Views are also available from high points on Birrell Street.

The progressive subdivision of early estates combined with topographical changes have resulted in an irregular street and block pattern, with lots of varying size. Birrell Street, Murray Street and Bronte Road, at the area’s boundaries, provide the primary connections to and from the area. Buses service these routes. Internal roads limit circulation, being typically one-way or no-through, for example Dickson, Carter and Gibson Streets. The area is neither a main thoroughfare nor a destination, catering to predominantly local traffic only. Pedestrian access and connectivity are maintained by multiple through-block links (see Figure 7-8). Walkability varies along these pedestrian connections and throughout the area, with pedestrian links often consisting of stairs only.

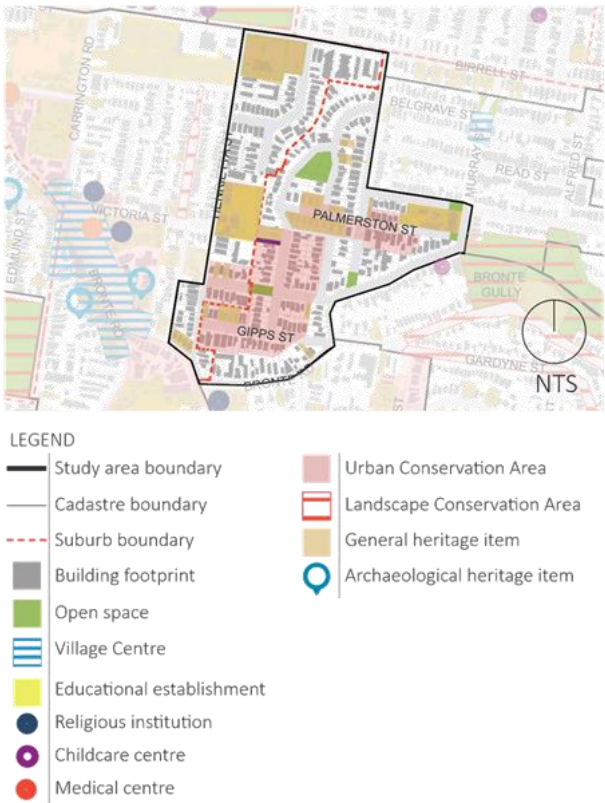


Figure 7-7 - Built form, uses and heritage area #07

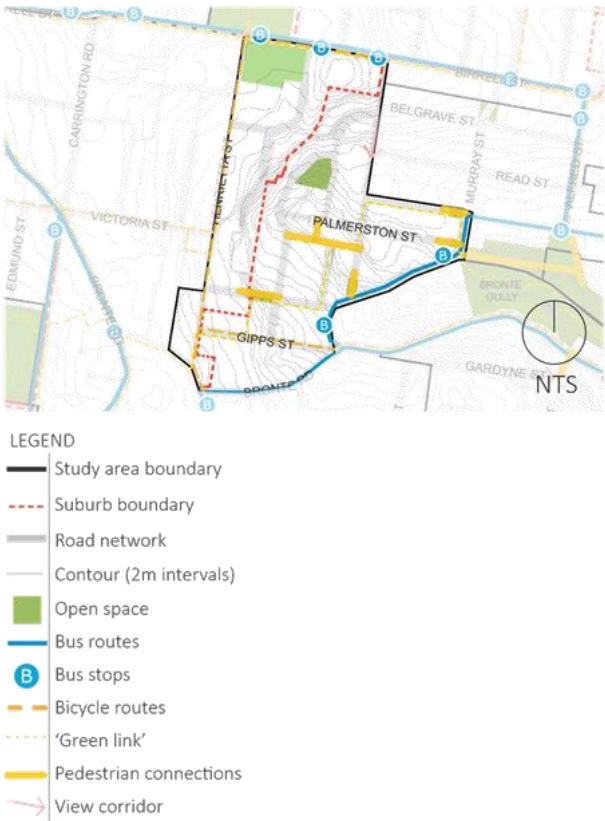


Figure 7-8 - Road network and movement area #07

Built form

The area is characterised by predominantly detached dwellings, interspersed with semi-detached dwellings and residential flat buildings (RFBs), of various architectural styles from Federation and Inter-War to 21st century. Clusters of detached and semi-detached simple Federation dwellings are evident within Langlee Avenue, Henrietta Street, Dickson Street, and Gibson, Gipps and Brown Streets (heritage-listed as the Brown Street Conservation Area). The bungalows are of brick or weatherboard construction with low gabled roofs, timber verandah posts and decorated timber gable trim. Simple Inter-War bungalows are also evident on Gibson Street (see Figure 7-13) and Blandford Avenue. Bungalows of this period are characterised by low gabled roofs, thick masonry verandah posts and timber decorated gable trim. Despite noticeable architectural styles, early dwellings have been significantly modified overtime. Modifications include, second-storey and garage additions. Cohesive groupings of Inter-War and early Post-war RFBs are evident on Henrietta Street and Palmerston Avenue (heritage-listed as the Palmerston Street Conservation Area) displaying curved or flat facades with decorative stepped brick, characteristic of the Art Deco and Free Classical styles. Mid-century detached dwellings and RFBs, for example on Blandford Avenue, Birrell Street and Bronte Road, reflect the periodic development and redevelopment of the area. Sporadic modern infill development of late 20th century and 21st century styles has also occurred throughout the area. These dwelling typologies result in a population density of approx. 76 persons /ha.



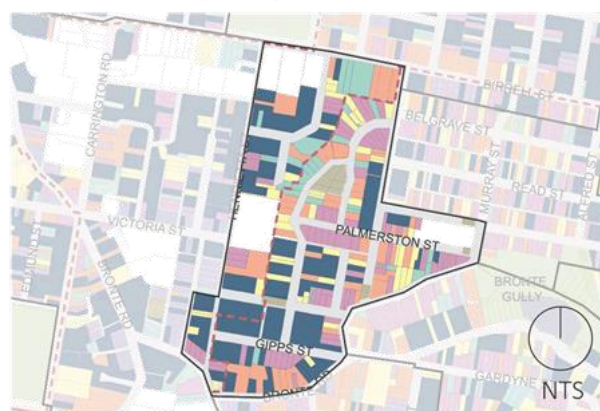
Figure 7-9 - Detached dwellings, Brown Street



LEGEND

- Study area boundary
- Cadastral boundary
- Detached dwelling
- Semi-detached dwelling
- Dual-occupancy
- Terrace
- Residential flat building
- Manor home
- Multi-dwelling housing
- Shop-top housing
- Commercial
- Other

Figure 7-10 - Dwelling typologies area #07



LEGEND

- Study area boundary
- Cadastral boundary
- Colonial
- Early Victorian
- Late Victorian
- Federation
- Inter-war
- Mid-Century Modern
- Late 20th Century
- 21st Century

Figure 7-11 - Architectural styles area #07

70 Existing character description cont.

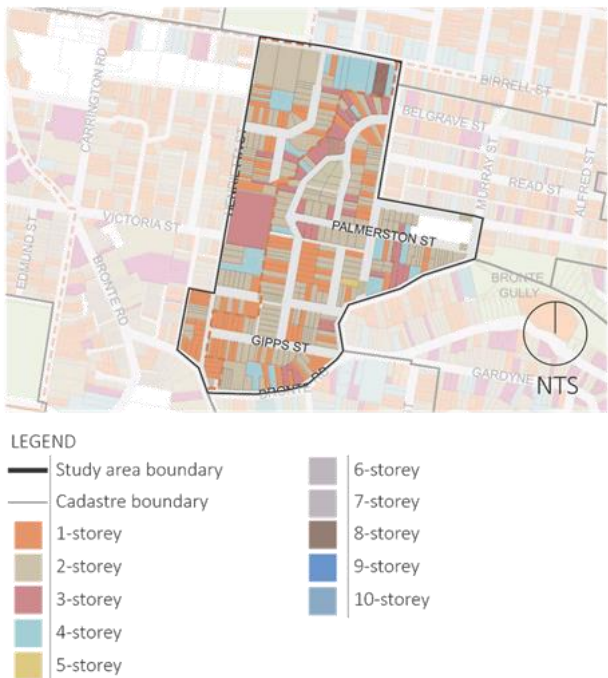


Figure 7-12 - Building height in storeys area #07

Dwellings are predominantly 1-2 storey in height, with the exception of 3-4 storey RFBs or dwellings on sloping sites. Transition in building height is largely influenced by topographical change. The height of a building may appear increased due to the raised topography with the dwelling sitting above a street-level garage, for example Blandford Avenue (see Figure 7-14). Buildings of four or more storeys, for example the 8-storey point-block-tower on Birrell Street (see Figure 7-16), are outliers and are inconsistent with the prevailing height character of the area.

Public and private domain interface

The public and private interface differs considerably as a result of varying street widths, and periodic development of different typologies and styles. Depths of front setbacks are generally consistent, however encroachment by parking additions including enclosed garages is common. On sloping sites excavation is required to accommodate garages. This can limit front landscaping, obscure the building façade and detract from the public-private transition, in instances creating an undesirable solid wall at street level. Mid-late 20th century RFBs are raised above street level incorporating ground-floor car-parking. Upper balconies overlook the public domain.



Figure 7-13 - Detached dwellings, Gibson Street



Figure 7-15 - RFBs, Palmerston Avenue



Figure 7-14 - Semi-detached dwellings, Blandford Avenue



Figure 7-16 - RFBs, Birrell Street

Natural environment

Vegetation coverage varies from medium-high in the south of the study area reducing to low-medium in the north. Many streets comprise significant tree planting on street or within the front setback, which softens the transition from the street to dwelling but can also obscure the dwelling façade. For example, terraced sites fronting Blandford Avenue are characterised by consistent front landscaping, which has been deteriorated by new modern infill. Irregular lots, with deep rear yards support private landscaping, including the dense vegetation, known as “the Jungle”, to the rear of Waverley College Junior School. Marlborough Reserve, Gibson Street Reserve (see Figure 7-18) and other pedestrian links also support vegetation. These factors contribute to a low-medium heat vulnerability.



Figure 7-17 - Open space and vegetation area #07




Figure 7-18 - Gibson Street Reserve, looking east

Recent development

Recent development includes alterations and additions to existing detached and semi-detached dwellings, such as second-storey additions, double garages, carports, demolition of existing dwellings and construction of new 2-3 storey detached or semi-detached dwellings (including dual occupancy), with integrated garages, and the partial redevelopment of the Waverley Bowling Club for seniors housing. Indicative of a trend toward maintaining existing built form whilst achieving more floor space and on-site car-parking and redevelopment of sites for the highest and best use.



Figure 7-19 - Langlee Lane, looking east



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

8



CHARACTER AREA - 8

"The area is characterised by well-defined, regular blocks comprising detached, and semi-detached dwellings interspersed with residential flat buildings, of varying heights, architectural styles, materiality and finishes; narrow rear laneways; and wide-street verges with limited drive-way crossovers and sporadic street trees".

The study area is generally bound by Dickson Lane to the north, Cross Street to Hewlett Street to the east, Bronte Gully and Hewlett Street to the south and Dickson Street to the west.



Figure 8-1 - Local character area #08 map



Figure 8-4 - Semi-detached dwelling / RFB, Alfred Street



Figure 8-2 - RFB, Belgrave Street



Figure 8-5 - Streetscape, Belgrave Street

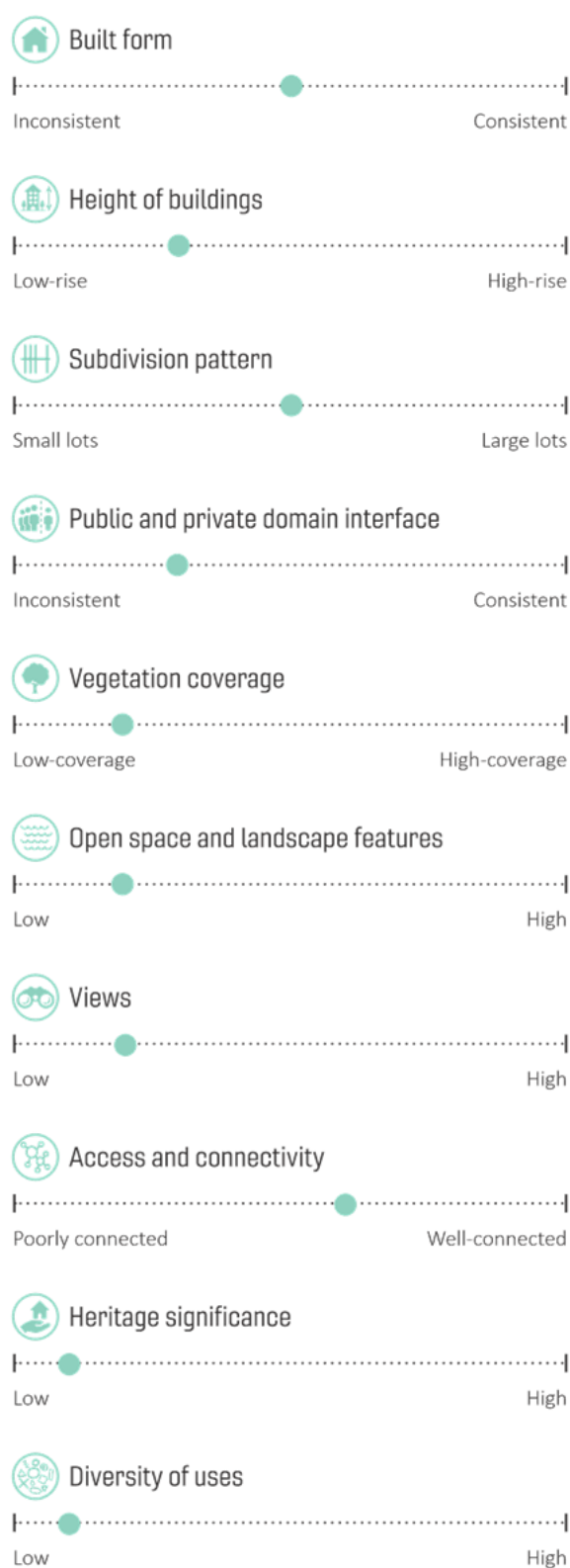


Figure 8-3 - RFB, cnr Alfred Street and Hewlett Street



Figure 8-6 - Detached dwellings, Read Street

Existing character attributes



Desired future character

75

Vision

The desired future character is a leafy and varied residential area with easy and safe access to open space.

Objectives

The objectives for development on land identified within the character area are as follows:

- To promote the diversity of dwelling styles and typologies, including semi-detached (dual occupancy),
- To encourage the restoration of traditional architectural forms and details of Federation and Inter-War-style bungalows,
- To ensure alterations and additions read as a cohesive part of the existing dwelling and reinforce the established form, style and materiality of the dwelling,
- To ensure new development responds to the adjacent built form and street frontage in terms of height, setbacks and street alignment,
- To maintain the 1-4 storey height character of the area,
- To ensure secondary dwellings and ancillary development enhance rear laneways and maintain a high standard of residential amenity for surrounding dwellings,
- To discourage new driveway crossovers and car parking within the front setback, by retaining vehicle access from rear lanes,
- To retain and extend street tree plantings on all streets,
- To promote landscaping at the rear of dwellings, to soften transition to rear laneways.

76 Existing character description

History

Development of the area has resulted from the subdivision of various land holdings including the Dickson, Palmerston, Kenilworth, Mandeville and Pacific View Estates, in the Late Victorian to early Federation era, between 1880-1900. These holdings were part of 16 blocks of land of varying sizes on the elevated plateau, on the southern side of Birrell Street that were sold in 1855 to various purchasers. The topography slopes gently from the natural ridgeline along Belgrave Street, south-east towards Bronte Gully. The area was developed for predominantly residential use, with the subdivision sale notices advertising “commanding grand views, convenient access to Waverley and Bondi trams...” and a “healthy location”. The area remains predominantly residential except for the Belgrave local centre which comprises a small cluster of shops.

Configuration and connectivity

Successive subdivision of the estates combined with the area’s relatively flat topography has resulted in a well-defined, regular street network, of generally north-south and east-west alignment. The network consists of a primary through-street, secondary local streets and rear laneways. Murray Street provides the primary north-south connection to and from the area. The regular block and street network results in a high degree of permeability. Wide street corridors, with wide verges improve visibility. Relatively flat topography promotes walkability. Public transport is limited with only a few bus routes servicing the area via Birrell, Alfred, Hewlett and Murray streets, which provide connection to surrounding areas including Bondi Junction.



Figure 8-7 - Alfred Street, looking south

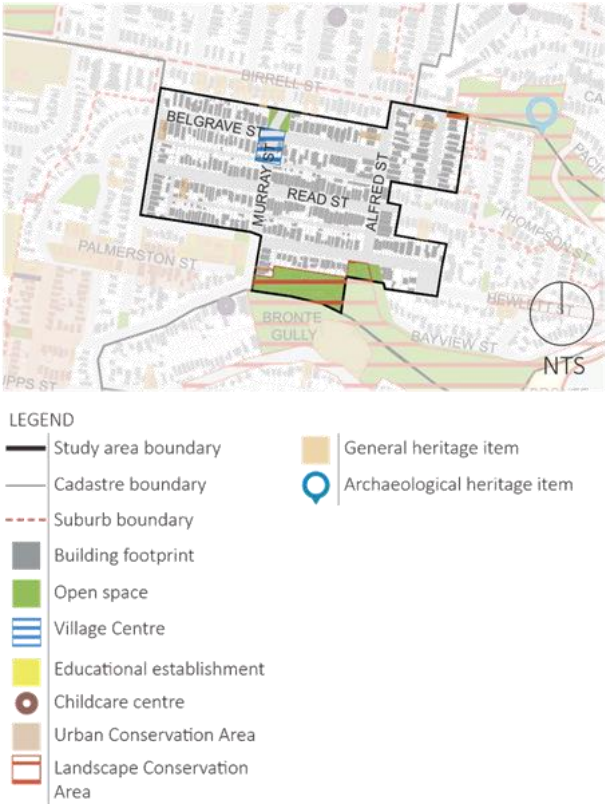


Figure 8-8 - Built form, uses and heritage area #08

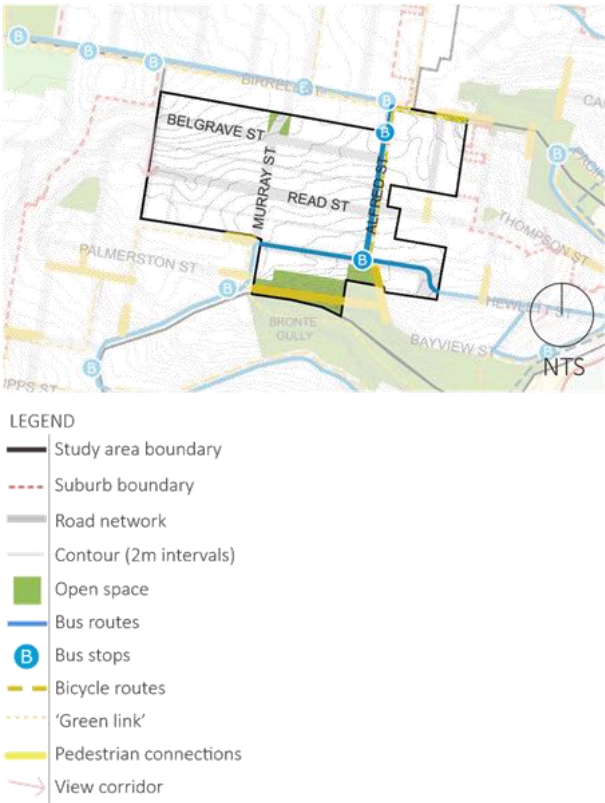


Figure 8-9 - Road network and movement area #08

Built form

The area is predominantly characterised by 1-2 storey detached and semi-detached dwellings interspersed with 3-4 storey residential flat buildings (RFBs), of varying architectural styles. The predominant dwelling typologies are Federation and Inter-War bungalows. These dwellings are often characterised by brick, rendered brick or weatherboard construction, low gabled terracotta tiled roofs, with thick masonry, timber or ironwork verandah posts and decorated timber gable trim. Window awnings and chimneys are additional features. Exemplar buildings include heritage-listed 2 Belgrave Street and 3 Alfred Street, as well as 13 Belgrave Street and 2 Read Street. A cluster of Federation bungalows are evident on the western side of Cross Street. Examples of earlier Late-Victorian dwellings are evident to the west of the area on Read, Dickson and Belgrave streets. These styles reflect the evolution of housing as the area changed from a district of rural worker housing and isolated villas to a setting of close subdivisions. However, despite noticeable architectural styles, early dwellings have been significantly modified overtime. Modifications include second-storey and garage additions. Replacement of early dwellings has occurred since the 1950s, with the Mid-century Modern style RFBs and late 20th century and 21st century detached and semi-detached dwellings evident throughout the area. The interspersed of these dwelling results in a varied tapestry of building heights, architectural styles, materiality and finishes. The area has a population density of about 70 persons/ha.



Figure 8-10 - Detached dwelling, Belgrave Street

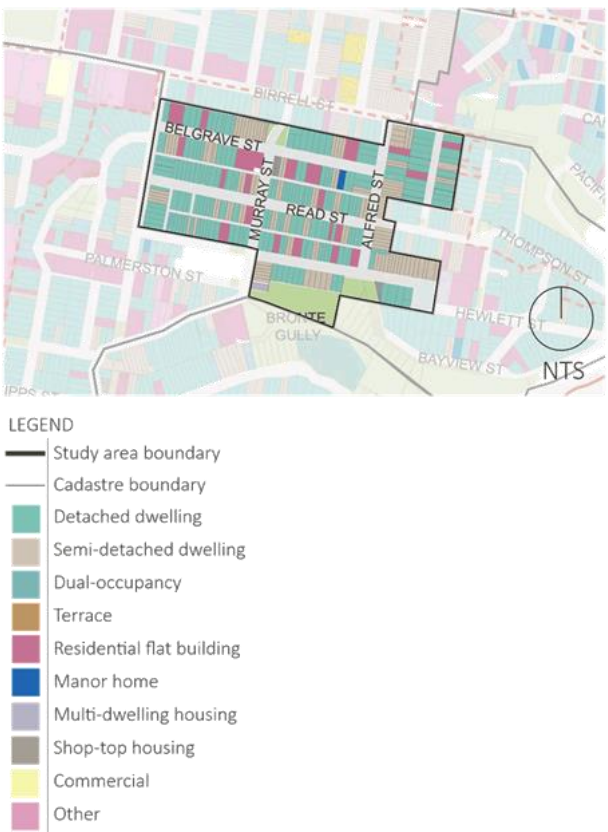


Figure 8-11 - Dwelling typologies area #08

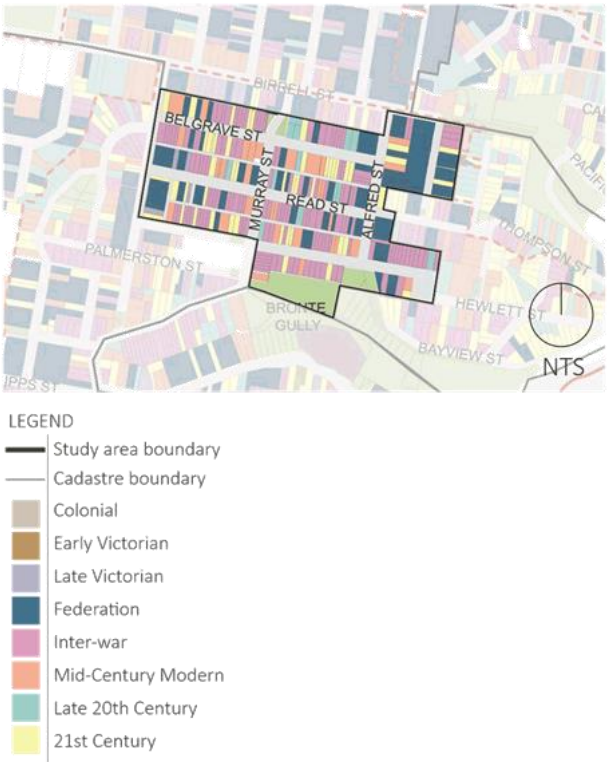


Figure 8-12 - Architectural styles

78 Existing character description cont.

Public and private interface

The public and private domain interface varies depending on street hierarchy. Murray Street, the primary through-street, is characterised by narrow verges with limited street trees. Side boundaries typically abut the street, resulting in inactive frontages, screened by high fences (see Figure 8-14). Where a front boundary abuts the street, it is typically characterised by street-level garages. For local streets, wide verges provide for additional street trees, softening the transition between the public and private domains. Dwelling setbacks are typically consistent and of a narrow depth, resulting in the dwelling being in close proximity to the street. However, visibility of the dwelling, however varies, due to carparking and landscaping of the front setback and the style of the front fence, for example timber or brick of low-medium height. The exception being Mid-century Modern RFBs, which are characterised by street-level garages with upper balconies overlooking the public domain (see Figure 8-16). Rear lanes are characterised by garages, hard-stand parking or high fences at the boundary (see Figure 8-17). Dwellings are predominantly serviced by off-street carparking at the rear of the property, accessed by the adjoining lane, hard stand / carport parking in the front setback or integrated garages for dwellings without rear lane access. Laneway parking reduces the need for driveway cross overs, resulting in a more consistent streetscape and greater on-street carparking.



Figure 8-13 - Street frontage, Read Street



Figure 8-14 - Street frontage, Hewlett Street



Figure 8-15 - RFB, Belgrave Street



Figure 8-16 - RFB, Murray Street



Figure 8-17 - Garage frontages, Read Lane

Natural environment

Open space is limited within the study area, comprising of small pockets in Jessie Street Reserve, Belgrave Street Reserve and Hewlett Street Park (see Figure 8-18). Notwithstanding, the area abuts Bronte Gully and is in close proximity to the coastal open space network and Tamarama and Bronte beach / park to the east, and Waverley Park to the north-west. A biodiversity habitat corridor traverses the area, connecting these open spaces. Vegetation coverage across the area is generally low. In the public domain, wide verges support increased planting, however rear lanes are typically void of vegetation. In the private domain, planting is low due to narrow front setbacks and rear lane structures, however planting increases where rear boundaries adjoin. These conditions result in a medium-high urban heat island affect and low-medium heat vulnerability.

Recent development

Recent development history includes alterations and additions to existing detached and semi-detached dwellings, such as second-storey additions, double garages, carport replacements; demolition of existing dwellings and construction of new 2-3 storey detached or semi-detached dwellings (including dual occupancy), with integrated garages; limited secondary dwellings including studios above rear garage. This indicates a demand for additional floor space and car-parking within the area. It is also observed that the suburb of Bronte has the fourth highest proportion of dwellings by suburb listed on Airbnb within Australia, indicating a trend of use of private dwellings for short-term rental accommodation.



Figure 8-18 - Hewlett Street Park Community Garden



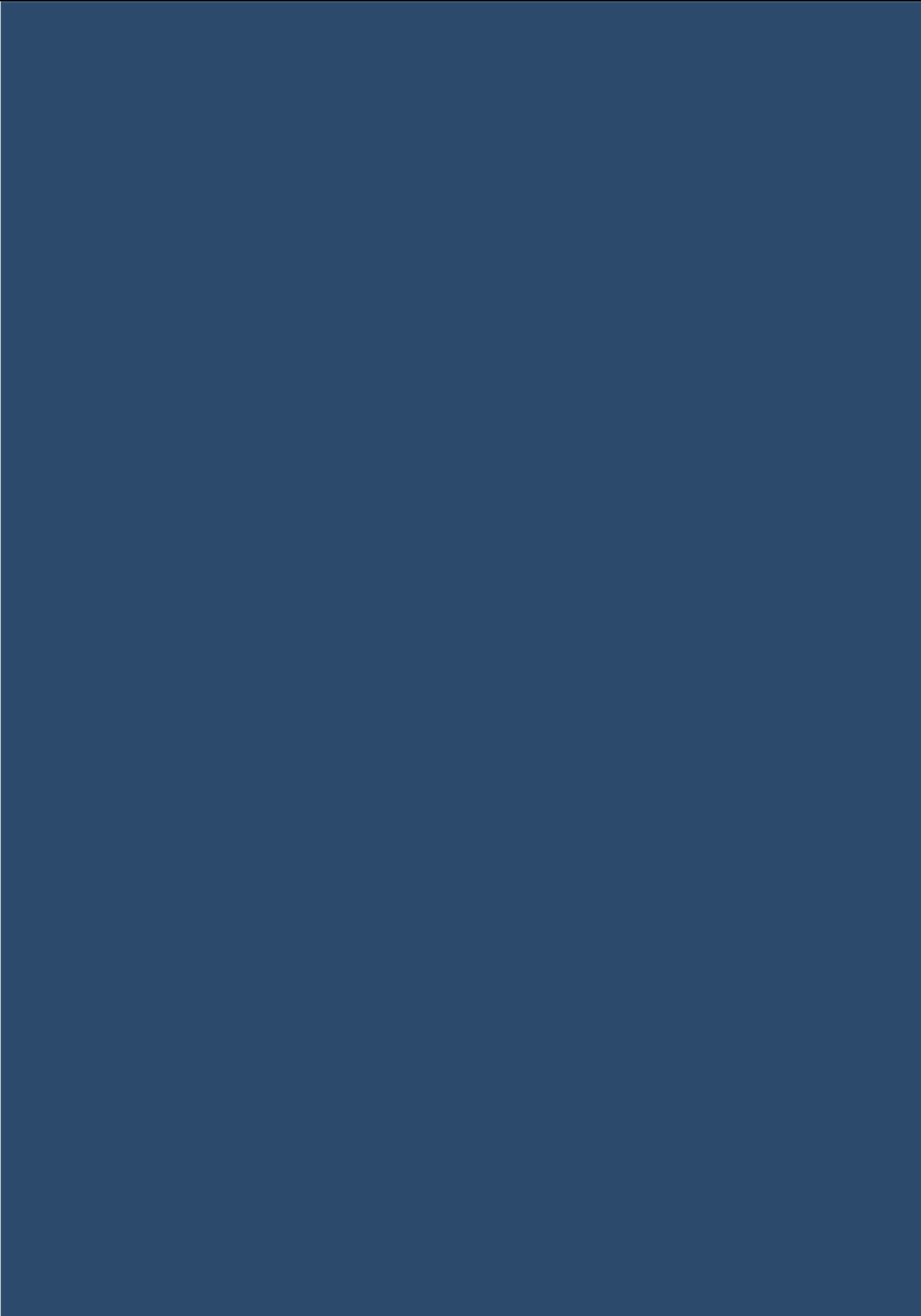
Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?

79



Figure 8-19 - Open space and vegetation area #08



CHARACTER AREA

9



CHARACTER AREA - 9

"The area is defined by its prominent headland location and adjoining gullies which form a prominent corridor of coastal open space; panoramic views of the ocean; irregular blocks, with terraced streets and steep lots comprising layered low-rise built form, with built retaining walls, fences, garages and limited vegetation fronting the street".

The study area is generally bound by Tamarama Gully and Park to the north, the Pacific Ocean to the east, Bronte Gully and Park to the south and Ashley Street to Hewlett Street to the west.



Figure 9-1 - Local character area #09 map



Figure 9-4 - Street frontage, Pacific Avenue



Figure 9-2 - Tamarama Beach and Park from Pacific Avenue



Figure 9-5 - Detached dwellings, Thompson Street



Figure 9-3 - Natural coastal setting from Wolaroi Crescent



Figure 9-6 - Tamarama Gully from Birrell Street pedestrian link

Existing character attributes



Desired future character

Vision

The desired future character of the area is defined by high-quality, contemporary detached and semi-detached dwellings with appropriate façade and material articulation. Dwellings are integrated with the natural sloping topography, buffered by vegetation that enhances the natural setting of the coastal headland.

Objectives

The objectives for development on land identified within the character area are as follows:

- To maintain the predominant 2-3 storey height character of the area, noting that buildings on sloping sites should adjust the relative level and height to follow the natural topography,
- To avoid excessive excavation,
- To ensure high-quality design of new contemporary detached and semi-detached dwellings, with appropriate façade and material articulation. Flat roofs are supported for view sharing,
- To ensure that carparking structures are of a size and materiality that integrate with existing landscape features and do not dominate the streetscape,
- To retain and enhance natural landscape features including the sloping topography, sandstone or bedrock walls,
- To maintain the significant landscape buffer between Thompson Street and Tamarama Marine Drive, and promote development that retains the landscape character,
- To promote the reduction of hard surfaces and an increase of public and private landscaping,
- To maintain views and vistas from the public domain,
- To minimise the impact on existing views and vistas from the private domain and maintain residential amenity in terms of overlooking and noise.

84 Existing character description

History

The character of the area is defined by its prominent headland location, offering panoramic views of the coastline, ocean and surrounding areas. The topography slopes steeply towards the coast and adjoining gullies. Progressive subdivision and development of the area from the late 1880s has resulted in irregular blocks, with terraced streets and steep lots of varying size. Stone retaining walls and exposed sandstone bedrock are common features, for example on Thompson Street. Lot alignment is typically north-south, east-west, except for the blocks closest to the south, which remained only partially developed until the 1940s.

Configuration and connectivity

Topographical changes, combined with an unclear street hierarchy, restricts access to, from and within the area. Hewlett (see Figure 9-7) and Darling streets provide the primary east-west connections. The coastal road, Tamarama Marine Drive and Bronte Marine Drive, provides connectivity to the north. Bronte Gully and Park impedes connectivity to the south. Limited buses service these routes. The prevalence of no-through local streets, for example Bayview Street, Wolaroi Crescent and Harlowe Place, further impede access and circulation within the area. Pedestrian connectivity is maintained through multiple through-block pedestrian links, for example Thompson Street, Wolaroi Crescent to Tamarama Park and Andrew Street to Hewlett Street.



Figure 9-7 - Hewlett Street, looking east

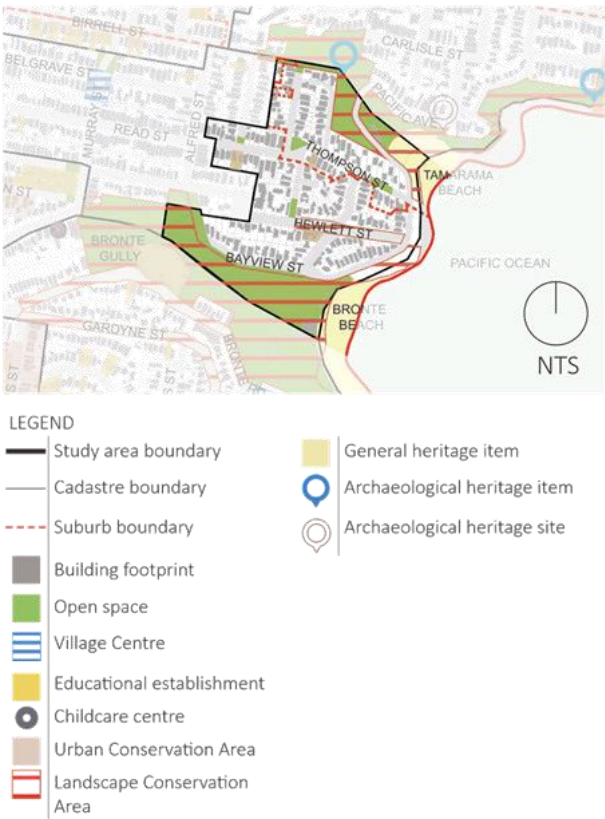


Figure 9-8 - Built form, uses and heritage area #09

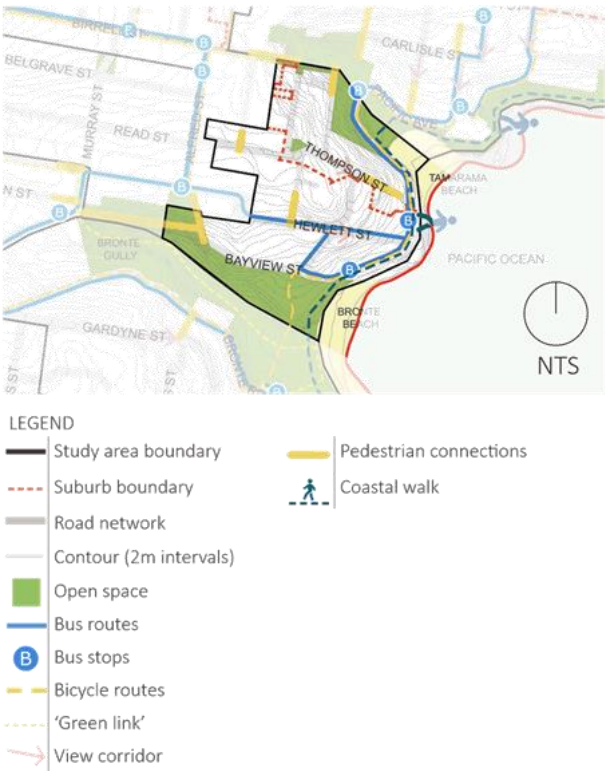


Figure 9-9 - Road network and movement area #09

Public and private domain interface

Streetscapes are typically characterised by upper and lower sites, each with different features. Variable verge widths and front setbacks result in built form (dwellings, garages) being situated at varying distances from the public domain. Dwellings on the upper sites are raised above the public domain, with built retaining walls, high fences and / or garage doors of varying materials and finishes, fronting the street. A solid wall presenting to the street is common, for example Thompson (see Figure 9-10) and Darling streets. Front landscaping also varies, with deep soil often limited due to garage construction, for example Bayview Street. Upper balconies typically overlook the public domain and are oriented to provide expansive views to the ocean. Dwellings on the lower sites often have their ground level partially or completely obscured from the street as a result of the sloping topography, vegetation, fencing and / or garages at the boundary, for example Ashley Street and Hewlett Street (see Figure 9-11). Again, materiality and finishes vary, contributing to the area's inconsistent character. On flatter sites, for example Andrew Street, dwelling visibility increases, however the streetscape remains characterised by parking structures and varying front landscaping. The combination of terraced upper and lower sites creates a layering of built form when viewed from a distance.

Built form

The area comprises predominantly detached dwellings, interspersed with semi-detached dwellings and clusters of residential flat buildings (RFBs) in Andrew and Bayview streets (see Figure 9-12). These dwelling typologies result in a low population density. Architectural styles vary, however Mid-century, late 20th century and 21st century styles dominant, highlighting the progressive redevelopment of the area since the 1950s. Limited examples of earlier Federation or Inter-War dwellings remain. Those that do remain, particularly detached or semi-detached bungalows, are characterised by brick, rendered brick or weatherboard construction, low gabled terracotta tiled roofs, with thick masonry or timber verandah posts and decorated timber gable trim. These have been substantially modified over time, with second-storey and garage additions. Notable examples of Inter-War RFBs include 99 Hewlett Street (heritage-listed) and 2 Bayview Street. Modern dwellings are typically 3-storey flat-roofed cascading buildings with wider modulation, wide integrated garages, large balconies and areas of transparent glass for doors, windows and balcony balustrades (see Figure 9-13).



Figure 9-10 - Detached dwellings, Thompson Street



Figure 9-11 - Obscured detached dwellings, Hewlett Street



Figure 9-12 - RFB, Bayview Street



Figure 9-13 - Detached dwellings, Mirimar Avenue

86 Existing character description cont.

These dwellings seek to maximise floor space and height and capture available views.

Dwellings are predominantly 2-3 storeys in height. The topography has resulted in the modulation of built form, with the dwelling base (retaining wall, fence or garage) at street level and floors stacked above on upper sites or behind and below for lower sites. The height of the building can appear increased due to the raised topography above street level. Further, dwellings sloping up / down sites are irregularly splayed, with varying front and rear setbacks, resulting in varied transitions between dwellings.

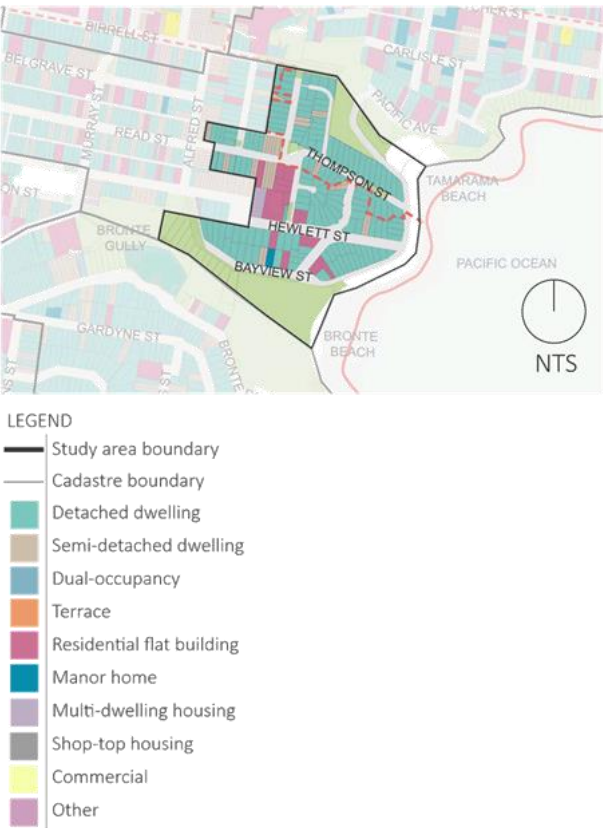


Figure 9-15 - Dwelling typologies area #09

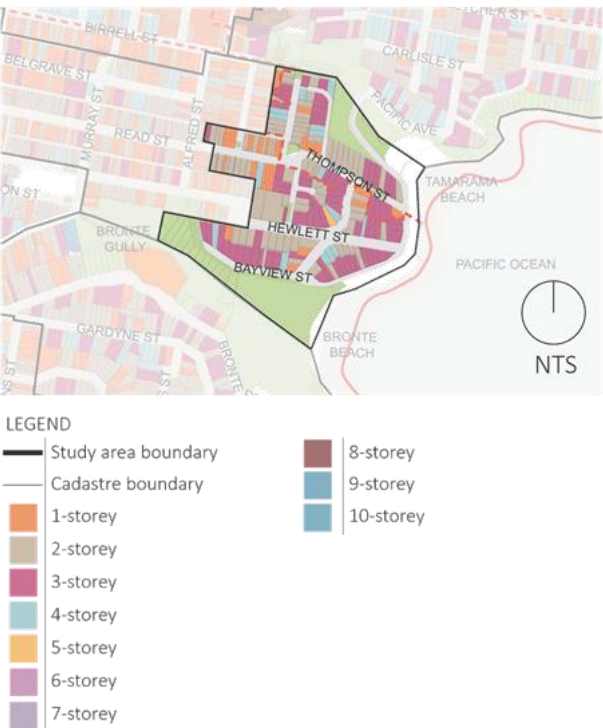


Figure 9-14 - Building height in storeys area #09

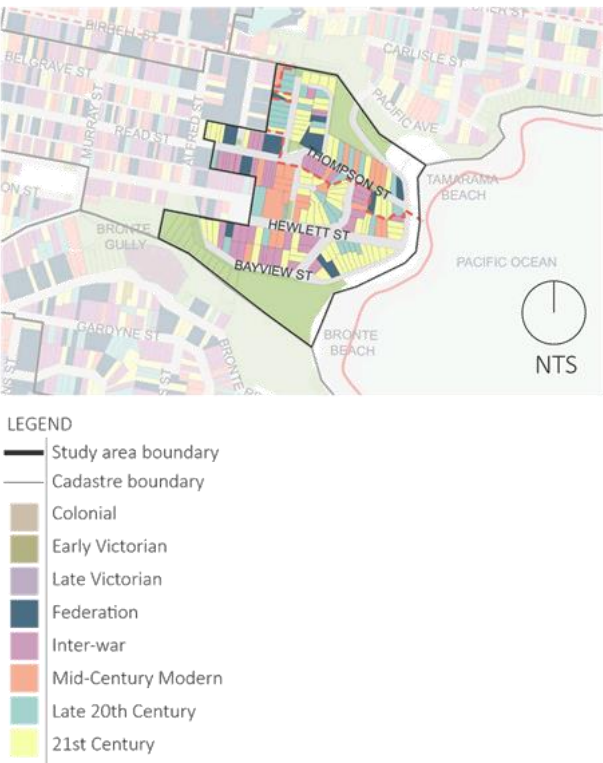


Figure 9-16 - Architectural styles area #09

Natural environment

The headland and adjoining gullies contribute to an important corridor of coastal public open space, having significant aesthetic, landscape and recreational value. Tamarama Beach and Park (see Figure 9-6), Marine Drive, Hewlett Street and Bronte Beach and Park are heritage-listed Landscape Conservation Areas. These areas support a biodiversity corridor. Vegetation coverage is typically low across the area. In the public domain, varying verge widths limit the ability to accommodate consistent planting. In the private domain, landscaping is often limited due to high site coverage and the desire to maintain views. Notwithstanding, the slope between Thompson Street / Wolaroi Crescent and Tamarama Marine Drive (see Figure 9-3), has identifiable landscape character. Dwellings are integrated within the landscape, immersed in vegetation, softening the impact of built form on the coastline. These factors contribute to a low-medium heat vulnerability across the area.

The area is recognised for its long history of seaside bathing and leisure and for its association with the beginnings of the surf lifesaving movement. Bronte Surf Life Saving Club (SLSC) and Tamarama SLSC were formed soon after ocean bathing was legalised in 1902. The iconic beaches, parks and Bondi-Coogee coastal walk offer passive and active recreation opportunities and support public gathering and events.

Recent development

Recent development includes alterations and additions to existing detached and semi-detached dwellings, such as second-storey additions, double garages, carport replacements; demolition of existing dwellings and construction of new 2-3 storey detached or semi-detached dwellings (including dual occupancy), with integrated garages; and limited secondary dwellings including studios above rear garage. This indicates a demand for additional floor space and car-parking within the area. It is also noted that at a suburb level, Tamarama has the highest percentage of dwellings listed on Airbnb in Australia, with one in five dwellings listed, Bronte has the fourth highest, indicating a trend of use of private dwellings as short-term rental accommodation.

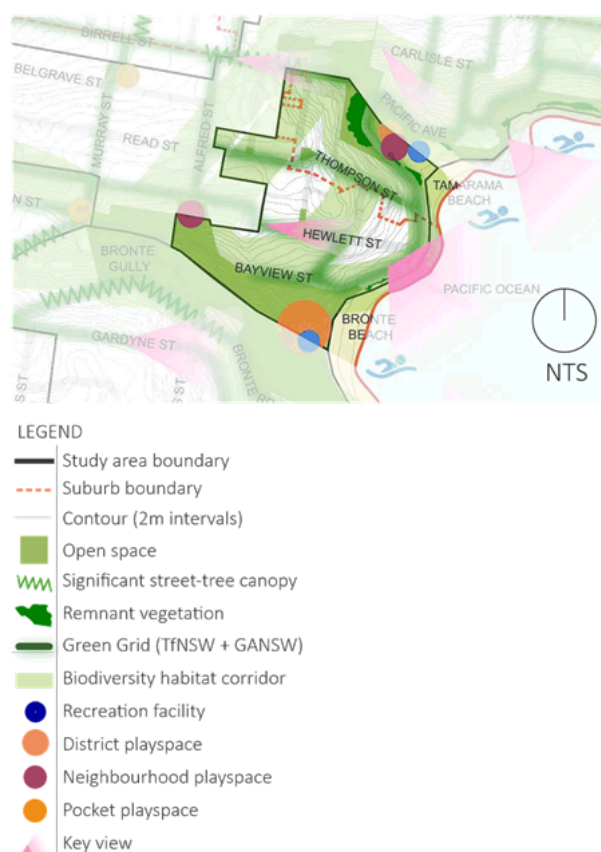
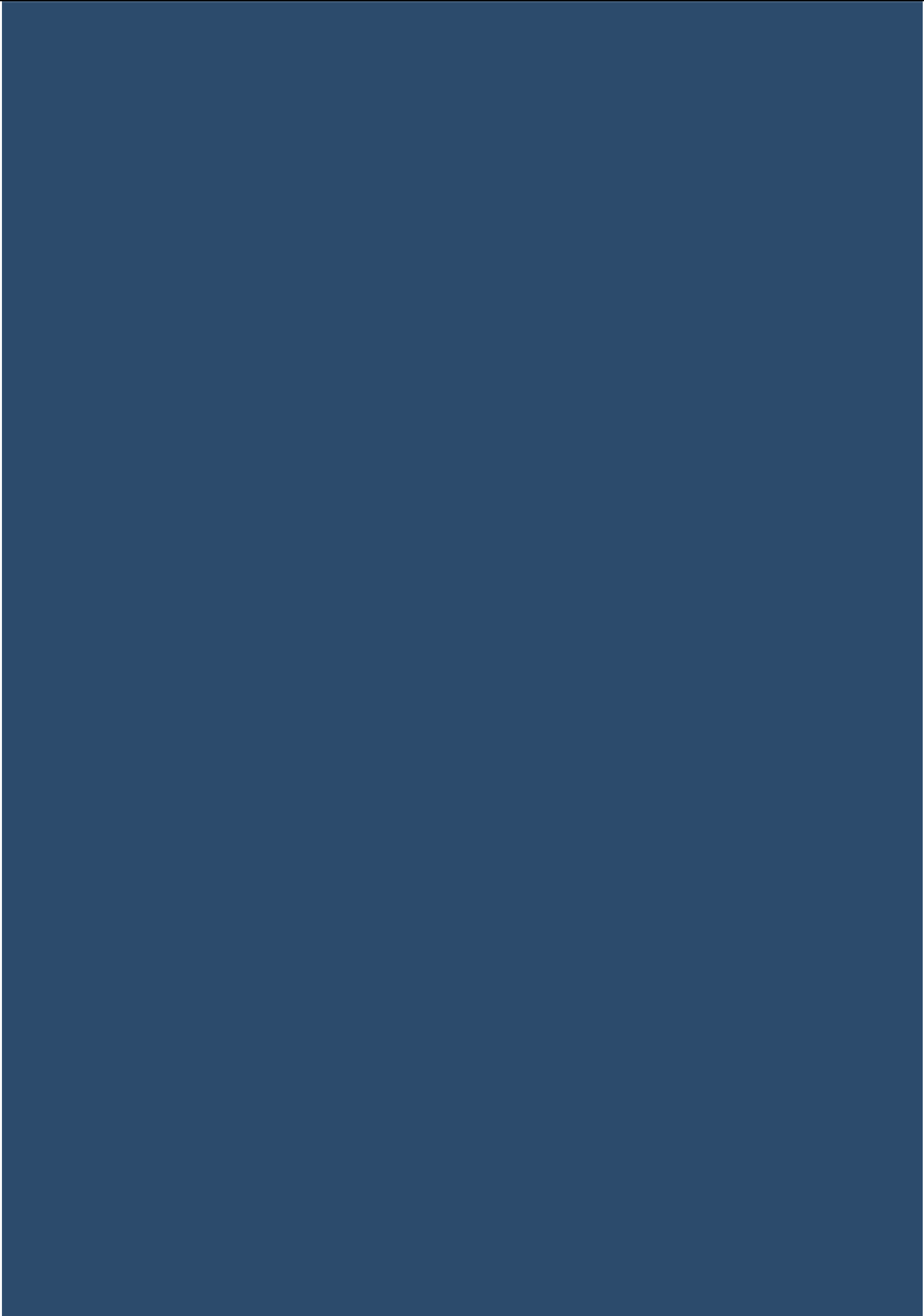


Figure 9-17 - Architectural styles area #09



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

10



CHARACTER AREA – 10

“The area is defined by highly irregular blocks comprising a patchwork of densely set, low-medium rise dwellings of various typologies and styles; streetscapes of varying materiality, limited landscaping and garages; coastline and ocean views; headland parks and gully that contribute to an important corridor of coastal open space”.

The study area is generally bound by Bondi Road and Hunter Park to the north, the Pacific Ocean to the east, Tamarama Gully and Park to the south and Denham Street to Tamarama Street to the west.



Figure 10-1 - Local character area #10 map



Figure 10-4 - Character area viewed from Birrell Street



Figure 10-2 - Dwellings fronting Pacific Avenue



Figure 10-5 - Marks Park, looking east

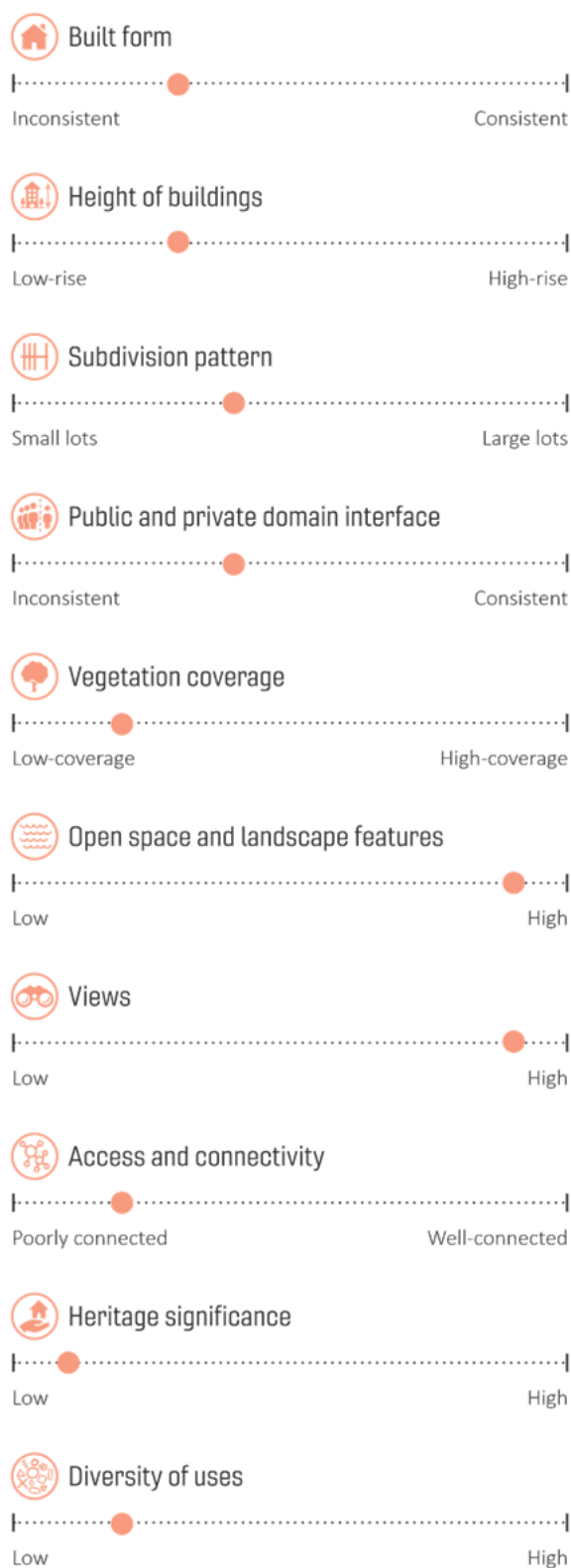


Figure 10-3 - Semi-detached dwellings, Dellview Street



Figure 10-6 - Semi-detached dwellings, Rowland Street

Existing character attributes



Desired future character

Vision

The desired future character of the area celebrates the iconic coastline, with a diverse range of residential development integrated with the natural sloping topography, buffered by vegetation that enhances the natural setting.

Objectives

The objectives for development on land identified within the character area are as follows:

- To encourage a diversity of dwelling styles and typologies, including semi-detached dwellings and low-rise RFBs (where compatible with adjacent built form),
- To ensure high-quality design of new contemporary detached and semi-detached dwellings, with well-articulated form and materiality. Flat roofs are supported for view sharing,
- To ensure alterations and additions read as a cohesive part of the existing dwelling and extension of historic form and materiality, particularly for existing semi-detached dwellings,
- To maintain the predominant 2-4 storey height character of the area, noting that buildings on sloping sites should adjust the relative level and height to follow the natural topography,
- To ensure that carparking structures do not dominate or adversely impact upon the streetscape. Integrate carparking within new dwellings,
- To promote the reduction of hard surfaces and an increase of public and private landscaping,
- To maintain views and vistas from the public domain,
- To minimise the impact on existing views and vistas from the private domain and maintain residential amenity in terms of overlooking and noise.

92 Existing character description

History

Development of the area has evolved from an early land holding of 10 acres, covering Tamarama bay, purchased by John Roby Hatfield in 1839. In addition to early housing, the land was used for grazing, dairy herding, market gardens and entertainment / leisure venues until the early 1900s. The Tamarama Aquarium was opened in 1887 and was a destination for dancing, bowling, skating and a shooting gallery. It closed in 1889. Wonderland City, an antipodean Coney Island later opened on the abandoned aquarium site in 1906. It closed in 1911. Popularity of the area for housing grew, driven by access to public transport, with the Sydney tram service reaching the Aquarium in 1887 and Bondi Beach in 1894, as well as the rising popularity of seaside daytrips and bathing. Tamarama Surf Life Saving Club (SLSC) was opened in 1906. Today, the area comprises predominantly residential uses, with supporting retail and commercial uses along Bondi Road and within the Fletcher Street village centre.



Figure 10-7 - Built form and uses area #10

Configuration and connectivity

Progressive subdivision and development of the area, combined with topographical constraints, tramline alignment, environmental damage from the former Aquarium and Wonderland City and neglect of Tamarama Gully, has resulted in a highly irregular block and street configuration. Lots are predominantly aligned east-west or north-south. The street hierarchy is unclear and hard to define, made up of multiple connected street segments, which impede clear navigation and circulation. The pattern of curved streets reflects the tramline alignment along Fletcher Street, responding to the tram's inability to take tight corners, as well as the poor road formation through the gully and coastline. The primary east-west connection through the area is Fletcher Street, with other east-west streets limited to no-through roads and laneways. Multiple north-south streets link Bondi Road and Pacific Avenue, which provide the primary access to and from the area. Multiple bus routes service the area providing connections to surrounding suburbs, Bondi Junction and Sydney CBD. Pedestrian connectivity is maintained along the street network, coastline and through-block links, for example Silva Street to Pacific Avenue.

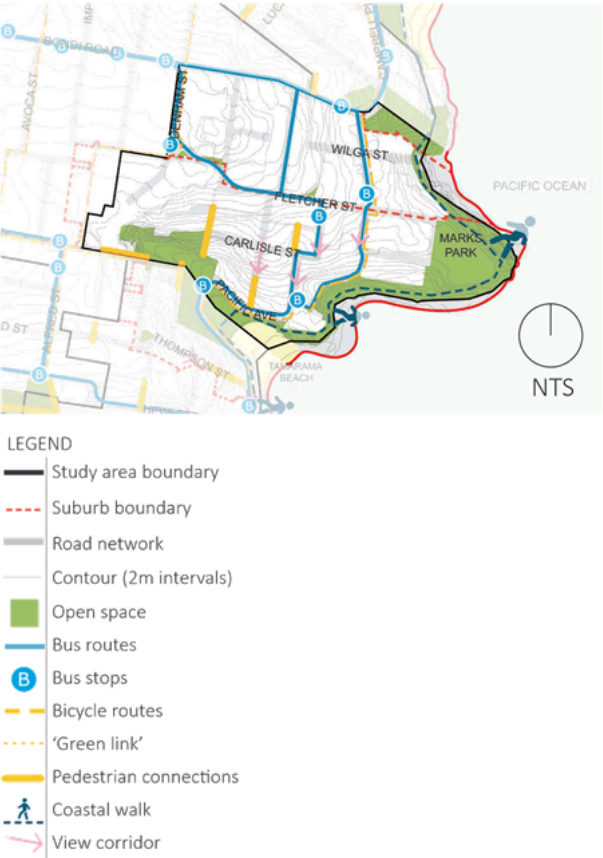


Figure 10-8 - Road network and movement area #10

Built form

The area is characterised by patchwork of dwelling typologies and styles, from detached and semi-detached Federation and Inter-War style bungalows, Inter-War and Mid-century Modern style RFBs, to late 20th century and 21st style detached, semi-detached dwellings and residential flat buildings (RFBs). This variety is reflective of the area’s progressive development. Notable clusters of Federation and Inter-War style bungalows are located on Dudley Street, Sandridge Street and Rowland Avenue. Bungalows of these styles are characterised by brick construction, low gabled terracotta tiled roofs, with thick masonry or timber verandah posts and decorated timber gable trim. Notable examples of Inter-War style RFBs are located on Fletcher Street and Wonderland Avenue. Modifications to early dwellings are common including second-storey, garage and balcony additions. Mid-century RFBs are interspersed throughout the area. RFBs of this style are typically red or blonde brick, raised above ground-level parking. Contemporary detached, semi-detached and RFB development is interspersed throughout the area, but is particularly evident on sites with views to the coast or gully, for example Kenneth Street. Modern dwellings are typically flat-roofed cascading buildings with wider modulation, wide integrated garages, large balconies and areas of transparent glass for doors, windows and balcony balustrades. These dwellings seek to maximise floor space, height and capture available views. The population density of the area is approximately 81 persons/ha. The dominant tenure type is private rental.



Figure 10-9 - RFB, Dellview Street

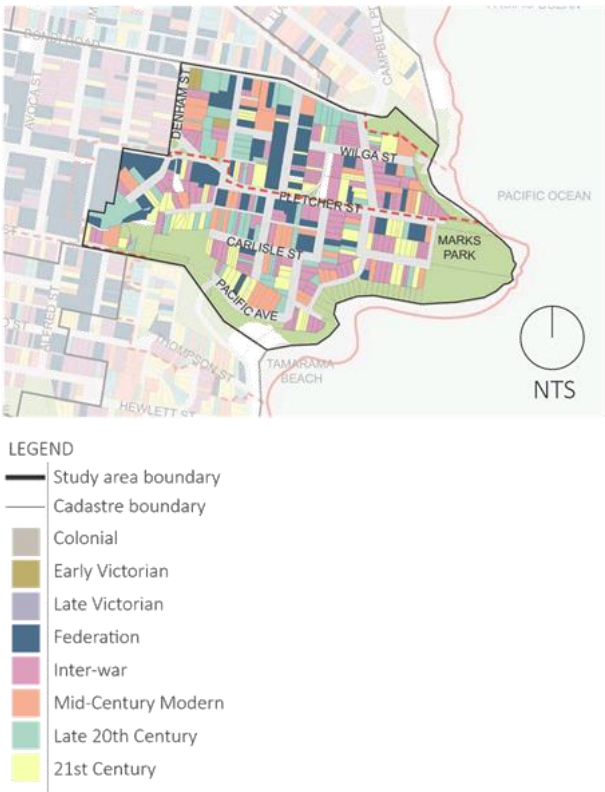


Figure 10-10 - Architectural styles area #10

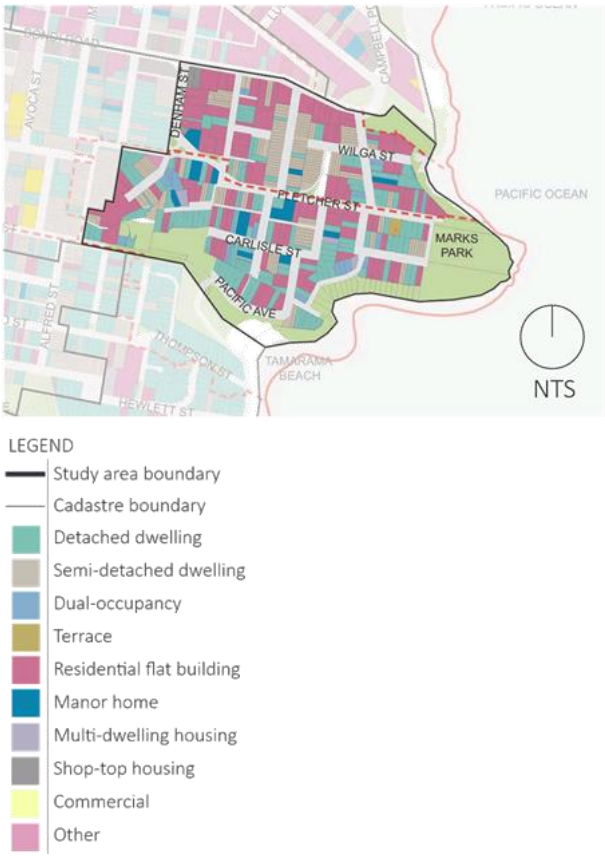


Figure 10-11 - Dwelling typologies area #10

94 Existing character description cont.

Dwellings are predominantly 2-4 storeys in height. Sloping topography has resulted in the modulation of built form, with the dwelling base (retaining wall, fence or garage) at street level and floors stacked above on upper sites or behind and below for lower sites. The height of the building can appear increased due to the raised topography above street level. Dwellings of 5+ storeys are evident within the area, including the 8-storey tower on Illawong Avenue, but are inconsistent with the prevailing height character.

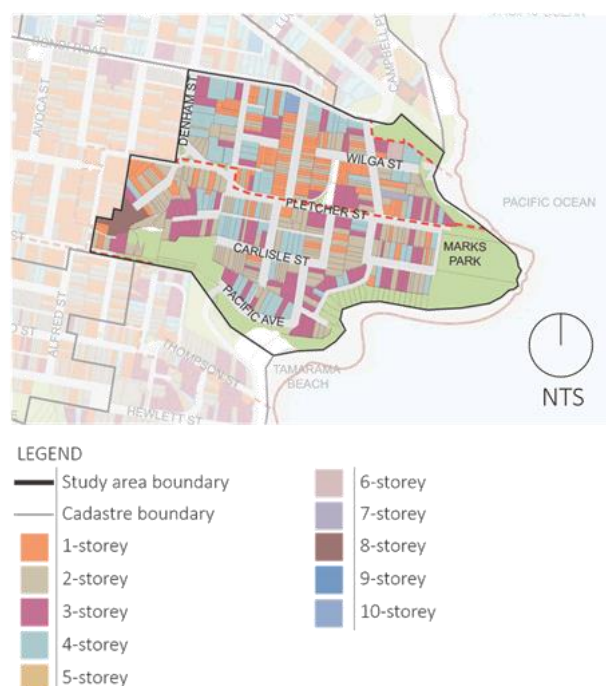


Figure 10-12 - Building height in storeys area #10

Public and private domain interface

The interface between the public and private domains differs due to street configuration, topographical changes, and dwelling typology. Inconsistent street corridor, verge and footpath widths vary the physical and visual transition between the domains, for example Sandridge Street versus Carlisle Street. The varying capacity of the verge to accommodate trees also influences the visual transition, altering the level of visibility between the street and dwelling. Laneways provide rear access and off-street parking, typically with high fence lines and enclosed garages at the boundary. Topographical changes result in a lower and upper side of the street. Dwellings on the upper sites are raised above the public domain, with built retaining walls, high fences and

/ or garage doors of varying materials and finishes, fronting the street. A solid wall presenting to the street is common, for example Kenneth Street. Front landscaping also varies, with deep soil often limited due to garage construction, for example Pacific Avenue. Upper balconies typically overlook the public domain. Dwellings on the lower sites often have their ground level partially or completely obscured from the street as a result of the sloping topography, vegetation, fencing and / or garages at the boundary, for example Carlisle Street (see Figure 10-14). Again, materiality and finishes vary, contributing to the area's inconsistent character. Front setbacks are generally consistent, however are difficult to read due to encroachment by parking structures. Inter-War RFBs also typically comprise narrow setbacks and limited landscaping, with a solid brick façade (facades vary), small window openings and entry presenting to the street (see Figure 10-9). Mid-late 20th century RFBs are raised above street level incorporating ground-floor carparking. Upper balconies overlook the public domain. Viewed from the coastline the area presents as a dense wall of layered built form (see Figure 10-4).



Figure 10-13 - Dwellings fronting Pacific Avenue



Figure 10-14 - Partially obscured dwellings, Carlisle Street

Natural environment

The headland parks and adjoining gully contribute to an important corridor of coastal public open space, having significant aesthetic, landscape and recreational value. Heritage-listed for their significance, the areas comprise European and Indigenous archaeological sites, remnant vegetation and a striking natural landscape that has drawn the attention of many artists. Vegetation coverage is predominantly low across the area, due to sparse street trees and high site coverage. Coverage improves along the coastline, with the area supporting a biodiversity corridor. These factors contribute to a generally low heat vulnerability. The area's elevated coastal location offers views to the ocean and surrounding areas from Fletcher Street, the headland parks and private domain. The iconic beaches, parks and Bondi-Coogee coastal walk (see Figure 10-16) offer passive and active recreation opportunities and support public gathering and events.

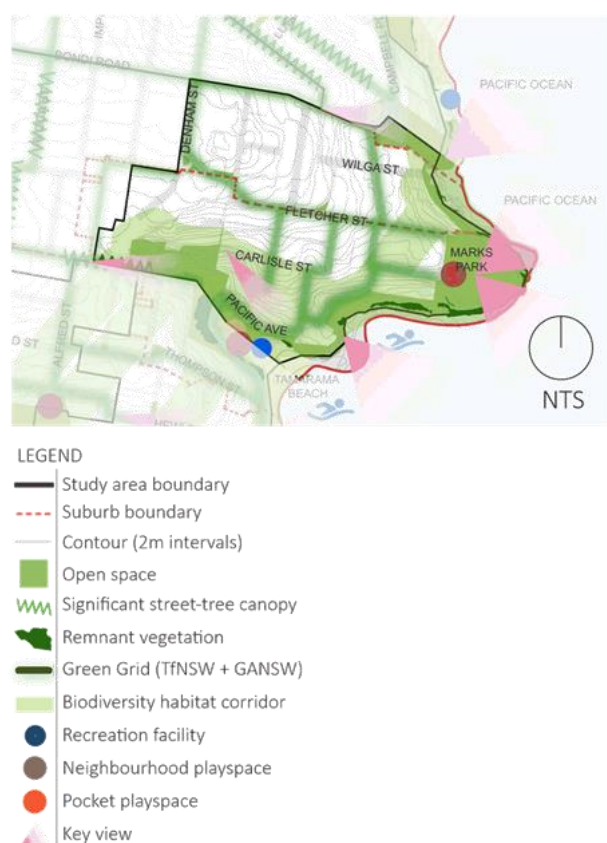


Figure 10-15 - Open space and vegetation area #10



Figure 10-16 - Coastline and coastal walk, looking north-east

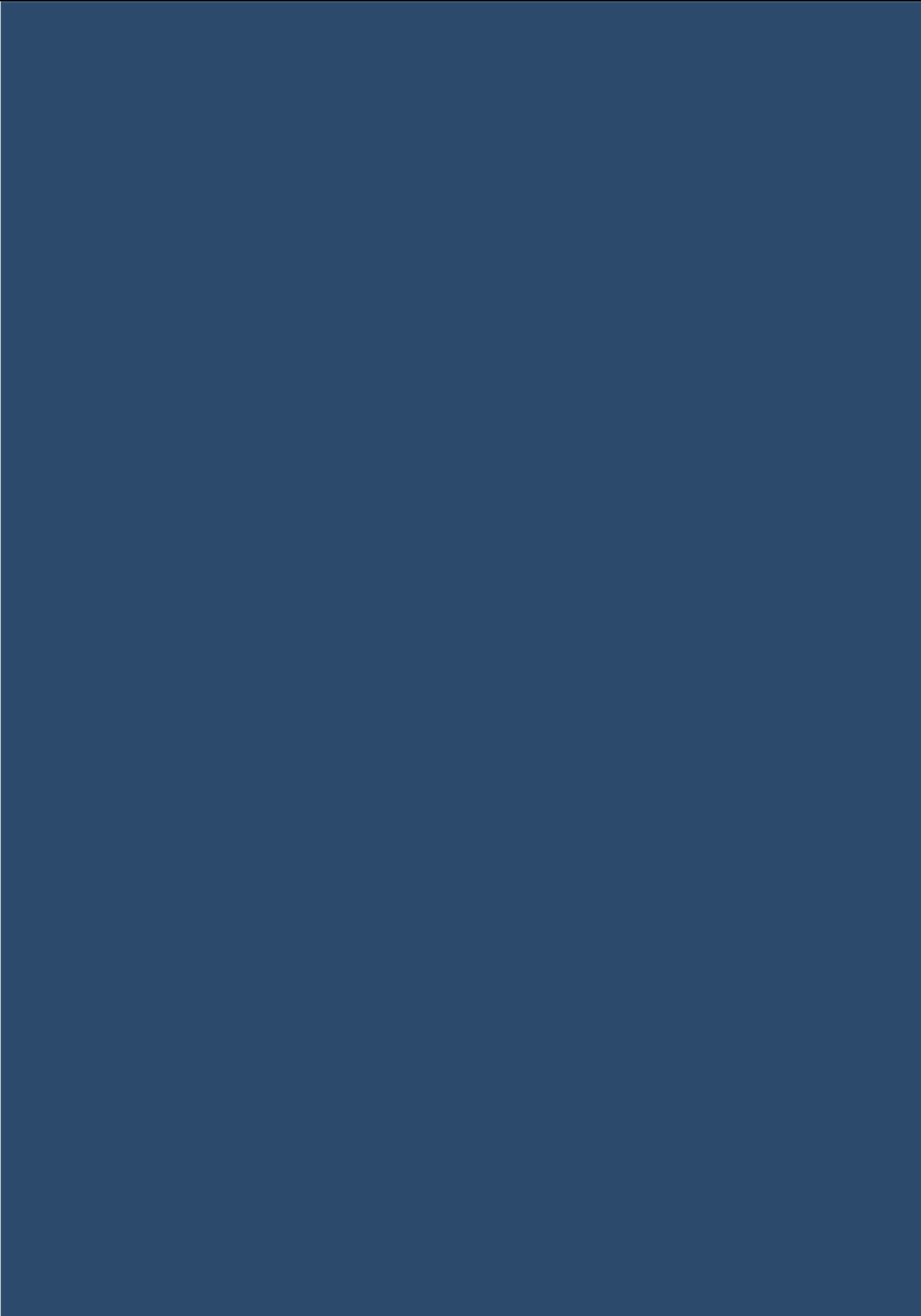
Recent development

Recent development comprises alterations and additions to existing detached and semi-detached dwellings and RFBs, including second-storey additions, attic extensions, garage extensions; construction of new detached and semi-detached dwellings; and limited consolidation of semi-detached and apartment dwellings. This indicates a demand for more floor space. It is also noted that at a suburb level, Tamarama has the highest percentage of dwellings listed on Airbnb in Australia, with one in five dwellings listed, indicating a trend of use of private dwellings for short-term rental accommodation.



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

11



CHARACTER AREA - 11

"The area is defined by an irregular grid pattern of long north-south blocks with limited east-west connections; closely set, low-rise built form on internal streets transitioning to medium-rise on peripheral streets, inconsistent streetscapes of varying styles, materials and vegetation coverage, including tree-lined avenues and open space".

The study area is generally bound by Bondi Road to the north, Denham Street to Tamarama Street to the east, Birrell Street to the south and St Marys Avenue to Paul Street to the west.



Figure 11-1 - Local character area #11 map



Figure 11-4 - Inter-War RFB, Bennett Street



Figure 11-2 - Terrace shopfronts, Bondi Road



Figure 11-5 - Semi-detached dwellings, Park Parade

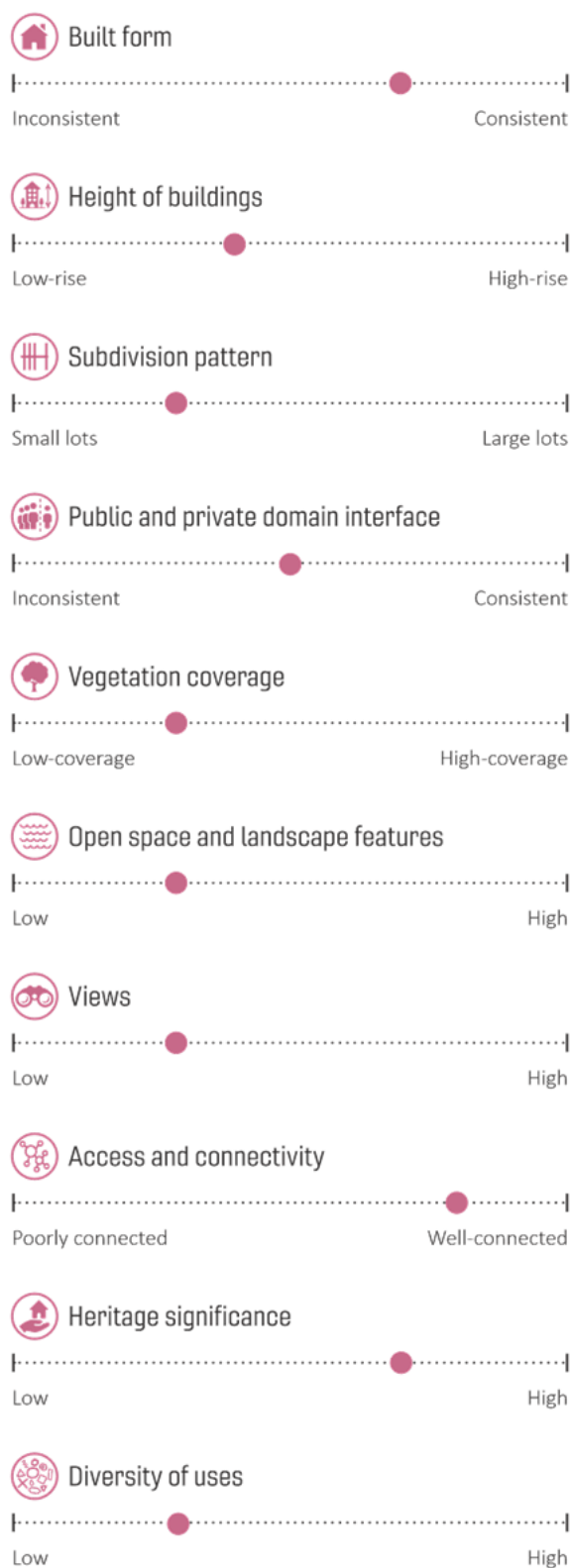


Figure 11-3 - Semi-detached dwellings, Avoca Street



Figure 11-6 - RFBs, Birrell Street

Existing character attributes



Desired future character

Vision

The desired future character is a densely-set residential area within easy walking distance of local shops and services, open space and the iconic coastline. The residential area is defined by a regular grid and street frontage pattern with a diversity of built form and canopy.

Objectives

The objectives for development on land identified within the character area are as follows:

- To recognise and maintain the diversity of uses in the area, specifically along Bondi Road,
- To recognise and promote Bondi Road as a gateway to Bondi Beach,
- To celebrate the heritage and maintain the fine-grain nature of the historic shopfronts,
- To effectively manage the retail / commercial and residential interface,
- To reinforce the consistent groupings of Federation and Inter-War style dwellings, including pitched roofscape and front setbacks,
- To ensure alterations and additions read as a cohesive part of the existing dwelling and extension of historic form and materiality, particularly for existing terraces and semi-detached dwellings,
- To ensure front fences and landscaping relate to the period and architectural style of the dwelling, and maintain visual connection between the dwelling and street,
- To promote new detached, semi-detached dwellings and RFBs that complement the existing built form in terms of height, setbacks and predominant horizontal and vertical proportions,
- To maintain the 1-2 storey height character of internal streets,
- To ensure that carparking structures do not dominate or adversely impact upon the streetscape. Locate carparking structures behind the building line,
- To retain and increase tree canopy in the public and private domains,
- To reduce pedestrian, cyclist and vehicle conflicts, and to improve pedestrian and cyclist amenity on Bondi Road.

100 Existing character description

History

Development of the area has evolved from the progressive subdivision of a number of large gentlemen’s estates, including the Dickson, Avoca, Braylesford and Boonara estates originally constructed in the mid-late 19th century. In addition to early housing, the land was used for grazing, dairy herding and market gardens. Waverley Park was established in 1880. The linear north-south pattern of the estates and initial streets established along their boundaries are reflected in the configuration of the area today. Increased development progressively extended along Bondi Road and into the area following subdivision of the estates from the late 19th century. Housing development was driven by access to public transport with the Sydney tram service reaching Tamarama in 1887 and Bondi Beach in 1894. Bondi Road became a major transport route, with businesses servicing the growing local population and tourist trade. Today, the area comprises predominantly residential uses with supporting commercial and retail uses within the Bondi Road local centre (see Figure 11-2).

Configuration and connectivity

Blocks are arranged in an irregular grid pattern across the area’s topography, which slopes gradually to the east. Internal streets are predominantly aligned north-south. To the west of Watson Street, parallel through-streets (Park Parade, Bennett, Ocean and Watson streets) link Bondi Road and Birrell Street which provide the primary access to and from the area. To the east of Watson Street, north-south connectivity is less defined. Permeability of the area is reduced due to long north-south blocks and limited east-west connectivity resulting from the prevalence of no-through roads and laneways. Multiple bus services connect the area to the northern and southern suburbs of the LGA, Bondi Junction and Sydney CBD.

Built form

The area is characterised by predominantly 1-2 storey terraces, detached and semi-detached dwellings along internal streets, with shop-top housing fronting Bondi Road and 3-4 storey residential flat buildings (RFBs) fronting Bennett and Birrell streets (see Figure 11-6).

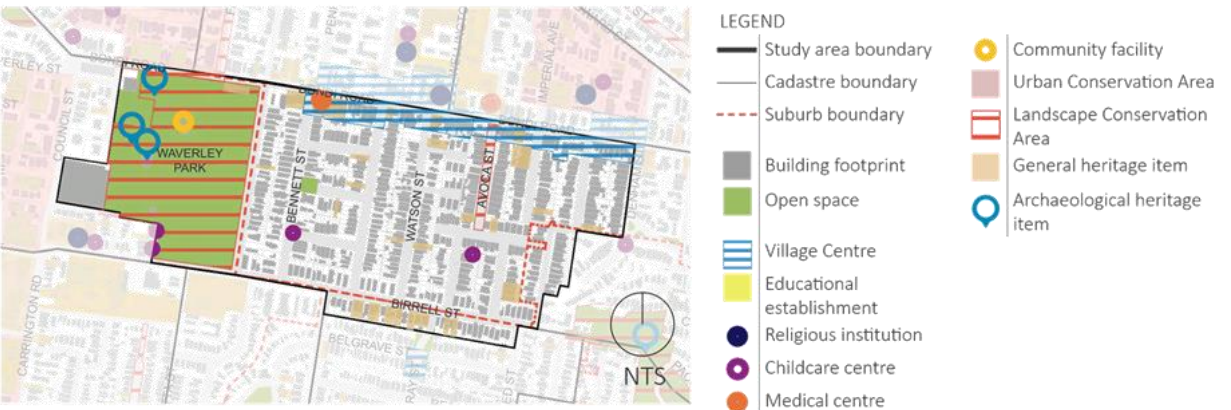


Figure 11-7 - Built form, uses and heritage area #11

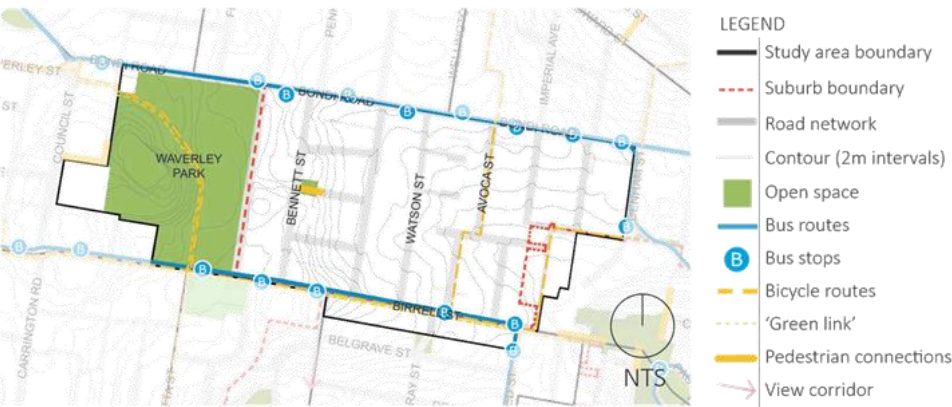


Figure 11-8 - Road network and movement area #11

The area is characterised by a variety of architectural styles, the dominant style being Federation which reflects the first wave of significant development of the former estates. Consistent streetscapes of this style are evident on Avoca, Phillip, Tamarama, King and Ewell streets. Federation-style shopfronts are a feature on Bondi Road. The Inter-War style reflects the second wave of development. Clusters of Inter-War detached, and semi-detached dwellings are located on Imperial and Boonara avenues and Denham, Avoca and Ocean streets. These styles are characterised by brick construction, low gabled terracotta tiled roofs, with thick masonry or timber verandah posts and decorated timber gable trim. Inter-War RFBs are located on Bennett Street. Alterations including materiality changes and second-storey and parking additions, are common. Later development, including Mid-century Modern style RFBs eroded the earlier setting, capitalising on views to the ocean and availability of land around earlier dwellings or through property amalgamation. RFBs of this style are typically red or blonde brick. Infill development of late 20th century and 21st style development has continued sporadically throughout the area. The population density of the area is approximately 92 persons/ha.



Figure 11-11 - Semi-detached dwellings, Coulton Street



Figure 11-12 - RFB, Watson Street

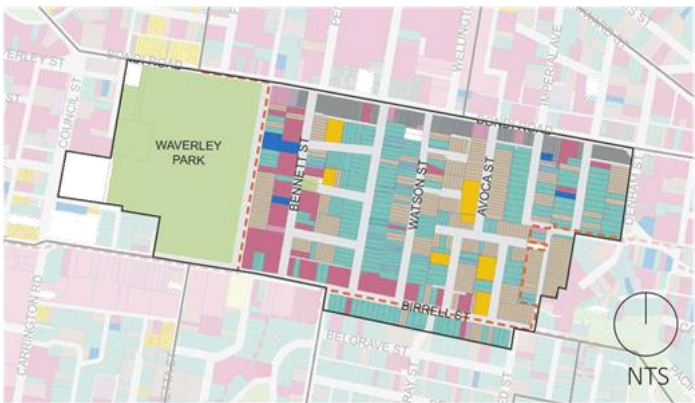


Figure 11-9 - Dwelling typologies area #11



Figure 11-10 - Architectural styles area #11

102 Existing character description cont.

Public and private domain interface

The interface between the public and private domain varies across the area as a result of different street and dwelling typologies. Differing widths of the street corridor, verge and footpath varies the physical and visual transition between the domains, for example Tamarama Street compared with Imperial Avenue. The narrow, corridor-like rear lanes are dominated by garage doors, high fences and walls and landscape screening. Shallow front setbacks, low fencing and limited front landscaping result in high visibility of the dwelling from the public domain (see Figure 11-16). The later addition of car-parking within the front setback, either hard-stand, carport or enclosed garage at the boundary, detracts from the streetscape and the dwelling form. A number of corner sites present blank side walls or fences to the public domain. Inter-War RFBs also typically comprise narrow setbacks and limited landscaping, with a solid brick façade (facades vary), small window openings and entry presenting to the street (see Figure 11-17). Mid-late 20th century RFBs are raised above street level incorporating ground-floor carparking (see Figure 11-13). Upper balconies overlook the public domain. Through the Bondi Road centre, fine-grain shopfronts abut the public domain, creating a highly visible, active frontage.



Figure 11-13 - RFBs, Bennett Street



Figure 11-15 - Semi-detached dwellings, Watson Street



Figure 11-16 - Detached dwellings, Boonara Avenue



Figure 11-17 - RFB, Imperial Avenue



Figure 11-14 - Semi-detached dwellings, Avoca Street

Natural environment

The area benefits from access to Waverley Park, Stephen Street Reserve as well as the coastal open space network to the east. ‘Green links’ aid connectivity. Waverley Park is a major recreational facility which supports a number of sporting and community groups. The area’s sloping topography provides views out from Waverley Park (see Figure 11-19) and Bondi Road towards the coast. Internal views are limited. Vegetation coverage is predominantly low across the area, as a result of closely set development which limits the opportunity for significant private open space in the front or rear yards as well as the varying capacity of the street verge to accommodate planting. Varying on-street planting contributes to a sense of openness or enclosure, for example King Street compared to Tamarama Street. Mature fig trees line King, Stephen, Ewell and Avoca streets. The area has a medium-high heat vulnerability.

Recent development

Recent development comprises alterations and additions to existing dwellings, including second-storey additions, attic conversions, carport / garages; limited construction of secondary dwellings, such as loft / studio over rear garages; and limited construction of new infill detached and semi-detached dwellings. Indicative of a trend toward maintaining existing built form whilst achieving more floor space and on-site car-parking.

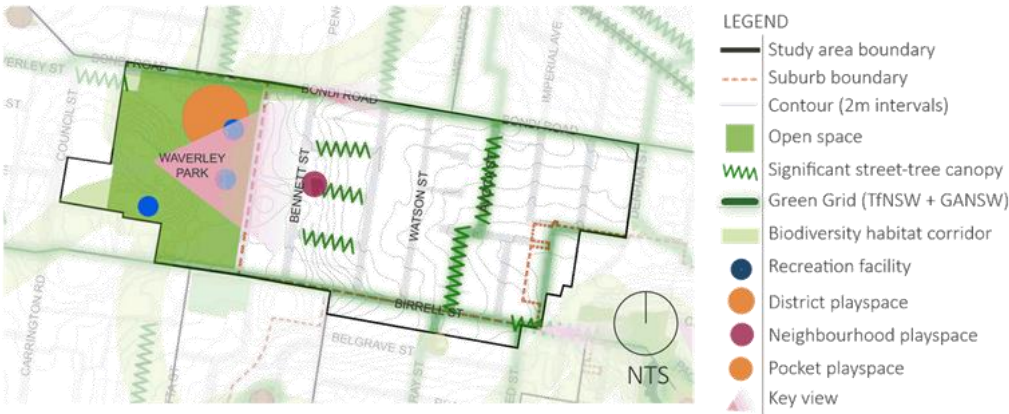



Figure 11-18 - Open space and vegetation area #11

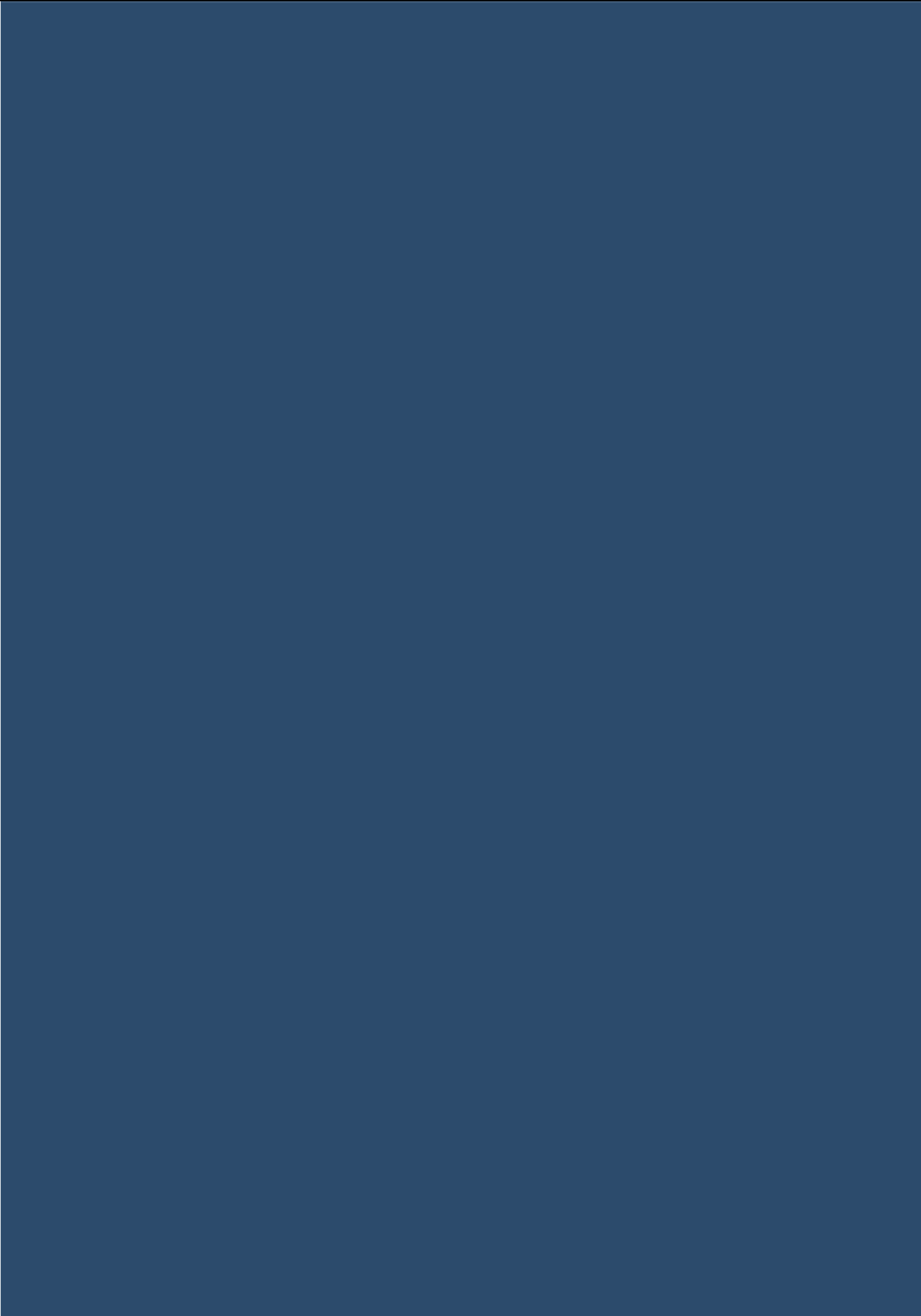


Figure 11-19 - Waverley Oval, looking east



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

12



CHARACTER AREA - 12

"The area is characterised by established streetscapes of closely set, low-rise terraces, detached and semi-detached dwellings residential flat buildings of predominantly Late Victorian, Federation and Inter-War styles, narrow rear laneways; and narrow-street verges, limited drive-ways and irregularly spaced street-trees".

The study area is generally bound by Old South Head Road (OSHR) to the north, Flood Lane to the east, and Bondi Road to the south and west.



Figure 12-1 - Local character area #12 map



Figure 12-4 - Street corridor, Kenilworth Street



Figure 12-2 - Semi-detached dwellings, Woodstock Street



Figure 12-5 - Old South Head Road frontage, looking west

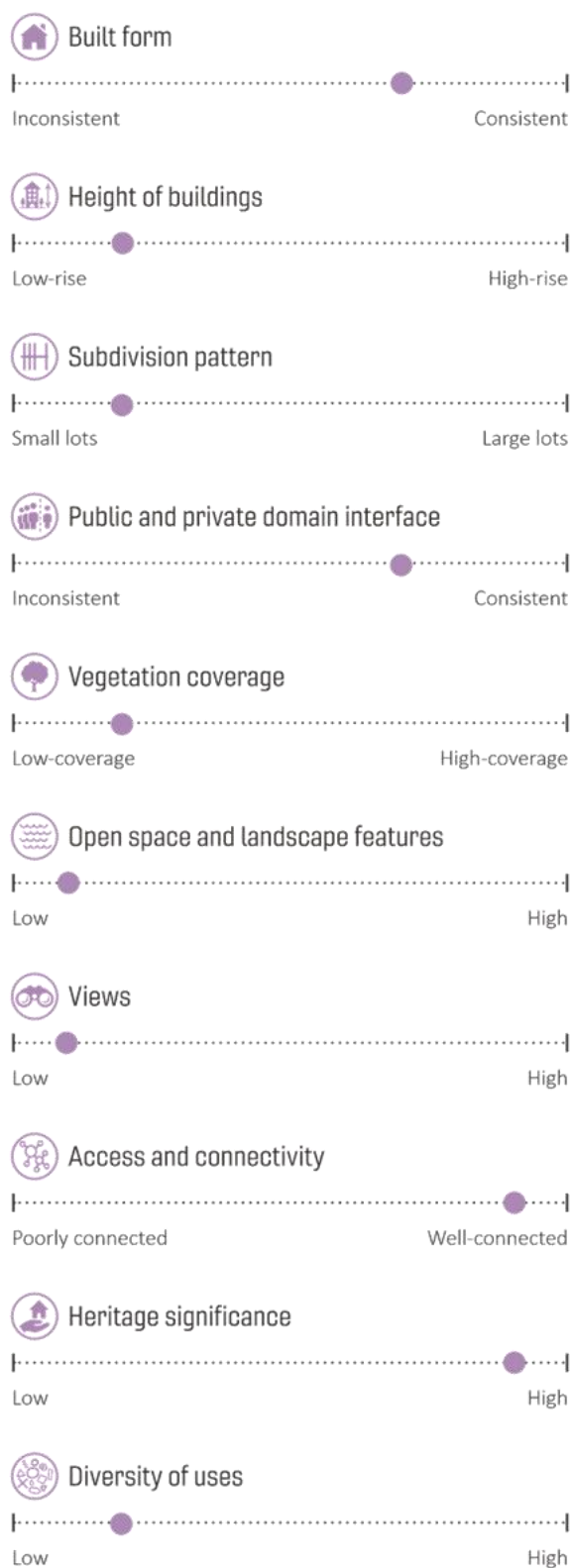


Figure 12-3 - Terrace dwellings, Woodstock Street



Figure 12-6 - Waverley Crescent, looking west

Existing character attributes



Desired future character

Vision

The desired future character is an historic and consistent residential neighbourhood within easy walking distance of local shops and services, and open space.

Objectives

The objectives for development on land identified within the character area are as follows:

- To preserve the heritage items and the integrity of the Urban Conservation Area,
- To maintain the predominant low-rise character of the area,
- To maintain the historically distinctive pattern of subdivision and associated terrace, semi-detached and detached dwelling typologies,
- To discourage demolition and promote sympathetic additions that retain the scale and massing of front elevations and the original roof form as viewed from the primary street frontage,
- To ensure new development respects the historic patterns, original built form, architectural styles, materials and details of the area,
- To promote the high-quality design of new contemporary dwellings to the north-west of the area, fronting OSHR and Bondi Road, and recognising this area as a key gateway to the Waverley LGA,
- To ensure secondary dwellings and ancillary development enhance rear laneways and maintain a high standard of residential amenity for surrounding dwellings,
- To ensure front fences and landscaping relate to the period and architectural style of the dwelling, and maintain visual connection between the dwelling and street,
- To limit new driveway crossovers and car parking within the front setback, by retaining vehicle access from rear lanes,
- To retain and increase tree canopy in the public and private domains.

108 Existing character description

History

The area has evolved from the subdivision and development of early land holdings along OSHR. The primary land holding being Barnett Levey's 60 acres granted in 1826. Levey was the third grantee of land in the Waverley municipality. Levey's Waverley Crescent Subdivision was advertised on 30 January 1828 in The Australian, comprising 68 allotments. One of Waverley's earliest villas, 'Ben Eden' constructed in 1863, remains. The subdivision of the Levey Estate to the west of Paul Street, and John B Jones' and Edward Flood's Estates to the east, established the current street pattern and narrow allotments. Improvements in transport and the rapid expansion of suburban Sydney between 1880-1915 saw the consolidation of Bondi Junction and further development of the established Victorian streetscapes for housing. The area remains predominantly residential, with supporting clusters of religious and educational institutions, including the Central Synagogue, and commercial and retail premises along Bondi Road and within the Flood Street local centre on OSHR.

Configuration and connectivity

Blocks are arranged in an irregular grid pattern across the area's relatively flat topography. To the east of Paul Street, parallel east-west streets and rear laneways establish consistent blocks from Bondi Road. The cranked alignment of Paul Street changes the block configuration to the west, with streets running parallel to OSHR. Waverley Crescent (see Figure 12-6) and Bon Accord Avenue are curvilinear in nature. North-south street connectivity is limited to Flood Lane and Paul Street. Internal streets are bound by primary arterial routes OSHR (see Figure 12-5) and Bondi Road, which provide the primary access to and from the area. The area benefits from its close proximity to Bondi Junction and Bronte Road, where heavy rail and bus services provide access to the coast, Sydney CBD and surrounding areas. The area also benefits from the commercial, retail and social services offered at Bondi Junction.



Figure 12-7 - Built form, uses and heritage area #12

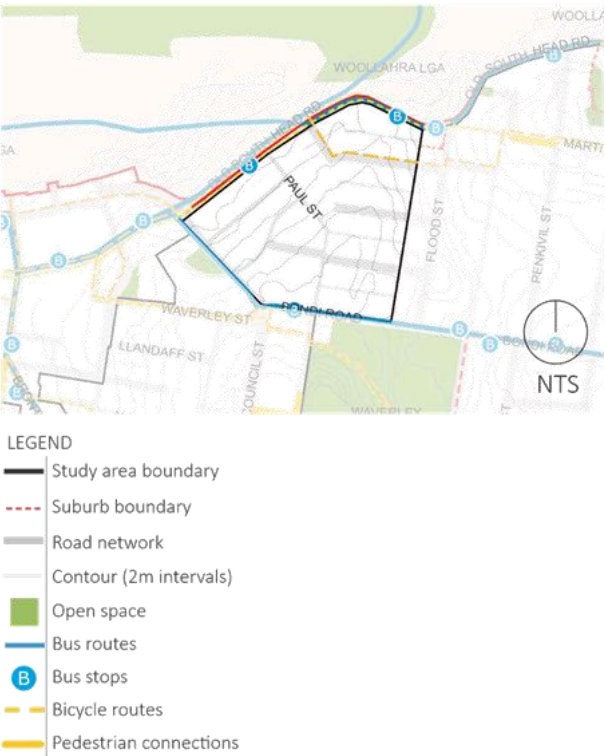
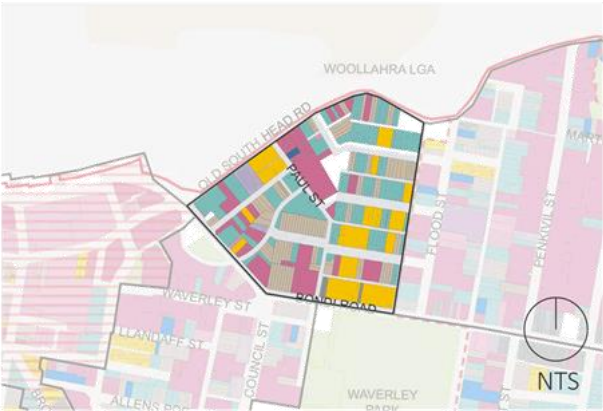


Figure 12-8 - Road network and movement area #12

Built form

The area is predominantly characterised by 1-2 storey Late Victorian and Federation-style terraces, detached and semi-detached dwellings, reflective of the area being the first attempt at a consolidated residential setting within Waverley and a rare example of Georgian town planning in Sydney's east. Features of these styles include masonry, moulded render, decorative tile and iron detailing. Exemplar, heritage-listed dwellings are located on Ben Eden Street and Woodstock Street (see Figure 12-3). Later Inter-War style semi-detached dwellings as located on Gowrie Avenue (see Figure 12-10). These dwellings are characterised by low gabled roofs, brick construction, and arched verandah openings. Inter-War residential flat buildings (RFBs) of 3-4 storeys front OSHR. Consistent bulk, scale and style creates coherent streetscapes. The area forms the heritage-listed Woodstock Conservation Area. Intrusive construction of Mid-century and late 20th century-style RFBs of 9+ storeys are inconsistent with the prevailing character of the area, for example fronting Bondi Road, Gowrie Avenue and Woodstock and Kenilworth streets. Contemporary infill emulates the bulk, scale and detailing of the earlier styles. The population density of the area is approximately 100 persons/ha.



- LEGEND
- Study area boundary
 - Cadastre boundary
 - Detached dwelling
 - Semi-detached dwelling
 - Dual-occupancy
 - Terrace
 - Residential flat building
 - Manor home
 - Multi-dwelling housing
 - Shop-top housing
 - Commercial
 - Other

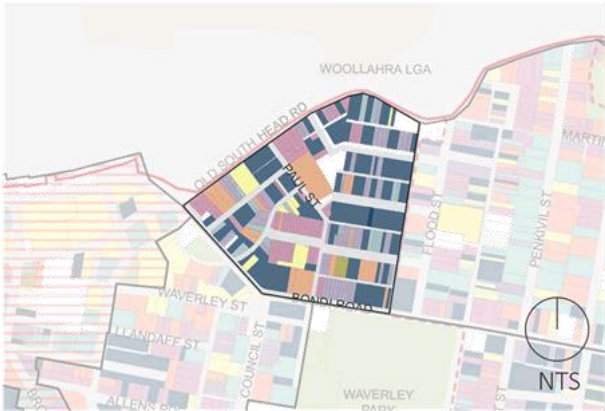
Figure 12-9 - Dwelling typologies area #12



Figure 12-10 - Semi-detached dwellings, Gowrie Street



Figure 12-11 - RFB, Paul Street



- LEGEND
- Study area boundary
 - Cadastre boundary
 - Colonial
 - Early Victorian
 - Late Victorian
 - Federation
 - Inter-war
 - Mid-Century Modern
 - Late 20th Century
 - 21st Century

Figure 12-12 - Architectural styles area #12

110 Existing character description cont.

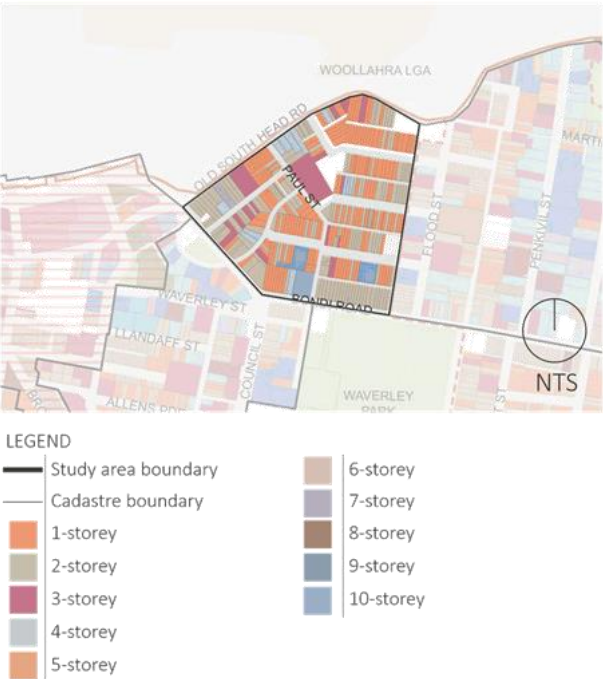


Figure 12-13 - Building height in storeys area #12



Figure 12-14 - Terrace dwelling, Kenilworth Street



Figure 12-15 - Garage frontages, Gowrie Avenue

Public and private domain interface

The interface between the public and private domain varies across the area. East of Paul Street, street corridors are typically wide, contributing to a sense of openness. To the west of Paul Street, street corridors narrow, creating a sense of enclosure. Predominantly narrow street verge and footpath widths combined with shallow front setbacks result in a short physical and visual transition between the public and private domains, for example Bon Accord Avenue compared to Waverley Crescent (see Figure 12-17 and Figure 12-18). Terraces, detached, and semi-detached dwellings are typically closely set, with low front fences and limited landscaping. Terraces typically have upper-level balconies which overlook the public domain. Inter-War RFBs also typically comprise nil-narrow setbacks and limited landscaping, with a solid brick façade (facades vary), small window openings and entry presenting to the street, for example Paul Street. Mid-late 20th century RFBs comprise greater setbacks and are typically raised above street level. Upper balconies overlook the public domain (see Figure 12-19). The majority of dwellings within the area are serviced by off-street parking due to the prevalence of rear lanes, with later additions of hard-stand, carport or garage parking. Lanes are dominated by garage doors, high fences and walls and landscape screening. Rear parking results in a consistent streetscape not interrupted by driveway crossovers. Whilst not common, later additions of car-parking (carports or garages) encroach on the front setback.



Figure 12-16 - RFB, Bondi Road



Figure 12-17 - Waverley Crescent, looking west



Figure 12-18 - Terrace dwellings, Bon Accord Avenue



Figure 12-19 - RFB, Woodstock Street

Recent development

Recent development comprises alterations and additions to existing dwellings, including second-storey additions, carports / garages, attic conversions; construction of secondary dwellings, such as loft / studio over rear garages; limited construction of new infill detached, semi-detached dwellings and RFBs, particularly on OSHR; and boarding house uses. Indicating a trend toward additional floor space and maximising site coverage whilst respecting the existing character of the Woodstock Conservation Area.

Natural environment

The area is devoid of open space, however benefits from close proximity to Fingleton Reserve, Waverley Park and Cooper Park (Woollahra). 'Green links' aid connectivity. Vegetation across the area is predominantly low, particularly on the area's boundaries along OSHR and Bondi Road. This is due to the varying capacity of the street verge to accommodate planting. Densely built form also inhibits significant planting within the private domain. These factors contribute to a medium-high heat vulnerability.

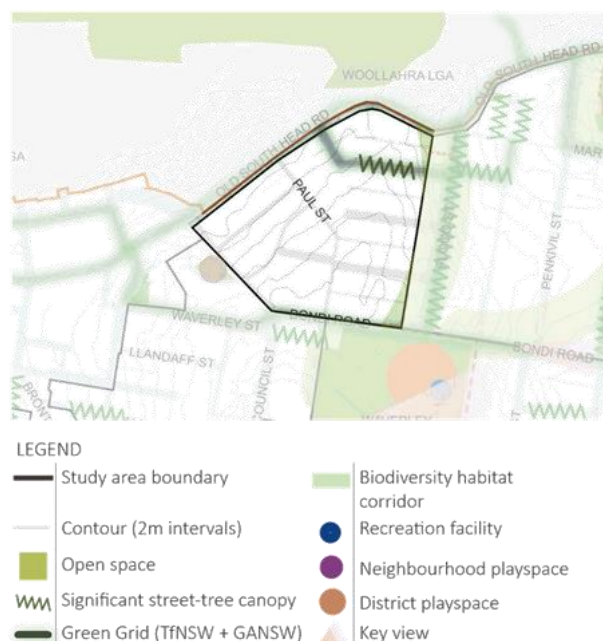


Figure 12-20 - Open space and vegetation area #12



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

13



CHARACTER AREA – 13

“The area is defined by long north-south blocks comprising predominantly medium-high rise residential flat buildings of various styles, situated on large, irregular lots, amongst a mature tree canopy; limited street presence with front setbacks of car-parking, paved areas and limited landscaping; district views to and from the area”.

The study area is generally bound by Old South Head Road (OSHR) and Francis Street to the north, Wellington Street to the west, Bondi Road to the south and Flood Lane to the east.



Figure 13-1 - Local character area #13 map



Figure 13-4 - RFBs, Penkivil Street



Figure 13-2 - Street corridor, Penkivil Street



Figure 13-5 - RFBs, Ocean Street North

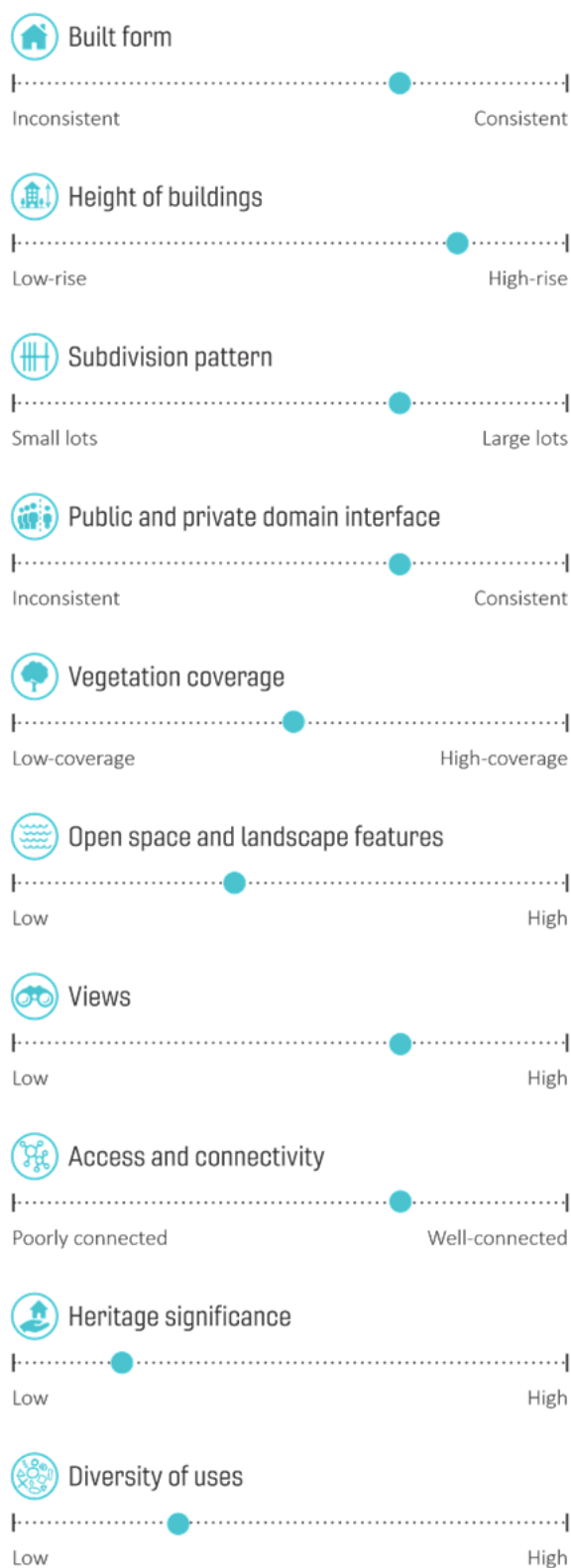


Figure 13-3 - RFBs, Penkivil Street



Figure 13-6 - Terrace dwellings, Watkins Street

Existing character attributes



Desired future character

Vision

The desired future character of the area is defined by high-density residential area within walking distance to local shops and services, and open space and the coastline. Development is well integrated into the streetscape through design excellence and landscape design including mature tree canopy.

Objectives

The objectives for development on land identified within the character area are as follows:

- To recognise and maintain the diversity of uses in the area, particularly along Bondi Road,
- To celebrate the heritage and maintain the fine-grain nature of the historic shopfronts,
- To effectively manage the retail / commercial and residential interface,
- To preserve the heritage items and the integrity of the Urban Conservation Area,
- To discourage demolition of earlier Late-Victorian, Federation and Inter-War-style dwellings, and promote sympathetic additions that retain the scale and massing of front elevations and the original roof form as viewed from the primary street frontage,
- To encourage high-quality contemporary medium-high rise RFB development within the area. Consider site amalgamation where appropriate,
- To maintain and enhance the significant landscape features of the area, including the large street tree canopy,
- To maintain the significant landscape buffer at the rear of properties abutting Thomas Hogan Reserve and Dickson Park,
- To promote the reduction of hard surfaces, particularly within the front setback, to increase landscaping,
- To promote through-block connections, where appropriate,
- To minimise the impact on existing views and vistas from the private domain and maintain residential amenity in terms of overlooking and noise.
- To reduce pedestrian, cyclist and vehicle conflicts, and to improve pedestrian and cyclist amenity on Bondi Road.

Existing character description

History

Development of the area has evolved from the progressive subdivision of a number of early land holdings and Victorian estates between OSHR and Bondi Road, including 'Anglesea Estate', from the mid-1800s. The linear north-south pattern of the holdings and initial streets, including Flood, Anglesea and Penkivil streets, established along their boundaries are reflected in the configuration of the area today. Up until the early 1890s the area comprised scattered free-standing houses and assorted buildings. One of the late-Victorian villas 'Scarba', constructed in 1884, remains at 30 Wellington Street. From the early 1900s, improvements in tram transport along Bondi Road and the consolidation of Bondi Junction saw further subdivision and housing construction through the area. Today, the area comprises predominantly residential uses with supporting commercial and retail uses along Bondi Road local centre, and educational and religious establishments.

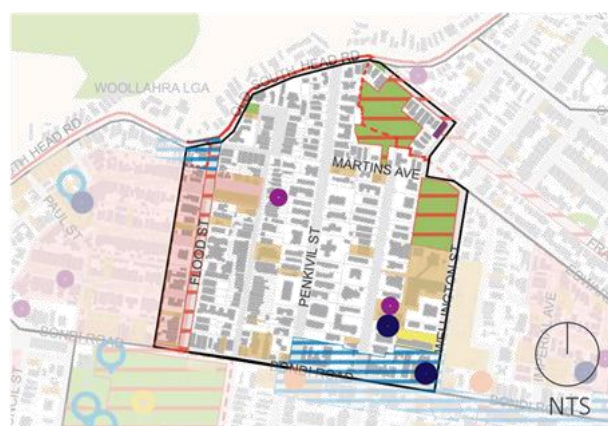


Figure 13-7 - Built form, uses and heritage area #13

Configuration and connectivity

Long north-south blocks extend across the area's relatively flat topography. Lot sizes vary. A well-defined street network comprises primary through streets (Flood, Penkivil, Wellington streets) and secondary streets (Anglesea and Ocean streets), extending north-south, with limited east-west street connections, which results in reduced permeability. Penkivil Lane maintains pedestrian connectivity between Orr Street and Martins Avenue. Streets are predominantly 2-way with on-street parking. OSHR and Bondi Road provide the primary access to and from the area. Multiple bus services along OSHR and Bondi Road connect the area to the northern and southern suburbs of the LGA, Bondi Junction and Sydney CBD. The area also benefits from its proximity to the commercial, retail and social services offered at Bondi Junction.

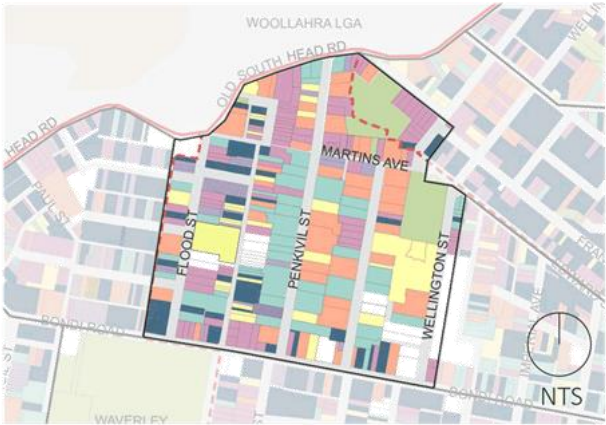
Built form

The area is characterised predominantly by residential flat buildings (RFBs), of various styles, from Inter-War, Mid-century Modern, to late 20th century and 21st century styles. RFBs are typically situated on large, irregular lots and are of 3-9 storeys in height. Dominance of the RFB typology results in the area being the highest density residential precinct within the LGA. The population density of the area is approximately 162 persons/ha. Clusters of 3-4 storey Inter-War style RFBs are evident on Francis, Simpson, Ocean and Penkivil streets (see Figure 13-3 and Figure 13-4). Inter-War RFBs are typically characterised by a solid brick façade (facades vary), small window openings and entry presenting to the street (see Figure 13-16). Mid-century Modern to 21st century style RFBs, of 4+ storeys define Wellington, Ocean and Penkivil streets. RFBs of these styles comprise red, blond or rendered brick, upper-level balconies and ground or underground parking. A number of these properties have been built around or to the rear of earlier Victorian and Federation-style dwellings. To the west of the area, on Anglesea, New and Watkins streets, the typology changes to 1-2 storey terraces, detached and semi-detached dwellings of earlier Victorian, Federation and Inter-War style dwellings (see Figure 13-6 and Figure 13-15). Watkins Street forms the heritage-listed Watkins Street Conservation Area. The subdivision pattern changes to narrow-fronted deep allotments. Elements of these styles include brick construction, tiled roofs, timber verandah posts and decorative iron or timber balustrades, fences etc. Modifications to these earlier dwellings have occurred over time. The bulk, scale, materiality and articulation of the area varies as a result.



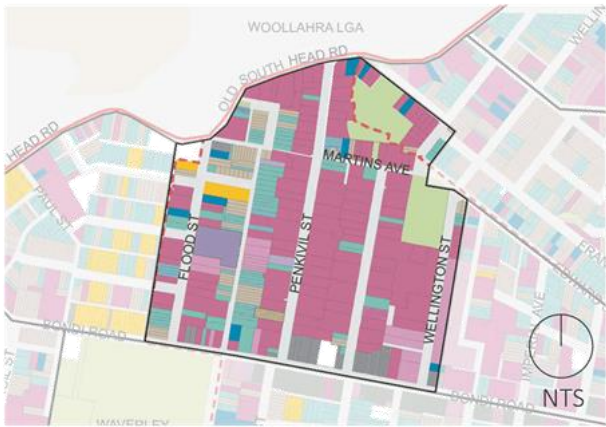
- LEGEND
- Study area boundary
 - Suburb boundary
 - Road network
 - Contour (2m intervals)
 - Open space
 - Bus routes
 - Bus stops
 - Bicycle routes
 - Pedestrian connections

Figure 13-8 - Road network and movement area #13



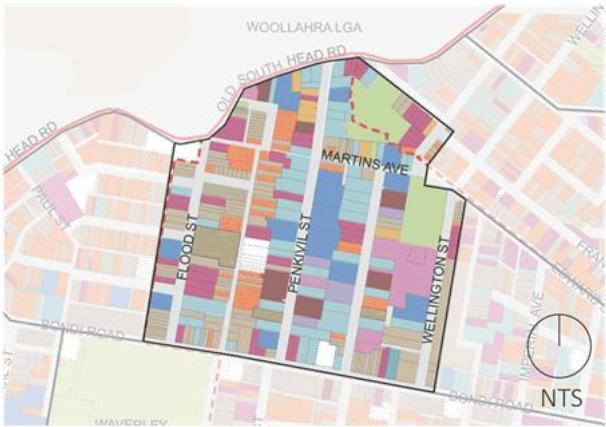
- LEGEND
- Study area boundary
 - Cadastral boundary
 - Colonial
 - Early Victorian
 - Late Victorian
 - Federation
 - Inter-war
 - Mid-Century Modern
 - Late 20th Century
 - 21st Century

Figure 13-10 - Architectural styles area #13



- LEGEND
- Study area boundary
 - Cadastral boundary
 - Detached dwelling
 - Semi-detached dwelling
 - Dual-occupancy
 - Terrace
 - Residential flat building
 - Manor home
 - Multi-dwelling housing
 - Shop-top housing
 - Commercial
 - Other

Figure 13-9 - Dwelling typologies area #13 Building height in storeys area #13



- LEGEND
- Study area boundary
 - Cadastral boundary
 - 1-storey
 - 2-storey
 - 3-storey
 - 4-storey
 - 5-storey
 - 6-storey
 - 7-storey
 - 8-storey
 - 9-storey
 - 10-storey

Figure 13-11 - Building height in storeys area #13

118 Existing character description cont.

Public and private domain interface

The interface between the public and private domain varies across the area as a result of different street and dwelling typologies. Wider versus narrower street corridors, verges and footpaths vary the physical distance and visual transition between the domains, for example Anglesea Street compared to Penkivil Street. The varying capacity of the verge to accommodate trees also influences the visual transition, and contributes to a sense of openness or enclosure. Terraces, detached, and semi-detached dwellings are typically closely set, with narrow front setbacks. Front landscaping and fence materiality and height varies, influencing the visibility of the dwelling from the public domain, for example New Street (see Figure 13-12). Encroachment into the front setback for carparking structures, can further obscure the dwelling and detract from the streetscape. Inter-War RFBs also typically comprise narrow setbacks and limited landscaping. The irregular lot layout also results in the sides of buildings presenting to the street. Mid-late 20th century RFBs comprise greater setbacks and are typically raised above street level, with ground-level parking structures, for example Penkivil Street (see Figure 13-13). Upper balconies overlook the public domain. Through the Bondi Road centre, fine-grain shopfronts abut the public domain, creating a highly visible, active frontage. Laneways provide rear access and off-street parking, typically with high fence lines and enclosed garages at the boundary.



Figure 13-12 - Dwellings fronting New Street



Figure 13-13 - RFBs, Penkivil Street

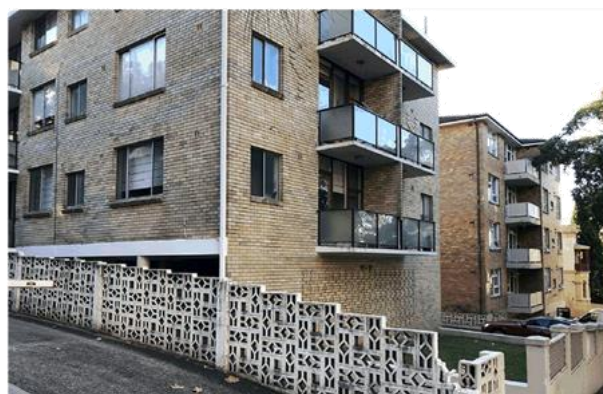


Figure 13-14 - RFBs, Ocean Street North

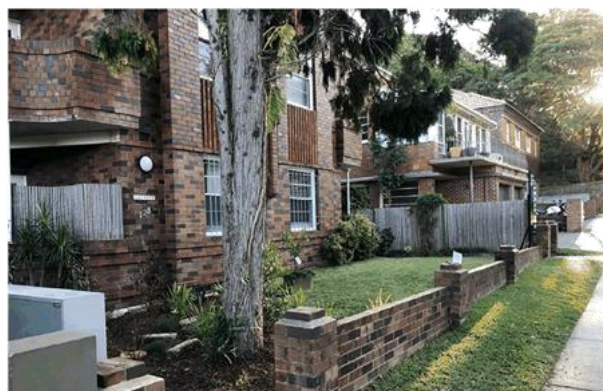


Figure 13-16 - Inter-War RFB, Francis Street



Figure 13-15 - Detached dwelling, Watkins Street

Natural environment

The area is located within close proximity (<450m) of significant public open space, including Thomas Hogan Reserve (see Figure 13-18) and Dickson Park within the north-east of the area, Waverley Park, Cooper Park (Woollahra) as well as the coastal open space network. 'Green links' aid connectivity. A biodiversity corridor traverses the area between the parks. The area is located at a topographical high point, which provides district views to and from the area. The topography slopes steeply at Martins Avenue into Thomas Hogan Reserve and Dickson Park. Vegetation coverage varies across the area. Substantial street trees define Flood, Watkins, New, Penkivil and Ocean streets (see Figure 13-19), increasing coverage and contributing to the area's landscape character. These factors contribute to a low-medium heat vulnerability.

Recent development

Recent development includes the construction of new RFBs, through amalgamation of sites, demolition of existing dwellings or construction of new buildings to rear of existing dwellings; alterations and additions to existing dwellings, including second-storey and garage addition. This reflects development capacity under the planning controls, a desire to intensify valuable land, more floor space and car-parking in the area.

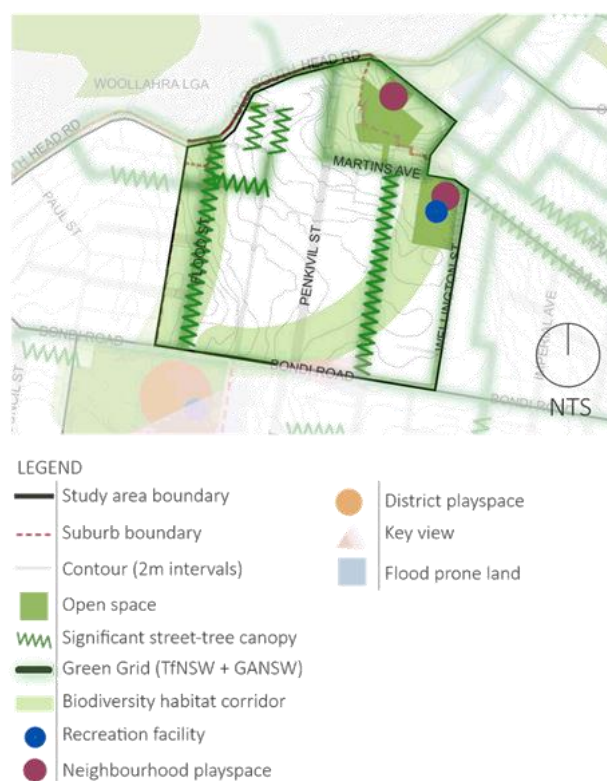


Figure 13-17 - Open space and vegetation area #13



Have Your Say!

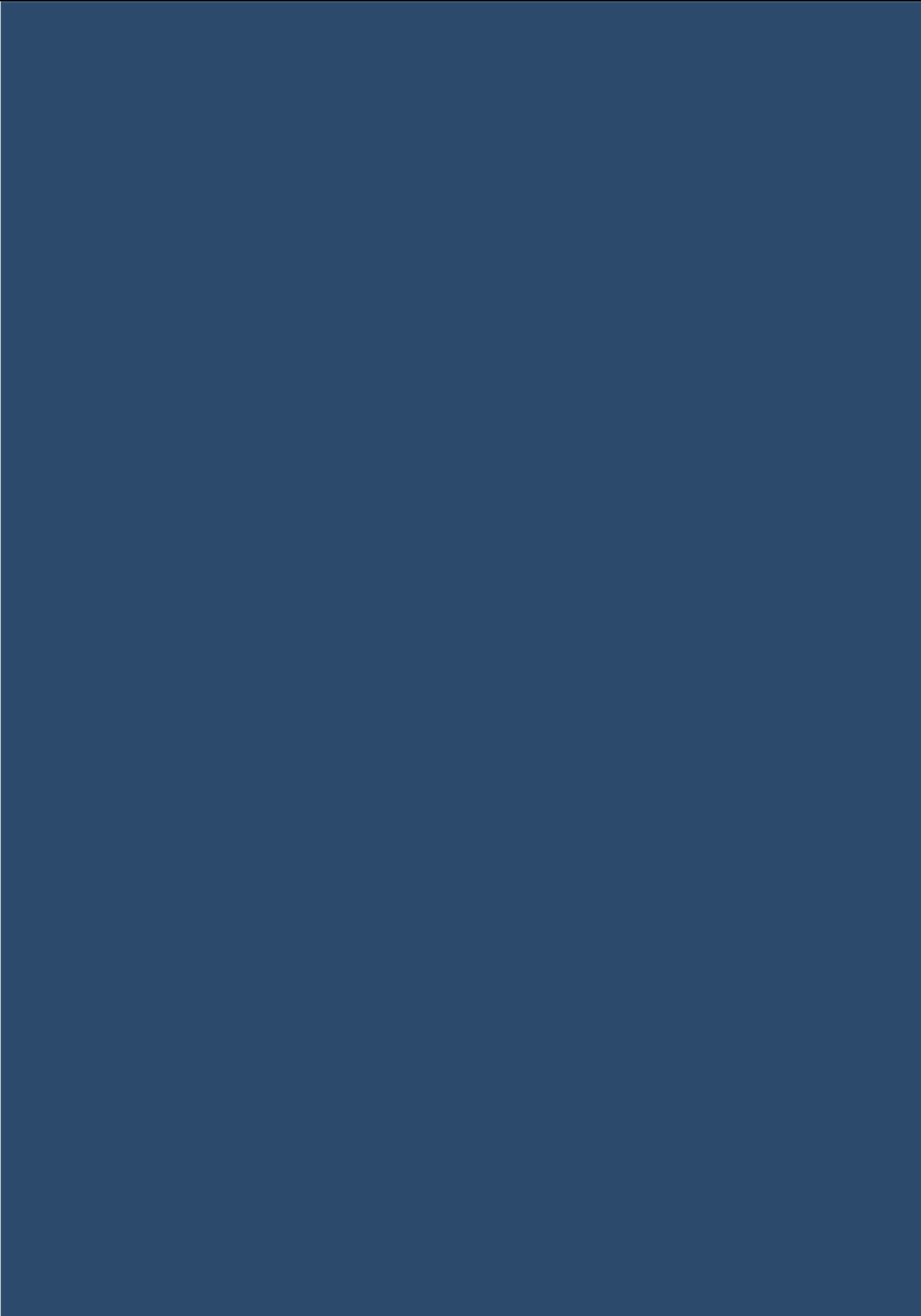
1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



Figure 13-18 - Thomas Hogan Reserve



Figure 13-19 - Tree coverage, Ocean Street North



CHARACTER AREA

14



CHARACTER AREA – 14

“The area is characterised by irregular blocks arrayed east-west; predominantly low-medium rise detached and semi-detached dwellings and residential flat buildings, of various styles and materiality; fine-grain, active shopfronts within the Bondi Road local centre; wide street corridors with irregularly spaced trees”.

The study area is generally bound by Edward Street to the north, Bondi Road to the south and Wellington Street to the east.

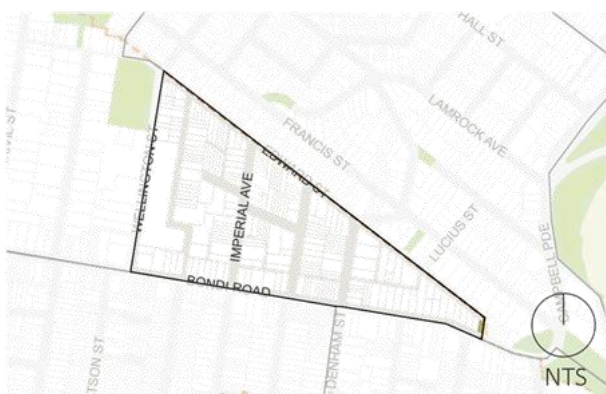


Figure 14-1 - Local character area #14 map



Figure 14-4 - Detached dwelling, Castlefield Street



Figure 14-2 - Imperial Avenue, looking south



Figure 14-5 - Semi-detached dwellings, Imperial Avenue



Figure 14-3 - RFB, cnr Imperial Avenue and Miller Street



Figure 14-6 - RFBs, Edward Street

Existing character attributes



Desired future character

Vision

The desired future character of the area is defined by high-density residential area within walking distance to local shops and services, and open space and the coastline. Development is well integrated into the streetscape through design excellence and landscape design including mature tree canopy.

Objectives

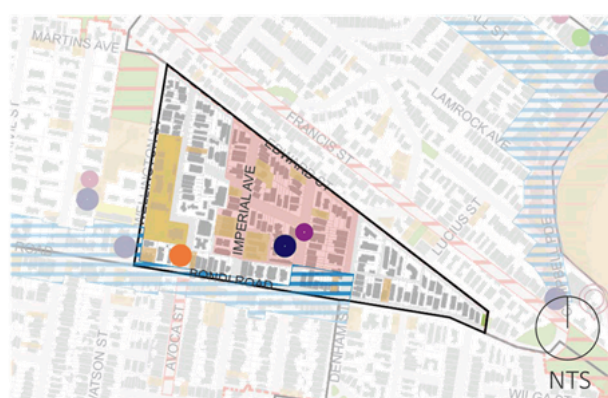
The objectives for development on land identified within the character area are as follows:

- To recognise and maintain the diversity of uses in the area, particularly along Bondi Road,
- To celebrate the heritage and maintain the fine-grain nature of the historic shopfronts,
- To effectively manage the retail / commercial and residential interface,
- To preserve the heritage items and the integrity of the Urban Conservation Area,
- To reinforce the consistent and unified Federation and Inter-war-style detached and semi-detached dwelling elevations and frontages to internal streets, including pitched roofscape and front setbacks,
- To promote sympathetic alterations and additions that respect the form, architectural style, height, materials and details of existing dwellings, particularly semi-detached dwellings,
- To encourage high-quality contemporary low-medium rise RFB development at the southern and western edges of the area. Consider site amalgamation where appropriate,
- To promote the reduction of hard surfaces and an increase of landscaping in the front, rear and side of properties,
- To ensure front fences and landscaping relate to the period and architectural style of the dwelling, and maintain visual connection between the dwelling and street,
- To minimise the impact on existing views and vistas from the private domain and maintain residential amenity in terms of overlooking and noise,
- To reduce pedestrian, cyclist and vehicle conflicts, and to improve pedestrian and cyclist amenity on Bondi Road.

124 Existing character description

History

Development of the area has evolved from the subdivision of the Castlefield Estate which was located east of Bondi Road. The Castlefield residence, built in the 1870s, was noted for its magnificent garden and views over Bondi Bay. The Estate was subdivided and sold in 1907. The subdivision and a second sale in 1909, established the prevailing block pattern and streets, including Edward, Denham and Castlefield streets and Imperial Avenue. Development progressively extended along Bondi Road and into the area, driven by access to public transport, the Sydney tram service reaching Bondi Beach in 1894 and the rising popularity of seaside excursions and bathing. Bondi Road became a major transport route, with businesses servicing the growing local population and tourist trade. Bondi Public School, in Wellington Street, opened in 1883. Enrolment growth continued until the 1930s. Today, the area comprises predominantly residential uses with supporting commercial and retail uses within the Bondi Road local centre, and educational and religious establishments.



LEGEND

- | | |
|---------------------------|-----------------------------|
| Study area boundary | Urban Conservation Area |
| Cadastre boundary | Landscape Conservation Area |
| Suburb boundary | General heritage item |
| Building footprint | |
| Open space | |
| Village Centre | |
| Educational establishment | |
| Religious institution | |
| Childcare centre | |
| Medical centre | |
| Community facility | |
| Police station | |

Figure 14-7 - Built form, uses and heritage area #14

Configuration and connectivity

Irregular blocks are arrayed east-west across the prevailing slope, tapering to the east. A well-defined street network comprises east-west bounding streets (Edward Street and Bondi Road), north-south through-streets (Wellington, Edward, Denham streets and Imperial Avenue) and inner streets and rear laneways. The network results in a high level of permeability. Wellington Street and Bondi Road provide the primary access to and from the area. Multiple bus services along Bondi Road connect the area to the northern and southern suburbs of the LGA, Bondi Junction and Sydney CBD.

Built form

The area is characterised by predominantly 1-2 storey detached and semi-detached dwellings and 3-4 storey residential flat buildings (RFBs), of various styles. The earliest remaining dwellings date from 1907 to 1915 and are of the Federation-style. Clusters of detached and semi-detached Federation bungalows are located on Imperial Avenue (see Figure 14-5), Castlefield Street and Denham Street. Federation-style shopfronts front Bondi Road. Inter-War style detached and semi-detached bungalows and RFBs constructed between 1915 to 1940 are also evident throughout the area, for example on Moore Street, Edward Street (see Figure 14-15) and Bondi Road. Bungalows of these styles are characterised by brick construction, low gabled terracotta tiled roofs, with thick masonry or timber verandah posts and decorated timber gable trim. Inter-War RFBs are typically characterised by a solid brick façade (facades vary), small window openings and entry presenting to the street. These styles reflect the significant land and housing booms between 1881-1939. Heritage listing of much of the area as the Imperial Avenue Conservation Area has helped retain the character of these early streetscapes, however alterations including second-storey and parking additions, as well as later infill development, have impacted on their integrity. Later mid-century development, including Mid-century Modern style RFBs eroded the earlier setting, capitalising on views to the ocean and availability of land around earlier dwellings or through property amalgamation. RFBs of this style are typically red or blonde brick (see Figure 14-3 and Figure 14-13). Infill development of late 20th century and 21st style development has continued throughout the area, particularly along the Bondi Road. The area has a population density of approximately 115 persons/ha. The dominant tenure type is private rental.

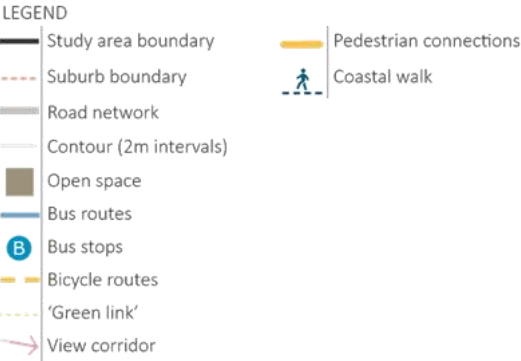


Figure 14-8 - Road network and movement area #14



Figure 14-10 - Architectural styles area #14



Figure 14-9 - Dwelling typologies area #14

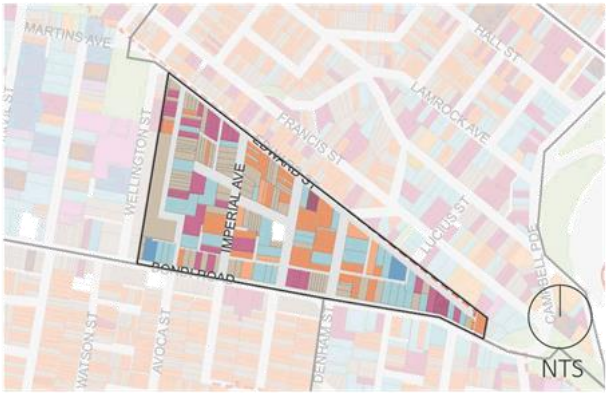


Figure 14-11 - Building height in storeys area #14

126 Existing character description cont.

Public and private domain interface

The interface between the public and private domain varies across the area as a result of different street and dwelling typologies. Wide street corridors contribute to a sense of openness. Wider versus narrower street verges and footpaths vary the physical and visual transition between the domains, for example Imperial Avenue compared with Moore Street (see Figure 14-16). The varying capacity of the verge to accommodate trees also influences the visual transition, altering the level of visibility between the street and dwelling. On-street planting can increase the sense of enclosure, for example Edward Street. Setbacks vary across the area, as does the alignment of dwellings to the street, for example on Imperial Avenue. Front landscaping, fence materiality and height also vary, however the cohesive use of sandstone retaining walls is a key feature. The later addition of car-parking within the front setback, either hard-stand, carport or garage further obscures the dwelling. Mid-late 20th century RFBs are raised above street level incorporating ground-floor carparking (see Figure 14-12). Upper balconies overlook the public domain. Through the Bondi Road centre, fine-grain shopfronts abut the public domain, creating a highly visible, active frontage. Laneways provide rear access and off-street parking, typically with high fence lines and enclosed garages at the boundary (see Figure 14-14).



Figure 14-12 - RFB, Cutler Street



Figure 14-13 - RFB, Denham Street



Figure 14-14 - Garage frontages, Cutler Street



Figure 14-15 - Detached dwellings, Edward Street



Figure 14-16 - Moore Street, looking north

Natural environment

The area is largely devoid of open space, however benefits from its close proximity to Dickson Park, Thomas Hogan Reserve and Waverley Park to the west and Bondi Beach and the coastal open space network to the east, which provide active and passive recreation opportunities. 'Green links' aid connectivity. The area's topography, which slopes to the north / north-east provides views out to the coastline from the public and private domains. Vegetation coverage is predominantly low-medium across the area. This is attributable to the area's coastal location with sandy soils and high sun exposure. Coverage is particularly low along Bondi Road and rear lanes, however, improves along inner streets and Edward Street. Extensive on-site planting, particularly in rear yards, provides background tree lines to many dwellings and improves coverage. These factors contribute to a medium-high heat vulnerability.

Recent development

Recent development includes alterations and additions to existing detached and semi-detached dwellings, including second-storey additions; alterations and additions to older RFBs, including balcony additions or materiality changes; amalgamation and construction of new RFBs, particularly along Bondi Road. Suggesting a desire to intensify valuable land close to public transport, for more floor space and car-parking in the area whilst maintaining the existing character of the Imperial Avenue Conservation Area.



Figure 14-18 - Open space and vegetation area #14



Figure 14-17 - Tree canopy, Castlefield Street



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

15



CHARACTER AREA – 15

“The area is defined by its coastal setting, with the headland parks and beach forming an iconic corridor of open space, a strong local centre along Campbell Parade and Hall Street, cohesive streetscapes of predominantly low-medium rise dwellings of the Federation and Inter-War styles, varying vegetation coverage”.

The study area is bound by O’Brien and Roscoe streets to the north, Campbell Parade and Notts Avenue to the east, Edward Street to the south and Simpson Street and Old South Head Road (OSHR) to the west.

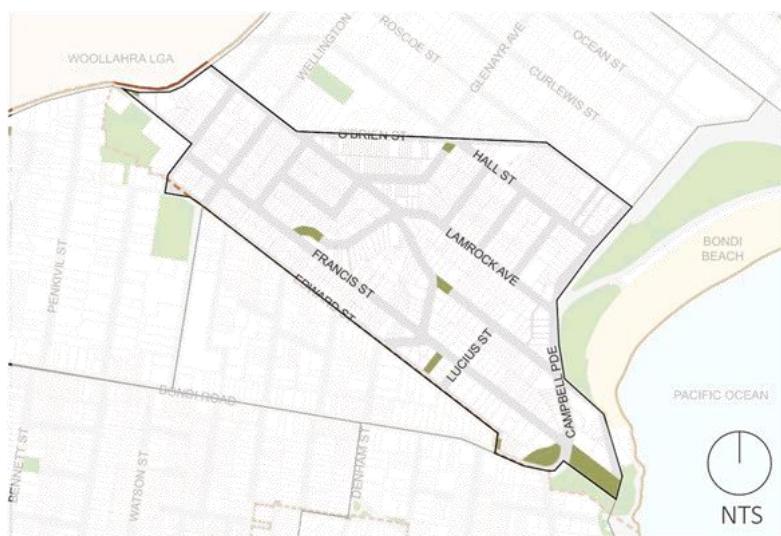


Figure 15-1 - Local character area #15 map



Figure 15-4 - RFB, Edward Street



Figure 15-2 - RFBs, Francis Street



Figure 15-5 - Semi-detached dwellings, Francis Street

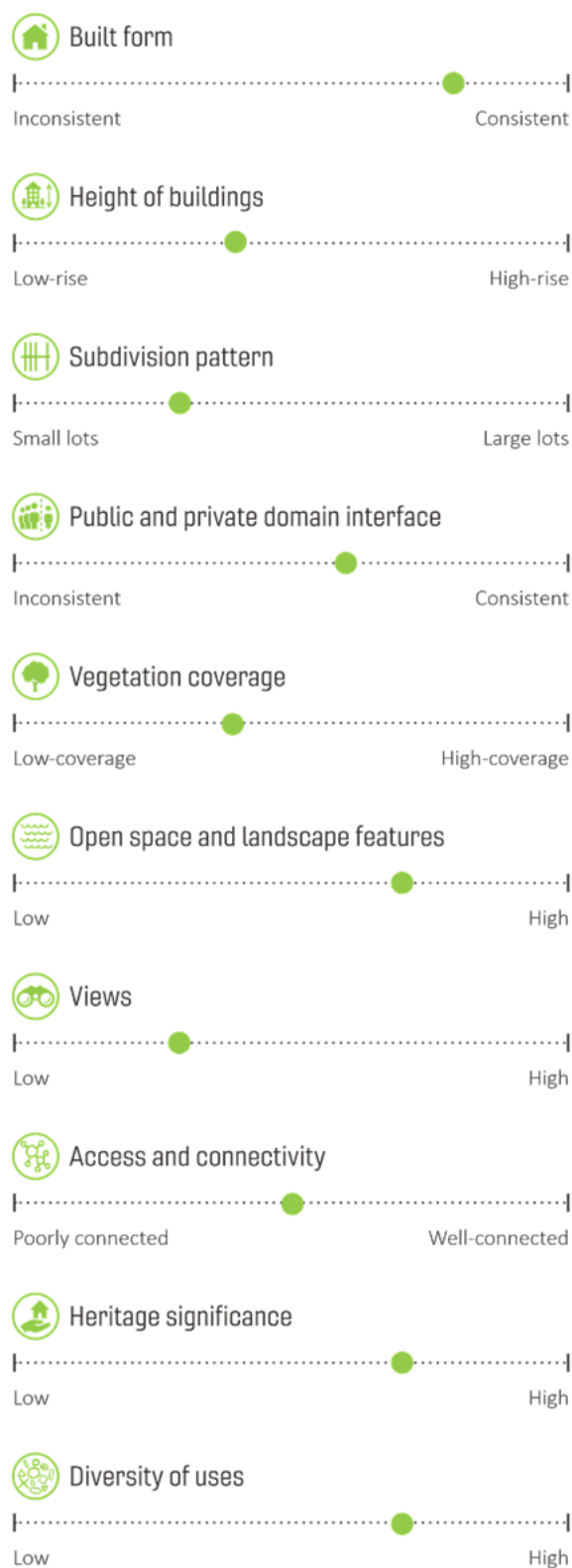


Figure 15-3 - RFBs, Denham Street



Figure 15-6 - Tree canopy, Ormond Street

Existing character attributes



Desired future character

Vision

The desired future character of the area is defined by the iconic coastline and Bondi Beach Centre. Surrounding the centre is a historic residential area with cohesive and attractive streetscapes.

Objectives

The objectives for development on land identified within the character area are as follows:

- To recognise and maintain the diversity of uses in the area,
- To effectively manage the retail / commercial and residential interface,
- To reinforce the consistent and unified Federation and Inter-war-style detached and semi-detached dwellings and RFBs, including consistent elevations, pitched roofscapes and front setbacks,
- To promote sympathetic alterations and additions that respect the form, architectural style, height, materials and details of existing buildings,
- To ensure alterations and additions to the rear of dwellings retain the scale and massing of front elevations and to retain the original roof form,
- To ensure additions to the rear of dwellings maintain a high-level of amenity for surrounding properties,
- To ensure new development responds to the historic patterns, original built form, architectural styles, materials and details of the area,
- To ensure front fences and landscaping relate to the period and architectural style of the dwelling, and maintain visual connection between the dwelling and street,
- To maintain and enhance the significant street tree canopy,
- To ensure that carparking structures do not dominate or adversely impact upon the streetscape,
- To discourage new driveway crossovers,
- To reduce pedestrian, cyclist and vehicle conflicts.

132 Existing character description

History

The area has a rich pre-and post-European settlement history. The Waverley area was occupied by the Bidjigal and Gadigal people, with Bondi Beach the location of an open campsite(s), midden(s) and burial place. Development of the area has evolved from the first land grant in the Waverley municipality, being 200 acres between OSHR and Bondi Beach granted to William Roberts in 1810. The land was used for grazing, quarries, brickworks etc. In 1851 the land was sold, undeveloped, to E.S (Monitor) Hall in trust for his daughter, Georgiana, who was married to Francis O’Brien. O’Brien attempted to subdivide part of the property in 1852 but was unsuccessful. In 1854-1856 negotiations saw a 21-acre reserve established at the southern end of the Beach. A further 25 acres was resumed in 1882 for public use.

The Bondi Beach commercial area evolved from a setting of small tea houses catering to day excursions to a flourishing tourist destination by the early 1990s, driven by the construction of the Bondi Baths (1886), rising popularity of sea bathing and the extension of the Sydney tram service to Bondi Beach by 1894. Progressive sale of the O’Brien estate provided sites for rapid Federation-era speculative subdivision on the southern ridge and slope of the basin. The O’Brien family remained in residence at “The Homestead” near Lucius Street until 1911, when it was sold and subdivided for housing during the Inter-War period. By 1939 Campbell Parade was a completed setting of hotels and shopfronts. Today, the area comprises predominantly residential uses supported by a strong retail and commercial centre , tourist and visitor accommodation and iconic coastal open space.

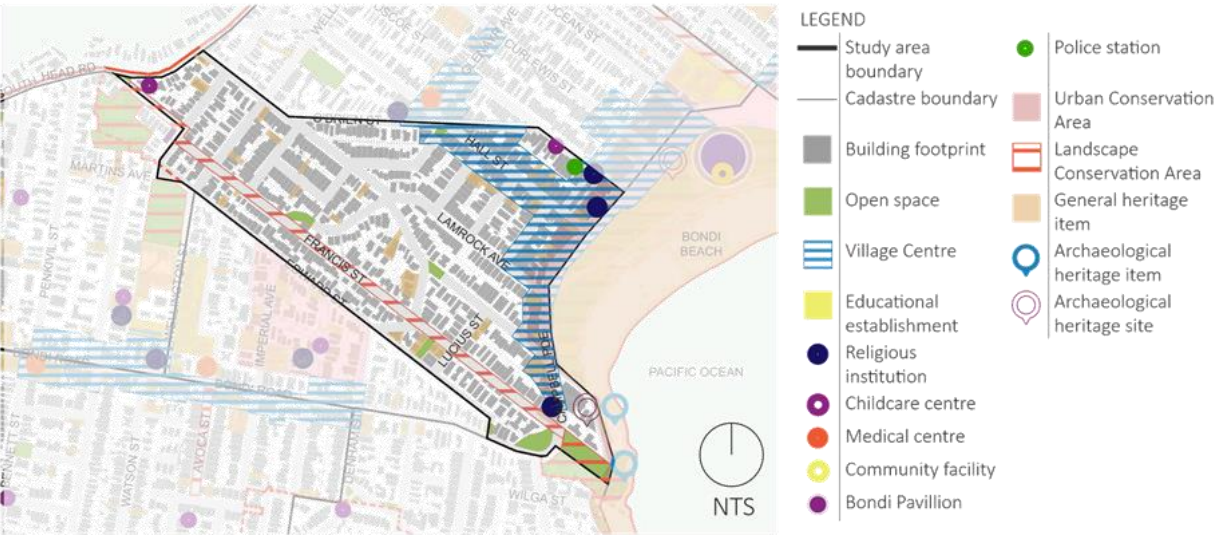


Figure 15-7 - Built form, uses and heritage area #15

Configuration and connectivity

The prevailing block and street pattern of the area reflects the 1852 subdivision plan instigated by O’Brien and early streets that appeared from 1878. Long north-west / south-east streets, with short cross streets, follow the steeply sloping topography from Edward Street into the basin and out to the coastline. The street alignment alters around Francis Street, Forest Knoll Avenue and Sir Thomas Mitchell Road, due to a localised gully. Topographical limitations result in no-through streets, which combined with multiple 1-way-only streets reduce access and circulation within the area. Pedestrian connectivity is

maintained along the coastal walk, ‘Green links’ and through-block connections, for example Edward Street to Frances Street, Cox Avenue to O’Brien Street and Ormond Street to Sir Thomas Mitchell Road. Lamrock Avenue includes a dedicated on-street bicycle lane. Campbell Parade, Bondi Road and OSHR provide the primary access to and from the area. Multiple bus services along Campbell Parade, O’Brien Street and OSHR connect the area to the northern and southern suburbs of the LGA, Bondi Junction and Sydney CBD.

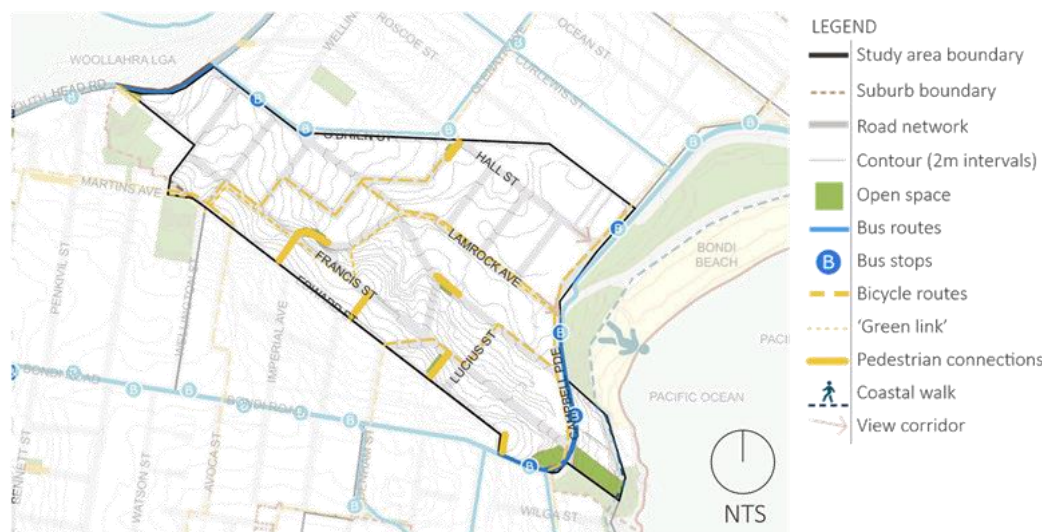


Figure 15-8 - Road network and movement area #15

Built form

The area is characterised by streetscapes of predominantly 1-2 storey semi-detached and detached dwellings and 3-5 storey residential flat buildings (RFBs), of the Federation and Inter-War styles. The Federation period (1890-1919) saw housing construction begin on the south-west slopes of the basin, fuelled by the partial sale of the O'Brien Estate in 1910. Generous freestanding dwellings on the upper slopes, for example Edward and Francis streets, and more close-set semi-detached dwellings to the lower slopes, for example Barracluff, Rickard (see Figure 15-9) and Lamrock avenues, reflect the relative amenity of the subdivisions. These streetscapes comprise cohesive styles and materials, namely brick construction, low gabled terracotta tiled roofs, with thick masonry or timber verandah posts and decorated timber gable trim. The subsequent Inter-War period (1919-1939) saw the emergence of the RFB, employed within new subdivisions of the O'Brien Estate around Lucius Street and on opportunity sites on the southern slopes, for example Edward Street and Sir Thomas Mitchell Road. Campbell Parade and Hall Street reflect an Inter-War commercial streetscape. Inter-War RFBs are typically characterised by a solid rendered or unrendered brick façade (facades vary in style), terracotta tiled roof, small window openings and entry presenting to the street. Alterations including second-storey and street-front carparking additions, as well as later infill development, has impacted the integrity of the early streetscapes. Later insertions of Mid-century Modern, 20th century and 21st century dwellings are evident throughout the area, for example Notts Avenue, OSHR and within the Bondi Beach local centre. The population density is approximately 107 persons/ha.



Figure 15-9 - Semi-detached dwellings, Rickard Avenue

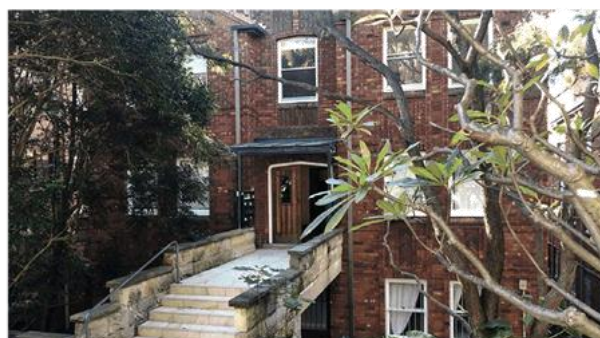


Figure 15-10 - Inter-War RFB, Francis Street



Figure 15-11 - RFB, Rickard Avenue

134 Existing character description cont.

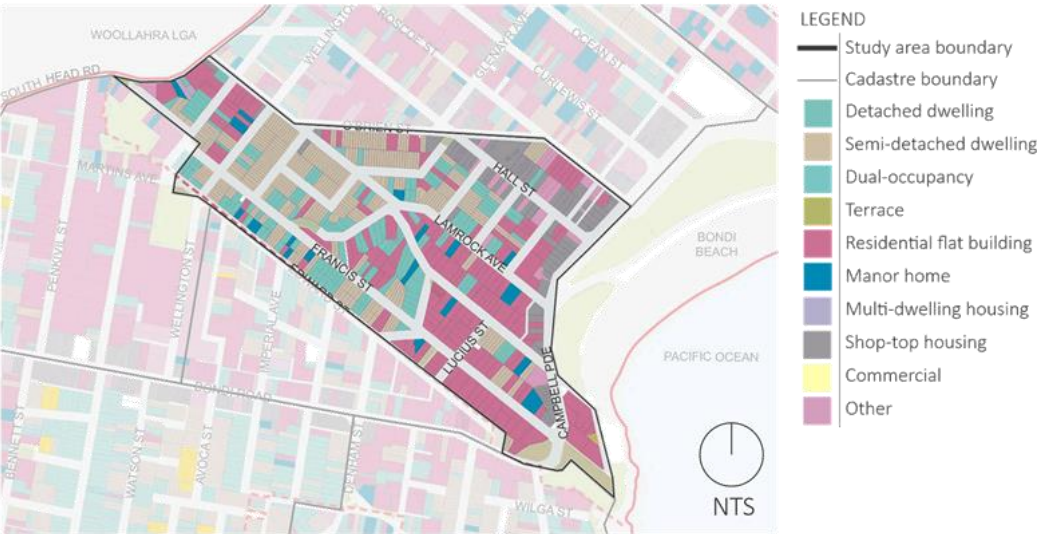


Figure 15-12 - Dwelling typologies area #15

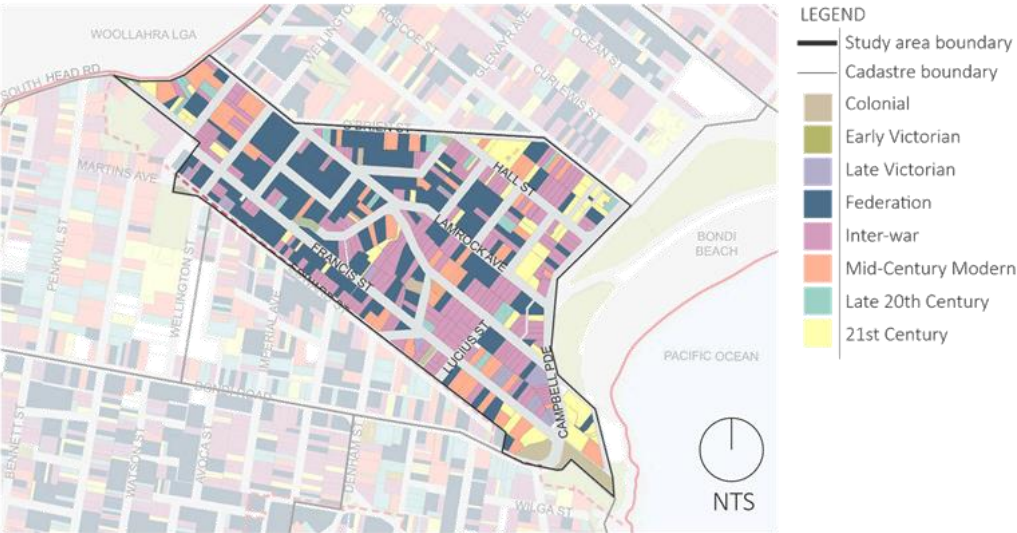


Figure 15-13 - Architectural styles area #15

Public and private domain interface

The interface between the public and private domain varies across the area in response to dwelling typology and topography changes. Detached and semi-detached dwellings typically have consistent front setbacks of shallow depth. Fence lines vary from low solid or picket fence to higher solid fence, for example Rickard Street (see Figure 15-9). Front landscaping is typically limited. This results in physical and visual proximity between the public and private domains. Front setbacks for RFBs vary; at times the dwelling abuts the boundary, for example Lamrock Avenue, or is setback further, providing for additional front landscaping, for example Francis Street (see

Figure 15-2). Buildings remain closely set. Mid-late 20th century RFBs are raised above street level with ground-level parking and upper balconies overlooking the public domain (see Figure 15-11). On-street planting also creates a varied visual transition between the domains. Sloping topography creates an upper and lower side of some streets. Dwellings on upper sites are raised above the public domain, with built retaining walls, high fences and / or garage doors of varying materials and finishes at street-level, for example Francis Street (east) and Notts Avenue. Dwellings on lower sites are often partially or completely obscured from the street, for example Edward Street (west). The later addition of street

level hard-stand parking, carports and garages where the topography or front setbacks allow can further obscure the dwelling. However, due to these factors many dwellings are not serviced by off-street parking. Topographical changes and clustering of dwellings in irregular blocks, for example Ormond Street to Forest Knoll Avenue, can result in overlooking. Along Campbell Parade and Hall Street, fine-grain shopfronts and dwellings abut the public domain, creating a highly visible, active frontage.

Natural environment

The area is characterised by its coastal setting and long history of seaside leisure and recreation. The heritage-listed, Bondi Beach, Biddigal Reserve and Hunter Park contribute to an iconic corridor of public open space of significant aesthetic, landscape and recreational value. The areas comprise Aboriginal archaeological sites and European built form including the current Bondi Baths (1931) and Bondi Park design (1923). Vegetation coverage is predominantly low-medium across the area. Coverage reduces to very low over the beach, Notts Avenue and through the local centre, however, improves to medium-high in the gully around Forest Knoll Avenue and surrounding streets including Ormond Street (see Figure 15-6) and Consett, Jacques and Cox Avenues. On-street avenue planting contributes to a sense of enclosure. The corridor supports and biodiversity corridor. The beach, parks and Bondi-Coogee coastal walk offer passive and active recreation opportunities and support public gathering and events.



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?

Recent development

Recent development comprises alterations and additions to existing detached and semi-detached dwellings, including second-storey additions; alterations and additions to older RFBs, including additional apartments, balcony additions or materiality changes; construction of new 2-3 storey detached and semi-detached dwellings (including dual occupancy) and RFBs, particularly along OSHR and within the local centres. It is also noted that Bondi has the second highest proportion of dwellings by suburb listed on Airbnb within Australia, indicating a trend of use of private dwellings for short-term rental accommodation.



Figure 15-14 - Open space and vegetation area #15



CHARACTER AREA

16



CHARACTER AREA – 16

“The area is characterised by its basin topography; streetscapes of predominantly low-medium rise dwellings of Federation and Inter-War styles; strong local centres which create a highly active public domain; limited vegetation coverage; its coastal setting, with the beach forming an iconic corridor of open space”.

The study area is bound by Blair Street and Warners Avenue to the north, Campbell Parade to the east, Roscoe and O’Brien streets to the south and Old South Head Road to the west.



Figure 16-1 - Local character area #16 map



Figure 16-4 - RFBs, Beach Road (Source: Google Images)



Figure 16-2 - Curlewis Street centre



Figure 16-5 - RFBs, O'Brien Street (Source: Google Images)



Figure 16-3 - Semi-detached dwellings and RFB, Beach Road (Source: Google Images)



Figure 16-6 - Semi-detached dwellings, Roscoe Street (Source: Google Images)

Existing character attributes



Desired future character

Vision

The desired future character of the area is defined by the iconic coastline and Bondi Beach Centre. Surrounding the centre is a historic residential area with cohesive and attractive streetscapes.

Objectives

The objectives for development on land identified within the character area are as follows:

- To recognise and maintain the diversity of uses in the area,
- To promote the retention of urban services in the area and manage the interface between urban services and residential development,
- To effectively manage the retail / commercial and residential interface,
- To maintain the predominant 2-4 storey height character of the area,
- To preserve the diversity of dwelling typologies, architectural periods and heights in the area by retaining buildings from the Federation and Inter-war periods,
- To ensure alterations and additions read as a cohesive part of the existing dwelling and extension of historic form and materiality, particularly semi-detached dwellings,
- To ensure high-quality design of contemporary development with well-articulated forms, rooflines and materiality,
- To encourage high-quality, contemporary, low rise development at the western edges of the area, fronting OSHR. Consider site amalgamation where appropriate,
- To ensure front fences and landscaping relate to the period and architectural style of the dwelling, and maintain visual connection between the dwelling and street,
- To promote the reduction of hard surfaces and an increase of landscaping in the front, rear and side of properties,
- To retain and increase street tree plantings on all streets to enhance the streetscape character,
- To ensure that carparking structures do not dominate or adversely impact upon the streetscape. Discourage carparking structures in front setback unless the predominant,
- To reduce new vehicle crossings on key roads.

140 Existing character description

History

The area has a rich pre-and post-European settlement history. The Waverley area was occupied by the Bidjigal and Gadigal people, with Bondi Beach the location of an open campsite(s), midden(s) and burial place. The area initially noted as ‘barren lands’ (1791 survey), characterised by mobile sand dunes interspersed with hinterland lagoons surrounded by windswept vegetation on higher ground, remained largely undeveloped until the 20th century. Development of the area evolved from the first land grant in the Waverley municipality, being 200 acres between OSHR and Bondi Beach, granted to William Roberts in 1810. In 1851 the land was sold, undeveloped, to E.S (Monitor) Hall in trust for his daughter, Georgiana, who was married to Francis O’Brien. O’Brien attempted to subdivide part of the property in 1852 but was unsuccessful. Reclamation of beach front land and progressive sale of the O’Brien Estate saw the southern end of the basin grow by the early 1900s. However, the sand formations in the middle and north side of the basin restricted development of the area. Remediation and removal of sand occurred, with the allocation of State funding, between 1900 and 1920, providing land for the Inter-War housing boom. Development was supported by the extension of the Bondi tramline to North Bondi in 1911 and the Bellevue Hill to Bondi Beach line in 1914. The Bondi Beach Public School opened in 1926. By 1939 Campbell Parade was a completed setting of hotels and shopfronts. Today, the area comprises predominantly residential uses supported by a strong retail and commercial centre, tourist and visitor accommodation, educational establishments and adjacent coastal open space.



Figure 16-8 - Semi-detached dwellings, Curlewis Street (Source: Google Images)



Figure 16-9 - RFBs, Beach Road (Source: Google Images)



Figure 16-10 - RFB, Curlewis Street (Source: Google Images)

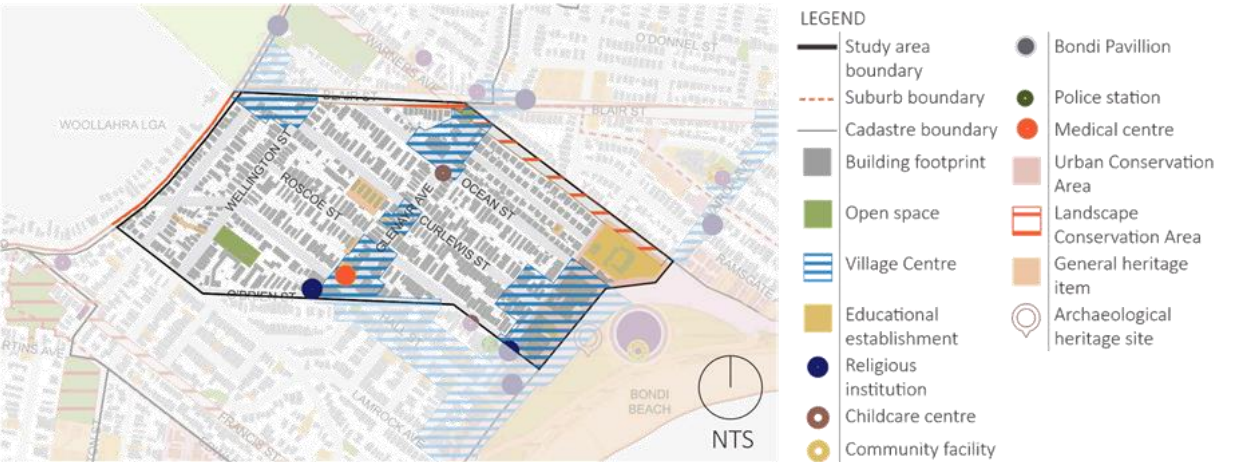


Figure 16-7 - Built form and uses area #16

Configuration, connectivity and built form

The prevailing block and street pattern of the area reflects the 1852 subdivision plan instigated by O'Brien. Street planning, including the wide avenue of Blair Street and the cross route of Warners Avenue, reflect the Garden Suburb philosophy. Long north-west / south-east streets, and limited north-east / south-west cross streets, are arranged in an irregular grid pattern across the area's relatively flat topography. Multiple 1-way-only streets reduce internal vehicle access and circulation. Campbell Parade, OSHR, O'Brien and Curlewis streets provide the primary access to and from the area. Pedestrian connectivity remains high, assisted by the defined street network, flat topography and continuous coastal open space. Dedicated on-street bicycle lanes are located on Glenayr Avenue, Curlewis Street and Blair Street. Multiple buses service the area providing connections to the northern and southern suburbs of the LGA, Bondi Junction and Sydney CBD.

The area is characterised by cohesive groups of 1-2 storey detached and semi-detached dwellings and 3-4 storey residential flat buildings (RFBs), of predominantly Federation and Inter-War styles, interspersed with later interventions of Mid-century Modern, late 20th century and 21st century style dwellings. The local centres along Glenayr Avenue, Curlewis Street and Campbell Parade are characterised by shop-top housing of various styles. Rapid development of the area during the late-Federation and Inter-War periods, following the sand dune remediation, resulted in consistency of streetscapes of housing with a predominant aesthetic of face-brick exteriors with terra cotta tile roofs. Inter-War style RFBs make an import contribution to the distinctive character of the LGA. Clusters of Federation and Inter-War styles are evident along Curlewis Street, Wellington Street, Beach Road, Glasgow Avenue and Warner Avenue. Alterations including second-storey and street-front carparking additions, as well as later infill development of up to 8-storeys.

141

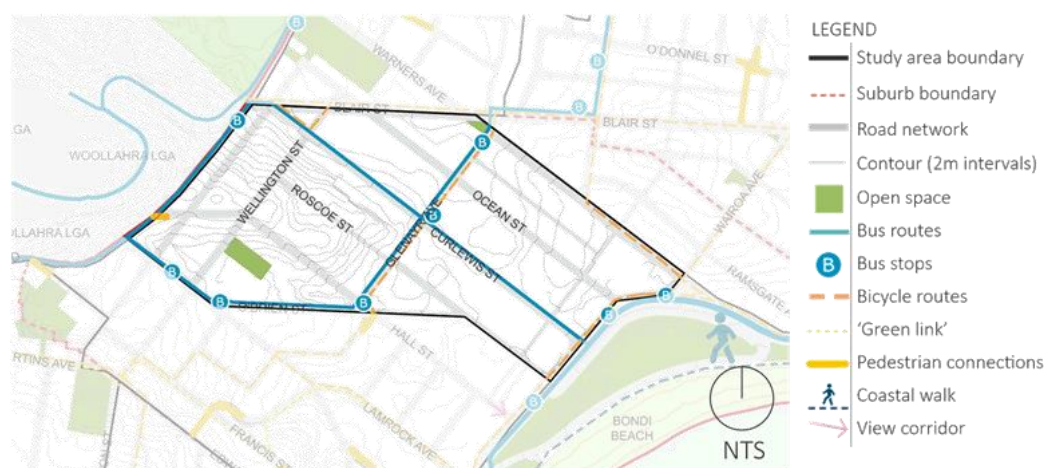


Figure 16-11 - Road network and movement area #16



Figure 16-12 - Dwelling typologies area #16

142 Existing character description cont.



Figure 16-13 - Architectural styles area #16



Figure 16-14 - Building height in storeys area #16

Later insertions of Mid-century Modern to 21st century dwellings are evident along O'Brien, Curlewis (see Figure 16-10), Roscoe and Glenayr (north) streets. The population density is approximately 129 persons/ha. The dominant tenure is private rental.

Public and private domain interface

The interface between the public and private domains varies significantly across the area, as a result of differing dwelling typologies, front setback depths, front landscaping, fence treatment and parking structures. Federation and Inter-War style dwellings typically have consistent front setbacks of shallow depth. This results in physical and visual proximity between the public and private domains. The visibility of the dwelling varies due to fence treatment and front landscaping, for example Warners Avenue, Curlewis Street and Simpson Street. The addition of street-level hard-stand parking, carports and garages within the front setback of detached and

semi-detached dwellings can further obscure the dwelling. Excavation to accommodate parking has also occurred in early semi-detached dwellings fronting Curlewis Street (west). Mid-late 20th century RFBs typically comprise greater front setbacks and are raised above street level with ground-level parking and upper balconies overlooking the public domain, for example Roscoe (see Figure 16-15) and O'Brien streets. Inter-War style RFBs can also comprise street-level garages, for example Gould Street, creating a solid inactive wall. Along Glenayr Street, Curlewis Street and Campbell Parade, commercial and retail uses abut the public domain, creating a highly visible, active frontage. Vegetation coverage is predominantly low-medium across the area, as a result of closely set development which limits the opportunity for significant private open space in the front or rear yards as well as the varying capacity of the street verge to accommodate planting. On-street planting also varies the visual transition between the domains.

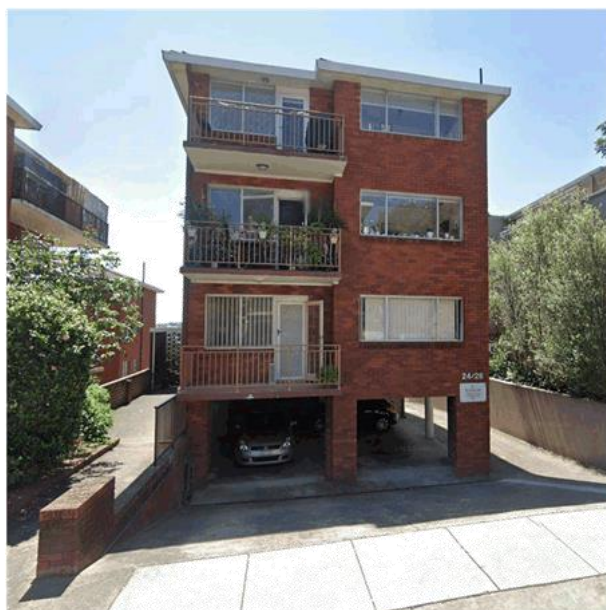


Figure 16-15 - RFB, Roscoe Street (Source: Google Images)

Natural environment

The area is recognised for its long history of seaside bathing and leisure. In 1903, Bondi Beach was provided with its first daytime bathing facilities and in 1911 the first bathing shed opened. The North Bondi Surf Life Saving Club (SLSC) and the Bondi SLSC club opened in 1906 and 1907. The heritage-listed, Bondi Beach and Park, contribute to an iconic corridor of public open space of significant aesthetic, landscape and recreational value. The areas comprise Aboriginal archaeological sites and European built form including the Bondi Pavilion (1929) and Bondi Park design (1923). The beach, parks and Bondi-Cooee coastal walk offer passive and active recreation opportunities and support public gathering and events.



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?

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Recent development

Recent development history includes alterations and additions to existing detached and semi-detached dwellings, including second-storey additions; alterations and additions to older RFBs, including additional apartments, balcony additions or materiality changes; construction of new 2-3 storey detached and semi-detached dwellings (including dual occupancy) and RFBs, particularly along OSHR and within the local centres. It is also noted that Bondi has the second highest proportion of dwellings (by suburb) listed on Airbnb within Australia, indicating a trend towards the use of private dwellings for short-term rental accommodation.

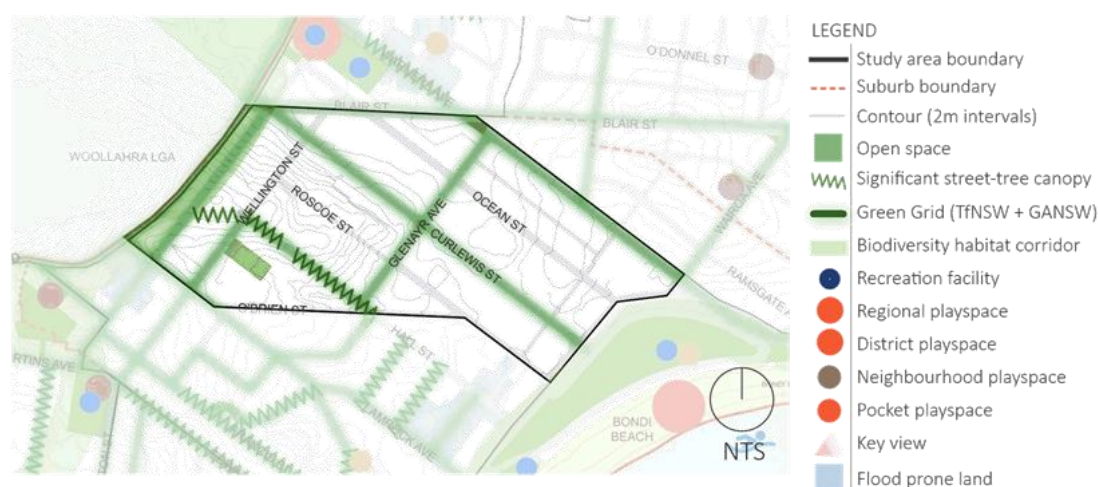


Figure 16-16 - Open space and vegetation area #16



CHARACTER AREA

17



CHARACTER AREA - 17

"The area is defined by its prominent headland location with exposed rock platforms and steep sandstone cliffs; panoramic views of the ocean; uniform subdivisions aligned along parallel streets, comprising densely set, largely boxy proportioned low-medium rise detached and residential flat buildings of various styles and colours".

The study area is generally bound by the Bondi Golf and Diggers Club to the north, the Pacific Ocean to east and south, Bondi Beach to the west, and Campbell Parade to the north-west.



Figure 17-1 - Local character area #17 map



Figure 17-4 - Sam Fiszman Park, looking west



Figure 17-2 - RFBs, Ramsgate Avenue



Figure 17-5 - Ramsgate Avenue streetscape

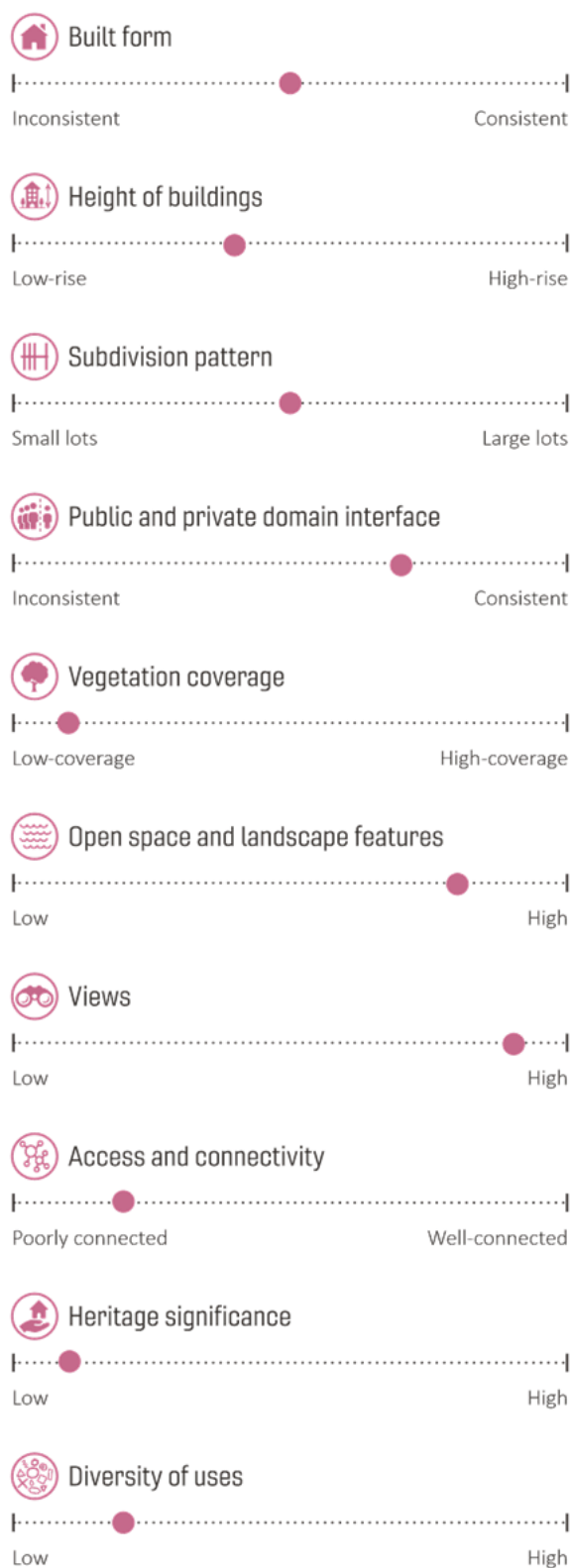


Figure 17-3 - RFBs, Hastings Parade



Figure 17-6 - Ramsgate Avenue centre and beach frontage

Existing character attributes



Desired future character

Vision

The desired future character for the area is defined by its prominent headland location forming a key part of the iconic view of Bondi Beach. Development is characterised by design excellence and vegetation that is appropriate to the natural setting. Key views from the public domain and retained and celebrated.

Objectives

The objectives for development on land identified within the character area are as follows:

- To maintain the headland character of Ben Buckler through the landscaping of front setbacks and street verges,
- To retain and protect the visibility of sandstone cliffs and outcrops by integrating the landscaping of the adjoining public and private areas,
- To retain the current lot sizes as an import feature of this area. Lot amalgamations are discouraged,
- To reinforce the prevailing street pattern of rectilinear, boxy proportioned building forms, architectural elements and range of materials and finishes,
- To ensure side setbacks maintain glimpses of the beach or ocean,
- To ensure high-quality design of new contemporary development with well-articulated forms, rooflines and materiality. Flat roofs are supported for view sharing,
- To promote sympathetic alterations and additions that respect the form, architectural style, height, materials and details of existing dwellings,
- To maintain views and vistas from the public domain,
- To minimise the impact on existing views and vistas from the private domain and maintain residential amenity in terms of overlooking and noise,
- To ensure that carparking structures do not dominate or adversely impact upon the streetscape. Integrate carparking within new dwellings.

148 Existing character description

History

Development of the area has evolved from the second land grant within the Waverley municipality. In 1809, 30 acres, extending from the coastline to Wairoa Avenue was granted to John Hurd. However, the grant was not confirmed and legal confusion over the claim for ownership resulted in the land remaining undeveloped. In 1841, a lease was finally re-granted to Parry Long, who retained the land as an investment. Subdivision of the early grant for estate development, including the Queenscliff Estate, occurred around the 1880s. The Federation period saw the subdivision of the estates and housing construction begin, albeit slowly. The popularity of Bondi Beach in the early 1900s and transport improvements, including the extension of the tramline to the North Bondi terminus in 1929, spurred development of the area during the late-Federation and Inter-War periods. The area remains predominantly residential with supporting retail and commercial businesses within the North Bondi neighbourhood centre and Ramsgate Avenue (east).



- LEGEND
- Study area boundary
 - Suburb boundary
 - Cadastral boundary
 - Building footprint
 - Open space
 - Village Centre
 - Urban Conservation Area
 - Landscape Conservation Area
 - General heritage item
 - Archaeological heritage item
 - Archaeological heritage site

Figure 17-7 - Built form, uses and heritage area #17

Configuration, connectivity and built form

The character of the area is defined by its prominent headland location. Exposed rock platforms and steep sandstone cliffs rise from the ocean, forming a rocky plateau which slopes gently to the west. The area's elevated location offers panoramic views of the coastline, ocean and surrounding areas. Topped with densely set built form, the area provides a distinctive backdrop to the iconic Bondi Beach.

Uniform subdivisions are aligned along parallel streets extending from Campbell Parade and terminating at the coast. These street corridors are important view axes, revealing and framing vistas of the coastline and beach. Lots are predominantly orientated east-west. The configuration of internal north-south streets varies, providing for 1 and / or 2-way traffic along loop and no-through streets, which reduces access and circulation. East-west access is limited to Bay Street, which provides for 1-way traffic only. Pedestrian connectivity is maintained along the street network and through-block links between Brighton Boulevard and Ramsgate Avenue. Campbell Parade provides the primary access to and from the area and supports an on-street cycleway and bus route. Bus services connect the area to the northern suburbs of the LGA, Bondi Road, Bondi Junction and Sydney CBD.



- LEGEND
- Study area boundary
 - Suburb boundary
 - Road network
 - Contour (2m intervals)
 - Open space
 - Bus routes
 - Bus stops
 - Bicycle routes
 - Pedestrian connections
 - Coastal walk
 - View corridor

Figure 17-8 - Road network and movement area #17

The area is characterised by a variety of dwelling typologies and styles. The dominant typologies are detached dwellings and residential flat buildings (RFBs) of Inter-War, Mid-century Modern and 21st century styles. These typologies are interspersed with semi-detached dwellings (including dual occupancy) and shop-top housing, of the same predominant styles. Dwellings are predominantly 2-4 storeys in height. Inter-War and Mid-century Modern style RFBs responded to the rising popularity of the area for housing from the 1920s. Many replaced earlier Federation cottages, others occupied vacant sites on the periphery of the area overlooking the beach. These styles are characterised by largely boxy proportioned buildings of brick and painted masonry punctuated by glazed openings and hipped tile roofs (see Figure 17-2). Façade articulation varies, for example Art Deco brickwork. The dominance of 21st century-style dwellings reflects the ongoing redevelopment of the area. Contemporary dwellings retain the largely boxy form, with painted masonry, floor-to-ceiling glass windows, linear elements, incorporating natural materials e.g. timber battens, and a combination of pitched, flat or architectural roofscapes (see Figure 17-13). Varied styles are unified by the orientation of balconies, decks and windows towards the coastline. The area has a population density of approximately 66 persons/ha (density increases to the east). Private rental is the dominant tenure type.

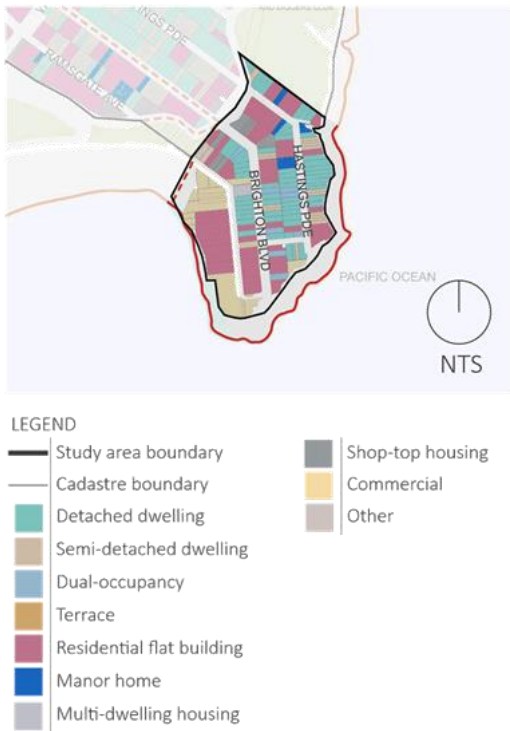


Figure 17-9 - Dwelling typologies area #17



Figure 17-10 - RFBs, Ramsgate Avenue



Figure 17-11 - RFBs, Brighton Boulevard



Figure 17-12 - RFBs, Hastings Parade



Figure 17-13 - Detached dwellings, Hastings Parade

150 Existing character description cont.



Figure 17-14 - Architectural styles area #17

Public and private domain interface

The public and private domain interface varies across the area. Wider (Brighton Boulevard) versus narrower (Hastings Parade and Ramsgate Avenue (see Figure 17-5)) street carriageways, verges and footpaths influence the physical distance and visual transition between the domains. The varying width of the street verge and the prevalence of wide driveway crossovers results in sparse street trees. On-street parking and parking on driveway crossovers creates visual clutter in the streetscape. Cross-falls to the west result in a high and low side of the street. Dwellings on the high sides are typically highly visible, raised above the public domain, with built retaining walls, high fences and / or garage doors of varying materials and finishes, fronting the street, for example Hastings Parade (see Figure 17-13). Front landscaping also varies. Upper balconies typically overlook the public domain and are oriented to provide expansive views to the ocean. Dwellings on the low sides often have their ground level partially or completely obscured from the street as a result of the sloping topography, vegetation, fencing and / or garages at the boundary, for example Brighton Boulevard. Front setbacks are inconsistent across the area, however encroachment into the front setback by parking structures including car ports and enclosed garages is common. Dwellings are closely set, with

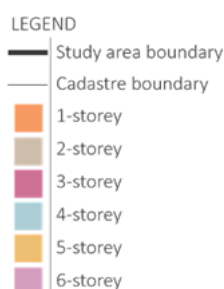


Figure 17-15 - Building heights in storeys area #17

glimpses out to the ocean and sky available through narrow side setbacks (see Figure 17-2 and Figure 17-10). This contributes to a sense of enclosure. Viewed from Bondi Beach, the area presents as a dense wall of layered built form.

Natural environment

The area benefits from access to substantial public open space including Ray O'Keefe Reserve, Sam Fisman Park (see Figure 17-19), Biddigal Reserve and Bondi Beach, which form part of the continuous coastal open space network and offer passive and active recreational opportunities. The area is recognised for its long history of seaside bathing and leisure. In 1903, Bondi Beach was provided with its first daytime bathing facilities and in 1911 the first bathing shed opened. The North Bondi Surf Life Saving Club (SLSC) and the Bondi SLSC club opened in 1906 and 1907. The headland has significant aesthetic, landscape and archaeological value. These areas support a biodiversity corridor. Vegetation coverage across the area is low, characteristic of the elevated and exposed coastal location and the need to maintain views. The elevated location provides for prevailing coastal winds from the east, which combined with the open character results in low-medium heat vulnerability.

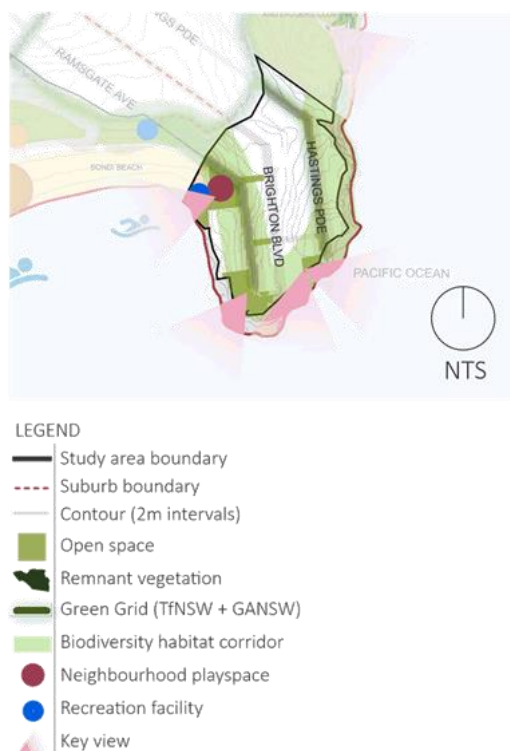


Figure 17-16 - Open space and vegetation #17



Figure 17-17 - Ramsgate Avenue to Brighton Boulevard link



Figure 17-18 - Sam Fisman Park, looking west to Bondi Beach



Figure 17-19 - Coastal lookout, Sam Fisman Park

Recent development

Recent development history includes alterations and additions to existing dwellings, including older RFBs such as materiality changes and balcony additions; construction of 2-3 storey detached or semi-detached dwellings of contemporary forms, with integrated garages. Indicating an anecdotal desire to maintain existing dwellings and a demand for more floor space and carparking.



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

18



CHARACTER AREA 18 - NORTH BONDI

"The area is characterised by blocks set in two irregular grids comprising predominantly low-rise detached, semi-detached dwellings and residential flat buildings, tiled roofscapes, varying front setback depths, front landscaping, fences and parking structures, and low vegetation coverage".

The study area is generally bound by Murrivier Road to the north, the Pacific Ocean and Campbell Parade to the east, Campbell Parade and Warners Avenue to the south and Plowman Street to the west.



Figure 18-1 - Local character area #18 map



Figure 18-4 - Inter-War RFB, O'Donnell Street



Figure 18-2 - Semi-detached dwellings, O'Donnell Street



Figure 18-5 - RFB, Blair Street

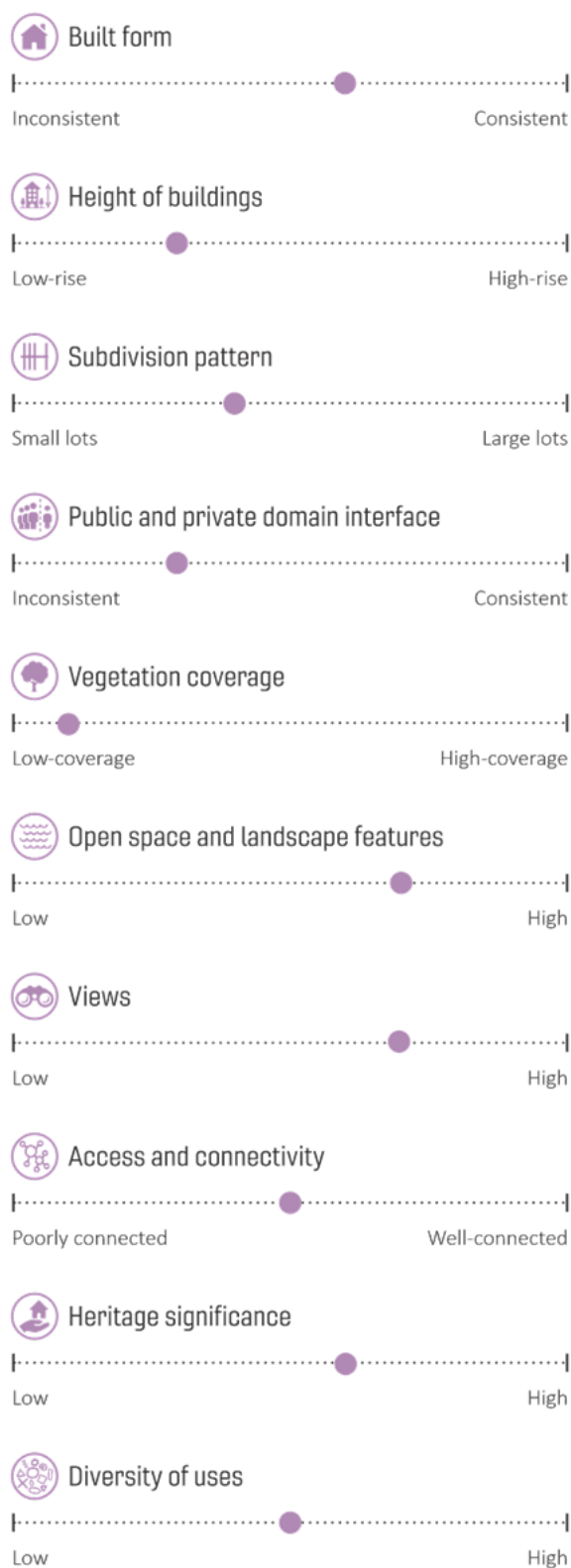


Figure 18-3 - Semi-detached dwellings, Mitchell Street



Figure 18-6 - Inter-War RFB, Ramsgate Avenue

Existing character attributes



Desired future character

155

Vision

The desired future character for the area is defined by low-rise residential development within easy walking distance of neighbourhood shops and services, the iconic coastline and Bondi Beach.

Objectives

The objectives for development on land identified within the character area are as follows:

- To recognise and maintain the diversity of uses in the area,
- To promote the diversity of dwelling typologies in the area, including semi-detached (dual occupancy),
- To ensure Inter-War-style dwellings are retained and conserved,
- To ensure alterations and additions read as a cohesive part of the existing dwelling and extension of historic form and materiality,
- To maintain the appearance of semi-detached development as one of a pair, demonstrating consistent scale, style and materiality,
- To ensure new development respects the historic patterns, original built form, architectural styles, materials and details of the area,
- To reinforce the existing pitched roofscape and promote consistency in roofing materials,
- To retain and extend street tree plantings on all streets to enhance the streetscape character,
- To promote the reduction of hard surfaces and an increase of landscaping in the front, rear and side of properties,
- To ensure that carparking structures do not dominate or adversely impact upon the streetscape. Integrate carparking within new dwellings,
- To discourage new driveway crossovers,
- To ensure the safety of pedestrians along the coastal cliffscape.

156 Existing character description

History

The area encompasses lands originally within and adjacent to the first two land grants within the Waverley municipality, being 200-acres between OSHR and Bondi Beach, granted to William Roberts in 1810 and 30-acres extending from the coastline to Wairoa Avenue granted to John Hurd in 1809. The area, characterised by mobile sand dunes interspersed with hinterland lagoons surrounded by windswept vegetation on higher ground, was used for agricultural purposes and remained largely undeveloped until the 20th century. Remediation and removal of sand occurred, with the allocation of State funding, between 1900 and 1920, providing land for the subsequent Inter-War housing boom. The 1920s saw rapid expansion of housing across the area driven by population growth, a post-war economic boom, speculative building of residential flat buildings (RFBs) in response to housing shortages, the new Company Title land title system (providing separate ownership of apartments) and the extensive tram transport network (the Bondi tramline was extended to North Bondi in 1926). The speed of subdivision and construction saw consistent streetscapes emerge. Today, the area comprises predominantly residential uses with supporting community-focused commercial and retail centres at Murrivier Road (east), Glenayr Avenue (Seven Ways), Wairoa Road and Campbell Parade, clusters of educational institutions and coastal open space.



Figure 18-8 - Inter-War RFB with addition, Ramsgate Avenue



Figure 18-9 - Inter-War RFB, Ramsgate Avenue



Figure 18-7 - Built form and uses area #18

Configuration and connectivity

The prevailing block and street pattern comprise two irregular grids separated by Blair Street. To the south of Blair Street, long streets extend north-west / south-east, with limited north-east / south-west cross streets. To the north of Blair Street block sizes reduce, with parallel north-south streets and east-west cross streets. The wide avenue of Blair Street and the cross route of Warners Avenue and Wairoa Avenue reflect the Garden Suburb philosophy. The street grid increases permeability of the area, however, multiple 1-way-only streets reduce internal vehicle access and circulation, particularly in the south-west corner. Campbell Parade, Military Road and Blair Street provide to primary connection to and from the area. Pedestrian connectivity remains high, however access to the coastline is limited. Dedicated on-street bicycle lanes are located on Campbell Parade, Wairoa Avenue and Blair Street. Multiple buses service the area providing connections to the northern and southern suburbs of the LGA, Bondi Junction and Sydney CBD.

Built form

The area is characterised by a variety of dwelling typologies, including detached dwellings clustered to the east of Wairoa Avenue, semi-detached dwellings clustered to the north of Blair Street and manor homes and RFBs clustered in the north-east and south-west of the area. Dwellings are predominantly 1-4 storeys in height. The predominant architectural style is the Inter-War style, reflective of the area's rapid development during the 1920s. Inter-War sub-styles include California Bungalows, Old English 'Tudor' and Mediterranean/ Mission Style detached

and semi-detached dwellings, Art-Deco, Inter-War Georgian and Mediterranean (see Figure 18-9) style RFBs. Streetscapes of Inter-War dwellings are evident along Campbell Parade (forming part of the Bondi Beach Conservation Area), Ramsgate Avenue (see Figure 18-6 and Figure 18-8), Brighton Boulevard west (forming the Brighton Boulevard Conservation Area), Knowles Avenue, Middleton Avenue and O'Donnell Street (see Figure 18-4) and Oakley Road. Dominance of this style creates an aesthetic of face-brick exteriors with terra cotta tile roofs. Dwellings have been modified overtime. Modifications include, second-storey and garage additions. Inter-War styles are interspersed with earlier Federation-style dwellings and later Mid-century Modern, late 20th century and 21st century style dwellings. Prominent clusters of Mid-century and late 20th century RFBs are located along Military Road and the block bound by Blair Street (see Figure 18-5), Military Road and Wallis Parade (a former quarry). The area has a population density of approximately 103 persons/ha.

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Figure 18-11 - Semi-detached dwellings, Glenayr Avenue



Figure 18-10 - Road network and movement #18

158 Existing character description cont.

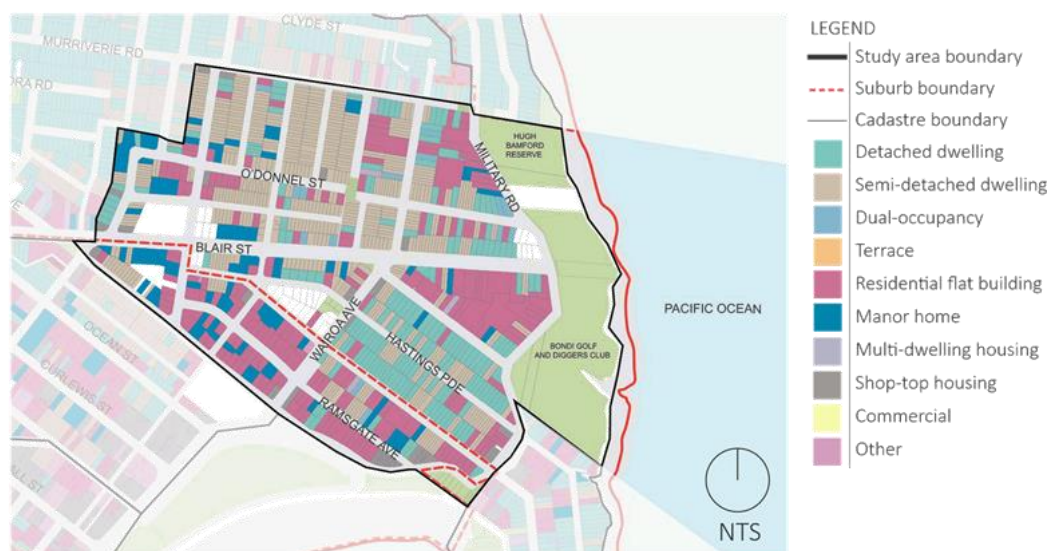


Figure 18-12 - Dwelling typologies area #18



Figure 18-13 - Architectural styles area #18

Public and private domain interface

Varying street corridor and verge widths change the physical and visual transition between the public and private domains. Limited on-street planting also influences this transition, increasing visibility of the private domain. The interface between the domains varies across the area, as a result of differing dwelling typologies, front setback depths, front landscaping, fence treatment and parking structures. Detached and semi-detached dwellings typically comprise a consistent front setback of narrow-average depth. The visibility of the dwelling varies, however, due to differing fence treatment (low, high, solid, picket or

railing, brick, stone, vegetation) and front landscaping, for example Mitchell and Gould streets. Hard-stand parking, carports or enclosed garages at the boundary further obscure the private domain and detract from the generally consistent building alignment, for example Middleton Avenue and Hastings Parade (east). Inter-War manor homes and RFBs typically comprise narrow-front setbacks and limited landscaping, with a solid brick façade (facades types vary), small window openings and entry presenting to the street. Closely set RFBs can result in a continuous wall of built form, for example Ramsgate Avenue. Mid-late 20th century RFBs typically comprise greater front

setbacks and are raised above street level with upper balconies overlooking the public domain, for example Wallis Parade. Hard-stand parking areas, enclosed garages and limited planting characterise street level. Through local centres varying uses (community, retail, commercial, cafes) abut the public domain, creating a highly visible, active frontage.

Natural environment

Open space is limited within the area comprising pocket parks O'Donnell Street Reserve and Wairoa Reserve. On the area's eastern boundary Hugh Bamford Reserve and the Bondi Golf and Diggers Club (Williams Park) contribute to the coastal open space network, which is of significant aesthetic, landscape and recreational value. The heritage-listed area's comprise Aboriginal and European archaeological sites, remnant vegetation and a striking natural coastal cliffscape, for example Meriverie Pass. The coastal open space network, including Bondi Beach supports passive and active recreation opportunities and support public gathering and events. The area is recognised for its long history of seaside bathing and leisure. Vegetation coverage is low across the area due to its sandy soil composition and prevailing coastal winds. The street verge typically comprises sporadic low planting. Private planting is typically restricted to the rear yard, however, and is limited due to closely set development. These factors result in a high heat vulnerability across the area.

Recent development

Recent development comprises alterations and additions to detached and semi-detached dwellings, including second-storey and attic additions, materiality



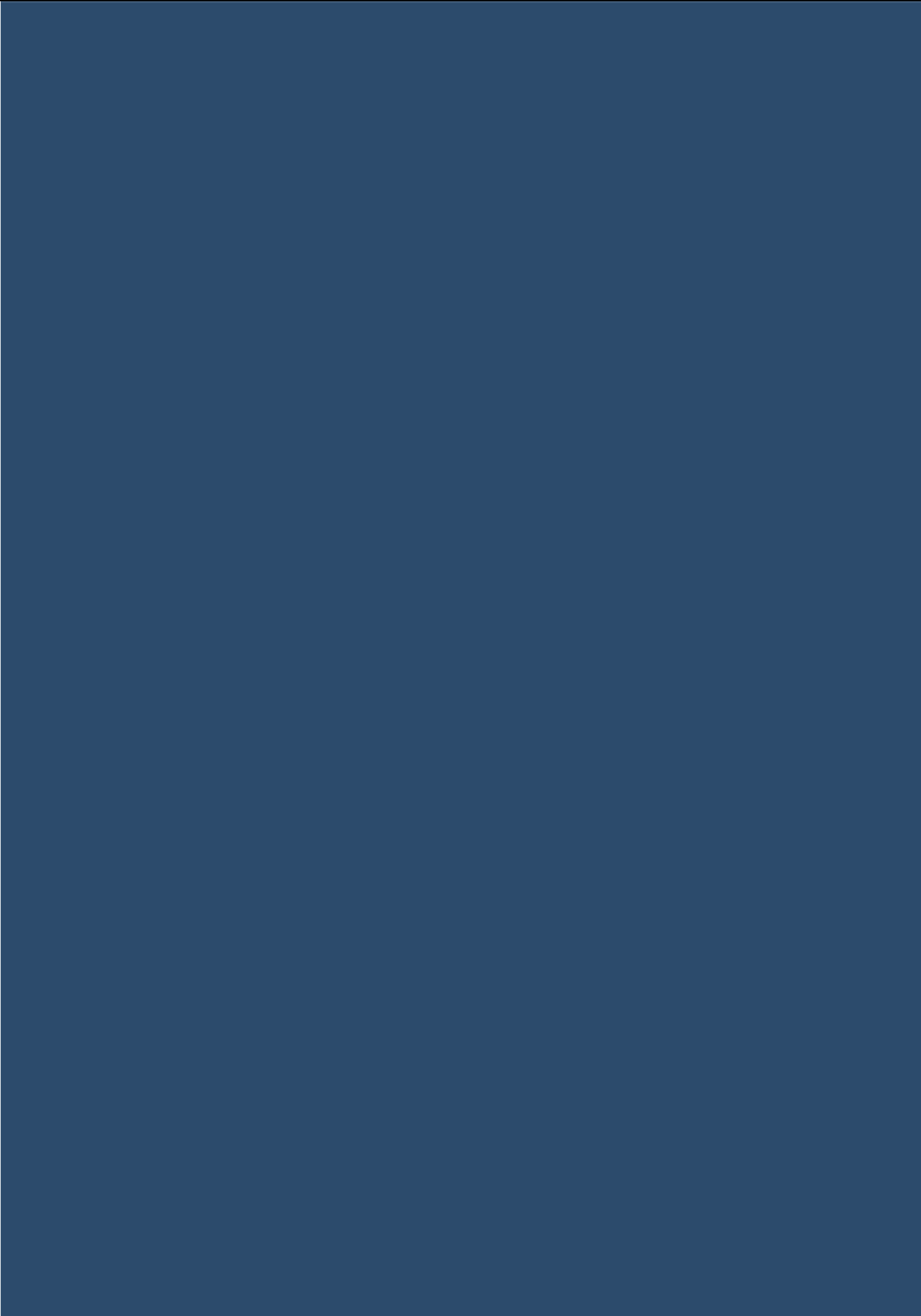
Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?

changes, hard-stand parking space, car ports, garages (with or without associated drive-way crossover); alterations and additions to older RFBs; construction of 2-3 storey detached or semi-detached dwellings (including dual occupancy); and limited amalgamation, demolition of existing dwellings and construction of RFBs. Suggesting a desire to maintain existing dwellings and a demand for more floor space and carparking. It is also noted that North Bondi has the third highest proportion of dwellings by suburb listed on Airbnb within Australia, indicating a trend of use of private dwellings for short-term rental accommodation.



Figure 18-14 - Open space, vegetation and heritage area #18



CHARACTER AREA

19



CHARACTER AREA – 19

“The area is defined by predominantly low-rise detached and semi-detached dwellings of varying styles, however with a common pitched roof form, wide street corridors with sporadic low plantings, inconsistent front setbacks with varying fence treatments, landscaping and carparking structures”.

The study area is generally bound by William Street, Hardy Street and MacLeay Street to the north, Military Road to the east, Murrivier Road to Blair Street to the south and Old South Head Road (OSHR) to the west.

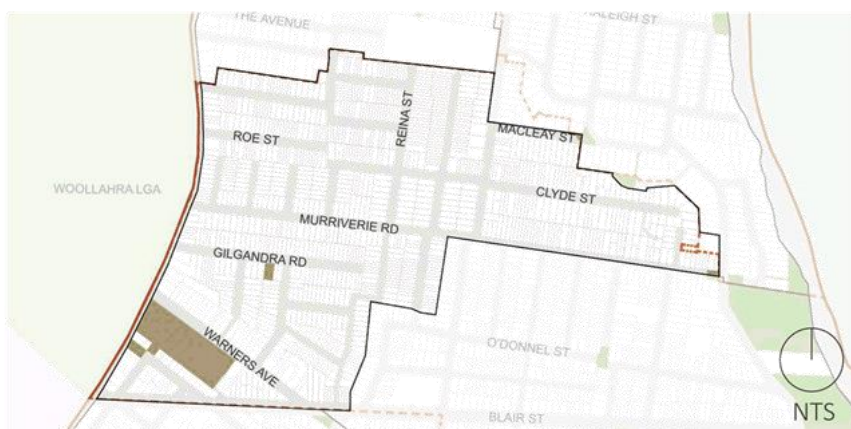


Figure 19-1 - Local character area #19 map



Figure 19-4 - Stewart Street dwellings



Figure 19-2 - Roofscape, viewed from Gilgandra Road, looking east



Figure 19-5 - Owen Street dwellings

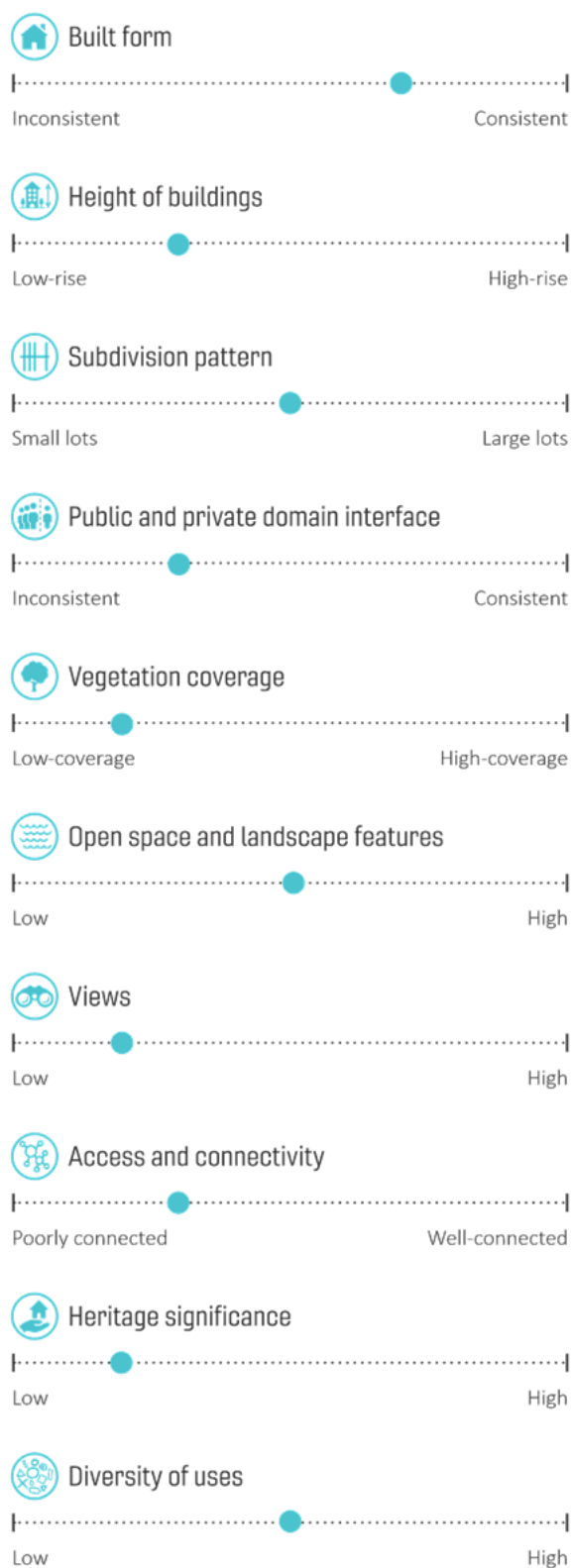


Figure 19-3 - Streetscape, Nancy Street



Figure 19-6 - Roe Street dwellings

Existing character attributes



Desired future character

Vision

The desired future character for the area is defined by wide leafy residential streets, with an interesting and varied built form.

Objectives

The objectives for development on land identified within the character area are as follows:

- To recognise and maintain the diversity of uses in the area,
- To promote the retention of urban services in the area and manage the interface between urban services and residential development,
- To maintain the predominant low-rise detached and semi-detached dwelling typologies in the area,
- To maintain the consistent setbacks / building alignments in the area,
- To encourage the conservation of Federation and Inter-War-style dwellings,
- To ensure alterations and additions read as a cohesive part of the existing dwelling and extension of historic form and materiality,
- To maintain the appearance of semi-detached development as one of a pair, demonstrating consistent scale, style and materiality,
- To ensure high-quality design of contemporary development with well-articulated forms, rooflines and materiality,
- To encourage high-quality, contemporary, low rise development at the western edges of the area, fronting OSHR. Consider site amalgamation where appropriate,
- To ensure that carparking structures do not dominate or adversely impact upon the streetscape. Integrate carparking within new dwellings, and discourage carparking structures in front setback unless the predominant interface of adjoining dwellings,
- To discourage new driveway crossovers,
- To promote the reduction of hard surfaces and an increase of public and private landscaping,
- To retain and protect the visibility of sandstone cliffs and edges by integrating the landscaping of adjoining public and private spaces, for example MacLeay Street.

164 Existing character description

History

Development of the area was slow due to the area’s remoteness, the attractiveness of land to the west of OSHR in Woollahra and the proximity to the sand dunes and hinterland lagoons that characterised the Bondi Basin. Tanneries and dairies were established on OSHR just north of present day Murriverie Road as early as the 1820s. The land remained agricultural (dairies, poultry) up until the late 1890s. East-west cross-streets from OSHR, for example Murriverie Road, began to appear from the early 1890s. Housing development began during the late Federation period (1890-1915) initially along OSHR and then progressively east, during the Inter-War period (1919-1939) following the remediation and removal of the sand dunes (1900-1920). The area remains predominantly residential with supporting commercial and retail uses within the Murriverie Road (west), Curlewis Street, Glenayr Avenue (Seven Ways) local centres , religious institutions and childcare centres.

Configuration and connectivity

Irregular blocks typically extend east-west following the early cross streets from OSHR. Blair Street and OSHR provide the primary connections to and from the area. Multiple no-through streets limit inter-block connectivity and circulation throughout the area. Pedestrian connectivity is maintained with through-block links, for example between OSHR, Brassie and Niblick streets, Stewart Street to Roe Street and Clyde Street to Waratah Street. Dedicated on-street bicycle lanes are located on Blair Street and OSHR (western side). Public transport is limited to bus services along OSHR, Blair Street and Hardy Street, which provide connections to the northern and southern suburbs of the LGA, Bondi Junction and Sydney CBD.

Built form

The area is characterised by predominantly 1-2 storey detached and semi-detached dwellings of the Inter-War style, interspersed with earlier Federation-style



Figure 19-7 - Built form, uses and heritage area #19

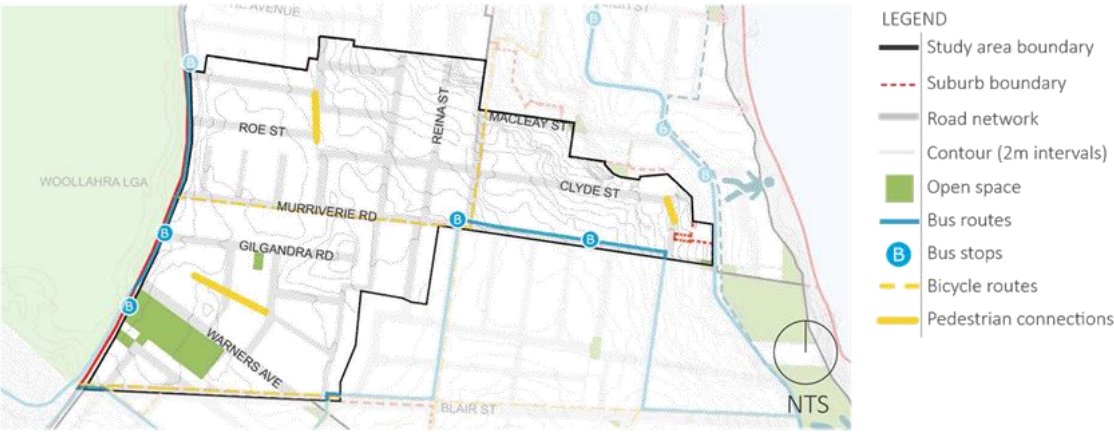


Figure 19-8 - Road network and movement area #19

and later Mid-century Modern, late 20th century and 21st century-style detached, semi-detached (including dual occupancy) dwellings and 3-4 storey residential flat buildings (RFBs). Clusters of Federation and Inter-War style bungalows are evident along Roe (see Figure 19-6), Narelle, Stewart, Reina (see Figure 19-11) and Nancy streets and Gilgandra Road. These styles are characterised by brick construction, pitched terracotta tiled roofs, with thick masonry or timber verandah posts and decorated timber gable trim. Early dwellings have been significantly modified overtime. Modifications include, second-storey and garage additions. Inter-War style RFBs (Art Deco, Georgian Revival, Spanish Mission sub-styles), are evident along Warners Avenue (see Figure 19-16) and Blair Street, are typically characterised by a solid brick façade (facades types vary), small window openings and entry presenting to the street. The concentration of Mid-century, late 20th century and 21st century styles increases to the east of the area, fronting MacLeay Street, Clyde Street and Murrivier Road. The area has a population density of approximately 81 persons/ha.



165

Figure 19-11 - Semi-detached dwellings, Reina Street

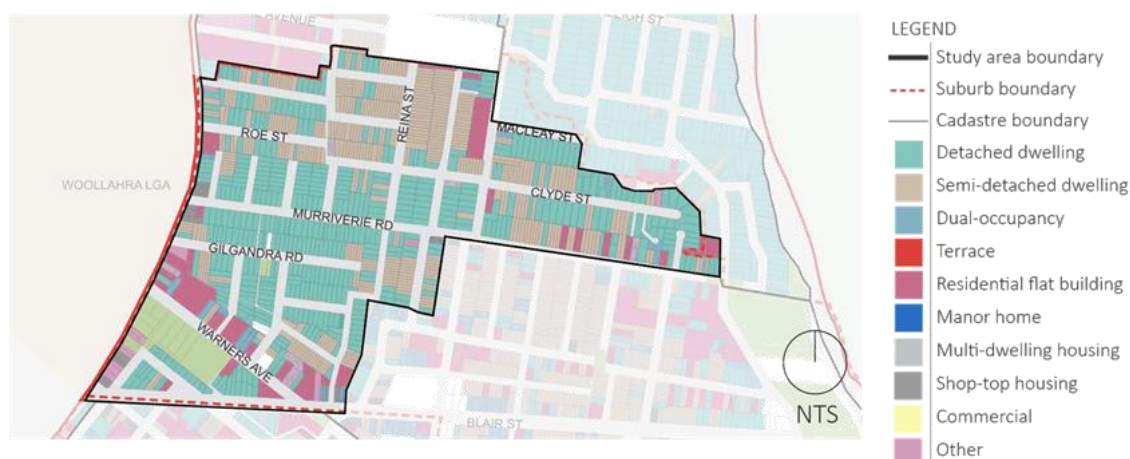


Figure 19-9 - Dwelling typologies area #19

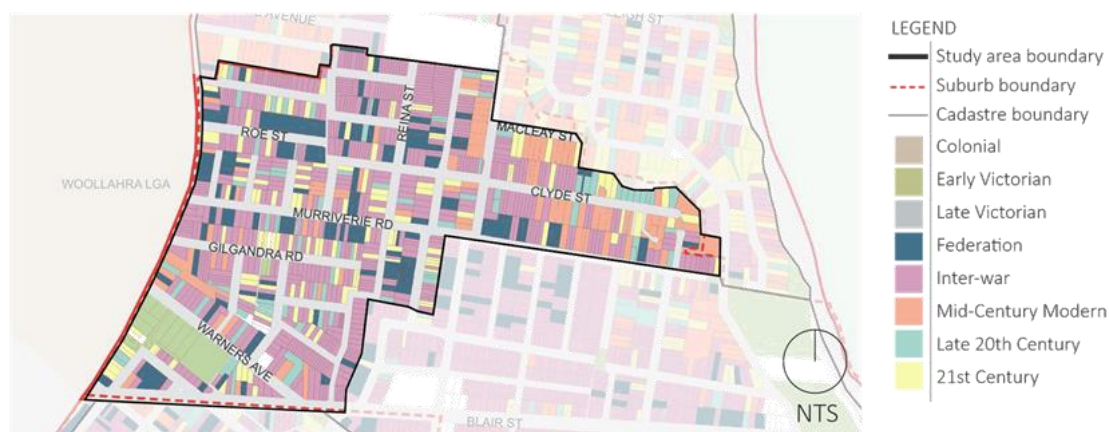


Figure 19-10 - Architectural styles area #19

166 Existing character description cont.

Public and private domain interface

Wide street verges provide a gradual physical and visual transition between the public and private domains. On-street planting also influences this visual transition. The interface between the domains is characterised by varying built form, materiality and landscaping. Detached and semi-detached dwellings typically comprise a consistent front setback of average depth. The visibility of the dwelling varies, however, due to differing fence treatment (low, high, solid, picket or railing, brick, stone, vegetation) and front landscaping, for example Clyde, Waratah and Nancy streets (see Figure 19-12). Street-level hard-stand parking, carports or enclosed garages at the boundary further obscure the private domain and detract from the generally consistent building alignment, for example Reina and Roe streets. Continuous garages can create a solid street wall, for example Justus Street. On sloping sites, dwellings on the high side are raised above street level, with dwellings on the lower side partially obscured from street level, for example Narelle Street and Murrivier Road (east). Inter-War RFBs also typically comprise narrow setbacks and limited landscaping, with a solid brick façade (facades vary), small window openings and entry presenting to the street. Mid-late 20th century RFBs are raised above street level incorporating ground-floor carparking, for example OSHR. Upper balconies overlook the public domain. Through the local centres, retail and commercial uses abut the public domain.



Figure 19-12 - Property frontages, Nancy Street



Figure 19-13 - Detached dwellings, Patterson Street



Figure 19-14 - Semi-detached dwellings, Owen Street



Figure 19-15 - Garage frontages, Gilgandra Road



Figure 19-16 - Inter-War RFB, Warners Avenue

Natural environment

Open space is limited within the area comprising Barracluff Park (see Figure 19-18) and pocket parks at Beach Road and Gilgandra Road. However, the area benefits from access to surrounding coastal and harbour public open space. Together with the Bondi Bowling Club and Tennis Centre these spaces offer passive and active recreation opportunities. Steep topographical changes in the north-east of the area, exposes the escarpment wall at MacLeay and Clyde Street. Distant views across the basin to the coastline are available from Hardy and Waratah streets. Vegetation coverage is predominantly low-medium across the area. The street verge typically comprises sporadic low plantings, except for the avenue planting along Warners Avenue and Blair Street (Landscape Conservation Areas). Private planting is typically restricted to the rear yard. These conditions result in a low-medium heat vulnerability across the area.



Figure 19-17 - Open space and vegetation area #19



Figure 19-18 - Barracluff Park, looking south-east

Recent development

Recent development history includes alterations and additions to detached and semi-detached dwellings, including second-storey and attic additions, materiality changes, hard-stand parking space, car ports, garages (with or without associated drive-way crossover); and construction of 2-storey detached or semi-detached dwellings (including dual occupancy). Suggesting a desire to maintain existing dwellings and a demand for more floor space and carparking.

167



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

20



CHARACTER AREA - 20

"The area is characterised by a patchwork of dwelling typologies and styles, of simple geometry and pitched roofs to contemporary forms with wider modulation and flat roofs; uniform front setbacks with varying landscaping, fence materiality and height and carparking structures; district views from topographical high points".

The study area is generally bound by Lancaster Road to the north, Gilbert and Hardy streets to the east, William Street to the south and Old South Head Road (OHSR) to the west.

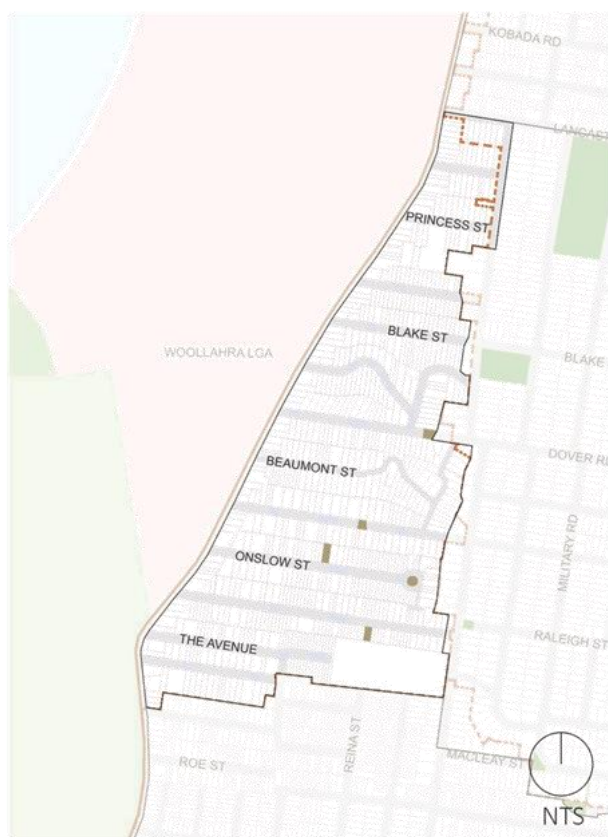


Figure 20-1 - Local character area #20 map



Figure 20-3 - Detached dwelling, Beaumont Street



Figure 20-4 - RFB, Liverpool Street

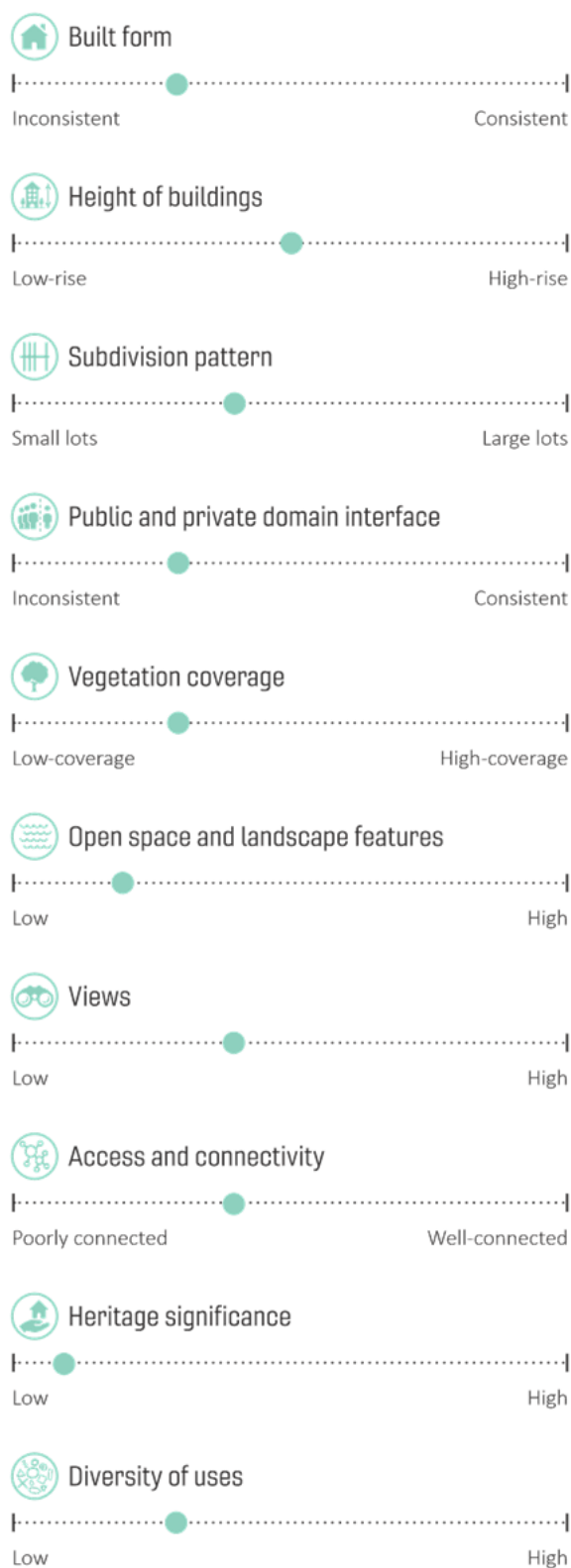


Figure 20-2 - Detached dwellings, Gilbert Street



Figure 20-5 - Liverpool Street example of east-west street corridor

Existing character attributes



Desired future character

Vision

The desired future character for the area is defined by leafy residential streets along an undulating topography, within walking distance of local shops and services available at Rose Bay South centre.

Objectives

The objectives for development on land identified within the character area are as follows:

- To recognise Rose Bay South as an important centre for providing goods and services to the local community,
- To retain a fine-grain shopfront pattern to development within the Rose Bay centre,
- To promote and coordinate consistent development along the eastern and western side of the Rose Bay centre,
- To recognise and retain the diversity of uses along OSHR,
- To minimise new vehicle crossings on Old South Head Road,
- To promote sympathetic alterations and additions that respect the form, architectural style, height, materials and details of existing dwellings, particularly semi-detached dwellings,
- To ensure high-quality design of contemporary detached and semi-detached dwellings (including dual occupancy), with appropriate façade and material articulation. Flat roofs may be supported for view sharing,
- To encourage high-quality, contemporary, low rise RFB development at the western edges of the area, fronting OSHR and replacement of existing RFBs. Consider site amalgamation where appropriate,
- To retain a consistent building alignment,
- To ensure that carparking structures do not dominate or adversely impact upon the streetscape,
- To promote the reduction of hard surfaces and an increase of public and private landscaping,
- To retain and protect the visibility of sandstone cliffs and edges by integrating the landscaping of adjoining public and private spaces, for example Hardy Street and rear of properties on Onslow Place,
- To maintain and minimise the impact on views and vistas from the public and private domain.

172 Existing character description

History

Early land grants were slow to develop due to the area’s remoteness and the attractiveness of land to the west of OSHR in Woollahra. By the 1880s east-west cross streets began to appear off OSHR, which spurred housing development during the late Federation period, initially fronting OSHR, and then progressing into the escarpment, and onto former quarry sites, such as Onslow Street, during the Inter-War period. The area remains predominantly residential with supporting commercial and retail uses within the South Rose Bay village centre and educational establishments, including Rose Bay Secondary College.

Configuration and connectivity

Irregular blocks extend east-west following the early cross streets from OSHR across the prevailing east-west slope. Subdivision has resulted in predominantly north-south facing lots of varying sizes, which contrasts the configuration of Dover Heights to the east. Steep topographical changes south of Blake Street result in terraced sites, curvilinear and no-through streets, for example Dover Road, Liverpool Street and Onslow Street. OSHR, Hardy and Gilbert streets provide the primary north-south connection to, from and through the area. Internal north-south connections are minimal. Pedestrian access and connectivity are maintained with through-block links, for example Chaley Street to Onslow Street and Onslow Street to Liverpool Street. Public transport is limited to bus services along OSHR, Victory Street, Dover Road and Hardy Street.



Figure 20-6 - Built form, uses and heritage area #20

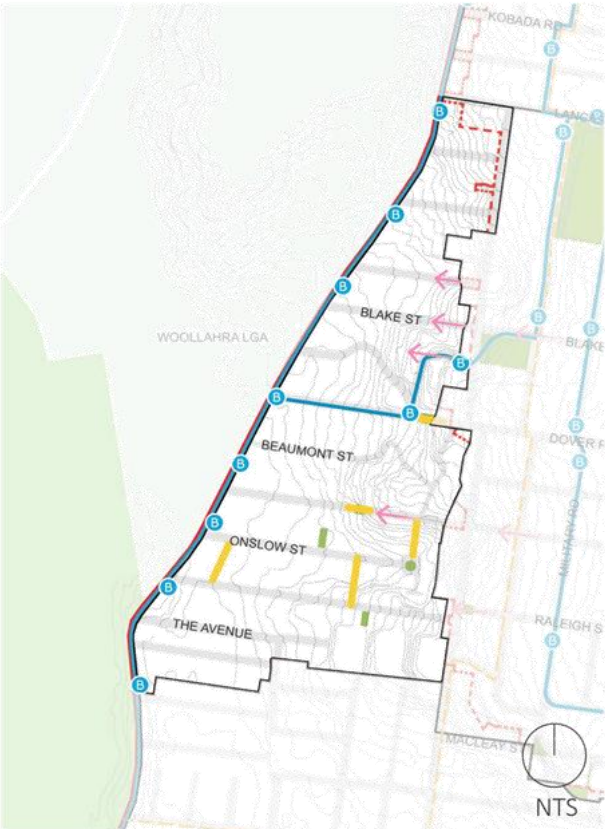
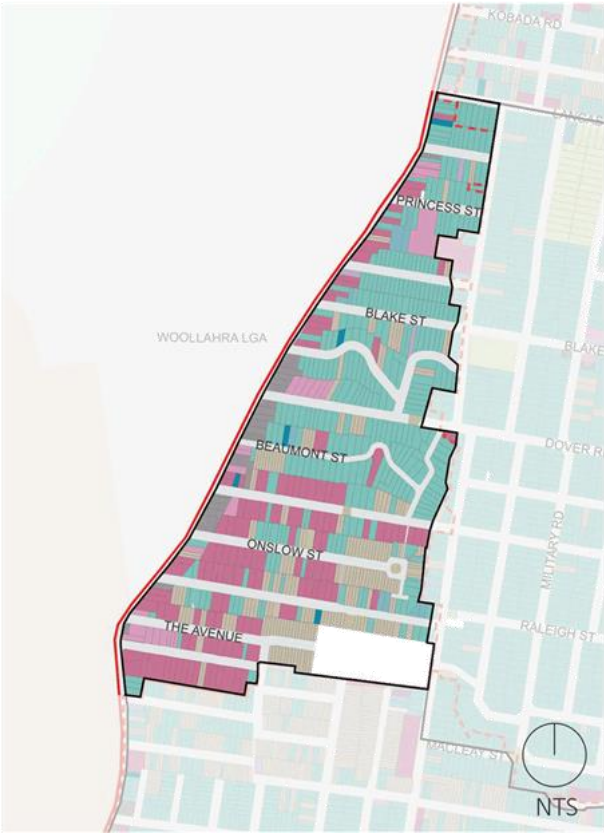


Figure 20-7 - Road network and movement area #20

Built form

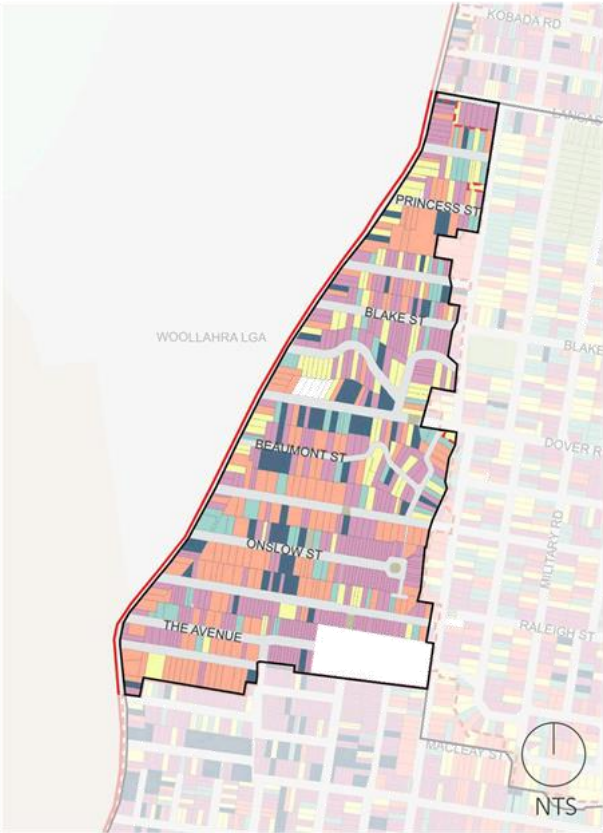
The area is characterised by a patchwork of dwelling typologies and styles. The area to the north of Liverpool Street is characterised by 1-3 storey detached dwellings located on cross streets, and 1-4 storey residential flat buildings (RFBs) and shop-top housing fronting OSHR and through the South Rose Bay village centre. Styles include Federation and Inter-War style detached and semi-detached bungalows, Mid-century style RFBs and newer late 20th century (see Figure 20-12) and 21st century detached dwellings, which reflects recent and ongoing redevelopment of the area. The area to the south of Liverpool Street is characterised by a high concentration of 1-2 storey Inter-War style detached

and semi-detached dwellings and 3-4 storey Mid-century to late 20th century RFBs (see Figure 20-4). RFB development resulted in the erosion of previously cohesive Inter-War streetscapes. Earlier architectural styles (pre-Mid-century) are defined by simple geometry, rendered or un-rendered red or light-coloured brick, terracotta pitched roofs, and varying façade detailing. Despite noticeable styles, early dwellings have been significantly modified overtime. Modifications include, second-storey and garage additions. Later contemporary architectural styles are defined by flat-roofed, contemporary forms with wider modulation, wide integrated garages, large balconies and areas of transparent glass for doors, windows and balcony balustrades (see Figure 20-2).



- LEGEND
- Study area boundary
 - Cadastre boundary
 - Detached dwelling
 - Semi-detached dwelling
 - Dual-occupancy
 - Terrace
 - Residential flat building
 - Manor home
 - Multi-dwelling housing
 - Shop-top housing
 - Commercial
 - Other

Figure 20-8 - Dwelling typologies area #20



- LEGEND
- Study area boundary
 - Cadastre boundary
 - Colonial
 - Early Victorian
 - Late Victorian
 - Federation
 - Inter-war
 - Mid-Century Modern
 - Late 20th Century
 - 21st Century

Figure 20-9 - Architectural styles area #20

174 Existing character description cont.

Public and private domain interface

The public and private domain interface varies across the area, due to different street corridor widths, topographical changes and dwelling typologies and styles. Wider versus narrower street carriageways, verges and footpaths influence the physical distance and visual transition between the domains. The varying capacity of the street verge to accommodate trees also influences this transition, creating a sense of openness or enclosure within the street corridor, for example Victory Street versus Onslow Street. The verge is punctuated by driveway crossovers due to the prevalence of on-site parking within the area. Dwellings tend to have a uniform front setback, however, varying front landscaping, fence materiality and height influence the visibility of the dwelling from the public domain, for example Strickland and Beaumont streets (see Figure 20-11). Encroachment into the front setback by parking structures including car ports and enclosed garages is common and further obscures the dwelling from the public domain, for example Northcote Street. This can also result in a continuous wall of garages. On sloping sites dwellings are raised above the street level, with built retaining walls, high fences and garage doors typically fronting the street, with the dwelling setback further within the lot, for example Victory Street. Front landscaping varies. RFBs are typically raised above street level, with ground-level carparking and upper balconies overlooking the public domain (see Figure 20-10).



Figure 20-10 - RFB, Chaleyer Street



Figure 20-11 - Street corridor, Beaumont Street



Figure 20-12 - Semi-detached dwellings, Onslow Street



Figure 20-13 - Detached dwellings, Victory Street



Figure 20-14 - RFB, Chaleyer Street

Natural environment

Topographical high points in the north and east of the area provide district views from the public and private domain to the harbour and Sydney CBD, for example Hardy Street and Liverpool Street. Open space is limited within the area comprising pocket parks at Dover Road and Onslow Street, however the area benefits from access to surrounding coastal and harbour public open space. Walkability to these areas is influenced by topographical changes. Stone retaining walls and exposed sandstone bedrock are prominent landscape features. Vegetation coverage across the area varies. Within the private domain coverage is typically low-medium, this is largely due to high site coverage and prevalence of pools. Within the public domain, coverage remains low in the north of the area, likely due to varying verge widths and to need to maintain views. Coverage increases within the south of the area. These conditions result in a low-medium heat vulnerability.

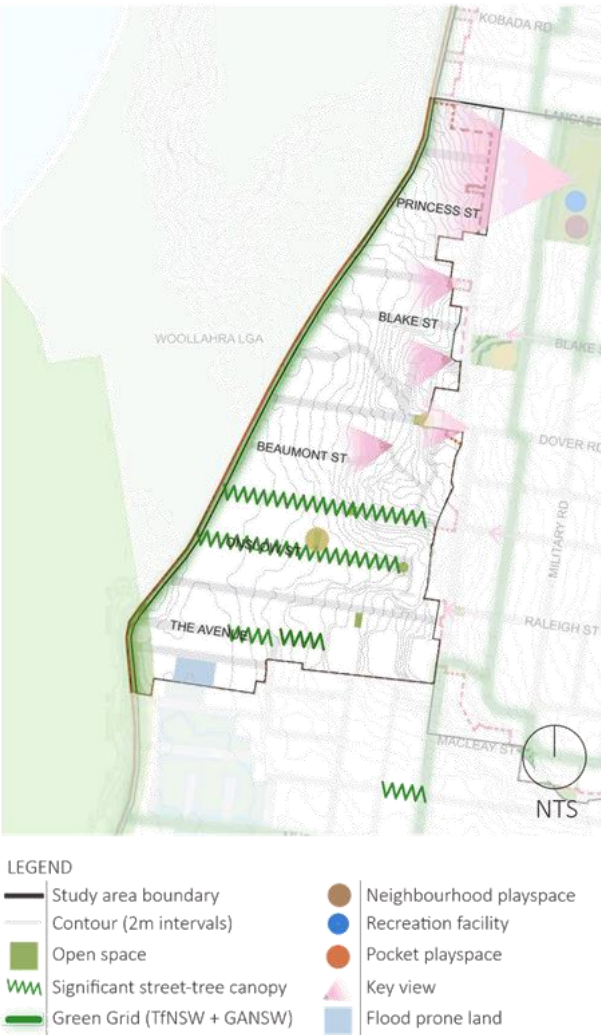


Figure 20-15 - Open space and vegetation area #20



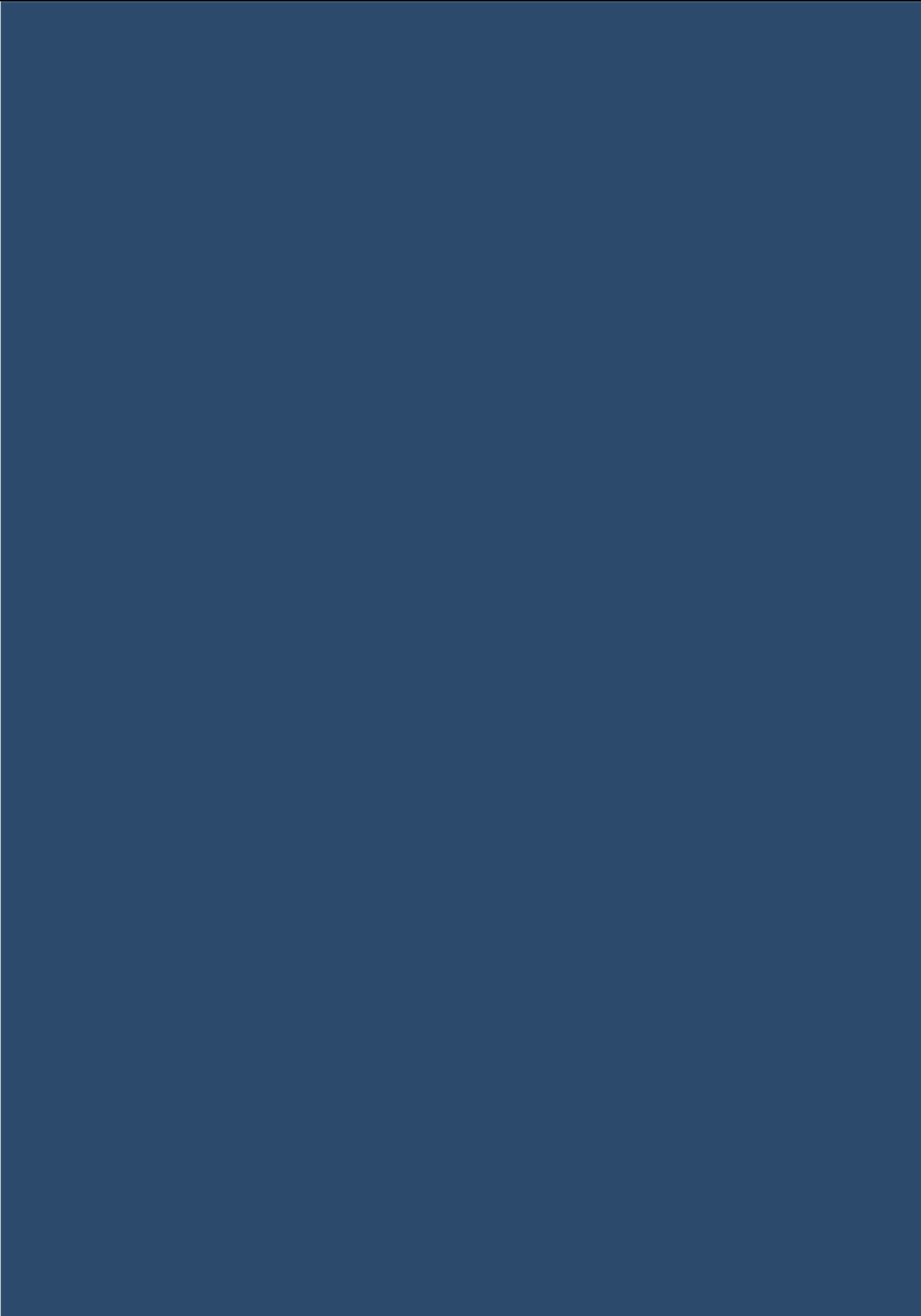
Figure 20-16 - Bangalla Road, looking west to Sydney CBD

Recent development

Recent development history comprises alterations and additions of existing dwellings, including second-storey, car ports and materiality changes; construction of 2-storey dwellings of contemporary forms with integrated garages; limited amalgamation and construction of RFBs and town houses, particularly along OSHR; and limited strata consolidation. Indicating an anecdotal demand for newer dwellings, more floor space and more on-site carparking in the area.

Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

21



CHARACTER AREA - 21

"The area is characterised by its elevated coastal location offering panoramic views; wide streets arranged in a grid pattern, comprising 1-3 storey detached and semi-detached dwellings of varying architectural styles; street-level garages and low landscaping; and significant public open space".

The study area is bound by Lancaster Road to the north, Gilbert and Hardy Streets to the west, MacLeay Street, Loombah Road and Military Road to the south, and the Pacific Ocean to the east.



Figure 21-1 - Local character area #21 map



Figure 21-3 - Semi-detached dwellings, Hunter Street



Figure 21-4 - Lyons Street, looking east



Figure 21-2 - Raleigh Reserve, looking south from Liverpool Street



Figure 21-5 - Detached dwellings, Portland Street

Existing character attributes



Desired future character

Vision

The desired future character of the area is defined by wide street corridors with regularly placed, low street trees, framing views to the ocean; consistent building line with front setbacks comprising low landscaping, to soften the visual transition between the public and private domains; well-designed low-rise dwellings of contemporary forms; integrated garages that do not dominate the streetscape or dwelling; and shared view opportunities.

Objectives

The objectives for development on land identified within the character area are as follows:

- To maintain the predominant 2-3 storey height character of the area, noting that buildings on sloping sites should adjust the relative level and height to follow the natural topography and avoid excessive excavation,
- To ensure that subdivision or amalgamation respects the predominant development pattern of the area,
- To ensure high-quality design of contemporary detached and semi-detached dwellings (including dual occupancy), with appropriate façade and material articulation. Flat roofs are supported for view sharing,
- To ensure alterations and additions read as a cohesive part of the existing dwelling and extension of historic form and materiality,
- To maintain a consistent front setback (including upper floors) to preserve the wide street corridors, reinforce views to coastline and allow for landscaping to soften the transition from public to private domains,
- To ensure that car parking structures do not dominate or adversely impact upon the streetscape,
- To maintain and minimise the impact on views and vistas from the public and private domain,
- To minimise development density along the cliff-front to reduce risk from coastal processes and climate change,
- To ensure the safety of pedestrians along the coastal cliff,
- To promote the reduction of hard surfaces and an increase of public and private landscaping.

180 Existing character description

History

Population and development of the area was minimal until the 1880s when cross routes from Old South Head Road began to develop. The Federation period saw subdivision and housing construction begin, albeit slowly. Transport improvements resulted in extensive development through the Inter-War and Post-War periods. More recently extensive amalgamation and replacement of older properties has occurred, particularly on the escarpment. The area is predominantly residential with supporting commercial uses, educational and religious institutions, including Kesser Torah College. The Blake Street local centre comprises a mix of local and community-focused retail and hospitality uses.

Configuration and connectivity

The area is situated on a coastal plateau, sloping gently to the west and south, becoming steeper on the western edge at Hardy Street. The area's elevated position provides panoramic views from the public and private domain to the Pacific Ocean, coastal cliffs, Sydney CBD and surrounding area.

Wide streets are typically arranged in a rectangular grid pattern, with the long axis in the north-south direction. Block size decreases south of Dover Road, providing greater north-south connectivity. Streets cater for predominantly local traffic.

The area has a mostly uniform subdivision pattern consisting of large (>500m²) rectangular lots, of predominantly east-west orientation, except for the lots adjoining east-west street corridors which terminate at the coastline. These corridors are important view axis', framing ocean views and providing a sense of direction and orientation. South of Raleigh Street the street layout and subdivision pattern are more irregular, reflecting the local topography.



Figure 21-6 - Views west from Caffyn Park

Built form

The area is characterised by predominantly 1-3 storey detached and semi-detached dwellings of varying architectural styles, from Inter-War to Mid-Century to 21st Century styles (see Figure 21-12). Older, Inter-War to Mid-Century style dwellings are typically of simple geometry with terracotta pitched roofs, masonry and fine modulation such as semi-circular bay windows, round fillet walls, influenced by the Art Deco period. Exemplar buildings include heritage listed 14 Aboukir Street and 2 Lord Howe Street. Newer dwellings are typically 3-storey flat-roofed cascading buildings with wider modulation, wide integrated garages, large balconies and areas of transparent glass for doors, windows and balcony balustrades. Some newer dwellings comprise complex and curvilinear forms introducing a new aesthetic. The population density is approx. 40 persons/ha. The dominant tenure type is home ownership, with low private rental.

Public and private domain interface

Dwellings tend to have a uniform front setback, enhancing the wider street corridor and open landscape character. Low planting and front fences aid surveillance and visual transition from street to dwelling.



Figure 21-7 - Detached dwelling frontages, Portland Street



Figure 21-8 - Hunter Street, looking east

On steep sites landscaping is often used to form a soft transition from the street to elevated dwellings (see Figure 21-5).

The prevalence of wide garages, often built to the front boundary or within the front setback, limits front landscaping, obscures the building façade and detracts from the public-private transition. The dominance of garages is attributable to <30 lots having no private parking, reflective of car ownership rates now and when the area developed and lack of public transport connectivity (bus only).

Natural environment

The area benefits from significant public open space including the Dover Heights Coastal Reserves, Hugh Bramford Reserve, Dudley Page Reserve and Caffyn Park which, forming part of the continuous coastal open space network, offer passive and active recreation opportunities. The Coastal Reserves hold Indigenous and European archaeological significance. The area is generally void of any remnant native vegetation except for some low coastal shrubs and grasses along the coastal reserves, which supports a biodiversity habitat corridor. Caffyn Park features mature tree planting. The natural sandstone bedrock is exposed throughout the area and along the coastal escarpment. Landscaping in the public and private domains is generally low, characteristic of the elevated and exposed coastal location and to need to maintain views. The elevated coastal location provides for prevailing coastal winds from the east, which combined with the open character results in low heat vulnerability.



Figure 21-9 - Dudley Page Reserve, looking west



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?

Recent development

Recent development history shows a trend towards, property amalgamation; alterations and additions to existing or construction of new detached or semi-detached dwellings of 2-3 storeys contemporary forms, with large integrated garages, balconies and minimal landscaping. Indicating a demand for more floor space and more on-site parking in the area.

182 Existing character description cont.



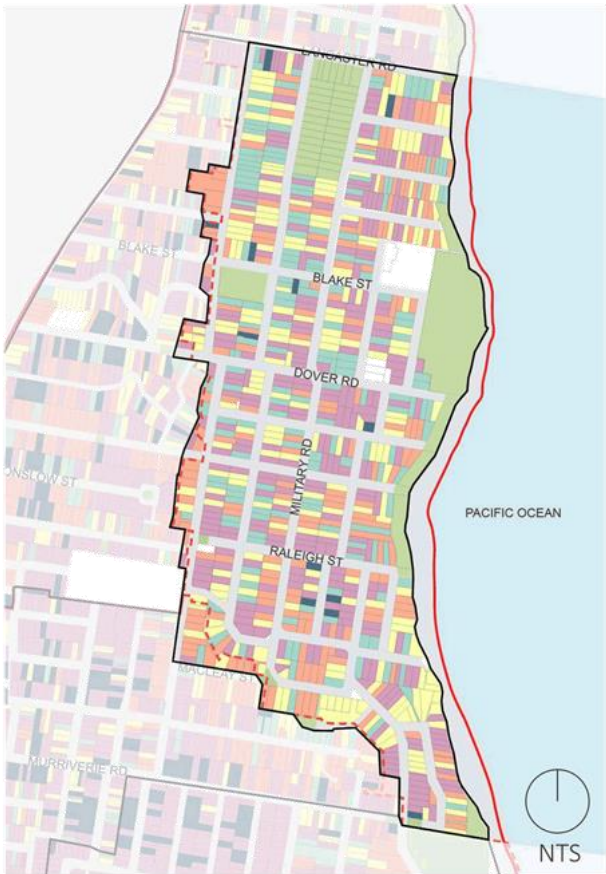
- LEGEND
- Study area boundary
 - Cadastral boundary
 - Building footprint
 - Open space
 - Blake Street Village Centre
 - Educational establishment
 - Religious institution
 - Landscape Conservation Area
 - General heritage item
 - Archaeological heritage item
 - Archaeological heritage site

Figure 21-10 - Built form, key uses and heritage area #21



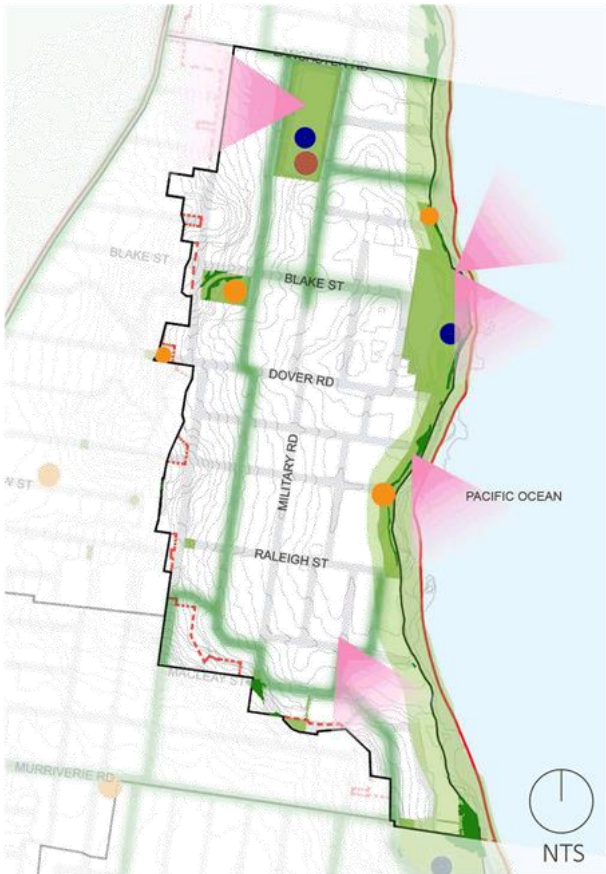
- LEGEND
- Study area boundary
 - Road network
 - Contour (2m intervals)
 - Open space
 - Bus routes
 - Bus stops
 - Bicycle routes
 - Coastal walk
 - View corridor

Figure 21-11 - Road network and movement area #21



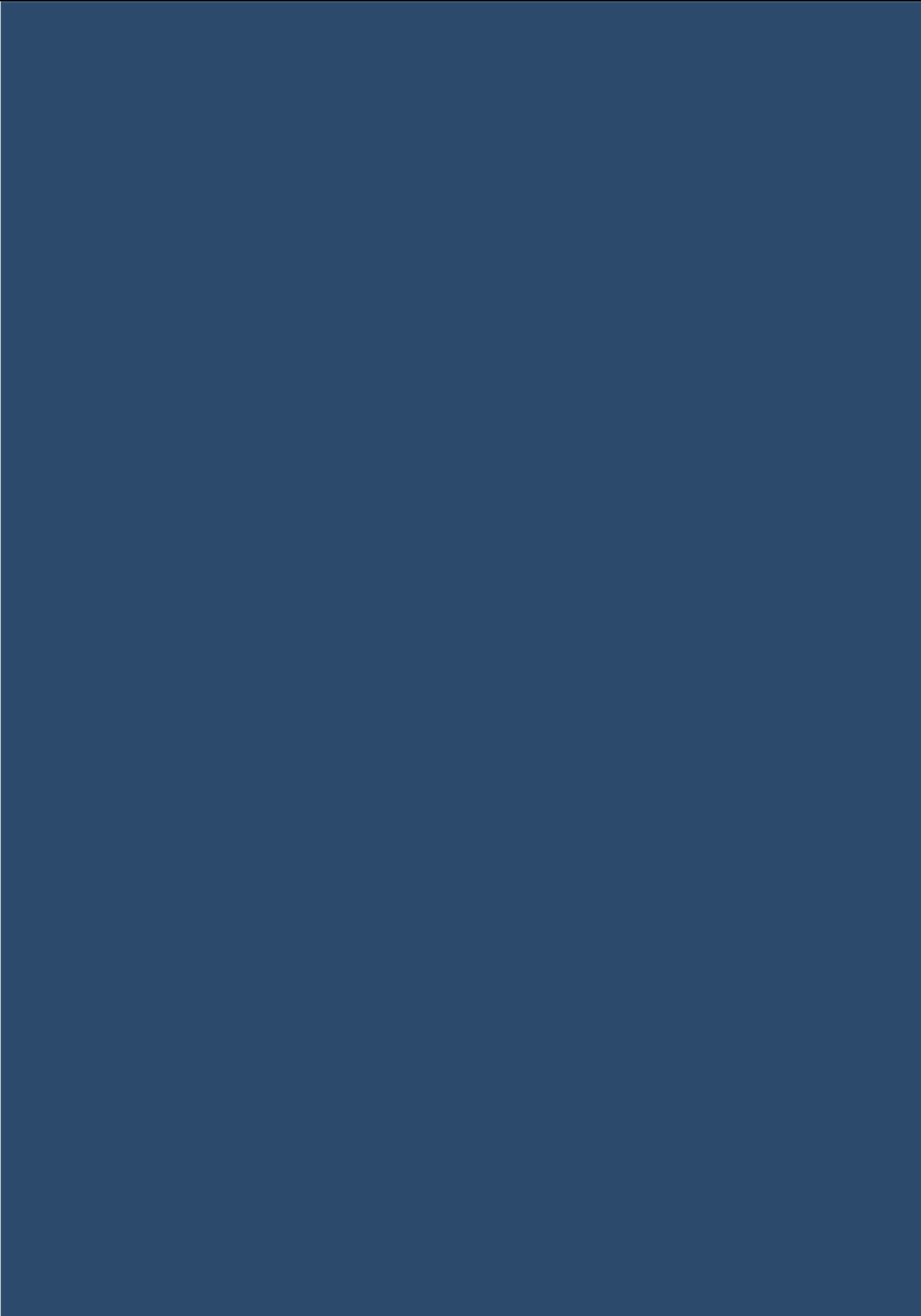
- LEGEND
- Study area boundary
 - Cadastral boundary
 - Colonial
 - Early Victorian
 - Late Victorian
 - Federation
 - Inter-war
 - Mid-Century Modern
 - Late 20th Century
 - 21st Century

Figure 21-12 - Architectural styles area #21



- LEGEND
- Study area boundary
 - Suburb boundary
 - Contour (2m intervals)
 - Open space
 - Biodiversity habitat corridor
 - Remnant vegetation
 - Green Grid (TfNSW + GANSW)
 - Neighbourhood playspace
 - Pocket playspace
 - Recreation facility
 - Key view

Figure 21-13 - Open space and vegetation area #21



CHARACTER AREA

22



CHARACTER AREA - 22

"The area is defined by its elevated coastal location with panoramic views; irregular block pattern comprising low-rise predominantly detached and semi-detached dwellings interspersed with residential flat buildings; uniform front setbacks, enhancing wide street corridors; street-level garages and low landscaping; coastal open space".

The study area is generally bound by Military Road and Kimberley Street to the north, the Pacific Ocean to the east, Lancaster Road to the south and Old South Head Road (OSHR) to the west.



Figure 22-1 - Local character area #22 map



Figure 22-4 - Residential flat buildings, Military Road



Figure 22-2 - Oceanview Avenue, looking east



Figure 22-5 - Military Road street frontage, looking south-west

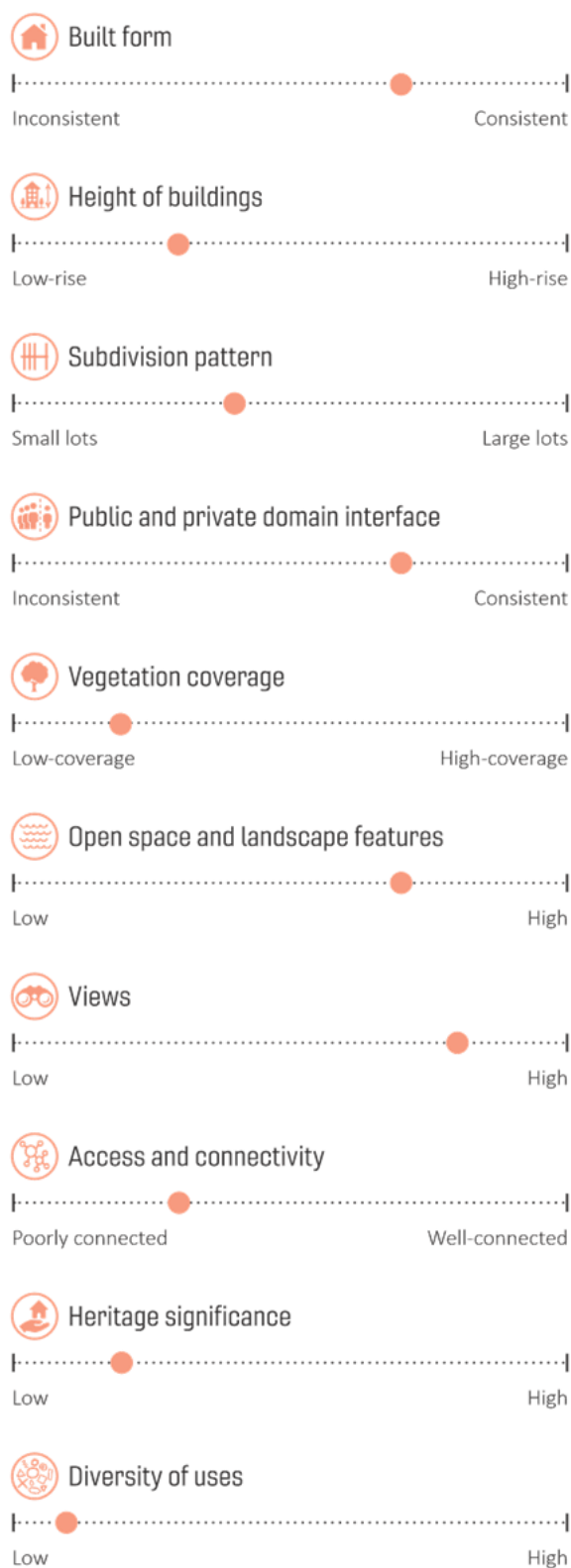


Figure 22-3 - Ethel Street, looking south



Figure 22-6 - Eastern Avenue Reserve, looking south

Existing character attributes



Desired future character

Vision

The desired future character of the area is defined by wide street corridors with panoramic ocean and Sydney CBD skyline views and is within walking access to local shops and services along Old South Head Road.

Objectives

The objectives for development on land identified within the character area are as follows:

- To recognise and maintain the diversity of uses in the area, particularly along OSHR,
- To maintain the predominant 2-4 storey height character of the area, noting that buildings on sloping sites should adjust the relative level and height to follow the natural topography and avoid excessive excavation,
- To ensure alterations and additions read as a cohesive part of the existing dwelling and extension of historic form and materiality,
- To ensure high-quality design of contemporary detached and semi-detached dwellings (including dual occupancy), with appropriate façade and material articulation. Flat roofs are supported for view sharing,
- To encourage high-quality, contemporary, low rise RFB development at the western edges of the area, fronting OSHR. Consider site amalgamation where appropriate,
- To maintain a consistent front setback (including upper floors) to preserve the wide street corridors, reinforce views to coastline and allow for landscaping to soften the transition from public to private domains,
- To ensure that carparking structures do not dominate or adversely impact upon the streetscape,
- To maintain views and vistas from the public domain,
- To minimise the impact on existing views and vistas from the private domain,
- To minimise development density along the cliff-front to reduce risk from coastal processes and climate change,
- To ensure the safety of pedestrians along the coastal cliff,
- To promote the reduction of hard surfaces and an increase of public and private landscaping.

188 Existing character description

History

The area’s isolated location resulted in limited population and development until the 1900s, during the Federation period. Transport improvements, including introduction of bus services to supplement tram services along OSHR and the rise of private vehicle ownership, spurred development of the area for housing during the Inter-War and Post-War periods. The area remains predominantly residential with supporting commercial and retail uses within the North Rose Bay village centre and coastal open space.

Configuration, connectivity and built form

Subdivision of the area has resulted in an irregular block pattern. Wide east-west streets typically extend from OSHR, following the area’s prevailing east-west slope traversing the natural north-south ridgeline along Military Road, and terminating at the coastline. These corridors are important view axes’, framing ocean views and providing a sense of direction and orientation. OSHR and Military Road provide the primary north-south connection to, from and through the area. Pedestrian access and connectivity are increased with through-block links, for example Wilfield Avenue to Oceanview Avenue and Bulga Road to Military Road as well as the coastal cliff walk. Public transport is limited to bus services along OSHR and Military Road.



Figure 22-7 - Road network and movement area #22



Figure 22-8 - Eastern Avenue, looking east



Figure 22-9 - Kobada Road, looking west

The area is characterised by predominantly detached and semi-detached (including dual occupancy) dwellings, interspersed with residential flat buildings (RFBs). The dominant architectural styles are Inter-War and Mid-century styles reflective of the primary periods of development. These styles are defined by simple geometry, rendered or un-rendered red or light-coloured brick, terracotta pitched roofs or flat roofs on RFBs, large windows and generally have integrated street-level garages. Early detached and semi-detached dwellings have been significantly modified overtime. Modifications include, second-storey, balcony and garage additions. Redevelopment of older dwellings is occurring throughout the area. Newer, late 20th century and 21st century-style detached, and semi-detached dwellings are defined by flat-roofed, contemporary forms with wider modulation, wide integrated garages, large balconies and areas of transparent glass for doors, windows and balcony balustrades. Some newer dwellings comprise complex and curvilinear forms. Dwellings are typically 1-3 storeys in height. RFBs are typically 3-5 storeys. The bulk and scale of dwellings throughout the area varies, due to the different forms, façade modulation / articulation and roof types. Character is created through the lack of uniformity in the built form.



Figure 22-10 - Dwelling typologies area #22

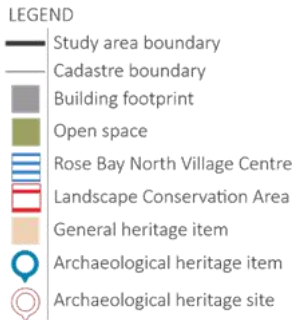


Figure 22-12 - Built form, uses and heritage area #22



Figure 22-11 - Dwelling typologies area #22



Figure 22-13 - Semi-detached dwellings, George Street



Figure 22-14 - Detached dwellings, Elvina Street

Existing character description cont.

Public and private domain interface

Dwellings tend to have a uniform front setback, enhancing the wider street corridor and open landscape character. Front landscaping, fence materiality and height varies throughout the area influencing the visibility of the dwelling from the public domain. On sloping sites dwellings on the high side can be raised above street level, with built retaining walls, high fences or garage doors fronting the street, for example OSHR and Oceanview Avenue. Dwellings on the low side, for example those fronting the coast on Ray Street, can be partially or completely obscured from street level as a result of the sloping topography, vegetation and carports and garages at the boundary. RFBs are typically raised above street level, with ground-level carparking and upper balconies overlooking the public domain. Overall, the streetscape is characterised by wide verges with limited street trees, punctuated by driveway cross-overs and car-parking structures typically located at the boundary.



Figure 22-15 - Military Road, looking east



Figure 22-16 - Oceanview Avenue street frontage



Figure 22-17 - Obscured dwellings, Ray Street



Figure 22-18 - Garage frontages, Oceanview Street

Natural environment

The area benefits from access to public open space including Eastern Avenue Reserve and Lancaster Road Reserve, which form part of the continuous coastal open space network (including the southern beaches) and offer passive and active recreation opportunities. The coastal reserves and cliffscapes are of significance landscape and archaeological value. The area comprises remnant native vegetation and supports a biodiversity habitat corridor. The natural sandstone bedrock is exposed along the coastal escarpment. The area's elevated position offers panoramic views from the public and private domain to the Pacific Ocean, coastline and surrounding areas. Landscaping in the public and private domains is generally low, characteristic of the elevated and exposed coastal location and to need to maintain views. These factors result in low-medium heat vulnerability across the area.



Figure 22-19 - Open space and vegetation area #22



Figure 22-20 - Detached dwelling, Elvina Street



Figure 22-21 - Semi-detached dwellings, Oceanview Avenue

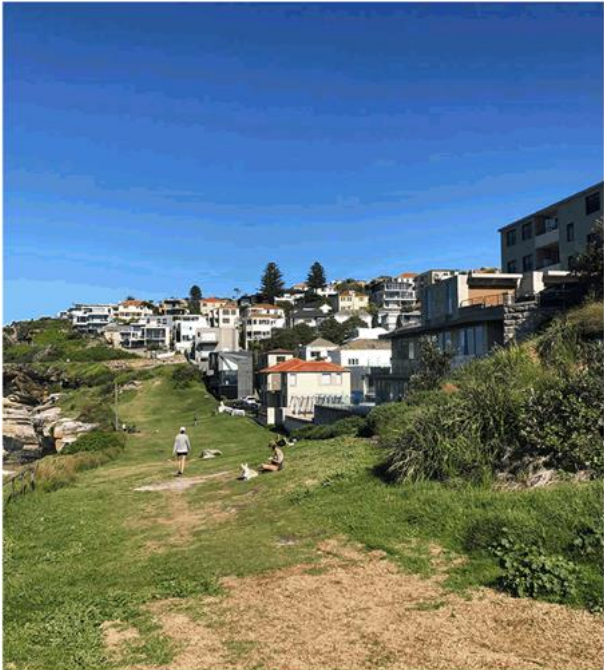



Figure 22-22 - Eastern Avenue Reserve, looking south

Recent development

Recent development history includes alterations and additions to existing dwellings, including second-storey additions and garage structures; property amalgamation; demolition of existing dwellings and construction of two-three storey dwellings of contemporary forms, with large integrated garages, balconies and minimal landscaping. Indicating an anecdotal demand for more floor space and more on-site parking in the area.



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



CHARACTER AREA

23



CHARACTER AREA - 23

"The area is characterised by natural landscape setting, of coastal reserves and cliffscapes; panoramic views; two defined areas of low-rise to medium-rise development comprising predominantly detached, semi-detached and residential flat buildings of various styles; uniform setbacks; street-level carparking; limited vegetation coverage".

The study area is generally bound by Christison Park to the north, the Pacific Ocean to the east, Kimberley Street and Military Road to the south and Old South Head Road (OSHR) to the west.



Figure 23-1 - Local character area #23 map



Figure 23-2 - Residential flat buildings, Diamond Bay Road



Figure 23-3 - Southern coastline from Chris Bang Crescent

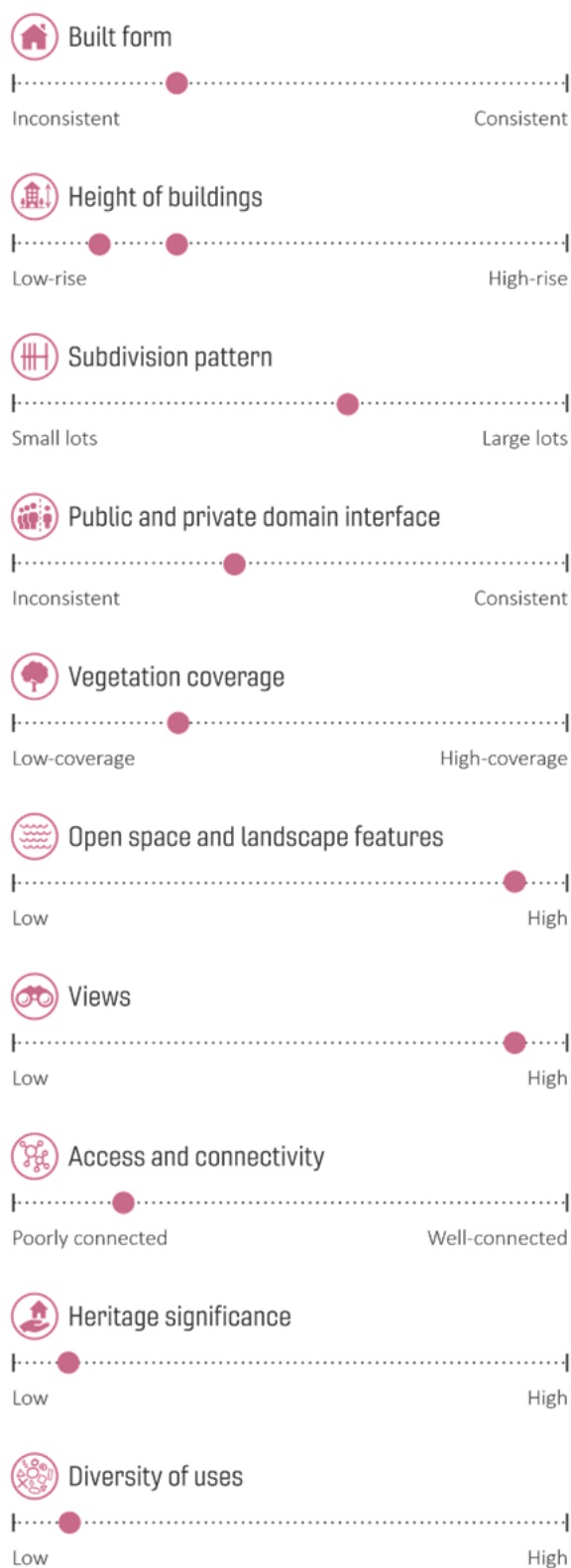


Figure 23-4 - Semi-detached dwellings, Marne Street



Figure 23-5 - Residential flat building, Diamond Bay Road

Existing character attributes



Desired future character

Vision

The desired future character of the area is defined by the coastal cliffscape and panoramic views to the ocean, a diversity of residential development with limited vegetation coverage.

Objectives

The objectives for development on land identified within the character area are as follows:

- To maintain the predominant 1-3 storey height character of the area, noting that buildings on sloping sites should adjust the relative level and height to follow the natural topography and avoid excessive excavation,
- To ensure alterations and additions read as a cohesive part of the existing dwelling and extension of historic form and materiality,
- To ensure high-quality design of new contemporary detached, semi-detached dwellings and RFB, with appropriate façade and material articulation. Flat roofs are supported for view sharing,
- To prevent the intensification of development along the coastal fringe,
- To ensure that carparking structures do not dominate or adversely impact upon the streetscape. Integrate carparking within new dwellings,
- To maintain views and vistas from the public domain,
- To minimise the impact on existing views and vistas from the private domain,
- To retain and enhance public and private recreation areas,
- To retain and protect the visibility of sandstone cliffs and edges by integrating the landscaping of the adjoining public and private areas,
- To minimise development density along the cliff-front to reduce risk from coastal processes and climate change,
- To ensure the safety of pedestrians along the coastal cliff, To promote the reduction of hard surfaces and an increase of public and private landscaping.

196 Existing character description

History

Population and development of the area was minimal until the 1900s, with only isolated residences on early land grants constructed during the Federation period. Transport improvements, including introduction of bus services to supplement tram services along OSHR and the rise of private vehicle ownership, spurred development of the area during the Inter-War and Post-War periods. The area remains predominantly residential with limited commercial uses within the Vaucluse village centre and substantial public and private open space, including the heritage-listed South Head Cemetery.

Configuration and connectivity

The area is defined by its natural landscape setting. Situated on a coastal plateau, the topography slopes from the natural ridgeline along OSHR, south and south-east towards Diamond Bay Reserve and the coastal cliffs. The area's elevated position offers panoramic views from the public and private domain to the Pacific Ocean, coastline and surrounding areas. Constrained by the natural topography and areas of open space, progressive subdivision of the

area has resulted in an irregular block and street network, creating two confined areas of development. These areas comprise circuit and no-through streets accessed by OSHR, which provides the primary connection to and from the area. Wide street corridors frame views and provide a sense of direction and orientation. Diamond Bay Reserve restricts north-south vehicle movements between the two areas. Pedestrian access and connectivity are maintained by multiple through-block links, for example Mons Street to MacDonald Street, Chris Bang Crescent to Craig Avenue and Isabel Avenue to Military Road as well as the coastal cliff walk. Public transport is limited to bus services along OSHR and Military Road.

Built form

The area is characterised by predominantly detached, semi-detached and residential flat buildings (RFBs) dwelling typologies, of Inter-War, Mid-century Modern to 21st century styles. Clusters of early Federation and Inter-War style detached, and semi-detached bungalows are evident throughout the area, for example Jenson Street. These early dwellings have been significantly modified overtime. Modifications include, second-storey and garage additions.

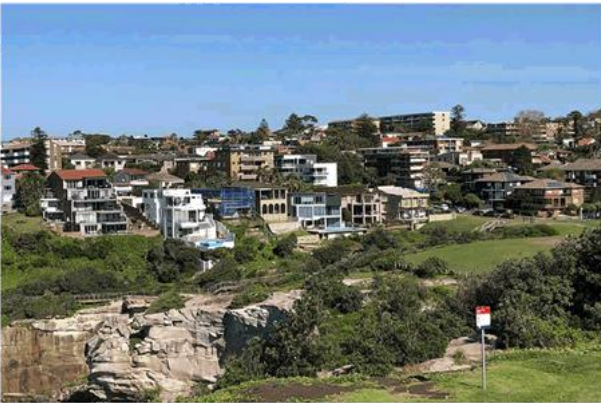


Figure 23-6 - Diamond Bay Reserve from Chris Bang Crescent



Figure 23-7 - Young Street, looking south

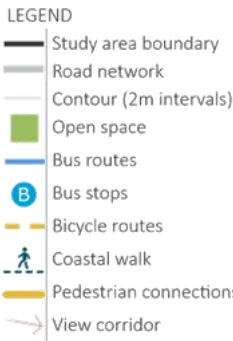


Figure 23-8 - Road network and movement area #23

The dominance of Mid-century Modern-style dwellings across the area reflects the primary period of development, post-WWII. Features of this style typically include, rendered or un-rendered red or light-coloured brick, flat or single-angled rooflines, floor-to-ceiling windows, integrated ground level parking and upper balconies for RFBs. The prominent apartment block on Kimberley Street, designed by Modernist architect Harry Seidler is a key example of this style. The area to the north, bound by Young Street, Chris Bang Crescent to Clarke Street, has a prevailing low-to-medium density character with detached and semi-detached Mid-century-style dwellings, and a significant cluster of Mid-century-style RFBs on Clarke and Tower streets. The area to the west, bound by Diamond Bay Road and Isabel Avenue, has a prevailing medium density character, comprising predominantly Mid-century Modern to 21st century-style RFBs and multi-dwelling housing. This area has also seen more recent multi-dwelling and RFB development, of late 20th and 21st century styles. Less than 10% of dwellings in this area are detached and are largely located on Craig Avenue. Redevelopment of peripheral lots, for example along Chris Bang Crescent, results in late 20th century and 21st style dwellings. Dwelling heights reflect the diversity of typologies and styles. Detached and semi-detached dwellings are typically 1-2 storeys in height, increasing to 3-storeys where the topography provides for a ground-level garage, for example Chris Bang Crescent. RFBs are typically 3-4 storeys. RFBs of 7+ storeys are also evident within the area, however, are inconsistent with the prevailing height character.



Figure 23-9 - Mid-Century Modern RFBs, Isabel Avenue



Figure 23-10 - Architectural styles area #23



Figure 23-11 - Dwelling typologies area #23

198 Existing character description cont.

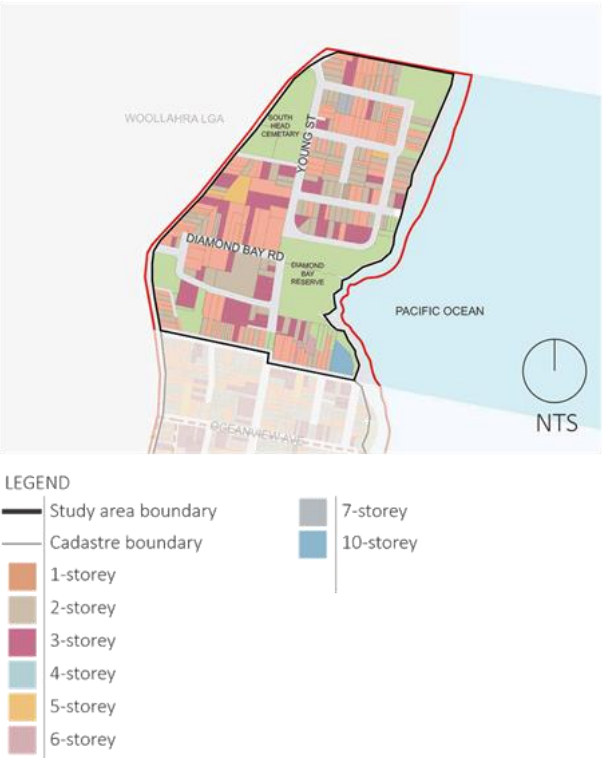


Figure 23-12 - Building heights in storeys area #23



Figure 23-13 - Built form, uses and heritage area #23

Public and private domain interface

Dwellings tend to have a uniform front setback, enhancing the wider street corridor and open landscape character. Front landscaping, fence materiality and height varies, influencing the visibility of the dwelling from the public domain, for example Clarke Street. Later additions of a carport or enclosed garage at the boundary encroach on the front setback and can further obscure the dwelling, for example Marne Street and Jensen Avenue. RFBs are typically raised above street level, with ground-level carparking and upper balconies overlooking the public domain. As a result, the streetscape is characterised by wide verges with limited street trees, punctuated by driveway cross overs and adjacent carparking structures.



Figure 23-14 - Clarke Street, looking east



Figure 23-15 - MacDonald Street, looking east



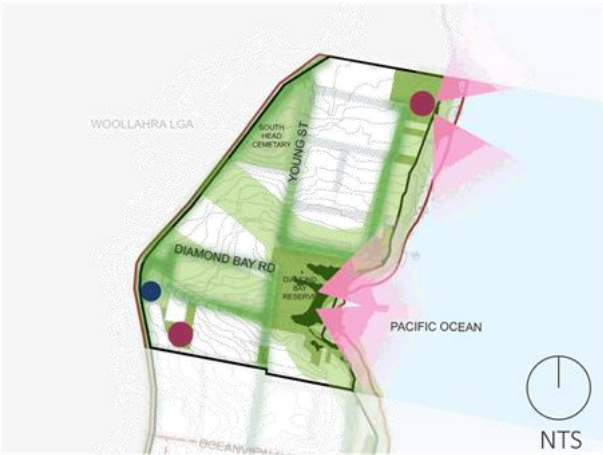
Figure 23-16 - Marne Street, looking south-west

Natural environment

The area benefits from access to significant public open space including Diamond Bay Reserve and Clarke Reserve, which form part of the continuous coastal open space network and offer passive and active recreation opportunities. The coastal reserves and cliffscapes are of significant landscape and archaeological value. Diamond Bay Reserve comprises remnant native vegetation and Aboriginal carvings. The area supports a biodiversity habitat corridor. Kimberley Reserve includes a community hall available for hire. Landscaping in the public and private domains is generally low, characteristic of the elevated and exposed coastal location and the need to maintain views. These factors result in low-medium heat vulnerability across the area.



Figure 23-17 - Clarke Reserve and playground



- LEGEND
- Study area boundary
 - Contour (2m intervals)
 - Open space
 - Biodiversity habitat corridor
 - Remnant vegetation
 - Green Grid (TfNSW + GANSW)
 - Neighbourhood playspace
 - Recreation facility
 - Key view


Figure 23-18 - Open space and vegetation area #23



Figure 23-19 - Diamond Bay Reserve and coastal walk

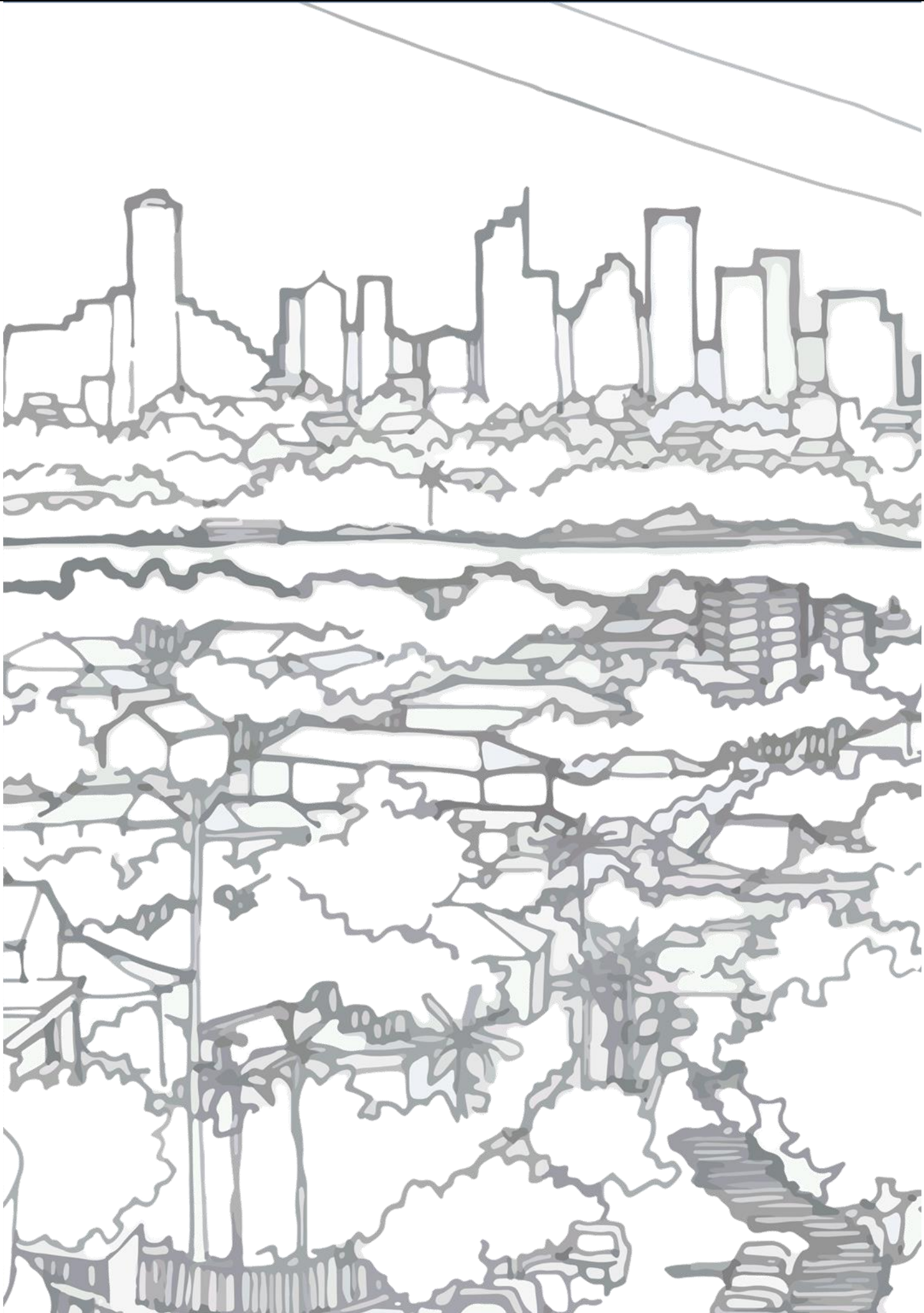
Recent development

Recent development history comprises alterations and additions to existing dwellings, including second-storey additions and garage structures; demolition of existing dwellings and construction of two-three storey dwellings of contemporary forms, including dual occupancy; consolidation and demolition of existing dwellings and construction of RFBs (particularly to the west of Diamond Bay); and some limited secondary dwellings (studios). Indicating an anecdotal demand for intensification of valuable land, more floor space and more on-site parking in the area.



Have Your Say!

1. Is the boundary of the area accurate?
2. Do you think this is an accurate description of the areas existing character?
3. What characteristics of the area do you value most?
4. Are the desired future character objectives listed above helpful in maintaining and enhancing the areas valued characteristics?



GLOSSARY

Table 3 - Common terms and abbreviations

Legislation, plans or policies	
CSP	Community Strategic Plan
DCP	Development Control Plan
District Plan	Eastern City District Plan, Greater Sydney Commission, 2018
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
LCO	Local Character Overlay
LEP	Local Environmental Plan
LHS	Local Housing Strategy
LRMDHC	Low-Rise Medium-Density Housing Code
LSPS	Local Strategic Planning Statement
Region Plan	Greater Sydney Region Plan, A Metropolis of Three Cities, GSC, 2018
SEPP	State Environmental Planning Policy
VCS	Draft Waverley Village Centres Strategy 2020
WAMP	Waverley Architectural and Urban Typologies Mapping Project
Organisations	
DPIE	Department of Planning Industry and Environment
GSC	Greater Sydney Commission
Other	
HCA	Heritage Conservation Area
LCA	Landscape Conservation Area
LGA	Local Government Area
RFB	Residential flat building

Table 4 - Glossary of terms

Term	Definition
Complying development	<p>Complying development is a development that meets specific standards in the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 (Codes SEPP) or other SEPPs such as the State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017 (Education SEPP).</p> <p>Some categories of works that are complying development:</p> <ul style="list-style-type: none"> • construction of a new dwelling or secondary dwelling • alterations and additions to an existing dwelling • demolition of a building • internal alterations (fit-outs) of commercial / retail premises. <p>Applications can be determined by a council or private certifier without the need for a full development application. This provides a faster approval process, whilst ensuring stringent planning and environmental requirements are met through a set of prescribed approval conditions.</p>
Detached dwelling	A building containing one dwelling, on a single block of land that is not attached to any other dwelling.
Development control plan (DCP)	A plan that provides detailed planning and design guidelines for specific types or developments or areas (e.g. heritage items and heritage conservation areas) to support the planning controls in a LEP.
District strategic plan	A 20-year plan prepared by the State Government (Greater Sydney Commission) that address the community's needs for housing, jobs, infrastructure and a healthy environment for the districts within metropolitan Sydney.
Dual occupancy	<p>Dual occupancy (attached) means two dwellings on one lot of land that are attached to each other either side by side or above and below, by a common wall / floor.</p> <p>Dual occupancy (detached) means two detached dwellings on one lot of land.</p>
Exempt development	Some development is prescribed as exempt development under the Codes SEPP and / or the WLEP. Provided the development is in accordance with any provisions set out in the Codes SEPP or WLEP, an applicant does not need approval to undertake works.
Local environmental plan (LEP)	An environmental planning instrument (EPI) developed by a local planning authority, generally a council. An LEP sets the statutory planning framework for a Local Government Area.
Manor home	Means a group of four dwellings provided within a single building predominantly of two-storey height (with some limited three-storey elements).
Multi-dwelling housing	Means three or more dwellings (whether attached or detached) on one lot of land each with access at ground level, but does not include a residential flat building.
Regional strategic plan	A 20-year plan prepared by the State Government (Greater Sydney Commission) that address the community's needs for housing, jobs, infrastructure and a healthy environment for metropolitan Sydney.

Term	Definition
Residential flat building	A building that contains three or more dwellings and is two or more storeys.
Secondary dwelling	Means a self-contained dwelling that: a) is established in conjunction with another dwelling (the principal dwelling), and b) is on the same lot of land as the principal dwelling, and c) is located within, or is attached to, or is separate from, the principal dwelling.
Semi-detached dwelling	A dwelling attached to one other dwelling by a common wall. Typically a vertical common wall connecting two dwellings that are side by side. This definition covers a Dual occupancy (attached) after it has been subdivided so that each dwelling is on its own torrens titled lot.
Shop-top housing	Means one or more dwellings located above ground floor retail, commercial or business premises.
State Environmental Planning Policy (SEPP)	An environmental planning instrument (EPI) developed by the DPIE, that relates to planning matters that are state significant or are applicable across the state.
Terrace	Means a building containing 3 or more dwellings, where: a) each dwelling is attached to another dwelling by a common wall, and b) located side by side, and c) each dwelling is on its own lot of land.

Table 5 - Architectural style and relevant time period

Architectural style	Time period
Colonial	Initial European Settlement - 1788-1820s
Early Victorian	1830s-1860s
Late Victorian	1870s-1880s
Federation	1890-1915
Inter-War	Inter-War years - 1919-1939
Mid-Century Modern	Post-War years - 1945-1970
Late 20th Century	1970-2000
21st Century	2000-now





Charing Cross Cycle Route Feasibility Study

Waverley Council

April 2020

This report was prepared by

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Bondi Junction NSW 2022

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Amendment Record

Version Number	Date	Description	Page No.
1.0	3Mar20	Draft issued for comment	--
2.0	25Mar20	Revised draft for client comment	various
3.0	20Apr20	Final report	various



Glossary

Bicycle Boulevard – low volume, low speed local street, typically traffic calmed with a cycling overlay to allow for way-finding, bicycle priority at intersections, filtered permeability, etc.

Bicycle Path – length of path for the exclusive use of bicycle riders beginning at a 'Bicycle Path' sign or bicycle path line marking, and ends at the nearest of (a) an 'End Bicycle Path' sign or end bicycle path linemarking; (b) a 'Separated Path' sign or separated path linemarking; (c) a road (except a road-related area); or (d) the end of the path.

Cycleway – generic term used to describe a bicycle route, bicycle lane, bicycle path or that part of a separated path used by riders.

Cycleway, Bi-Directional – an exclusive bicycle path on one side of the road related area designed for two-way bicycle traffic.

Cycleway, Uni-Directional – a pair of exclusive bicycle paths in the road related area designed for one-way bicycle traffic, one on each side of the road.

QTMR – Queensland Department of Transport and Main Roads.

Randwick – Randwick City Council, the Randwick City Council local government area.

RMS – NSW Roads and Maritime Services.

Separated Path – length of path where an exclusive bicycle path is laid adjoining a footpath. The separation may be visual (painted line) or physical (dividing strip or raised median). The facility begins at a separated path sign or separated path linemarking, and ends at the nearest of (a) an 'End Separated Path' sign or the end of the separated path linemarking; (b) a 'Bicycle Path' sign or bicycle path linemarking; (c) a 'No Bicycles' sign or no bicycles road marking; (d) a road (except a road-related area); or (e) the end of the path.

Shared Path – area open to the public (except a separated path) that is designated for use by both bicycle riders and pedestrians. The shared path begins at a 'Shared Path' sign and ends at the nearest of (a) an 'End Shared Path' sign; (b) a 'No Bicycles' sign or no bicycles road marking; (c) a 'Bicycle Path' sign; (d) a road (except a road-related area); or (e) the end of the path.

TfNSW – Transport for NSW.

Waverley – Waverley Council, the Waverley Council local government area.

Waverley Council



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1 Introduction

Waverley Council is committed to improving cyclist safety and amenity. In accordance with Waverley's Transport Plan: People, Movement and Places 2017 (Waverley, 2017.1), as well as Bondi Junction Complete Streets (Waverley, 2013.2) and the Waverley Bike Plan 2013 (Waverley, 2013.1), Waverley Council is seeking to improve the number and proportion of trips made by cycling so as to reduce traffic congestion, parking pressure and greenhouse gas emissions generated in Waverley while improving the health and amenity of our area. Several streetscape improvements are currently underway, with the next focus on Bronte Road.

Transport for New South Wales (TfNSW) have released the Principal Bicycle Network draft map which identified Bronte Road as a Tier 1 separated cycleway linking Bondi Junction and Randwick strategic centres (Waverley, 2020.1). The business cases are not currently available.

Waverley Council engaged Barros van den Dool Active Transport Pty Ltd to independently identify and comparatively assess all the options for a separated cycleway linking Bondi Junction and Randwick so that these options can be discussed with key stakeholders and inform the design of the Bronte Road streetscape projects.

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Figure 1.1 – Waverley Bike Plan and the TfNSW Principal Bicycle Network





2 Study Area and Route Options

In this section the following issues are discussed and evaluated:

- Analysis of the study area including the identification of barriers and constraints
- Identification of preliminary routes for consideration
- Description of each route.

2.1 Analysis of the Study Area

Figure 2.1 shows the study area covering a section of the Bondi Junction commercial and residential area to the east and west of the main desire line linking the end points of existing cycle route facilities: at the northern end, the intersection of Bronte Road and Spring Street; and, at the southern end, the intersection of Avoca Street and Frenchmans Road, Randwick. It is recognised that the latter falls outside the Waverley local government area and it is used only as a reasonable, common end point for the routes under investigation. Limited research on the routes has been carried outside the Waverley local government area.

Seven possible route options were investigated as shown in Figure 2.2. All routes were walked or cycled to investigate existing conditions such as land-use, traffic, parking, bus operations, etc.

The western-most route options through the area are York Road, Denison Street and Newland Street. West of these routes lies Centennial Park with its own, albeit restricted, cycling access opportunities. Further west is the City of Sydney.

The eastern-most route options follow Carrington Road and a route through Waverley Park / Henrietta Street. Any possible route alignment options further east are deemed not to adequately serve the desire line from Bondi Junction to Randwick Junction.

The two central route options follow Bronte Road / Albion Street, and Brisbane Street / Bourke Street / Queens Park.

There is a blended route which follows Bronte Road north of Charing Cross and Carrington Road south thereof.

The main desire line of the proposed Bondi Junction Cycleway, shown in Figure 2.1 by the orange double-headed arrow line, roughly follows the route via Brisbane Street, Bourke Street and Queens Park.

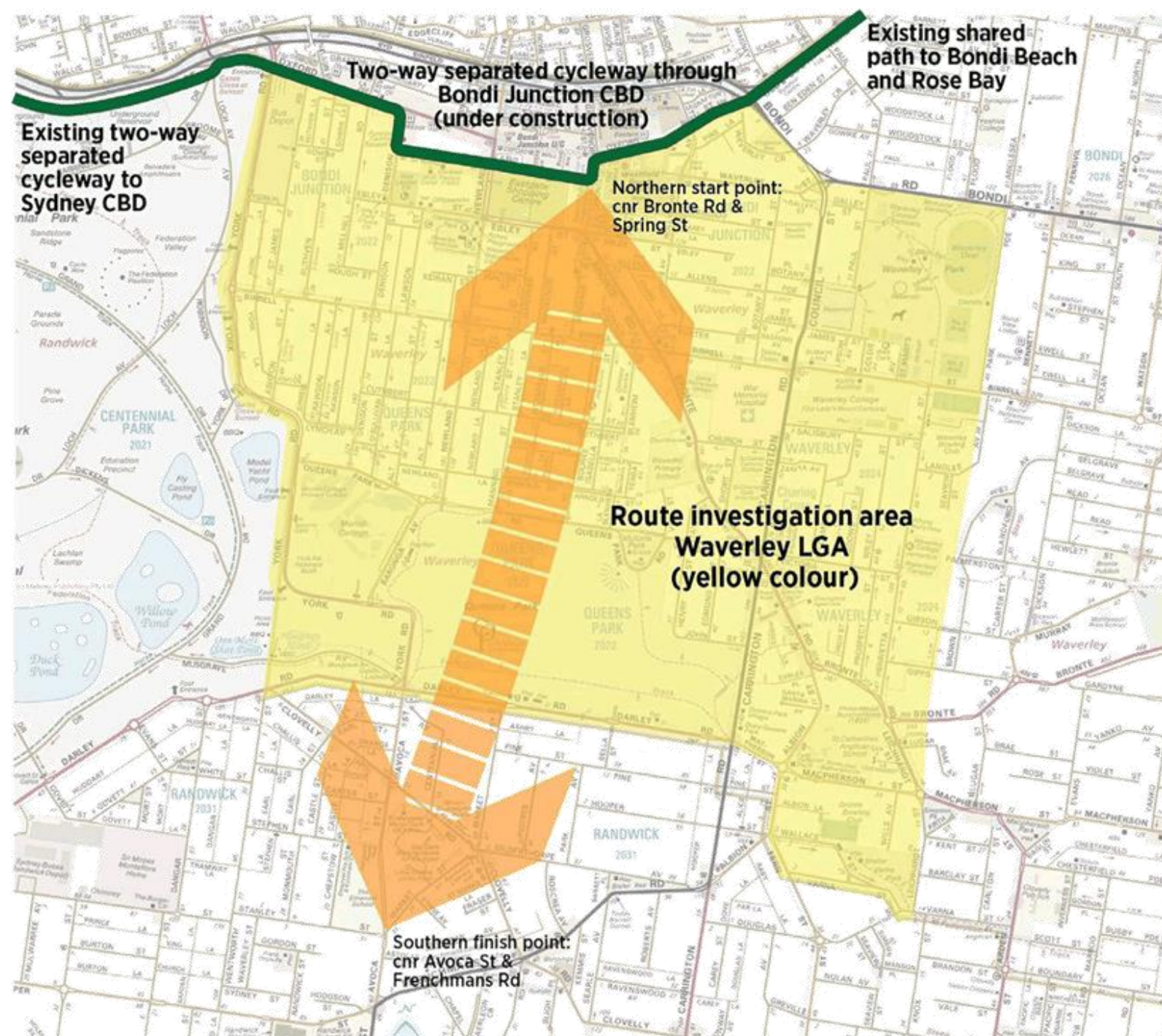
Even though other north-south routes are possible through the study area, these are affected by the arrangement of urban development blocks. All would require circuitous alignment of the routes, which adds costs and legibility complications without offering appreciable benefits.

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The topography of the area is a major factor to be considered. While the Bronte Road and Carrington Road route options generally follow the ridge line and with modest grades, all other routes involve a significant loss of height and some steep climbs back onto the ridge-line.

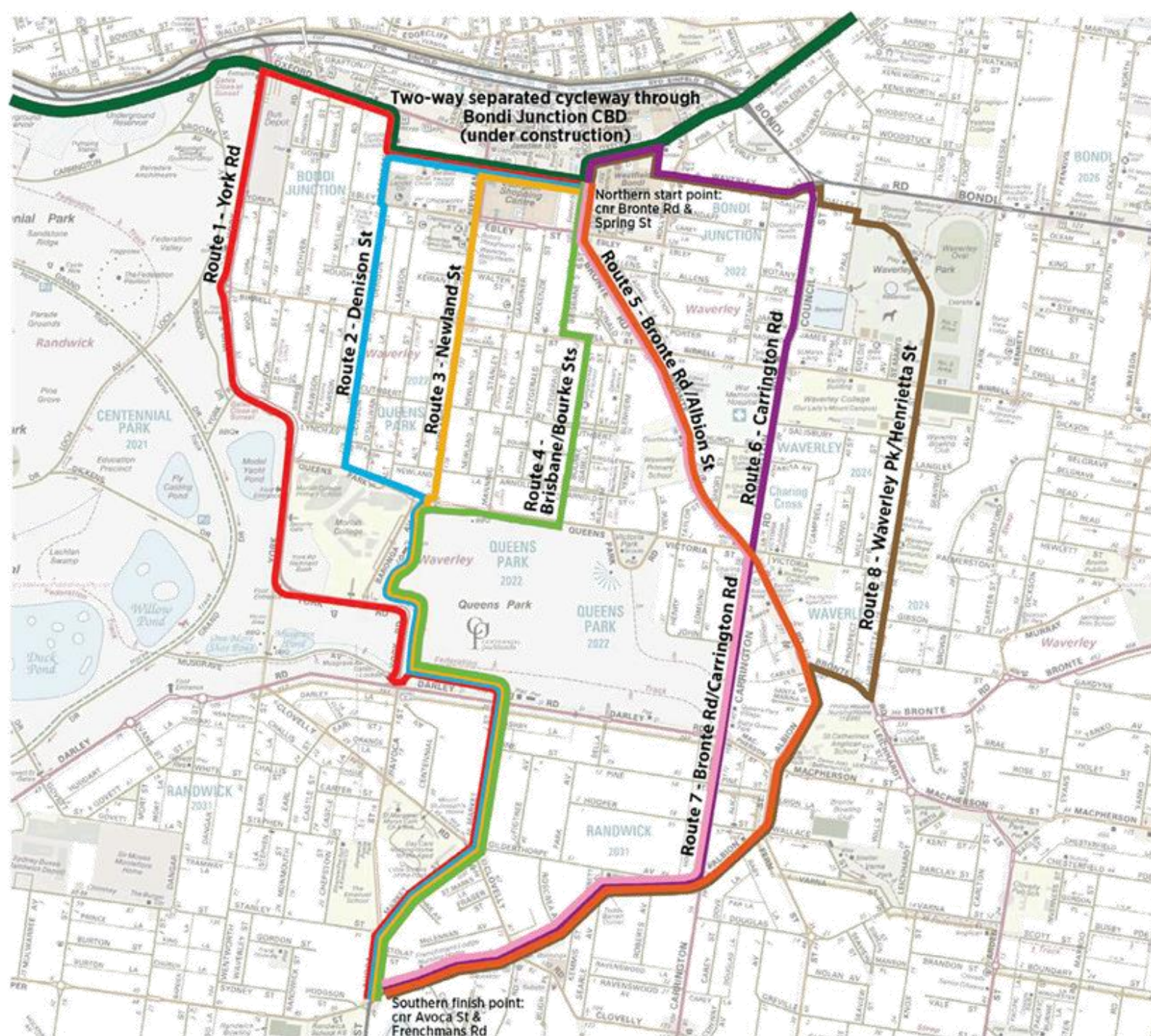
Figure 2.1 – Study area



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Figure 2.2 – Route options identified for preliminary assessment





2.2 Route Options

The route options identified for preliminary assessment following an analysis of the study area are shown in Figure 2.2 and include:

1. Oxford Street/Spring Street Separated Cycleway¹, **York Road**, Randwick streets
2. Oxford Street/Spring Street Separated Cycleway¹, **Denison Street**, Queens Park Road, Queens Park Shared Path, Randwick streets
3. Oxford Street/Spring Street Separated Cycleway¹, **Newland Street**, Queens Park Shared Path, Randwick streets
4. Bronte Road, **Brisbane Street**, **Bourke Street**, Queens Park Shared Path, Randwick streets
5. **Bronte Road**, Albion Street, other Randwick streets
6. Oxford Street/Spring Street Separated Cycleway¹, Waverley Street, Council Street, **Carrington Road**, other Randwick streets
7. **Bronte Road**, **Carrington Road**, other Randwick streets
8. Oxford Street/Spring Street Separated Cycleway¹, Waverley Street, Dalley Street, **Waverley Park** Shared Path, Henrietta Street, Bronte Road, Albion Street, other Randwick streets.

Routes 4 and 8 are identified as priority routes in the Waverley Bike Plan 2013, as well as Tier 2 routes in the TfNSW Principal Bicycle Network. It is noted that the Council plan identifies Route 4 as "Bondi Junction to UNSW". Both Routes are substantially complete, albeit not necessarily to the standard specified for the current investigations.

Route 5 is also included in the TfNSW Principal Bicycle Network and is identified as a Tier 1 route. Council has carried out some investigations for the section from Ebley Street to Birrell Street, while there is a streetscape project currently under way for the Charing Cross precinct.

The other routes have not previously been investigated.

¹ Under construction.

2.3 Route 1 – York Road

Figure 2.3 – York Road, north of Birrell Street



York Road is part of the RMS regional road network and carries substantial peak period traffic from New South Head Road at Edgecliff to Anzac Parade at Maroubra Junction (RMS, 2017). It generally provides one lane in each direction with turning lanes at select locations. There are a few traffic management devices to manage speeds, turning movements, safety and pedestrian crossings. The speed limit is 50km/h.

Much of York Road is used for bus access to the bus depot on Oxford Street, although no actual bus services are provided along the route.

On the western side of the road, there are a number of pedestrian gates for access into Centennial Park, although not all are supported by sealed paths within the Park.

There is a sealed footpath on the eastern side of the road starting from just south of Queens Park Road to Oxford Street. On the western side of the road, the sealed footpath is limited to the section from the York Road Gates to just south of Queens Park Road, as well as a short section near Oxford Street, the remainder being an unsealed verge. The western verge is generally in excess of 3.5m wide.

There are traffic signals at the intersection of York Road, Avoca Street and Darley Road, with marked foot crossing on all four approaches.

There is parking on both sides of the road, much of it being unrestricted and well used.

Centennial Park borders the entire western side of the York Road. The Waverley bus depot is located at southeastern side of the York Road / Oxford Street intersection with a key access point off York Road. Moriah College occupies the block southeast of the York Road / Queens Park Road intersection. Southeast of Moriah College is Queens Park. The remainder of the eastern side of the road is residential.

For the purposes of this assessment, it is assumed that an exclusive cycle path will be constructed for the full length of York Road on the western verge. There is a substantial narrowing of the verge in the curve east of Baronga Avenue, which requires detailed planning and design attention.

2.4 Route 2 – Denison Street

Figure 2.4 – Denison Street at Ebley Street



Denison Street is a local street under the care and control of Waverley Council. It is generally a 12.8m wide road in a 20m road reserve. The speed limit is 50km/h with plans by Council for a future 40km/h zone (Waverley, 2019.1), possibly with some supplementary traffic calming. Much of the parking along Denison Street is restricted, with some permit holder exemptions.

North of Ebley Street it has some traffic function and provides one traffic lane each direction with parallel parking on both sides. At the time of writing this report, this section was affected by road and building works. Land-use is mixed commercial and residential.

South of Ebley Street, the route is less trafficked and has some existing traffic management devices to control speeds. There are sections of 90° degree angle parking. Land-use is residential.

At its southern end, the route turns east along Queens Park Road and then joins the existing Shared Path along the western perimeter of Queens Park to Darley Road. Regular sporting events generate significant pedestrian movement along and across the path. The Queens Park section is common with Routes 3 and 4.

For the purposes of this assessment, it is assumed that there will be a mix of facilities, including:

- Continuation of the Oxford Street / Spring Street separated cycleway from Spring Street to Ebley Street, on the western side
- Bicycle Boulevard treatment south of Ebley Street
- Bi-directional separated cycleway along Queens Park Road
- Use of existing Shared Paths through Queens Park.

Detailed planning and design attention is required at key transition points and crossing locations such as Ebley Street, Birrell Street and Queens Park Road / Baronga Avenue. Some may require traffic signals. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path.

2.5 Route 3 – Newland Street

Figure 2.5 – Newland Street, eastern verge

Newland Street is a local street under the care and control of Waverley Council. It functions as a key access route to Bondi Junction and carries a substantial amount of peak period traffic. It operates in a complicated environment and features three different cross sections:

- Spring Street to Ebley Street – the traditional 20m road reserve appears to have been widened in the past to 21m allowing for 5 traffic/ turning/ parking lanes with a narrow footpath on the eastern verge. Traffic is heavy with significant turning movements at intersections. There is a carpark access at the Eastgate Shopping Centre. Buses service this section. Land-use is commercial.
- Ebley Street to Birrell Street – traditional 12.8m road in a 20m corridor with 4 traffic / parking lanes. Buses service this section. Land-use is mixed.
- South of Birrell Street – while the 20m corridor continues, the road is narrowed to about 8m with one parking lane (west side) and two traffic lanes. There is traffic calming to control speeds. There are no bus services. The verges are wide and feature a heavy tree canopy as well as lighting/ power poles. Most trees are mature. Some are figs with wide trunks and surface roots extending from the kerb to the footpath, with several squeeze points leaving room for no more than a 1.2m footpath, particularly along the western verge. Land-use is residential.



At its southern end the route joins the existing Shared Path through Queens Park, which is has in common with Routes 2 and 4.

For the purposes of this assessment, it is assumed there will be a mix of facilities:

- Bi-directional cycleway on the western side from Spring Street to Birrell Street
- South of Birrell Street, uni-directional cycleways on both sides, in addition to the existing footpaths
- Existing Shared Path through Queens Park.

It is noted that some of these facilities may not be achievable and/ or desirable. Transitions and crossings require detailed planning and design attention, eg Birrell Street and Queens Park Road. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path.

2.6 Route 4 – Brisbane & Bourke Streets

Figure 2.6 – Brisbane Street, south of Ebley Street



The Brisbane & Bourke Streets route commences at the northern end of Bronte Road, from Spring Street to Ebley Street, which it shares with Route 5.

While Bronte Road is classified as a main road, it is designated as a regional road for administrative purposes and falls under the care and control of Waverley Council. Bronte Road carries significant traffic volumes, bus traffic and service vehicles. Land-use is commercial.

At Ebley Street, the route enters the Brisbane/Bourke Streets corridor, which are local streets under the care and control of Waverley Council. Land-use is residential. The speed

limit is 50km/h with plans by Council for a future 40km/h zone, possibly with some supplementary traffic calming.

Brisbane Street forms a cul-de-sac at Ebley Street and only carries minimal local traffic. Bourke Street carries slightly more traffic as well as a low frequency bus route. There is a 50m offset between the termination of Brisbane Street at Birrell Street and the start of Bourke Street off Birrell Street.

At the southern end of Bourke Street, the route enters Queens Park and generally follows the existing Shared Path, which would need to be extended from Manning Street to Bourke Street. This extension has been recognised in the Queens Park Masterplan (Centennial Parklands, 2005).

For the purposes of this assessment, it is assumed that there will be a mix of facilities, including:

- Bi-directional cycleway on the western side of Bronte Road to Ebley Street
- Bicycle Boulevard treatment along Brisbane & Bourke Streets
- Separated path priority crossing of Birrell Street
- Short section of new Shared Path through Queens Park to join the existing Shared Path further west in the Park.

Transitions and crossings require detailed planning and design attention, eg Birrell Street and Queens Park Road. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path.

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2.7 Route 5 – Bronte Road

Figure 2.7 – Bronte Road, south of Ebley Street



The Bronte Road route shares a short part of its northern section with Route 4.

As discussed, it is classified as a main road and designated as a regional road for administrative purposes. It falls under the care and control of Waverley Council. It carries significant traffic volumes, bus traffic and service vehicles for its length.

Towards the south, the route runs through the Charing Cross Precinct.

The route continues along Albion Street, which is a local street under the care and control of Waverley Council. As with Bronte Road, it carries significant traffic volumes, bus traffic and service vehicles. There is a school

near the Macpherson Street roundabout.

The route then crosses into the Randwick street network to terminate at the common end point.

Land-use varies from commercial to mixed to residential.

Several sections of the route are or have been subject to Council improvement strategies, including:

- Spring Street to Ebley Street – 2020 12-months trial of alternate kerbside uses, such as parklets, park & ride, etc
- Ebley Street to Birrell Street – 2017 streetscape improvements (on hold; Waverley, 2017.3 and 2017.4)
- Charing Cross Precinct – 2020 travel study and streetscape design (Waverley, 2019.6).

To some extent Bronte Road and Carrington Road (Route 6) perform complementary network functions and changes in traffic and parking conditions along one route could influence the other, which could be important in the context of the Bronte Road urban improvement strategies.

For the purposes of this assessment, it is assumed that there will be a bi-directional cycleway for the length of the route. It is noted, however, that Bronte Road operates in a complex environment and is likely to require a more refined design approach, which responds more closely to localised changes in land-use and traffic patterns with a variety of cycling facilities and cross sections. Some broad concepts could include

filtered-permeability measures to reduce through traffic but encouraging pedestrians, bikes, buses and local access to business; select locations with intense place-based investments based on “shared space” principles (eg the Bronte Road/Spring Street intersection); more traditional sections to support longitudinal movement; and, increased setbacks for plazas at redevelopment sites.

2.8 Route 6 – Carrington Road

Figure 2.8 – Carrington Road, south of Bronte Road



The Carrington Road route commences at the intersection of Waverley Street and Oxford Street, then follows Waverley Street, Council Street and Carrington Road from where it continues into the Randwick street network to the common end point. The Waverley Street section is common with Route 8.

Waverley Street is a local street under the care and control of Waverley Council. The northern end of Waverley Street is a pedestrian mall; the eastern section is predominantly residential. The eastern end carries some traffic due its connectivity with Bondi Road and the Westfield carpark. Restricted parking is on the southern side only. It is marked as a cycle route with mixed traffic facilities.

Council Street and Carrington Road are classified State Roads under the care and control of RMS. Land-use is mixed, including a number of schools. As discussed earlier, the Carrington Road route to some extent performs complementary network functions to Bronte Road (Route 5). There are clearway-style parking and stopping restrictions for much of the way on both sides of the road. RMS have plans to formalise the clearway regime along the route which is opposed by Council (Waverley, 2019.5).

The RMS plans would require all four lanes along the route to be trafficable, preserving the full width between kerbs of about 12.8m. This would effectively preclude any exclusive cycleway in the corridor for much of its length. In the past, it would have been good engineering practice to adopt a conservative approach with a preference for the RMS position, which would prevent the route from being used for the purposes of this assessment.

Since the publication of the NSW Future Transport Strategy for 2056 (TfNSW, 2018), this has changed. The strategy introduces the principles of *Movement and Place* (refer Section 4.3), which recognises that roads are important *Places* that add vitality



to their neighbourhoods. This importance is further emphasised by more recent advice by the NSW Government Architect (GANSW, 2019 and 2020). This new emphasis allows a less conservative and more forward looking approach to the management of roads like Carrington Road, which has been adopted for this assessment.

Accordingly, it is assumed that there will be bi-directional cycleways along the length of the route. As with Bronte Road, there is both the need for and the opportunity to develop a variable cross section that responds closely to localised changes in land-use and traffic patterns, eg by limiting works to the northbound verge, which is wider at a few locations.

2.9 Route 7 – Bronte & Carrington Roads

This route is a blended route partly following Route 5, north of Charing Cross, and then following Route 6, south thereof.

As with Routes 5 and 6, it is assumed that there will be a bi-directional cycleway for the length of the route, again noting the need for an agile design response.

2.10 Route 8 – Waverley Park

As with Route 6, the Waverley Park route commences along Waverley Street, then Dalley Street, Waverley Park, Henrietta Street and then Bronte Road and Albion Street, which it shares with Route 5.

Dalley Street and Henrietta Street are quiet local streets under the care and control of Waverley Council. Land-use is generally residential.

Dalley Street has unrestricted parking on both sides and is marked as an on-road cycleway. Henrietta Street is a one-way street with one traffic lane, a contra-flow bicycle lane and generally one unrestricted parking lane. The traffic direction switches at Victoria Street. There are some traffic calming devices. There two schools: one at the northern end; and, one near Victoria Street.

For the purposes of this assessment, it is assumed that there will be a mix of facilities, including:

- Bi-directional cycleways along Waverley Street, Bronte Road and Albion Street
- Bicycle Boulevard treatment along Dalley Street
- Existing Shared Path through Waverley Park
- Existing contra-flow lanes in Henrietta Street, although not all traffic-shy user groups would be comfortable on such a facility.

Transitions and crossings require detailed planning and design attention, eg Council Street, Birrell Street, and Bronte Road. There is likely to be a need to upgrade the Shared Path in Waverley Park to a Separated Path.

Figure 2.9 – Henrietta Street, north of Victoria Street



2.11 Randwick Continuations

This assessment was commissioned by Waverley Council and limited research has been carried out for the route continuation through the Randwick local government area. Even so, the travel distance through Randwick is significant (700m-1000m). There are also some complications such as gradients and road classification.

The routes can be split into two groups with common alignments through Randwick:

- Routes 1, 2, 3 and 4 each cross the Council boundary at the intersection of Avoca Street, York Road and Darley Road. The most direct continuation through Randwick to the common end point is along Avoca Street. However, the gradient along Avoca Street is too steep for most user groups and the four routes are detoured by about 280m via Market Street, a little further to the east along Darley Road², as it offers a considerable improvement to the gradients. A second alternative was also considered further west along Darley Road at Dangar Street, but this route was not found to offer better gradients. It is also significantly longer. Market Street would need to be treated as a Bicycle Boulevard, including supplementary traffic calming measures and improved crossing facilities such as at Darley Road and Clovelly Road, possibly using traffic signals.

² Current proposals (Waverley, 2019.7) include a new Separated Path along Darley Road from York Road to Carrington Road, the design of which has been approved. The facility is currently awaiting funding.

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- Routes 5, 6, 7 and 8 each cross the Council boundary near the intersection of Carrington Road and Frenchmans Road to access the common end point. The most direct route with the best gradient is along Frenchmans Road, a classified State Road. As with Carrington Road, a forward looking approach has been adopted for this assessment with the continuation of the bi-directional cycleways along the length of the route.



3 Potential Cross Sections

As stated in the introduction, the brief specifically requires this report to “assess all the options for a separated cycleway”. These are a fairly narrow terms of reference and it seems appropriate to broaden the reference to include a range of facilities that could be used by all potential cyclists, particularly the traffic-shy riders such as the “interested but concerned”³ and “8-to-80” (years of age⁴), along of course with more confident riders.

While at this early stage in the route development process it is not possible to prepare site specific details, six generic cross sections have been prepared to inform the discussion (Figures 3.1 to 3.6). Typically, during future design development phases, the generic cross sections (and the related plans) will be refined to respond to specific road, traffic and land-use patterns.

All cross sections provided are suitable for the traffic-shy users groups discussed above and are in-line with the TfNSW Bicycle Network Planning and Design Strategy for the PBN Principal Bicycle Network (TfNSW, 2017). The PBN aims to provide its top level routes (Tier 1) with the highest level of separation from motor vehicle traffic and pedestrians (TfNSW, 2020). The requirements for Tier 2 routes are less defined.

- **Bi-directional Cycleway, kerbside**

This is now becoming the most commonly used facility for 12.8m wide roads in a 20m road reserve. Where the road is a little less than 12.8m, the cycleway could be raised flush with the footpath to gain the little extra width of the kerb and possibly some space behind it. Care is then required to ensure strong visual separation between pedestrians and cyclists. There is mounting evidence the flush cross section is also preferred at intersections and crossings with significant pedestrian movements across the cycleway due to trip hazards imposed by multiple steps or level differences between the footpath and the roadway.

- **Bi-directional Cycleway, pathside**

This is an alternate detail to the “kerbside” design. Rather than simply re-allocating space within the existing 12.8m roadway, it re-models the whole of the road reserve. While considerably more expensive (it affects both kerbs, drainage, power poles, trees, etc), it may be appropriate where parking lanes are used for traffic movement during clearways or where there are significant bus movements.

³ The term “interested but concerned” was first recognised by Portland City Council in 2005 (Portland, 2008) to describe a large cohort of potential bicycle riders, who would like to ride more but are concerned about traffic. The term is now widely used. Research in Australia has confirmed a similar size group of potential bicycle riders who would ride more if there were safe facilities, away from traffic.

⁴ “8-to-80 Cities” (2020) is a Canadian organisation, which “believes that if everything we do in our cities is great for an 8 year old and an 80 year old, then it will be great for all people” (www.880cities.org).



- **Uni-directional Cycleway**

To a large extent this cross section is preferred to bi-directional facilities due to the greater simplicity of intersection design. As with the “*pathside*” bi-directional facility, it is often difficult (expensive) to achieve in many 12.8/20m road corridors, without loss of on-street parking.

- **Shared Path**

This is the default facility still widely used around the country, both in the verges of the road corridor and in not-road-related-areas. There is mounting evidence that such facilities outdate quickly due to conflicts between pedestrians and cyclists, which are difficult to manage. Key examples include the Anzac Parade and Alison Road facilities and the new Bennelong Bridge at Homebush Bay. Separated paths provide a safer alternative for all path users.

- **Separated Path**

Twin paths: one exclusively for pedestrians; the other exclusively for cyclists; typically separated by a flush verge. Even at relatively modest volumes, this facility is known to significantly reduce conflicts between pedestrians and cyclists along with the related complaints to councils. Good examples are the pathway along the northern perimeter of Centennial Park and the Epping Road paths at Lane Cove and North Ryde.

- **Bicycle Boulevard**

This is a new concept slowly emerging in Australia from Europe and the USA. It is in essence a low volume, low speed local street, typically traffic calmed with a cycling overlay to allow for way-finding, bicycle priority at intersections, filtered permeability, etc. A design speed of 30km/h is critical and in some, but not all, Australian jurisdictions has also been adopted as the speed limit. There are a number of successful examples in Western Australia (Transport WA, 2020) and more recently in Victoria. There are excellent guidelines in Queensland (QTMR, 2018) and the ACT (2019), although there are no examples in either jurisdiction at this stage.

In addition to these facilities, consideration was given to split up-hill-down-hill facilities, which provide a uni-directional separated cycleway in the up-hill direction and a mixed traffic facility in the down-hill direction. However, this type of facility is only suitable for confident adult cyclists in the down-hill direction as it offers no protection from traffic for more vulnerable user groups such as the “*interested but concerned*” and “*8-to-80*” (years of age).

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Figure 3.1 – Bi-directional Cycleway, kerbside

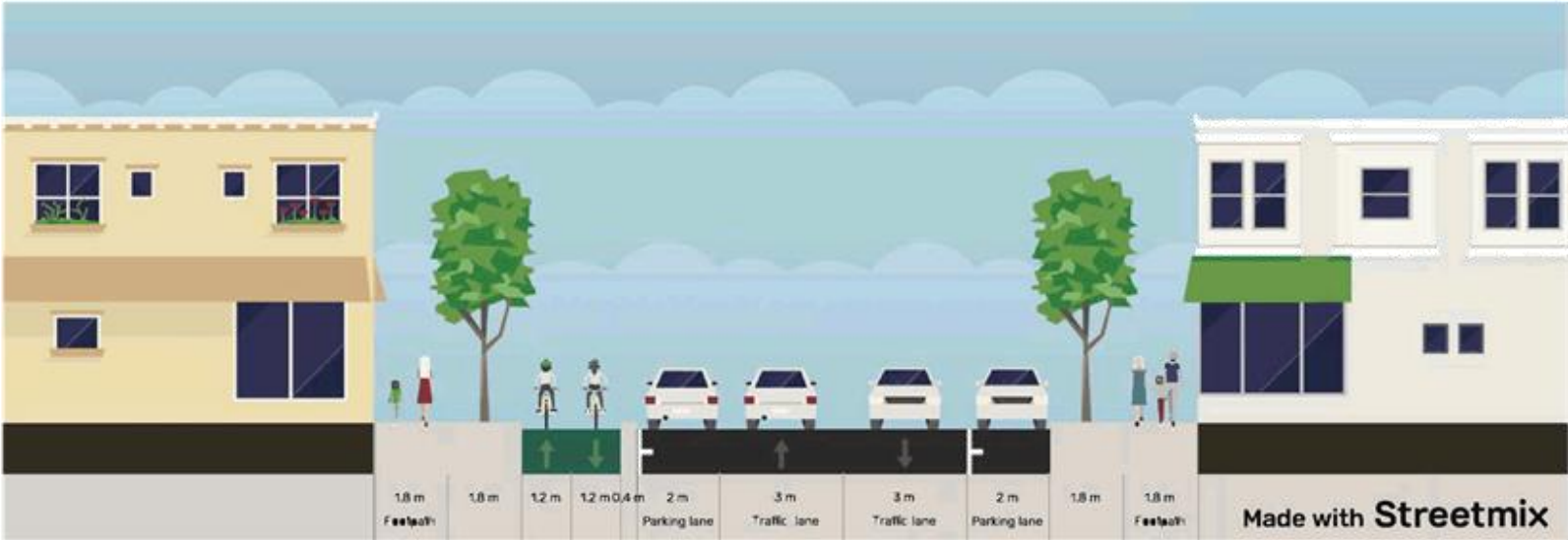


Figure 3.2 – Bi-directional Cycleway, pathside

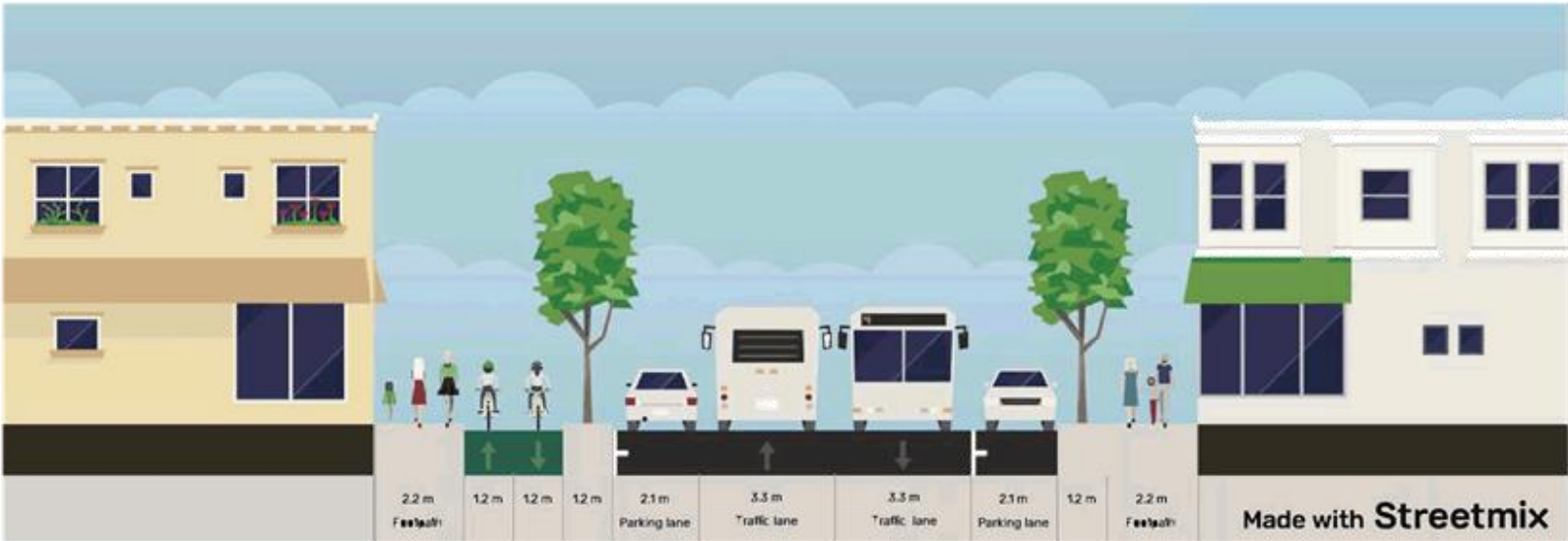


Figure 3.3 – Uni-directional Cycleway (one-way pair)



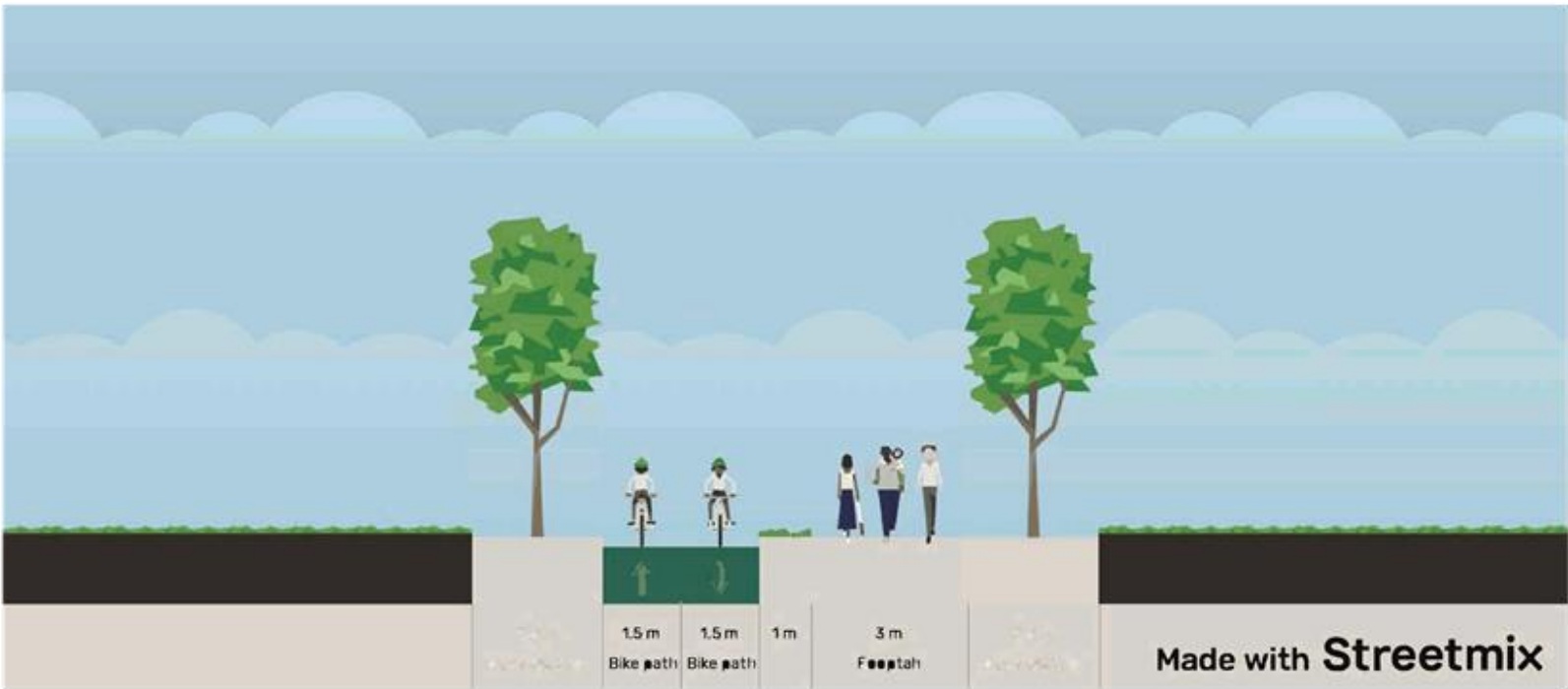
Waverley Council



Figure 3.4 – Shared Path



Figure 3.5 – Separated Path



Waverley Council

BARROS
vanden
DOOL
A+T

Figure 3.6 – Bicycle Boulevard



Source: QTMR, 2018

Charing Cross Cycle Route Feasibility Study



4 Evaluation Methodology

4.1 Base Methodology

The methodology used in this report to assess route suitability is derived from the generic cycle route assessment model detailed in Section 12 of the *NSW Bicycle Guidelines* (RTA, 2003). The RTA model was developed primarily to assess on-road bicycle routes and consists of a limited set of quantitative criteria to assess total distance, on-road distance, climbs, turns and stops. Sensitivity tests were also applied for total distance, turns, and on-road/off-road facilities.

The RTA model does not cover all considerations associated with the performance of a bicycle route. These limitations are discussed in Table 4.1. Five criteria critically affect route selection at an early stage (rows shown in light grey), therefore only these are used in the preliminary route analysis in Section 5. All nine criteria listed in Table 4.1 are used in the preferred route options analysis in Section 6.

In order to rate the above factors, a qualitative assessment has been used with a five stage performance indication shown in Table 4.2.

This assessment rating is used to evaluate the suitability of routes for both the preliminary route assessment in Section 5 and the preferred route options assessment in Section 6. The methodology has been tried and tested for Council (Waverley, 2019.2 and 2019.3; NSWLEC, 2020).

Table 4.1 – Criteria used in route evaluations and limitations of the RTA route analysis model

Criteria	Comment
Network legibility and cohesiveness	The RTA analysis does not consider the overall strategic fit with the intended Regional Route, such as its level of integration and ability to connect with other cycling corridors. The analysis also does not cover the degree of network legibility afforded, i.e. the ease with which the bicycle network can be negotiated. A cohesive and legible network connection is one which can be intuitively navigated as part of the broader cycling corridor. These issues are included in the directness and network connectivity criteria used in the detailed assessment in Section 4.
Corridor width and traffic constraints	It is an essential prerequisite of off-road separated facilities that sufficient physical space is available within the road corridor. Space for off-road bicycle facilities may be achieved by rearranging kerbs, travel lanes and on-street parking. Road network function and traffic amenity are determining factors.
Suitable facilities for a Tier 1 route	The Sydney Principal Bicycle Network aims to provide its top level routes (Tier 1) with the highest level of separation from motor vehicle traffic and pedestrians.

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Criteria	Comment
Constructability and cost	The analysis does not consider the likely cost and/or constructability of a route, its on-going maintenance cost and its impact on revenue (parking, footpath seating). This is a process of evaluating how much civil work would be required to make a route operational and safe.
Land ownership and government approvals	Land ownership issues and state government approvals to construct cycle facilities can directly impact on the viability of any route options affected.
Gradients	Whilst an overall measure of climbs is made, there is no ability within the RTA model to determine as to whether any climbing is done over a long or a short distance. For example, for a change of elevation of 100m, you could average 10% over 1km, or you could average 1% over 10km. This issue is included in the rider comfort and amenity criterion in Section 6.
Safety	There is no measure within the RMS model to be able to apply a subjective response to the perceived safety of a particular alignment. This includes the need to ride on roads which would have a high traffic demand or high speed differential, and also the level of safety provided at various types of crossings. It is noted that under the RTA analysis no penalty is included between the different types of crossings such as yield points, traffic signals, or sharp turns.
Travel time	The RTA model takes into consideration distance, which is arguably not the best way to evaluate potential bike routes; rather time is probably a better indicator of the burden on a rider. Cyclists are particularly sensitive to the burden of constantly decelerating and accelerating, especially in mixed traffic. This issue is included in the rider comfort and amenity criterion in Section 5.
Land-use and design impacts	The RTA model does not consider the important issue of the impacts a separated bicycle facility may have on adjoining land-uses, such as traffic flow, changes to on-street parking, changes to loading zones, changes in tree canopy, street events and other council initiatives.

Table 4.2 – Performance Indicators

Performance	Score
Excellent	5
Good	4
Neutral	3
Poor	2
Very poor	1



4.2 Alternate Methodologies

Multi-Criteria Analyses (MCA) are widely used to tackle complex evaluation processes. The evaluation methods are as varied as the topics they consider. The Base Methodology described in Section 4.1 is a fairly basic approach which equally considers all criteria on a qualitative five point scale ("excellent" to "very poor") with a score in whole numbers (5 to 1). By the nature of the system, a number of routes are ranked equal and not all scores are used for each criterion.

A number of alternate methods have been considered, based on general experience and some examples provided by Council (Waverley, 2020.2):

- Increased score (eg 1 to 10) – this would broaden the score range and more clearly enunciate differences between routes. It is not clear that this would improve the understanding of the differences in route performance.
- Indexed score (eg relative distance or travel time) – to some extent this has been done in Tables 5.1 and 6.1. This is difficult to achieve more broadly as most criteria are qualitative.
- Weighted criteria – this is useful when there are strong value differences between the criteria. It is not clear that such strong value differences exist in this analysis.
- Additional criteria – the following criteria have been added to the base methodology previously developed for Council (Waverley, 2019.3):
 - Suitable facilities for a Tier 1 route (refer Table 4.1)
 - Maintenance and revenue
 - Impacts on events
 - Impacts on other Council initiatives
 - Place (refer Section 4.3).
- Alternate criteria – value for money, catchment, planning compliance and approvals, construction risks, environmental risks, education and public awareness, DDA compliance, performance and efficiency, etc. Most of these factors have been included in one form or another in the Base Methodology. The remainder is not so relevant for cycleway infrastructure planning. Some, eg DDA compliance, will need to be considered at the design stages.

4.3 Movement and Place

The network of roads and streets is a major part of the system of public space that helps connect places. Public space is where people can socialise and add vitality to their neighbourhoods, and streets and roads have an important role in that vitality. Aligning movement functions with the places they serve can make the transport networks and public spaces better contribute to the liveability of communities and productivity of NSW.

The Movement and Place framework by the Government Architect of NSW (GANSW, 2019 and 2020) creates a shared language and approach to help all stakeholders



achieve better place outcomes for the people of NSW. It seeks consideration of place when developing the transport systems, through collaborative working between the community, and movement and place practitioners, to ensure that transport systems better support places.

The framework aligns with Future Transport (TfNSW, 2018) outcome 'Successful Places' and the State Infrastructure Strategy by designing infrastructure to complement and enhance the function, rather than merely dictate the form, of the place.

Movement and Place considers the whole street including footpaths, from property line to property line. It considers the needs of all users of this space including pedestrians, cyclists, deliveries, private vehicles and public transport, as well as people spending time in those places, whether moving around the place or enjoying street life including outdoor dining, waiting for a bus or watching the world go by.

When considering cycleways, Movement and Place can be considered in two ways:

- It links places along the length of a movement corridor – users of the cycleway can join at any point along its length to connect to any other point along its length; being able to access multiple Places along a Movement corridor is an important factor that can help distinguish one corridor from another.
- The cycleway itself is an urban design element that contributes to the design of Place in a number of ways including:
 - It is a feature of the place and therefore adds a component to the locality in the same way that a footpath, a parking lane or street trees change the character of the place.
 - It provides separation of pedestrians from vehicles, which is a positive contribution to Place and the amenity of pedestrians.
 - There is increasing evidence (Heart Foundation, 2011; Victoria Walks, 2019) that bicycle riders stop at local shops more frequently than motorists, partly due to the ease of parking a bicycle, whereas motorists frequently find parking difficult in retail precincts.

In this context, Place has been added as the final criterion for the preferred route options assessment in Section 6.



5 Preliminary Route Options Assessment

In this section the following issues are discussed and evaluated:

- Directness and network connectivity
- Corridor width and traffic constraints
- Appropriate facilities provided for a Tier 1 route
- Constructability and costs
- Land ownership and government approvals
- Preliminary route assessment findings and recommendations.

A comparative route analysis was undertaken for the seven preliminary route options identified in Section 2 to determine their feasibility and eligibility for inclusion in the more detailed analysis (Section 6). This analysis uses the methodology set out in Section 4 and Table 4.1, to objectively identify the relative strengths and weaknesses of each of the preliminary routes.

Some criteria used in the route assessment methodology are more important for the preliminary route assessment. These are the grey-coloured rows shown in Table 4.1. The purpose of this preliminary route assessment is to determine if any routes may be fatally flawed by unresolvable issues relevant to each site – corridor width, land tenure, agency opposition. Each criterion is assessed using high level, qualitative performance indicators as shown in Table 4.2. All assessment criteria shown in Table 4.1 are used to evaluate routes in the Section 6 of this route assessment.

5.1 Directness and Network Connectivity

Routes were evaluated on their directness or the ability of the route to deliver cyclists efficiently from end to end without major detours or need to stop or slow significantly below a comfortable riding speed. Figure 1.1 shows the proposed/existing Waverley Bike Plan 2013 and the TfNSW Principal Bicycle Network. Key north-south network links are Nelson Street, Grosvenor Street, Adelaide Street, Paul Street and Leichhardt Street in Waverley and Dangar Street, Clovelly Road, Avoca Street, Albion Street /Frenchmans Road and Fern Street in Randwick. Key east-west links are the Oxford Street / Spring Street route (under construction), Old South Head Road, Birrell Street and Waverley Street / Bondi Road, Queens Park Road / Victoria Street and Darley Road / Macpherson Street.

Table 5.1 shows the qualitative assessment for route directness. Table 5.2 shows the assessment for route connectivity. Table 5.3 shows the assessment of the suitability of the proposed facilities for a Tier 1 route in the Sydney Principal Bicycle Network.



Table 5.1 – Comparative options assessment for directness

Route	Performance	Notes
1. York Rd	Very poor	Distance 3,600m. This route is at the far western end of the study area and requires a significant detour from the Bondi-Randwick Junctions desire line. The route is lengthened somewhat as it utilises Market Street rather than Avoca Street.
2. Denison St	Neutral	Distance 2,830m. This route is at the western end of the study area and requires a detour from the Bondi-Randwick Junctions desire line. The route is lengthened somewhat as it utilises Market Street rather than Avoca Street.
3. Newland St	Good	Distance 2,480m. This route closely follows the Bondi-Randwick Junctions desire line. The route is lengthened somewhat as it utilises Market Street rather than Avoca Street.
4. Brisbane/ Bourke Sts	Good	Distance 2,540m. This route closely follows the Bondi-Randwick Junctions desire line. It is included in the Waverley Bike Plan and the TfNSW Principal Bicycle Network and earmarked as Bondi Junction to UNSW. The route is lengthened somewhat as it utilises Market Street rather than Avoca Street.
5. Bronte Rd	Good	Distance 2,650m. This route is at the eastern end of the study area and requires a short detour from the Bondi-Randwick Junctions desire line. It is included in the TfNSW Principal Bicycle Network.
6. Carrington Rd	Poor	Distance 3,050m. This route is at the eastern end of the study area and requires a medium detour from the Bondi-Randwick Junctions desire line.
7. Bronte & Carrington Rds	Good	Distance 2,510m. This route is at the eastern end of the study area and requires a short detour from the Bondi-Randwick Junctions desire line. It is partly included in the TfNSW Principal Bicycle Network. It is a little shorter than Route 5 as it doesn't travel as far east.
8. Waverley Park	Very Poor	Distance 3,500. This route is at the far eastern end of the study area and requires a significant detour from the Bondi-Randwick Junctions desire line.

Table 5.2 – Comparative options assessment for network connectivity

Route	Performance	Notes
1. York Rd	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.
2. Denison St	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.
3. Newland St	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.
4. Brisbane/ Bourke Sts	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.
5. Bronte Rd	Excellent	This route option has excellent connections to intersecting bicycle routes, trip attractors and the local street system. It differentiates from most other routes by virtue of the range of services along the route itself.

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Route	Performance	Notes
6. Carrington Rd	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.
7. Bronte & Carrington Rds	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system. It differentiates from most other routes by virtue of the range of services along the route itself, although it doesn't fully serve the Charing Cross precinct.
8. Waverley Park	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.

Table 5.3 – Comparative options assessment for suitability for a Tier 1 route

Route	Performance	Notes
1. York Rd	Neutral	This route uses an exclusive bicycle path along York Rd, a planned separated path along Darley Rd and a bicycle boulevard treatment along Market St.
2. Denison St	Poor	This route uses a separated bi-directional cycleway to Ebley St and along Queens Park Rd, bicycle boulevards along Denison St and Market St, a shared path in Queens Park, and a planned separated path along Darley Rd.
3. Newland St	Poor	This route uses a separated bi-directional cycleway to Birrell Street, a separated uni-directional cycleway to Queens Park Rd, a shared path in Queens Park, a planned separated path along Darley Rd, and a bicycle boulevard treatment along Market St.
4. Brisbane/ Bourke Sts	Poor	This route uses a separated bi-directional cycleway to Ebley Street, bicycle boulevards to Queens Park Rd, a shared path in Queens Park, a planned separated path along Darley Rd and a bicycle boulevard treatment along Market St.
5. Bronte Rd	Excellent	This route uses a separated bi-directional cycleway along its entire route.
6. Carrington Rd	Excellent	This route uses a separated bi-directional cycleway along its entire route.
7. Bronte & Carrington Rds	Excellent	This route uses a separated bi-directional cycleway along its entire route.
8. Waverley Park	Very poor	This route uses a separated bi-directional cycleway on Waverley St, a bicycle boulevard along Dalley St, a shared path through Waverley Park, unprotected road lanes along Henrietta St, and separated bi-directional cycleways on Bronte Rd, Albion St and Frenchmans Rd.



5.2 Corridor Width and Traffic Constraints

It is essential that sufficient physical space is available within the route corridor to install the bicycle facilities identified in Section 3. Space for these facilities may be achieved by rearranging kerbs, reducing general travel lanes and removing/rearranging on-street parking. Road network function and traffic amenity are determining factors.

Waverley's People, Movement and Places transport plan (Waverley, 2017.1) recommends a transport hierarchy which puts pedestrians first, followed by people travelling by bicycle, public transport, service vehicles, shared mobility and then private motor vehicles.

Section 2 provides details of the proposed mix of facilities for each route. Section 3 provides details on the related cross sections.

Table 5.4 – Comparative options assessment for corridor width and traffic constraints

Route	Performance	Notes
1. York Rd	Good	Space for an exclusive bicycle path is readily available in the western verge. Special attention is required at the curve east of Baronga Ave. Pedestrians currently use some of the western verge and there may be a need for additional and/or improved crossing facilities.
2. Denison St	Good	The corridor provides adequate space to accommodate the proposed mix of facilities. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path. Detailed planning and design attention is required at key transition points and crossing locations such as Ebley St, Birrell St, and Queens Park Rd / Baronga Ave. Some may require traffic signals.
3. Newland St	Poor	The corridor has a number of pinch points along the proposed uni-directional section, which makes it difficult or undesirable to achieve. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path. Transitions and crossings require detailed planning and design attention, eg Birrell St and Queens Park Rd. Some may require traffic signals.
4. Brisbane/ Bourke Sts	Good	The corridor provides adequate space to accommodate the proposed mix of facilities. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path. Transitions and crossings require detailed planning and design attention, eg Birrell St and Queens Park Rd. Some may require traffic signals.
5. Bronte Rd	Neutral	Due to the significant use of the corridor by buses and service vehicles, a kerbside bi-directional facility is deemed unsuitable, requiring the selection of a pathside directional facility instead. While pathside facilities compromise pedestrian space, a more agile design approach may avoid this, as discussed in Section 2.7.

Route	Performance	Notes
6. Carrington Rd	Neutral	Due to the significant amount of traffic in the corridor, a kerbside bi-directional facility is deemed unsuitable, requiring the selection of a pathside directional facility. As discussed in Section 2.8, an agile design approach is required.
7. Bronte & Carrington Rds	Neutral	Due to the significant use of the corridor by buses and service vehicles, a kerbside bi-directional facility is deemed unsuitable, requiring the selection of a pathside directional facility instead. A more agile design approach may avoid this, as discussed in Section 2.9.
8. Waverley Park	Poor	The corridor provides adequate space to accommodate the proposed mix of facilities, although not all traffic-shy user groups would feel comfortable on the contra-flow facilities in Henrietta St. Much of it is already complete although some of the completed works may require upgrading.

5.3 Constructability and Costs

This criterion considers the likely cost and/or constructability of a route, as shown in Table 5.5. Maintenance costs and revenue (existing, potential/planned, parking, footpath dining) are evaluated in Table 5.6. Section 2 provides details of the proposed mix of facilities for each route. Section 3 provides details on the related cross sections.

Table 5.5 – Comparative options assessment for constructability and costs

Route	Performance	Notes
1. York Rd	Neutral	Costs for an exclusive bicycle path in the western verge are relatively modest. The curve east of Baronga Ave requires specific investment and likely land acquisition. Some additional and/or improved pedestrian crossing facilities may require investment.
2. Denison St	Good	The two sections of bi-directional facilities are relatively short and are thus relatively low in cost. Some investment is required in traffic calming for the Bicycle Boulevard, which could be supported by Council's 40km/h Strategy. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path. Some investment is required at key transition points and crossing locations such as Ebley St, Birrell St, and Queens Park Rd / Baronga Ave. Some may require traffic signals.

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Route	Performance	Notes
3. Newland St	Neutral	<p>The section of bi-directional cycleway is relatively short and is thus relatively low in cost.</p> <p>The section of uni-directional cycleway is higher in cost than the bi-directional facility. Parts are complicated/undesirable due to impacts from trees and their roots which further adds to costs.</p> <p>Some investment is required at key transition points and crossing locations such as Birrell St and Queens Park Rd. Some may require traffic signals.</p>
4. Brisbane/ Bourke Sts	Good	<p>The section of bi-directional facility is relatively short and is thus relatively low in cost.</p> <p>Much of the traffic calming for the Bicycle Boulevard is already in place, thus limiting costs. Further investment could be supported by Council's 40km/h Strategy.</p> <p>There is likely to be a need for some pavement upgrades.</p> <p>There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path.</p> <p>Some investment is required at key transition points and crossing locations such as Birrell St and Queens Park Rd. Some may require traffic signals.</p>
5. Bronte Rd	Good	<p>Although the costs of a pathside bi-directional facility are very high, much of these costs could be off-set against current council programs for streetscape improvements.</p>
6. Carrington Rd	Neutral	<p>The section of kerbside bi-directional facility is relatively short, but it expected to be difficult to achieve/ costly.</p> <p>Although the costs of a pathside bi-directional facility are very high, these costs could be reduced by a more agile design approach.</p>
7. Bronte & Carrington Rds	Good	<p>Although the costs of a pathside bi-directional facility are very high, much of these costs could be off-set against current council programs for streetscape improvements.</p>
8. Waverley Park	Neutral	<p>The sections of bi-directional facilities are significant and some are difficult to achieve/ costly. Some of these costs could be off-set against current council programs for streetscape improvements</p> <p>There is likely to be a need to upgrade the Shared Path in Waverley Park to a Separated Path.</p> <p>Some investment is required in traffic calming for the Bicycle Boulevard section.</p> <p>Some investment is required at key transition points and crossing locations such as Council St, Birrell St and Bronte Rd. Some may require traffic signals.</p>

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Table 5.6 – Comparative options assessment for maintenance and revenue

Route	Performance	Notes
1. York Rd	Good	Maintenance costs of an exclusive pathway in the verge are low, as are those for crossing facilities. There are no changes to parking conditions. There is no footpath dining.
2. Denison St	Good	Maintenance costs of bi-directional facilities are low, as are those for traffic calming and paths in not-road-related-areas. Traffic signals incur annual maintenance and operating costs. There are no changes to parking conditions. There is no footpath dining.
3. Newland St	Neutral	Maintenance costs of shared paths and separated facilities are low. The uni-directional facility may require some ongoing maintenance due to impacts from trees and their roots. There are some changes to parking conditions for a short section at the northern end which affect revenue. There is no footpath dining.
4. Brisbane/ Bourke Sts	Good	Maintenance costs of bi-directional facilities are low, as are those for traffic calming and paths in not-road-related-areas. Traffic signals incur annual maintenance and operating costs. There are some changes to parking conditions for a short section at the northern end which affect revenue. There is no current footpath dining, although the potential exists.
5. Bronte Rd	Neutral	Maintenance costs of bi-directional facilities are low. There are some changes to parking conditions at the northern end which affect revenue. An agile design approach may affect parking revenue further along the route. There is some existing footpath dining with potential for more, which may improve or reduce by the proposal.
6. Carrington Rd	Good	Maintenance costs of bi-directional facilities are low. There are no changes to parking conditions. There is no footpath dining.
7. Bronte & Carrington Rds	Neutral	Maintenance costs of bi-directional facilities are low. There are some changes to parking conditions at the northern end which affect revenue. An agile design approach may affect parking revenue further along the route. There is some existing footpath dining with potential for more, which may improve or reduce by the proposal.
8. Waverley Park	Good	Maintenance costs are low for bi-directional facilities, Bicycle Boulevards and paths in not-road-related-areas. There are no changes to parking conditions. There is no footpath dining.



5.4 Land Ownership and Government Approvals

This criterion considers land ownership issues and state government approvals to construct cycle facilities. These can directly impact on the viability of any route options affected.

Table 5.7 – Comparative options assessment for land ownership and government approvals

Route	Performance	Notes
1. York Rd	Neutral	While York Rd is part of the RMS regional road network, RMS is not likely to object to works in the verge. Concerns about land take / ownership at the curve east of Baronga Ave.
2. Denison St	Good	All street corridors used by this route option are under the control of Waverley Council. RMS approvals are required for any new or changed traffic signals.
3. Newland St	Good	All street corridors used by this route option are under the control of Waverley Council. RMS approvals are required for any new or changed traffic signals.
4. Brisbane/ Bourke Sts	Good	All street corridors used by this route option are under the control of Waverley Council. RMS approvals are required for any new or changed traffic signals.
5. Bronte Rd	Neutral	Bronte Rd is classified as a main road and designated as a regional road for administrative purposes. It falls under the care and control of Waverley Council. It carries significant traffic volumes, bus traffic and service vehicles and RMS is expected to take significant interest in any changes, noting previous objections (Waverley, 2017.2).
6. Carrington Rd	Neutral	Carrington Road is a classified State Road under the care and control of RMS. RMS is expected to take significant interest in any changes, although new, more supportive policies are emerging.
7. Bronte & Carrington Rds	Neutral	Bronte Rd is classified as a main road and designated as a regional road for administrative purposes. It falls under the care and control of Waverley Council. Carrington Road is a classified State Road under the care and control of RMS. Both roads carry significant traffic volumes, bus traffic and service vehicles and RMS is expected to take significant interest in any changes, noting previous objections, although new, more supportive policies are emerging.
8. Waverley Park	Neutral	Other than a short section of Bronte Rd, all street corridors used by this route option are under the control of Waverley Council. The crossing at Bondi Rd/Waverley St/Council St/Dalley St has been under dispute for some time (Waverley, 2020.2).



5.5 Preliminary Route Options Evaluation and Recommendations

Based on the route options analysis summarised in Table 5.8, Routes 4, 5 and 7 perform the best and will be further assessed in the Section 6 preferred route options assessment. Routes 2, 3 and 6 also perform within acceptable ranges and will be also included in the Section 6 assessment.

Routes 1 and 8 are too far off the desire line between Bondi Junction and Randwick which makes them unsuitable for further consideration. There are also concerns about land take (Route 1), facility suitability and traffic constraints (Route 8). These routes will be excluded from further assessment in Section 6.

Table 5.8 – Overall comparative options assessment

Route	Directness	Network connectivity	Suitability for a Tier 1 route	Corridor width and traffic constraints	Constructability and costs	Maintenance and revenue	Land ownership and government approvals	Score
1. York Rd	Very poor	Good	Neutral	Good	Neutral	Good	Neutral	22
2. Denison St	Neutral	Good	Poor	Good	Good	Good	Good	25
3. Newland St	Good	Good	Poor	Poor	Neutral	Neutral	Good	22
4. Brisbane/ Bourke Sts	Good	Good	Poor	Good	Good	Good	Good	26
5. Bronte Rd	Good	Excellent	Excellent	Neutral	Good	Neutral	Neutral	27
6. Carrington Rd	Poor	Good	Excellent	Neutral	Neutral	Good	Neutral	24
7. Bronte & Carrington Rds	Good	Good	Excellent	Neutral	Good	Neutral	Neutral	26
8. Waverley Park	Very poor	Good	Very Poor	Poor	Neutral	Good	Neutral	18



6 Preferred Route Options Assessment

In this section the following issues are discussed and evaluated:

- Rider comfort and amenity (including travel time, gradient and sun protection / tree coverage)
- Safety and personal security
- Land-use and design impacts (including parking, bus operations, business and community impacts, construction impacts, impacts on events, impacts on other Council initiatives)
- Place
- Overall route options evaluation and recommendations.

In assessing the preferred route options, the following criteria (used in Section 5) are also used:

- Directness and network connectivity
- Corridor width and traffic constraints
- Constructability and costs
- Land ownership and government approvals.

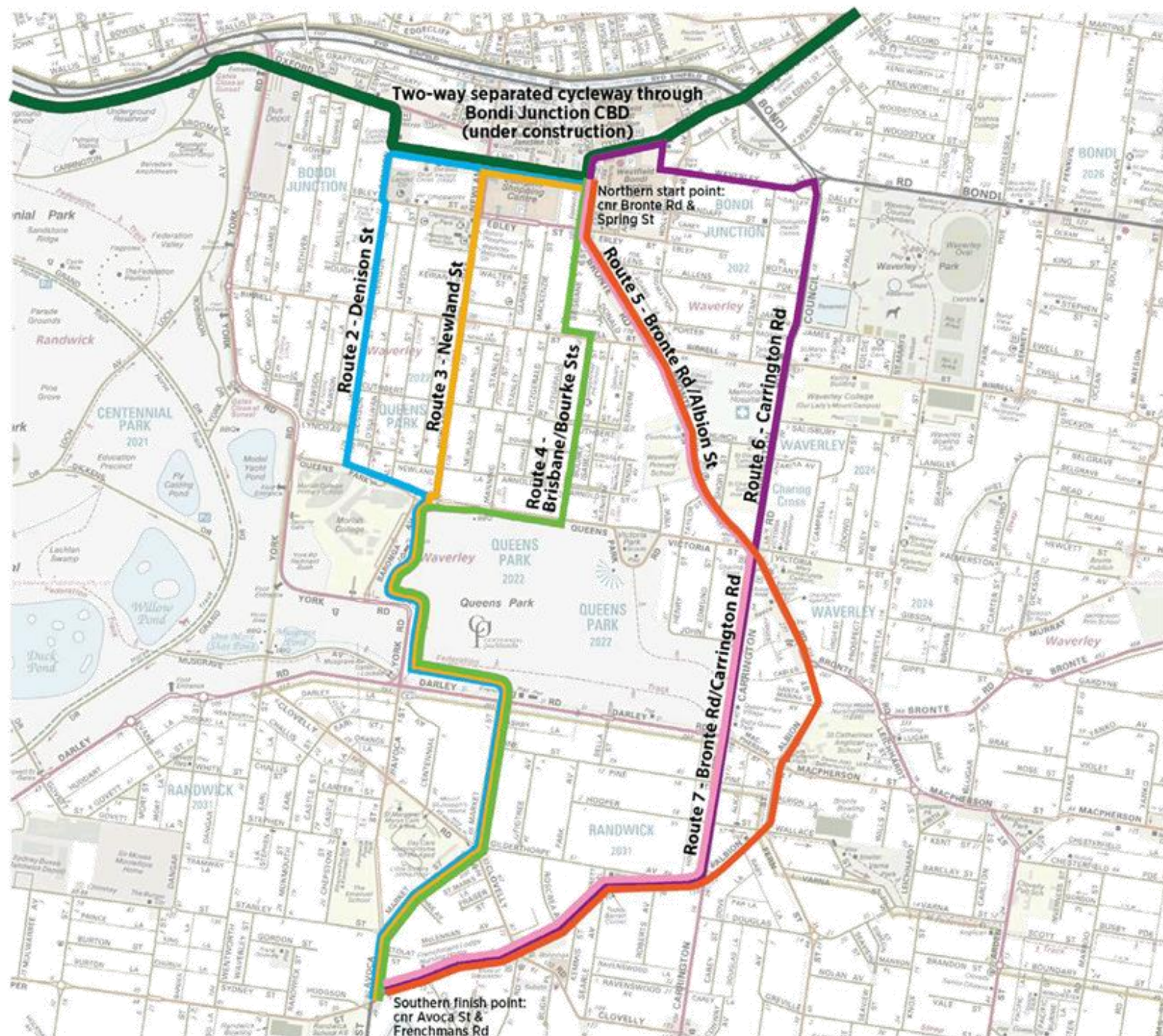
A comparative route analysis was undertaken for the five preferred route options identified in Section 5 to determine their feasibility and eligibility for final recommendation. This analysis uses the methodology set out in Section 4 and Table 4.1 to objectively identify the relative strengths and weaknesses of each of the preferred routes.

The assessment assumes the facilities set out in Section 2.

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Figure 6.1 – Preferred route options assessed in Section 5





6.1 Rider Comfort

This criterion considers the likely impact on riders for three key performance indicators: travel time, gradient and comfort.

Travel Time

Travel time is affected by delays caused by the need to stop (signals and signs) or the need to slow to below a comfortable travel speed (20-25 km/h) at uncontrolled intersections and in shared areas with pedestrians or on steeper gradients. The details provided in Appendix A have informed the ratings in Table 6.1.

Table 6.1 – Comparative options assessment for travel time

Route	Performance	Notes
2. Denison St	Good	1 existing signalised intersection and possibly 2 new ones (Darley Rd, Clovelly Rd). 2 non-priority crossings (Birrell St, Queens Park Rd). Slower speeds due to climbs in either direction. Steep grade on southern approach to Bondi Junction. Slower speeds on the Queens Park Shared Path (unless upgraded to Separated Paths).
3. Newland St	Neutral	3 existing signalised intersections (one with a two-stage crossing) and possibly 2 new ones (Darley Rd, Clovelly Rd). 1 non-priority crossings (Queens Park Rd). Significant pinch points along the uni-directional section. Slower speeds due to climbs in either direction. Steep grade on southern approach to Bondi Junction. Slower speeds on the Queens Park Shared Path (unless upgraded to Separated Paths).
4. Brisbane/ Bourke Sts	Excellent	1 existing signalised intersection and possibly 2 new ones (Darley Rd, Clovelly Rd). 1 non-priority crossings (Queens Park Rd). Slower speeds due to climbs in either direction. Steep grade on southern approach to Bondi Junction. Slower speeds on the Queens Park Shared Path (unless upgraded to Separated Paths).
5. Bronte Rd	Excellent	7 existing signalised intersections and crossings (near the courts and St Catherine's). 1 non-priority crossings (Macpherson St).
6. Carrington Rd	Poor	9 existing signalised intersections and crossings (near St Clare College).
7. Bronte & Carrington Rds	Excellent	7 existing signalised intersections and crossings (near the courts).

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Gradients

Figure 6.2: Comparative route elevations

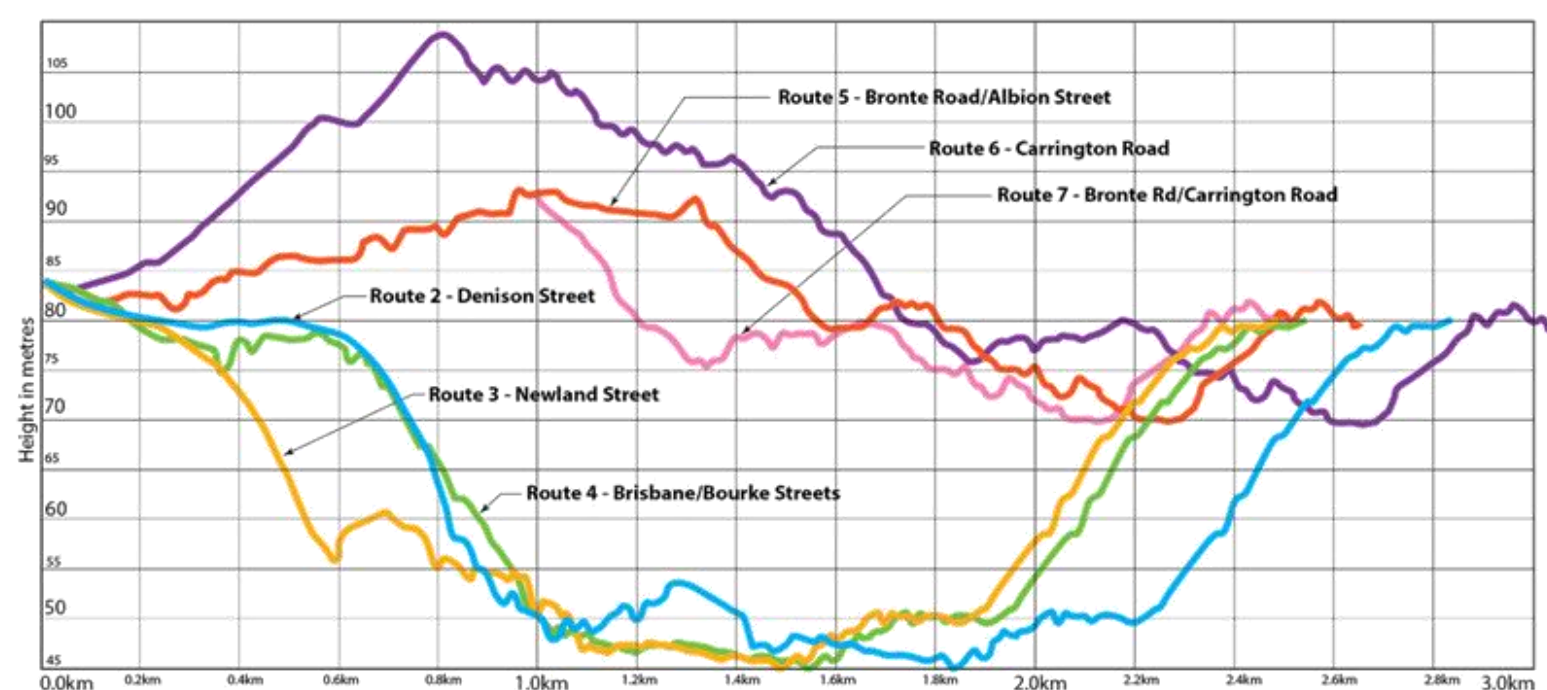


Table 6.2 – Comparative options assessment for gradient

Route	Performance	Notes
2. Denison St	Poor	Total elevation change is about 45m, mostly along Denison St and Market St. Steep grade on southern approach to Bondi Junction. Average grades are about 6-8%.
3. Newland St	Poor	Total elevation change is about 45m, mostly along Newland St and Market St. Steep grade on southern approach to Bondi Junction. Average grades are about 6-7%.
4. Brisbane/Bourke Sts	Poor	Total elevation change is about 45m, mostly along Brisbane St and Market St. Average grades are about 6-7%.
5. Bronte Rd	Good	Although the route nominally follows the ridge line, total elevation change is still about 25m, mostly along Albion St and Frenchmans Rd. Average grades are about 5%.
6. Carrington Rd	Neutral	Total elevation change is about 40m, with a gradual climb from Clovelly Rd to Bondi Rd. Average grades are about 5%.
7. Bronte & Carrington Rds	Good	Although the route nominally follows the ridge line, total elevation change is still about 25m, mostly along Carrington Rd and Frenchmans Rd. Average grades are about 5%.



Sun Protection and Tree Coverage

This criterion considers the remaining rider comfort issues of: smooth riding surface; protection from adverse climate (wind, sun and rain); and, the ease of finding popular destinations. As this assessment considers all options fitted with a separated or other high quality cycleway with a smooth riding surface and wayfinding signage throughout, Table 6.3 covers the remaining issue of protection from adverse climate, mainly focussed on sun protection / tree coverage.

Currently, all routes only afford minimal tree coverage except for a few select areas. However, all routes have significant potential for more extensive tree coverage which would move all ratings to "Excellent".

Table 6.3 – Comparative options assessment for sun protection and tree coverage

Route	Performance	Notes
2. Denison St	Neutral	Partial street tree coverage along the Denison Street section of the route, but otherwise below average protection from sun.
3. Newland St	Neutral	Significant street tree coverage along the southern section of Newland Street, but otherwise below average protection from sun.
4. Brisbane/ Bourke Sts	Neutral	Significant street tree coverage along Brisbane Street, but otherwise below average protection from sun. There is a need to upgrade the pavement surface along Brisbane Street.
5. Bronte Rd	Poor	Below average tree coverage along the route for protection from sun.
6. Carrington Rd	Poor	Below average tree coverage along the route for protection from sun.
7. Bronte & Carrington Rds	Poor	Below average tree coverage along the route for protection from sun.

6.2 Safety and Personal Security

This criterion considers the safety of riders from traffic and their personal security while using the facility particularly during evenings. Assessments in Table 6.4 assume a separated or other high quality cycleway between Bondi and Randwick Junctions, i.e.: base level assessments for all routes = Good.



Table 6.4 – Comparative options assessment for safety and personal security

Route	Performance	Notes
2. Denison St	Neutral	<p>2 non-priority crossings (Birrell St, Queens Park Rd) are a potential safety risk.</p> <p>The Queens Park Shared Path has potential for conflict with pedestrians unless the path is upgraded to Separated.</p> <p>Otherwise all of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>
3. Newland St	Good	<p>1 non-priority crossing (Queens Park Rd) is a potential safety risk.</p> <p>The Queens Park Shared Path has potential for conflict with pedestrians unless the path is upgraded to Separated.</p> <p>Otherwise all of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>
4. Brisbane/ Bourke Sts	Good	<p>1 non-priority crossings (Queens Park Rd) is a potential safety risk.</p> <p>The Queens Park Shared Path has potential for conflict with pedestrians unless the path is upgraded to Separated.</p> <p>Otherwise all of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>
5. Bronte Rd	Excellent	<p>1 non-priority crossings (Macpherson St) is a potential safety risk.</p> <p>All of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>
6. Carrington Rd	Excellent	<p>All of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>
7. Bronte & Carrington Rds	Excellent	<p>All of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>



6.3 Land-use and Design Impacts

The major impacts on the community of constructing and operating a separated cycleway between Bondi and Randwick Junctions are assessed: on-street parking and bus operations; business and community impacts (including loading zones and taxi ranks); construction impacts (including early learnings from the Oxford Street / Spring Street project); impacts on events; and, impacts on other council initiatives. These are considered separately and the options are compared in Tables 6.5 to 6.10.

Parking and Bus Operations

Parking impacts are assessed in Table 6.5 and bus impacts in Table 6.6. Experience gained during the planning and construction of at least five City of Sydney separated cycleways shows that even though on-street parking may be affected this does not necessarily result in the loss of all these parking spaces. Usually on-street parking beside the cycleway remains, while parking setbacks required by RMS near signals and other intersections will usually require a few parking spaces to be relocated in adjacent side streets or closer to intersections by the use of kerb extensions.

Table 6.5 – Comparative options assessment for on-street parking impacts

Route	Performance	Notes
2. Denison St	Excellent	There are no changes to parking conditions.
3. Newland St	Poor	Removal of parking lane (approx. 22 spaces, 14 paid) from Spring to Birrell Sts, western kerb. It appears most of these spaces could be off-set by angle parking in Keiran and Walter Sts.
4. Brisbane/ Bourke Sts	Excellent	Removal of southbound parking lane (1 space) btw Spring & Ebley Sts. There are no other changes to parking conditions.
5. Bronte Rd	Excellent	Removal of southbound parking lane (1 space) btw Spring & Ebley Sts. There are no other changes to parking conditions.
6. Carrington Rd	Excellent	There are no changes to parking conditions.
7. Bronte & Carrington Rds	Excellent	Removal of southbound parking lane (1 space) btw Spring & Ebley Sts. There are no other changes to parking conditions.



Table 6.6 – Comparative options assessment for bus operation impacts

Route	Performance	Notes
8. Denison St	Good	3 bus stops – 1 northbound, 2 southbound; 20-30 minute service; northbound services converted to in-lane stop.
9. Newland St	Good	4 bus stops – 2 northbound, 2 southbound; 20-30 minute service; northbound services converted to in-lane stops.
10. Brisbane/ Bourke Sts	Good	Adjusted cross section btw Spring & Ebley Sts which requires low impact adjustment to 2 very busy bus stops – one in each direction. 6 bus stops in Bourke St – equal north- and south-bound; none require adjustment. 1 southbound bus stop in Avoca St converted to in-lane stop.
11. Bronte Rd	Poor	Adjusted cross section btw Spring & Ebley Sts which requires low impact adjustment to 2 very busy bus stops – one in each direction. 19 busy bus stops btw Ebley St and Avoca St; northbound stops may require conversion to in-lane stops. This is the key factor informing the route performance.
12. Carrington Rd	Neutral	8 bus stops along Carrington Rd – 3 northbound, 5 southbound; 30 minute service; minor adjustments to northbound stops. 6 busy bus stops along Frenchmans Rd; northbound stops may require conversion to in-lane stops. This is the key factor informing the route performance.
13. Bronte & Carrington Rds	Poor	Adjusted cross section btw Spring & Ebley Sts which requires low impact adjustment to 2 very busy bus stops – one in each direction. 6 busy bus stops btw Ebley St and Carrington Rd; northbound stops may require conversion to in-lane stops. This is a key factor informing the route performance. 6 bus stops along Carrington Rd – 3 each way 30 minute service; minor adjustments to northbound stops. 6 busy bus stops along Frenchmans Rd; northbound stops may require conversion to in-lane stops. This is a key factor informing the route performance.

* Bus stop totals are for both sides of street. These will only be directly impacted if on the same side of the street as the cycleway.

Business and Community Impacts

Table 6.7 shows a comparative assessment for business and community impacts. These relate to the likely effect on business operations and active street life.

The City of Sydney has constructed in excess of five major separated cycleways during the past decade. Experience with these projects has shown that it is possible and desirable to work closely with business and the community to ensure that their practical needs are met in relation to deliveries, customer access and driveway access. A number of specialised treatments have been developed to cater for specific site requirements such as: special driveway and loading zone markings, regulation width loading zones with matching cycleway indent, raised sections of cycleways at commercial driveways to lessen the impact of street crossfall.



Table 6.7 – Comparative options assessment for business and community impacts

Route	Performance	Notes
2. Denison St	Excellent	No loading zones or taxi ranks. Low impact on street activity.
3. Newland St	Excellent	No loading zones or taxi ranks. Low impact on street activity.
4. Brisbane/ Bourke Sts	Excellent	There are two special zones north of Ebley St for Police vehicles and a public drop off zone, which are not affected by the proposals. No loading zones or taxi ranks. Low impact on street activity.
5. Bronte Rd	Neutral	There are two special zones north of Ebley St for Police vehicles and a public drop off zone, which are not affected by the proposed works. There are various loading zones, taxi ranks and other special zones south of Ebley St and while these are not directly affected by the proposals they require careful management through the design and implementation process.
6. Carrington Rd	Good	There is one special zone along Frenchmans Rd which is not directly affected by the proposals; careful management is required through the design and implementation process. No loading zones or taxi ranks elsewhere along the route. Low impact on street activity.
7. Bronte & Carrington Rds	Neutral	There are two special zones north of Ebley St for Police vehicles and a public drop off zone, which are not affected by the proposed works. There are various loading zones, taxi ranks and other special zones south of Ebley St (mostly along Bronte Rd) and while these are not directly affected by the proposals they require careful management through the design and implementation process.

Construction Impacts

The construction of a separated cycleway can have a major impact on traffic flow, business traffic (passing trade), bus operations and pedestrian access and amenity. Experience from the City of Sydney cycleway projects has shown that, to a large extent, the way construction is undertaken should always attempt to balance community impacts and cost. City of Sydney cycleway construction is generally carried out block by block to minimise full street impact with worksites strictly limited to the physical area of the cycleway, ensuring pedestrian and vehicular access around the site. Areas of high activity need special attention and timing of works to minimise impacts.

Early feedback from the construction of the Spring Street / Oxford Street cycleway indicates the need to diligently manage construction noise, pedestrian/customer access, parking, waste collection, and damage and disruption to utilities.



Other potential construction impacts to consider for Bronte Road and other routes includes access and safety of school children (esp at drop off/pick up times), bus timetabling impacts, traffic flow impacts, and pedestrian and cyclist safety.

Table 6.8 – Comparative options assessment for construction impacts

Route	Performance	Notes
2. Denison St	Good	Significant construction works are limited to two short sections of bi-directional separated cycleway along the northern end of Denison St and Queens Park Rd. Some impacts of new signalised crossings should these be required. The Bicycle Boulevard sections may require some low impact enhancements to traffic calming.
3. Newland St	Good	Significant construction works are limited to a short section of bi-directional separated cycleway along the northern end of Newland St. Some impacts on pedestrian access during construction of the uni-directional facilities Some impacts of new signalised crossings should these be required. The Bicycle Boulevard sections may require some low impact enhancements to traffic calming.
4. Brisbane/ Bourke Sts	Excellent	Significant construction works are limited to a short section of bi-directional separated cycleway north of Ebley St. Some impacts of new signalised crossings, should these be required. The Bicycle Boulevard sections may require some low impact enhancements to traffic calming and pavement rehabilitation.
5. Bronte Rd	Neutral	Assuming the works associated with the cycleway are fully integrated with current council programs for streetscape improvements, there are few or no direct construction impacts associated with the cycleway itself, although of course the impacts remain.
6. Carrington Rd	Poor	Significant construction impacts along the northbound side of whole route due to the required cross section.
7. Bronte & Carrington Rds	Neutral	Assuming the works along Bronte Rd are fully integrated with current council programs for streetscape improvements, there are few or no direct construction impacts associated with the cycleway itself, although of course the impacts remain. With an agile design approach, it may be feasible to avoid much of the construction impacts along Carrington Rd.



Impacts on Events

Council, the community, business and others arrange for various events throughout the year and throughout Waverley, eg markets, street fairs, etc. One specific event in the study area is in the Victoria Street carpark, which does not affect the operations of a future cycleway. There are regular sporting events in Queens Park which may occasionally affect the operations of the Shared Path, esp on Saturdays.

Table 6.9 – Comparative options assessment for impacts on events

Route	Performance	Notes
2. Denison St	Good	Regular sporting events in Queens Park which may occasionally affect the operations of the Shared Path, esp on Saturdays.
3. Newland St	Good	Regular sporting events in Queens Park which may occasionally affect the operations of the Shared Path, esp on Saturdays.
4. Brisbane/ Bourke Sts	Good	Regular sporting events in Queens Park which may occasionally affect the operations of the Shared Path, esp on Saturdays.
5. Bronte Rd	Excellent	No known events.
6. Carrington Rd	Excellent	No known events.
7. Bronte & Carrington Rds	Excellent	No known events.

Impacts on Other Council Initiatives

Council's forward works and planning programs include a range of initiatives for improvements to the public domain, road safety and other community activities. Key examples include the Village Centres Strategy (Waverley, 2019.4 and 2020.3), streetscape improvements along Bronte Road, and the introduction of 40km/h in Zone 1.

Table 6.10 – Comparative options assessment for impacts on other Council initiatives

Route	Performance	Notes
2. Denison St	Excellent	Introduction of 40km/h in Zone 1.
3. Newland St	Excellent	Introduction of 40km/h in Zone 1.
4. Brisbane/ Bourke Sts	Excellent	Introduction of 40km/h in Zone 1.
5. Bronte Rd	Excellent	Village Centres Strategy. Bronte Road streetscape improvements.
6. Carrington Rd	Neutral	None.
7. Bronte & Carrington Rds	Excellent	Village Centres Strategy. Bronte Road streetscape improvements.



6.4 Place

As discussed in Section 4.3, the *Movement and Place* framework by the Government Architect of NSW and Transport for NSW is an important aspect of the NSW Government long term planning strategies. It creates a shared language and approach to help all stakeholders achieve better place outcomes for the people of NSW.

Table 6.11 – Comparative options assessment for *Place*

Route	Performance	Notes
2. Denison St	Neutral	Links with <i>Places</i> at Bondi Junction, Queens Park, Centennial Park. Does not connect with the Charing Cross shops.
3. Newland St	Neutral	Links with <i>Places</i> at Bondi Junction, Queens Park, Centennial Park. Does not connect with the Charing Cross shops.
4. Brisbane/ Bourke Sts	Neutral	Links with <i>Places</i> at Bondi Junction, Queens Park, Centennial Park. Does not connect with the Charing Cross shops.
5. Bronte Rd	Excellent	Links with <i>Places</i> at Bondi Junction, Bronte Rd (Ebley St to Birrell St), Charing Cross shops, Queens Park, Frenchmans Rd shops. Adds to opportunities to enhance Council's Bronte Rd streetscape improvement program.
6. Carrington Rd	Good	Links with <i>Places</i> at Bondi Junction, Queens Park, Charing Cross shops, Frenchmans Rd shops.
7. Bronte & Carrington Rds	Excellent	Links with <i>Places</i> at Bondi Junction, Bronte Rd (Ebley St to Birrell St), Charing Cross shops, Queens Park, Frenchmans Rd shops. Adds to opportunities to enhance Council's Bronte Rd streetscape improvement program.

6.5 Overall Route Options Evaluation and Recommendations

Based on the route options analysis summarised in Table 6.12, Route 4 and Route 5 perform equally well. Route 7 is very similar to Route 5 and performs equally well. The other three routes perform significantly less well.

Route 4 closely follows the desire line between the two end points at Bondi Junction and Randwick. It is recognised in both the 2013 Waverley Bike Plan and the TfNSW Principal Bicycle Network (Tier 2). It is earmarked as the route from Bondi Junction to UNSW. The route is particularly attractive from a cost and constructability perspective as it requires no major investment, other than a short section of bi-directional separated cycleway north of Ebley Street and possibly two new signalised crossing facilities (at Darley Road and Clovelly Road). The rest of the route relies on existing local streets with minor enhancements to traffic calming and pavement quality as part of a Bicycle Boulevard treatment. Arguably, Bicycle Boulevards are not suitable for the Sydney Principal Bicycle Network Tier 1 network. It appears feasible to provide a separated facility along Bourke Street (and Market Street) but probably



not along Brisbane Street due to its narrower cross section and tree canopy. A further drawback is that this route (compared to Route 5) is off the main ridge line and grades can be difficult for some users. There is an opportunity to shorten the route by about 500m through a new, more direct connection through Queens Park from Bourke Street to Market Street, between the playing fields. To some extent, this connection is recognised in the Queens Park Masterplan, although it may be preferred as a pedestrian only link.

Route 5 along Bronte Road is recognised as a Tier 1 route in the TfNSW Principal Bicycle Network. To a large extent this route is currently preferred by many cyclists due its gradient. It offers superior performance for access to services, schools, retail, etc (Network Connectivity, *Place*). On the other hand, these services, etc create a complex environment, which is intensified by frequent bus services, general traffic and parking. As discussed in Section 2.7, a blanket design with a bi-directional cycleway (kerbside, pathside or otherwise) is not likely to be effective and a more refined design approach is required, which responds more closely to localised changes in land-use and traffic patterns with a variety of cycling facilities and cross sections. This requires significant investment and forward planning. Council has a number of streetscape and urban design plans for much of Bronte Road, which may be able to counter or off-set some of these requirements, eg under-grounding of utilities and any changes to parking patterns.

Route 7 is very similar to Route 5, using Carrington Road south of Victoria Street rather than Bronte Road. On the one hand, this slightly shortens the route and improves travel times. On the other hand, the construction costs and impacts cannot be off-set against Council's streetscape improvement program along Bronte Road. These differences are relatively subtle and do not significantly change the evaluation outcomes.

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Table 6.12 – Overall comparative options assessment

Route	Directness	Network connectivity	Suitability for a Tier 1 route	Corridor width and traffic constraints	Constructability and costs	Maintenance and revenue	Land ownership and government approvals	Travel time	Gradient	Sun protection / tree coverage	Safety & personal security	Parking impacts	Bus impacts	Business community impacts	Construction impacts	Impacts on events	Impacts on Council initiatives	Place	Total score
2. Denison St	3	4	2	4	4	4	4	4	2	3	3	5	4	5	4	4	5	3	67
3. Newland St	4	4	2	2	3	3	4	3	2	3	4	2	4	5	4	4	5	3	61
4. Brisbane/Bourke Sts	4	4	2	4	4	4	4	5	2	3	4	5	4	5	5	4	5	3	71
5. Bronte Rd	4	5	5	3	4	3	3	5	4	2	5	5	2	3	3	5	5	5	71
6. Carrington Rd	2	4	5	3	3	4	3	2	3	2	5	5	3	4	2	5	3	4	62
7. Bronte & Carrington Rds	4	4	5	3	4	3	3	5	4	2	5	5	2	3	3	5	5	5	70



7 Conclusions and Recommendations

This independent analysis has identified two routes as performing equally strong – Route 4 via Brisbane Street and Bourke Street; and Route 5 via Bronte Road. Both routes form part of the regional cycleway network and are recognised as such in local and/or State plans and strategies.

Route 7 is very similar to Route 5 and performs almost as well.

In implementing one or more route options there are various ways to capitalise on their strengths, address any weaknesses, seize opportunities and mitigate threats.

7.1 Route 4 – Brisbane & Bourke Streets

Strengths

The route provides a direct connection between Bondi Junction and Randwick Junction and follows closely the main desire line. It provides one of the most direct alignments and competitive travel times. It is supported by current bicycle plans and safety strategies and is among the most cost-effective for construction.

Weaknesses

The section along the existing Shared Path through Queens Park presents a slight detour off the desire line and also introduces potential for conflict with pedestrians, especially during sporting events which can be intensive on Saturdays. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path. To some extent the Park recognises this as is evident through the current design for the proposed Separated Path along Darley Road, east of York Road⁵. The Park Masterplan also acknowledges a more direct link between Bourke Street and Market Street (about 500m reduction in length), although such a route may be for pedestrians only given its proximity to playing fields.

For much of its length, the route consists of Bicycle Boulevards treatments, which arguably are not ideal for the Tier 1 Sydney Principal Bicycle Network. It appears feasible to provide a separated facility along Bourke Street (and Market Street) but probably not along Brisbane Street due to its narrower cross section and tree canopy.

A further drawback is that this route (compared to Routes 5 and 7) is off the main ridge line and grades can be difficult for some users.

⁵ Design approved; awaiting funding.



7.2 Routes 5 and 7 – Bronte Road (and Carrington Road)

Strengths

To a large extent Route 5 is currently preferred by many cyclists due its gradient. It offers superior performance for access to services, schools, retail, etc. Council has a number of streetscape and urban design plans for much of the route, which will support its significant investment and forward planning requirements.

Route 7 is slightly shorter than Route 5 but its construction costs and impacts cannot be off-set against Council's streetscape improvement program along Bronte Road. These differences are relatively subtle and do not change the evaluation outcomes.

Weaknesses

The route operates in a complex environment that requires an agile and integrated approach to the planning and design of any new infrastructure in the corridor, which responds closely to localised changes in land-use and traffic patterns with a variety of cycling facilities and cross sections. Some broad concepts could include filtered-permeability measures to reduce through traffic but encouraging pedestrians, bikes, buses and local access to business; select locations with intense place-based investments based on "shared space" principles (eg the intersection of Bronte Road and Spring Street); more traditional sections to support longitudinal movement; and, increased setbacks for plazas at redevelopment sites.

As indicated above, the construction costs and impacts of the required works are substantial, possibly a magnitude greater than that required for Route 4. Arguably, off-setting these costs against other Council programs is not equitable.

7.3 General

Opportunities

In the experience of other councils in implementing separated cycle facilities, principally City of Sydney, there is often initial opposition and resistance to changes in the urban streetscape. With careful implementation and after an early period of adjustment, it is likely that the community will embrace these facilities as a benefit.

City of Sydney has reported increased bicycle use (particularly with school age children) across its network since it began to roll out its core network of separated cycleways and similar high quality cycling facilities.

Bicycle Boulevards have similar potential, noting well-documented evidence of the community and safety benefits of traffic calming generally. These streets are usually considered as more attractive and liveable places as they support a broad range of community activity for cyclists, pedestrians and drivers.

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Threats

Potential impacts during both construction and operation of the route (such as to parking, loading, bus stops and bus operations) require careful management and agile responses, both at the design and construction stages. Ongoing monitoring on completion of the works may identify the need for further fine-tuning.

Early feedback from the construction of the Spring Street / Oxford Street cycleway indicates the need to diligently manage construction noise, pedestrian/customer access, parking, waste collection, and damage and disruption to utilities.



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Appendix A – Travel Times

Charing Cross Cycle Route Feasibility Study

Waverley Council

Mar-20



Nominal Bike Speed

20 km/h

Dist (m)	Travel Time (min)			Route	% Shortest	Impediments
	% Nominal Speed	100%	80%	60%		
100		0.3	0.4	0.5		
200		0.6	0.8	1.0		
300		0.9	1.1	1.5		
400		1.2	1.5	2.0		
500		1.5	1.9	2.5		
600		1.8	2.3	3.0		
700		2.1	2.6	3.5		
800		2.4	3.0	4.0		
900		2.7	3.4	4.5		
1000		3.0	3.8	5.0		
1100		3.3	4.1	5.5		
1200		3.6	4.5	6.0		
1300		3.9	4.9	6.5		
1400		4.2	5.3	7.0		
1500		4.5	5.6	7.5		
1600		4.8	6.0	8.0		
1700		5.1	6.4	8.5		
1800		5.4	6.8	9.0		
1900		5.7	7.1	9.5		
2000		6.0	7.5	10.0		
2100		6.3	7.9	10.5		
2200		6.6	8.3	11.0		
2300		6.9	8.6	11.5		
2400		7.2	9.0	12.0		
2480		7.4	9.3	12.4	Route 3	100%
2500		7.5	9.4	12.5		10
2510		7.5	9.4	12.6	Route 7	76%
2540		7.6	9.5	12.7	Route 4	77%
2600		7.8	9.8	13.0		6
2650		8.0	9.9	13.3	Route 5	80%
2700		8.1	10.1	13.5		
2800		8.4	10.5	14.0		
2830		8.5	10.6	14.2	Route 2	86%
2900		8.7	10.9	14.5		7
3000		9.0	11.3	15.0		
3050		9.2	11.4	15.3	Route 6	123%
3100		9.3	11.6	15.5		9
3200		9.6	12.0	16.0		
3300		9.9	12.4	16.5		
3400		10.2	12.8	17.0		
3500		10.5	13.1	17.5	Route 8	141%
3600		10.8	13.5	18.0	Route 1	109%
3700		11.1	13.9	18.5		6
3800		11.4	14.3	19.0		
3900		11.7	14.6	19.5		
4000		12.0	15.0	20.0		
20000		60.0	75.0	100.0		

Notes

1 - Distance for each route from Table 5.1

2 - Impediments for each route from Table 6.1, incl traffic signals, non-priority crossings, climbs and shared paths



Waverley Council

Charing Cross Streetscape Upgrade Cycleway Technical Assessment Report

July 2020

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

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Appendices

Appendix A – Cycle Route Feasibility Report

Appendix B – Cycleway Route Option Sketches

1. Introduction

1.1 Background information

Waverley Council (WC) are seeking to upgrade the Charing Cross precinct as part of the Charing Cross Streetscape Upgrade project (Project Ref A19/0314) to enhance the sense of arrival and improve safety and convenience for active and public transport modes.

As part of this upgrade, WC is looking to investigate the feasibility of a cycleway that links Bondi Junction and Randwick Junction. Barros van den Dool A.T. (Transport Planning) undertook a feasibility study (Charing Cross Cycle Route Feasibility Study, April 2020) for eight potential cycle routes between Bondi - and Randwick Junction and recommended three of the routes (Routes 4, 5 and 7 – see Figure 1-1) for further assessment and analysis.

WC has engaged GHD to undertake a technical assessment of the feasibility of the design and construction of the three routes recommended in the study by Barros van den Dool A.T.

GHD's technical assessment will however only assess the impacts of the three routes within the Waverley Council Local Government Area (LGA), and will not consider or quantify the impacts of the routes within the Randwick City Council LGA.

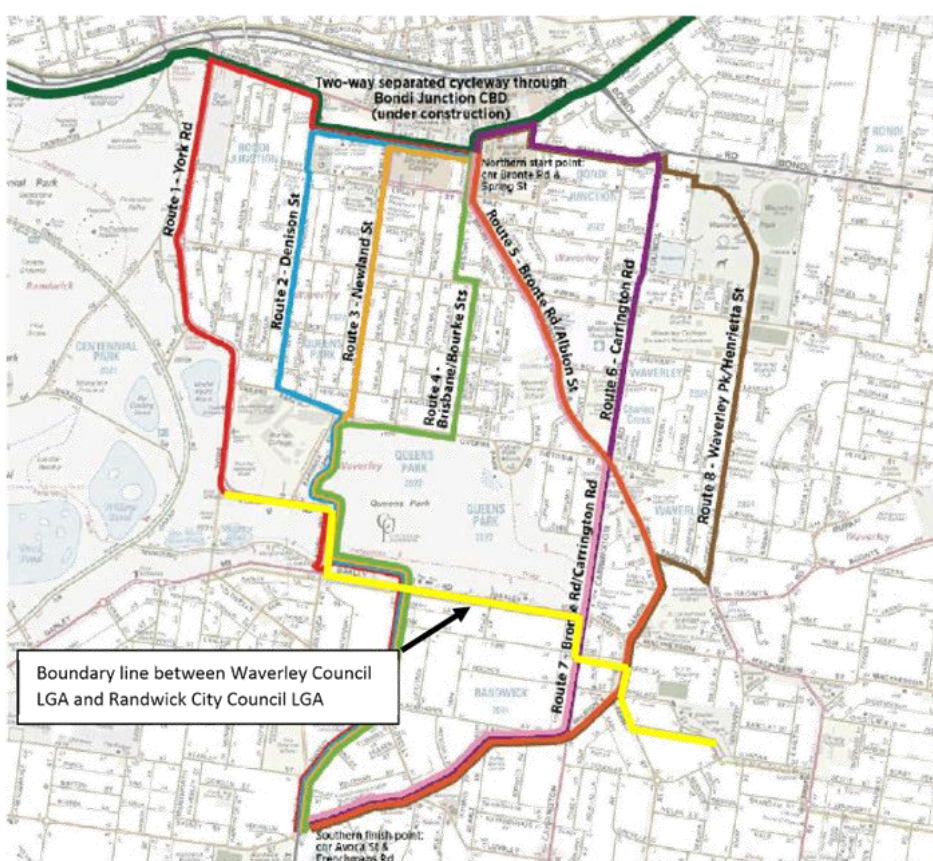


Figure 1-1 Cycleway Options

Source: Charing Cross Cycle Route Feasibility Study (Barros van den Dool Active Transport, April 2020)

1.2 Scope

The scope of this technical assessment includes:

- Development of high-level sketch plans to assist in identifying impacts along each cycleway route within the Waverley Council LGA;
- Development of typical cross sections for each option showing the current and proposed arrangements;
- A high-level value for money assessment based on a cycleway per meter estimate, including a cost benefit analysis for each of the options;
- Summary of the advantages and disadvantages for each of the options;
- Recommendation for a preferred cycleway option for Council's consideration.

1.3 Approach

The approach for the assessment of each cycleway option includes a site visit and desktop assessment to review the existing site infrastructure and surrounding environment and improve our understanding of the potential impacts of each of the options. A site visit will be undertaken at constrained locations along each route to confirm dimensions measured during the desktop assessment. Each route option will then be assessed and a preferred option will be selected based on the following criteria:

- Recommendations from the Barros van den Dool Active Transport feasibility study (April 2020);
- Connection potential to existing cycleways within and outside of the Waverley Council LGA;
- Usage of existing cycleway infrastructure in the area;
- Construction impacts on existing road infrastructure within the Waverley Council LGA;
- Costs and benefits associated with each of the route options.

2. Existing Cycleway Infrastructure and Usage

As part of the technical assessment of the proposed route options, GHD assessed the usage and connectivity of each of the proposed routes with existing cycleway infrastructure and local commercial precincts in the area. This section of the report discusses the connectivity and usage of the existing roads on which the new separated cycleways are proposed.

2.1 Connectivity

Figure 2-1 shows the existing cycleway routes within the Waverley Local Government Area (LGA) as per RMS's Cycleway Finder website. The figure shows that the main existing cycleways with connection potential to the proposed new bicycle routes are on Birrell Street, Queens Park Road, Darley Road (proposed) and Albion Street.

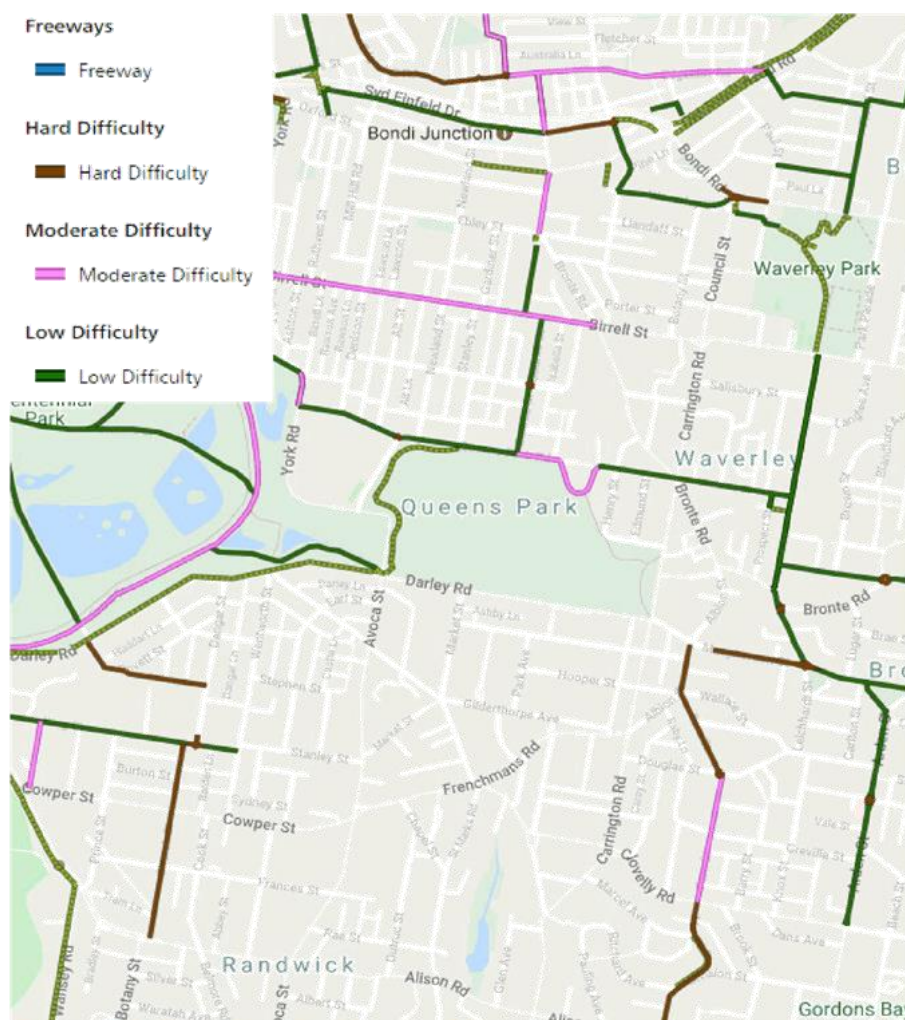


Figure 2-1 Existing Cycleway Infrastructure

Source: RMS Cycleway Finder, 2020

Route Option 4, which runs through Queens Park, has existing cycleway infrastructure (on road bicycle lanes) between Queens Park and Bondi Junction. The existing route is classified as a “low difficulty” route, with the starting section through Brisbane Street listed as “moderately difficult”. This route has connection potential to Queens Park, Centennial Park, Birrell Street and Queens Park Road, but does not connect to any of the surrounding commercial precincts.

Routes 5 and 7 both start on Bronte Road and run southeast towards Charing Cross. Both of these options have connection potential to existing cycleways on Birrell Street (ends at Bronte Road) and Queens Park Road (Changes to Victoria Street). These routes do not comprise of existing cycle infrastructure.

Once these options reach Carrington Road, Route 5 continues southeast on Bronte where it has potential to connect to the existing on-road cycleway on Albion Street. Route 7 turns south onto Carrington Road and connects to the proposed new separated cycleway on Darley Road.

Figure 2-2 shows the cycling routes that offer comfortable and direct methods of travel around Sydney’s east compiled by Woollahra and Waverley Councils. The map shows Route 4 to be an existing main cycle route through a combination of low and high traffic streets. For Routes 5 and 7, Bronte Road was identified as a main cycle route, but Carrington Road was not.

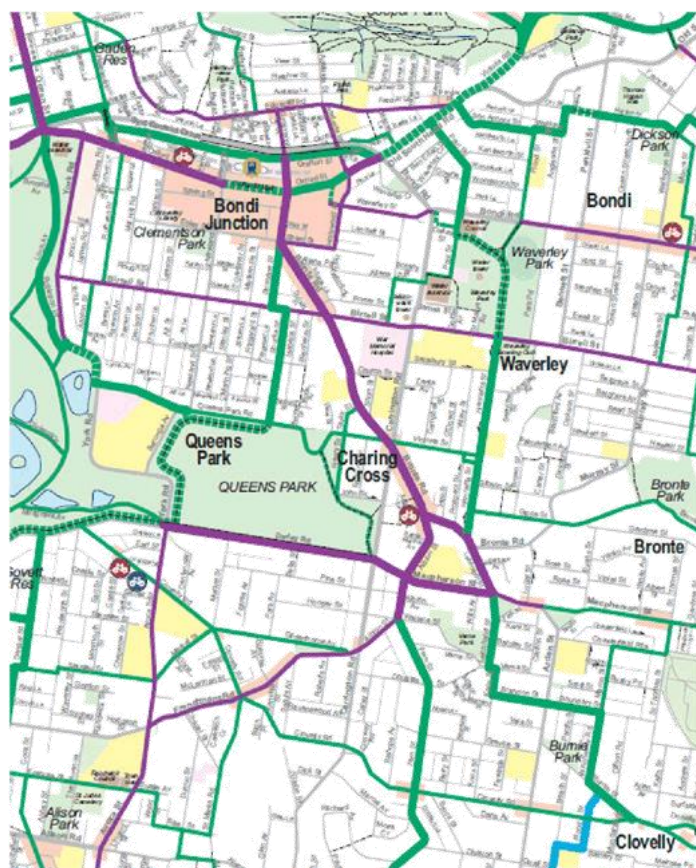


Figure 2-2 Cycling in Waverley and Woollahra Map

All three of the proposed route options have the potential to connect to existing cycleway infrastructure in the area, but only Routes 5 and 7 provide a connection to the Charing Cross commercial precinct on Bronte Road.

2.2 Usage

Usage of a cycleway, for the purpose of this assessment, refers to the amount of cyclists that currently use the proposed routes for cycling. Figure 2-3 is an extract from the STRAVA global heat map, which is a map generated by aggregated public cycling activities over the past two years. The figure demonstrates that Route 4 is not utilised as much by cyclists when compared to Routes 5 and 7, which have significantly more cyclist traffic.

Routes 5 and 7, as discussed in the connectivity section above, has no existing cycleway infrastructure in place. Whilst there is not any formal infrastructure, it is evident that more STRAVA users utilise these routes, perhaps viewing them as being more direct with flatter topography as they follow the ridgeline whereas Route 4 is more of an undulating route with longer and steeper climbs when approaching both Randwick and Bondi Junction. Provision of new cycling infrastructure along either of these two routes would cater for routes with existing cyclist demand based on the STRAVA heat map. Route 4, between Randwick and Darley Road does have high demand as it provides a link towards the cycleways at Centennial Parklands and towards Sydney CBD.

It is to be noted that the STRAVA heat map only accounts for users of the STRAVA app and therefore is weighted towards commuters and recreational cyclists (e.g. school children and people using bicycles for local trips are unlikely to record their trips using this app). The data in this map could be verified with local cycling groups.

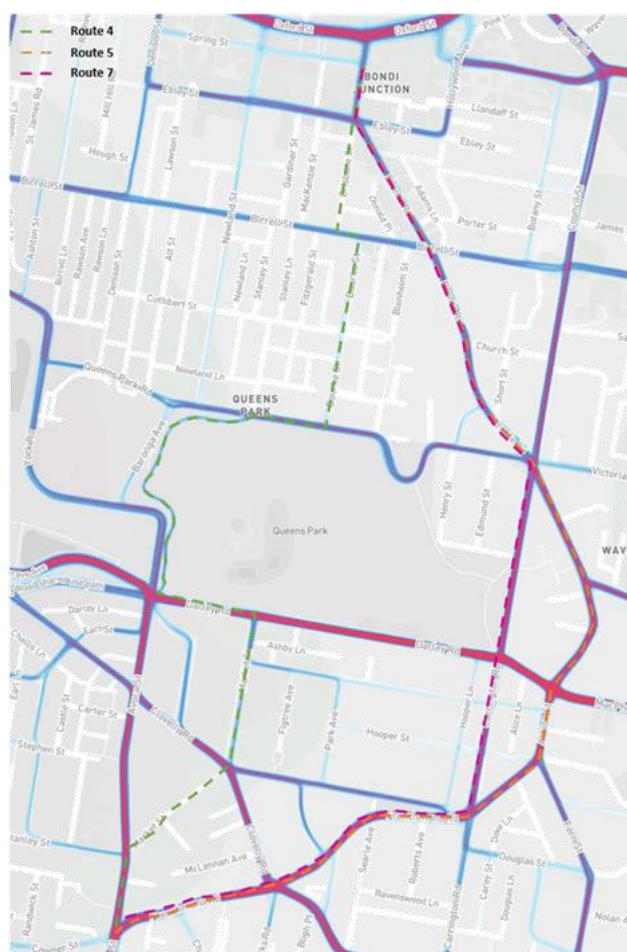


Figure 2-3 STRAVA Heat Map

Source: STRAVA website

3. Existing Route Overview

This section of the report will discuss the existing site and road conditions for each of the proposed cycleway routes, listing the infrastructure and constraints influencing the alignment of a separated cycleway along each of the routes within the Waverley Council LGA.

3.1 Route 4

As shown in Figure 1-1, Route 4 starts at Spring Street on the northern end of Bronte Road, from there it runs along Brisbane Street, onto Birrell and Bourke Streets. The route then follows Queens Park Road onto the existing shared path within Queens Park, from where it runs onto Darley Road.

The land use along the route is primarily residential with some commercial frontages at the northern end of Bronte Road.

3.1.1 Existing route overview

The following points outline the existing road infrastructure along each section of the route.

Bronte Road (Spring Street to Ebley Street) - Figure 3-1

Land use – Commercial

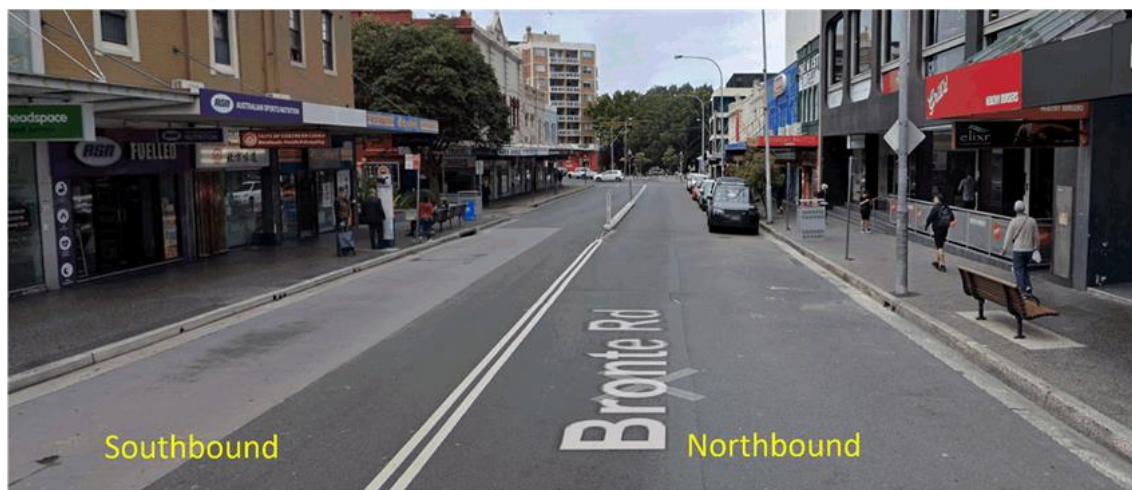


Figure 3-1 Bronte Road, Street View

Source: Google maps

Northbound (Western side of road)

- One lane;
- Loading zones;
- Kerbside parking;
- No verge;
- Double centre line only;

Southbound (Eastern side of road)

- One lane (changes to two at Ebley Street – one for bikes);

- Bus zone / stop;
- 15 minute parking space (1) - in front of “Joe’s Just for Men” hairdresser);
- No verge.

Brisbane Street (Ebley Street to Birrell Street) - Figure 3-2

Land use – Residential



Figure 3-2 Brisbane Street, Street View

Source: Google maps

Northbound

- One lane;
- Kerbside parking;
- Verge;
- Large Trees (potentially heritage listed);
- No line marking.

Southbound

- One lane;
- Kerbside parking;
- Verge;
- Large Trees (potentially heritage listed);
- Transformer (1).

Birrell Street (Brisbane Street to Bourke Street) - Figure 3-3

Land use – Residential



Figure 3-3 Birrell Street, Street View

Source: Google maps

Eastbound

- One lane;
- Kerbside parking;
- Existing cycleway (on-road, separated) – painted;
- Verge;
- Medium to large trees;
- Double centre line with parking lines.

Westbound

- One lane;
- Kerbside parking;
- Existing cycleway (on-road, separated) – painted;
- Verge.
- Medium to large trees;
- Double white line (centre) with parking and lanes lines.

Bourke Street (Birrell Street to Queens Park Road) - Figure 3-4

Land use – Residential



Figure 3-4 Bourke Street, Street View

Source: Google maps

Northbound

- One lane;
- Existing cycleway (on-road, separated) – unpainted;
- Kerbside parking ;
- Bus stops (3);
- Verge;
- Medium to large trees;
- Single Centre and parking lines;
- Transformer (1) at northern end of Bourke Street.

Southbound

- One lane;
- Existing cycleway (on-road, separated) – unpainted;
- Kerbside parking ;
- Bus stops (3);
- No verge (Birrell Street to Cuthbert Street), verge (Cuthbert to Queens Park Road);
- Medium trees;
- Single Centre and parking lines.

Queens Park Road (Bourke Street to Queens Park) - Figure 3-5

Land use – Residential and recreational.



Figure 3-5 Queens Park Road, Street View

Source: Google maps

Eastbound

- One lane;
- Existing cycleway (on-road, separated) – unpainted;
- Kerbside parking;
- 1 x disabled parking space;
- Verge;
- Medium to large trees;
- Single centre and parking lines;

Westbound

- One lane;
- Existing cycleway (on-road, separated) – unpainted;
- Kerbside parking;
- Single centre and parking lines;
- No trees;
- Verge.

Queens Park (Queens Park Road to Darley Road) - Figure 3-6

Land use – Recreational



Figure 3-6 Queens Park Cycleway, Street View (South of Queens Park Road)

Source: Google maps

Northbound

- Existing Shared Path.

Southbound

- Existing Shared Path.

Darley Road (Queens Park to Market Street) - Figure 3-7

Land use – Residential and recreational (future cycleway proposed)



Figure 3-7 Darley Road, Street View

Source: Google maps

Eastbound

- Future bi-directional separated cycleway (within Queens Park) expected to be constructed.

Westbound

- Future bi-directional separated cycleway (within Queens Park) expected to be constructed.

3.2 Route 5

As shown in Figure 1-1, Route 5 starts at the northern end of Bronte Road and continues along Bronte Road up to the intersection of Bronte Road and Albion Street, from where it continues along Albion Street to where it reaches the end of Waverley Councils LGA at Pine Street.

3.2.1 Existing route overview

Bronte Road (Spring Street to Ebley Street) - Figure 3-8

Land use - Commercial

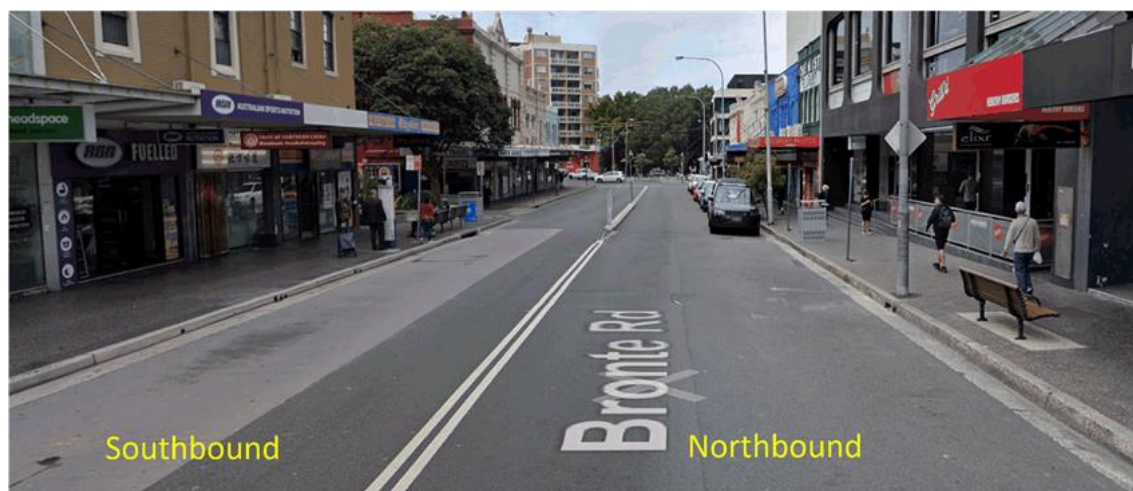


Figure 3-8 Bronte Road Section 1, Street View

Source: Google maps

Northbound

- One lane (wide);
- Loading zones;
- No verge;
- Double centre lines only;
- Kerbside parking.

Southbound

- One lane (changes to two at Ebley Street);
- Bus zone / stop (1);
- No verge;
- 15 minute parking (in front of "Joe's Just for Men" hairdresser) (1).

Bronte Road (Ebley Street to Birrell Street) - Figure 3-9

Land use - Commercial



Figure 3-9 Bronte Road Section 2, Street View

Source: Google maps

Northbound

- Two lanes (incl. 1 informal lane for kerbside parking);
- Kerbside parking;
- Wide footpaths;
- No verge;
- Parking meters;
- Double white line (centre).
- Bus zone / stop (1).

Southbound

- Two lanes (incl. 1 informal lane for kerbside parking);
- Loading zones;
- Kerbside parking;
- Wide footpaths;
- No verge;
- Parking meters;
- Bus stop (1).

Bronte Road (Birrell Street to Carrington Road) - Figure 3-10

Land use - Residential, with some sections of commercial



Figure 3-10 Bronte Road Section 3, Street View

Source: Google maps

Northbound

- Police station;
- School zone;
- Telstra public telephone;
- One lane;
- Single centre line;
- Kerbside parking;
- Medium trees;
- Majority of the section has a verge, however commercial area, police station and school zone areas do not have a verge;
- Bus zone / stop (2).

Southbound

- One lane;
- Single centre line;
- Kerbside parking;
- Bus zone / stop (2);
- Disability parking space (1);
- Medium trees;
- Verge.

Bronte Road (Carrington Road to Albion Street) - Figure 3-11

Land use - Commercial



Figure 3-11 Bronte Road Section 4, Street View

Source: Google maps

Northbound

- Two lanes (including one kerbside parking lane);
- Kerbside parking;
- No verge;
- Double Centre and parking lines;
- Bus stop (1);
- Telstra public telephone.

Southbound

- One lane;
- Kerbside parking;
- No verge;
- Double Centre and parking lines;
- Bus stop (1).

Albion Street (Bronte Road to Pine Street) - Figure 3-12

Land use - Residential and commercial



Figure 3-12 Albion Street, Street View

Source: Google maps

Northbound

- One lane;
- Kerbside parking;
- Verge between Pine Street and Santa Marina Avenue, no verge at the northern end of Bronte Road (commercial);
- Centre line at intersections only;
- Bus stops (2).

Southbound

- One lane;
- Kerbside parking;
- Transformer (1);
- Verge between Bronte Road and Santa Marina Avenue, no verge between footpath and road from Macpherson Street to Pine Street;
- School;
- Centre line at intersections only;
- Bus stop (2);
- Auspost box.

3.3 Route 7

As shown in Figure 1-1, Route 7 starts at the northern end of Bronte Road and continues along Bronte Road until the intersection of Bronte Road and Carrington Road. The route follows Carrington Road until the intersection with Darley Road, which is the end of the Waverley Council LGA.

The land use along the route is primarily residential with some commercial frontages at the northern end of Bronte Road.

3.3.1 Existing route overview

Bronte Road (Spring Street to Ebley Street) - Figure 3-13

Land use - Commercial

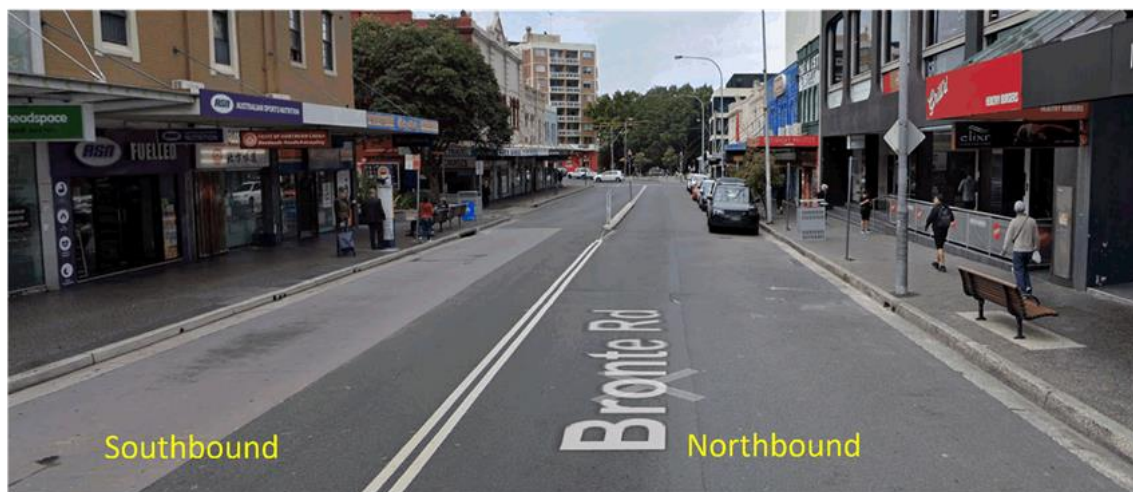


Figure 3-13 Bronte Road Section 1, Street View

Source: Google maps

Northbound

- One lane (wide);
- Loading zones;
- No verge;
- Double centre lines only;
- Kerbside parking.

Southbound

- One lane (changes to two at Ebley Street);
- Bus zone / stop (1);
- No verge
- 15 minute parking (in front of "Joe's Just for Men" hairdresser) (1).

Bronte Road (Ebley Street to Birrell Street) - Figure 3-14

Land use - Commercial



Figure 3-14 Bronte Road Section 2, Street View

Source: Google maps

Northbound

- Two lanes (incl. 1 lane for kerbside parking);
- Kerbside parking;
- Wide footpaths;
- No verge;
- Double centre lines only;
- Parking meters;
- Bus zone / stop (1).

Southbound

- Two lanes (incl. 1 lane for kerbside parking);
- Loading zones;
- Kerbside parking;
- Wide footpaths;
- No verge;
- Parking meters;
- Bus stop (1).

Bronte Road (Birrell Street to Carrington Road) - Figure 3-15

Land use - Residential, with some sections commercial



Figure 3-15 Bronte Road Section 3, Street View

Source: Google maps

Northbound

- Police station;
- School zone;
- Telstra public telephone;
- One lane;
- Kerbside parking;
- Single centre line only;
- Majority of the section has a verge, however commercial area, police station and school zone areas do not have a verge;
- Bus zone / stop (2).

Southbound

- One lane;
- Kerbside parking;
- Bus zone / stop (2);
- Disability parking space (1)
- Verge.

Carrington Road (Bronte Road to Darley Road) - Figure 3-16

Land use - Small portion commercial (northern and ends), residential and recreational



Figure 3-16 Carrington Road, Street View

Source: Google maps

Northbound

- Two lanes (one for kerbside parking);
- Telstra public telephone;
- Double centre lines with single lane / parking line;
- Some sections towards the north do not have a verge.
- Bus zone / stops (3).

Southbound

- Two lanes (one for kerbside parking);
- Bus zone / stops (3);
- Double centre lines with single lane / parking line;
- Some sections towards the north do not have a verge.

4. Proposed Cycleway Impacts

This section of the report will discuss the construction, social and environmental impacts of each of the proposed routes on the existing street infrastructure and usage. The assessment is based on the proposed cycleway being on one side of the road only, and that it will consist of two 1.2 m wide lanes with a 0.4 m wide median for separation from the road. (Austroads suggests 2-3 m width for a separated two-way cycleway: Austroads Guide to Road Design Part 6A: Pedestrian and Cyclist Paths – Section 7.5.4).

An overview of each of the route option can be seen in Appendix B.

4.1 Route 4

4.1.1 Construction impacts

Bronte Road (Spring Street to Ebley Street) – 120 m

Construction of a bi-directional cycleway on the western side of the road will have the following impacts:

- Removal of kerbside parking (approx. 13 spaces – 80 m length of parking, 6 m per space in accordance with AS2890.5);
- Reduction of western footpath (verge) from approximately 4 m to 3.3 m (120 m length, 0.7 m width). Removal of small garden bed (verge) (approx. 7 m x 2 m);
- Kerb realignment of western side of road (120 m);
- Relocation of signage poles (5);
- Relocation of light poles (5).

Brisbane Street (Ebley Street to Birrell Street) – 250 m

The construction of a Bi-directional cycleway on the western side of the road will have the following impacts:

- Removal / Relocation of garden bed on northern side of Brisbane Street (verge) (approx. 4 m x 4 m);
- Removal of road verge on the western side of the road (250 m, 3 m wide);
- Kerb realignment of western side of road (250 m);
- Removal of large trees with potential heritage impacts (approx 25 trees, 1 every 10 m);
- Relocation of signage poles (7);
- Relocation of light/power poles (3).

An alternative option to minimise the removal of trees and kerb realignment is to provide a bicycle boulevard treatment along this section of the route as recommended in Barros van den Dool Active Transport's Charing Cross Cycle Route Feasibility Study (April 2020).

A bicycle boulevard is a low volume, low speed, local street that is typically traffic calmed with a cycling overlay. An example is shown in Figure 4-1.



Figure 4-1 Bicycle Boulevard Example

Source: Traffic and Road Use Management, Transport and Main Roads, July 2018

Birrell Street (Brisbane Street to Bourke Street) – 50 m

Construction of a bi-directional cycleway on the southern side of the road will have the following impacts:

- Re-marking / realignment of road lines (50 m);
- Removing the existing cycleway that is running along the northern side of the road (50 m).

Bourke Street (Birrell Street to Queens Park Road) – 400 m

Construction of a Bi-directional cycleway on the western side of the road will have the following impacts:

Re-marking / realignment of road lines (400 m);

- Removing the existing cycle way that is running along the Eastern side of the road (400 m);
- Adjustment of bus stops (3).

Depending on the location the cycleway, kerb realignment might be required to fit the new bi-directional cycleway within the existing road corridor, which means there will be the following impacts:

- Removal of road verge along the western side of the road (400 m, 0.6 m wide);
- Kerb realignment of the western side of the road (400 m);
- Re-marking / realignment of road lines (400 m);
- Removal of large trees (approx. 40 trees, 1 every 10 m);
- Removing the existing cycle way that is running along the eastern side of the road (400 m);

- Adjustment around a transformer (1);
- Relocation of signage poles (15);
- Relocation of light/power poles (7).
- Adjustment of bus stops (3).

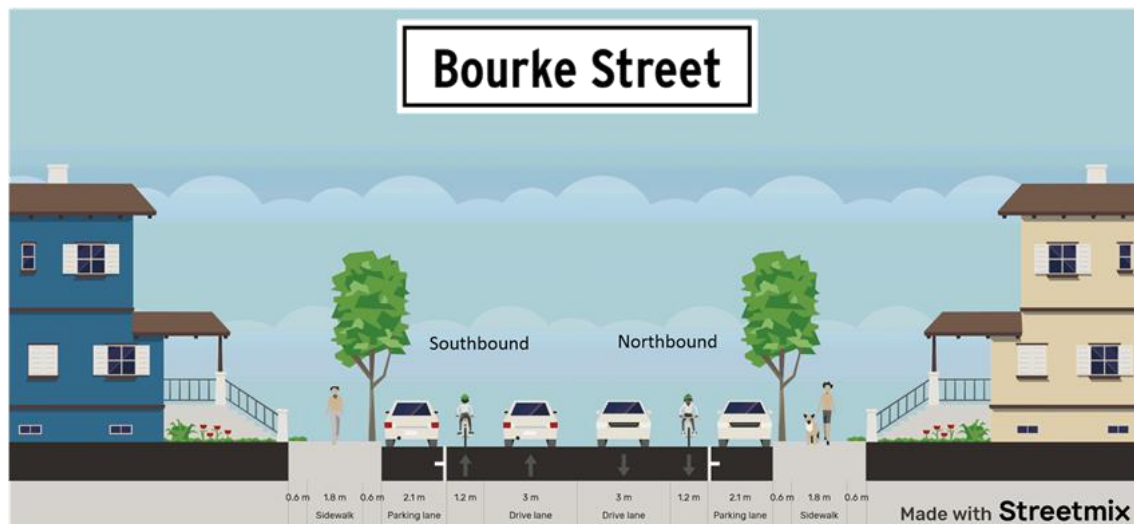


Figure 4-2 Cross Section of Existing Bourke Street (40 Bourke Street)

Source: Streetmix

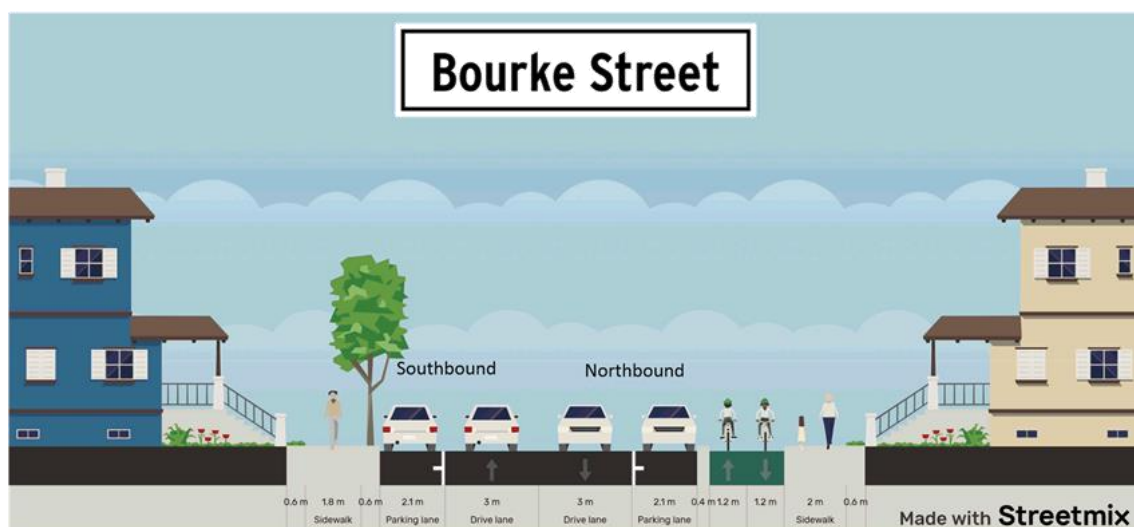


Figure 4-3 Cross Section of Proposed Bourke Street (40 Bourke Street)

Source: Streetmix

Queens Park Road (Bourke Street to Queens Park) – 160 m

Construction of a bi-directional cycleway on the southern side of the road will have the following impacts:

- Re-marking / realignment of road lines (160 m);
- Removing the existing cycle way that is running along the southern side of the road (160 m);

If there is insufficient space to relocate the existing on-road cycleway on the eastern side of the road to the western side, there will be the following impacts:

- Removal of kerbside parking along the southern side of the road (approx. 23 spaces – 140 m length of parking, 6 m per space);
- Re-marking / realignment of road lines (160 m);
- Removing the existing cycleway that is running along the northern side of the road (160 m).

Queens Park (Queens Park Road to Darley Road) – 580 m

The upgrade of the existing shared path within Queens Park to a bi-directional separated cycleway will have the following impacts:

- Construction of a new footpath alongside the existing shared path, with a grassed median separating the existing shared path, which will become the bi-directional cycleway, and the new footpath.

Darley Road (Queens Park to Market Street) – 220 m

Construction of a new bi-directional separated cycleway along the northern side of Darley Road is expected to proceed in the new financial year (2020/21).

4.1.2 Social and environmental impacts

The Social impacts associated with the construction activities discussed for Route 4 includes:

- Loss of parking along Bronte Road within the Bondi Junction commercial precinct, which might cause issues with business owners and the local community;
- Narrowing of the existing footpath within the Bondi Junction commercial precinct, which will limit and impact pedestrian movements along Bronte Road;
- Removal of large trees with potential heritage significance on Brisbane Street could cause issues with the community and local residents;
- Widening the road corridor in residential streets by realigning the kerb will cause losses of vegetation and trees along the full length of the route and reduce the green-scape in the area. The removal of large trees will reduce the shade along these routes.
- The planting of new trees and vegetation should be considered in the detailed design stage of the preferred route option to achieve a biodiversity offset and compensate for the loss of shade along the route.

4.2 Route 5

4.2.1 Construction impacts

Bronte Road (Spring Street to Ebley Street) – 120 m

Construction of a bi-directional cycleway on the western side of the road will have the following impacts:

- Removal of kerbside parking (approx. 13 spaces – 80 m length of parking, 6 m per space);
- Reduction of Western footpath (verge) from approximately 4 m to 3.3 m (120 m length, 0.7 m width). Removal of small garden bed (verge) (approx. 7 m x 2 m).

- Kerb realignment of Western side of road (120 m)
- Relocation of signage poles (5);
- Relocation of light poles (5);

Bronte Road (Ebley Street to Birrell Street) – 300 m

Construction of a bi-directional cycleway on the western side of the road will have the following impacts:

- Removal of kerbside parking along the western side of the road (approx. 33 spaces – 200 m length of parking, 6 m per space);
- Adjustment around bus stops (1);
- Removal of parking meters (3).

Bronte Road (Birrell Street to Carrington Road) – 490 m

Construction of a bi-directional cycleway on the western side of the road will have the following impacts:

- Reducing lane widths of kerbside parking lanes for both eastern and western sides of the road;
- Re-marking / realignment of road lines (490 m);
- Removal of road verge along the western side (390 m, 1.2 m wide);
- Reduction of footpath widths around school, police station and commercial areas (100 m);
- Kerb realignment along the Western side of the road (490 m);
- Relocation of signage poles (21);
- Relocation of light / power poles (16);
- Adjustment around bus stops (2);
- Removal of large trees (19);
- Adjustment around Telstra public telephone (1).

An alternative design approach can be considered to reduce impacts along the eastern side of the road by removing parking along the western side of the road.

The impacts associated with these works include:

- Removal of kerbside parking along the western side of the road (approx. 63 spaces – 380 m length of parking, 6 m per space);
- Adjustment around bus stops (2).

Bronte Road (Carrington Road to Albion Street) – 280 m

Construction of a bi-directional cycleway on the western side of the road will have the following impacts:

- Reducing footpath widths on both sides from 3.6 m to 2.5 m (1.1 m reduction of width on either side, 560 m total length);
- Relocation of signage poles (20);
- Relocation of light / power poles (19);

- Relocation of Telstra public telephone (1);
- Adjustment around bus stops (2);
- Reducing the lane width for kerbside parking on both sides from 3.3 m to 2.1 m (560 m length);
- Re-marking / realignment of road lines (280 m).

An alternative design approach can be considered to reduce impacts along the Eastern side of the road by removing parking along the Western side of the road.

The impacts associated with this option is as follows:

- Removal of kerbside parking on the western side (approx 33 spaces – 200 m length of parking, 5.4 m per space);
- Adjustment around bus stops (1).

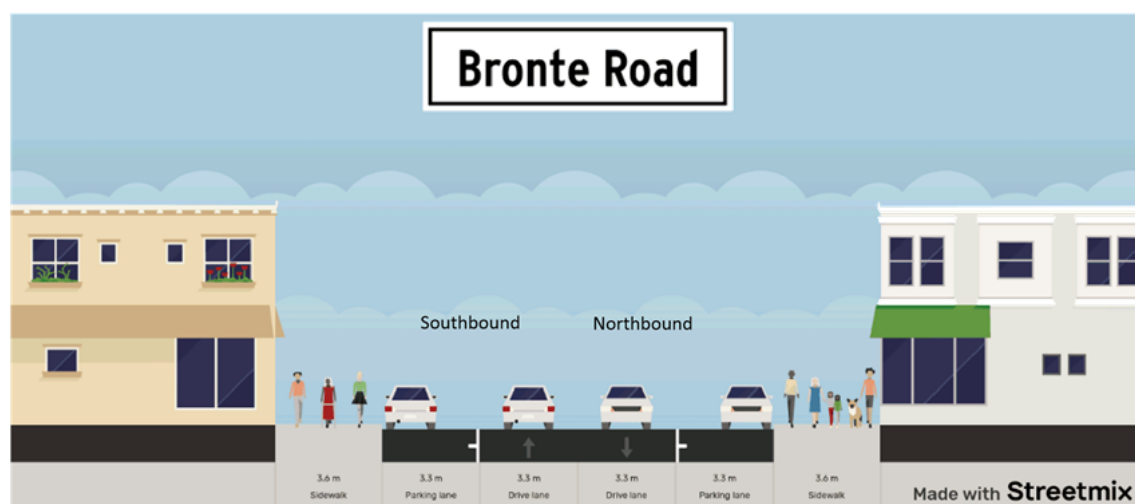


Figure 4-4 Cross Section of Existing Bronte Road (239 Bronte Road)

Source: Streetmix

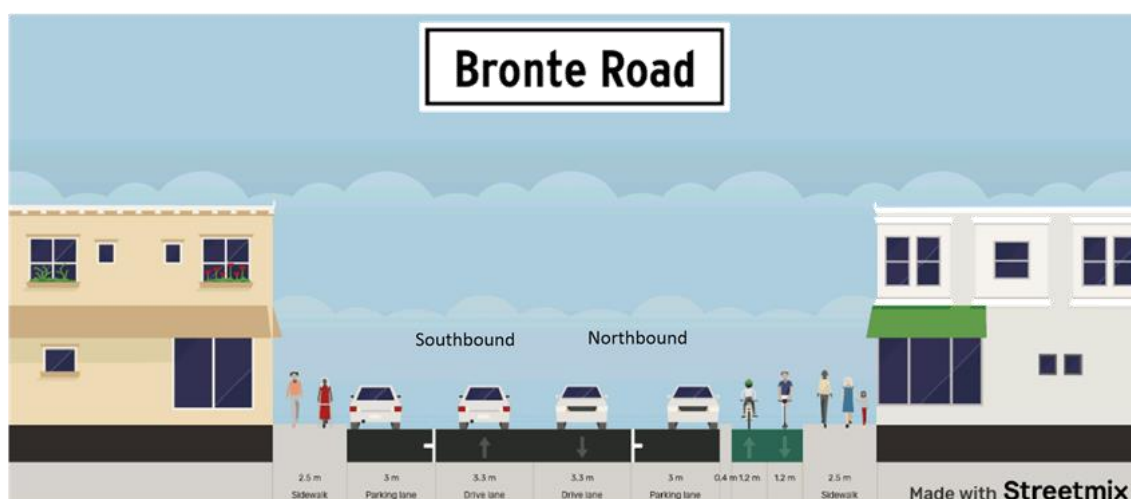


Figure 4-5 Cross Section of Proposed Bronte Road (239 Bronte Road)

Source: Streetmix

Albion Street (Bronte Road to Pine Street) – 320 m

Construction of a bi-directional cycleway on the western side of the road will have the following impacts:

- Reducing lane width of kerbside parking lane (approx. 100 m length) on both eastern and western sides of the road, removing kerbside parking on the western side of the road between Bronte Road and Santa Marina Avenue (approx. 13 spaces – 80 m length of parking, 6 m per space);
- Reducing lane widths of kerbside parking lanes of both sides of the road between Santa Marina Avenue and Pine Street (approx. 400 m total length);
- Removal of verge on the Western side of the road between Santa Marina Avenue and Pine Street (approx. 200 m, 1.5 m wide);
- Kerb realignment along western side of the road (220 m);
- Re-marking / realignment of road lines (320 m);
- Relocation of signage poles (12);
- Relocation of light / power poles (5);
- Adjustments around bus stops (2);
- Removal of large trees (18).



Figure 4-6 Cross Section of Existing Albion Street (26 Albion Street)

Source: Streetmix



Figure 4-7 Cross Section of Proposed Albion Street (26 Albion Street)

Source: Streetmix

4.2.2 Social and environmental impacts

The Social impacts associated with the construction activities discussed for route Option 4 includes:

- Loss of parking along Bronte Road , which might cause issues with business owners and the local residents;
- Narrowing of the existing footpath within the Bondi Junction commercial precinct, which will impact pedestrian movement along Bronte Road;
- Narrowing of the existing footpaths through Charing Cross on both sides of the road. Footpath widths to be reduced to only 2.7 m, which will increase the road corridor width through the precinct and have a significant impact on commercial visitors and pedestrians;

- Removal of large trees will reduce the amount of shade along routes. Planting of new trees should be considered in the detailed design of the preferred route option;
- An alternative to narrowing the footpaths would be to remove parking along the eastern side of the Bronte Road through Charing Cross. This is unlikely to get approved by the community and business owners along Bronte Road, as it will have a significant impact on their daily customers and deliveries.

4.3 Route 7

4.3.1 Construction impacts

Bronte Road (Spring Street to Ebley Street) – 120 m

Construction of a bi-directional cycleway on the western side of the road will have the following impacts:

- Removal of kerbside parking (approx. 13 spaces – 80 m length of parking, 6 m per space);
- Reduction of western footpath (verge) from approximately 4 m to 3.3 m (120 m length, 0.7m width). Removal of small garden bed (verge) (approx. 7 m x 2 m);
- Kerb realignment of western side of road (120 m);
- Relocation of signage poles (5);
- Relocation of light poles (5).

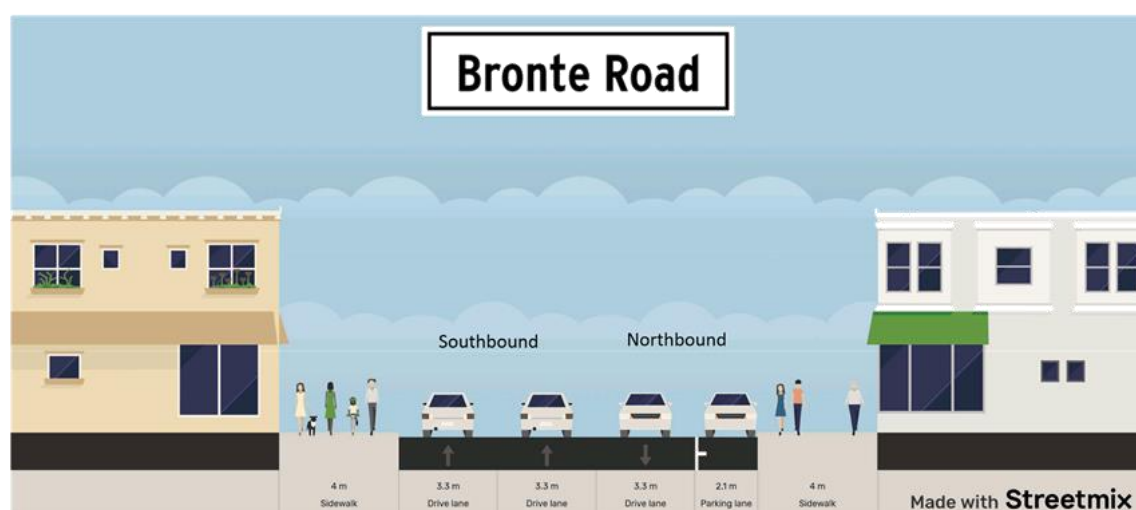


Figure 4-8 Cross Section of Existing Bronte Road (16 Bronte Road)

Source: Streetmix

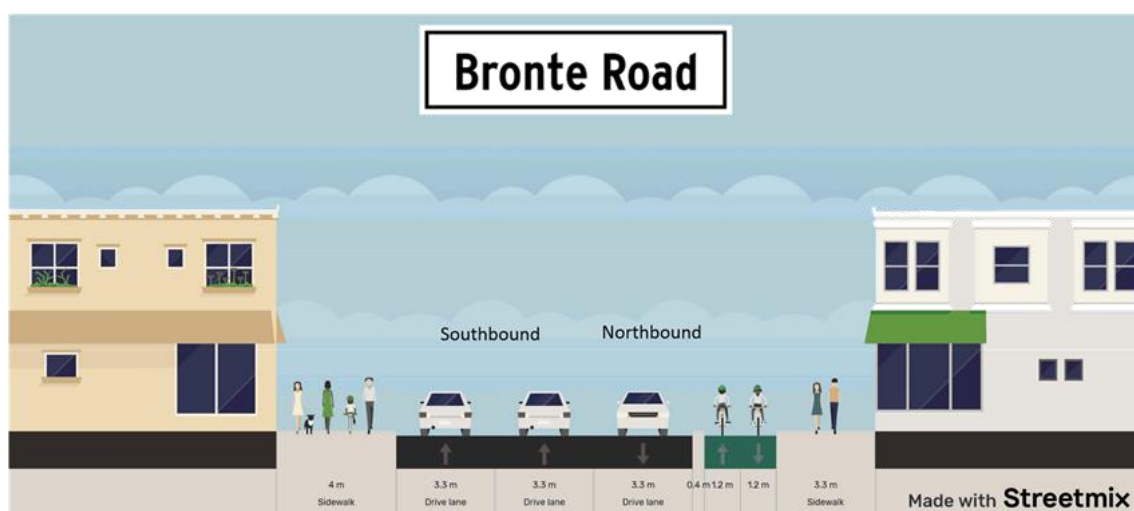


Figure 4-9 Cross Section of Proposed Bronte Road (16 Bronte Road)

Source: Streetmix

Bronte Road (Ebley Street to Birrell Street) – 300 m

Construction of a bi-directional cycleway on the western side of the road will have the following impacts:

- Removal of kerbside parking along the western side of the road (approx. 33 spaces – 200 m length of parking, 6 m per space);
- Adjustment around bus stops (1);
- Removal of parking meters (3).

Bronte Road (Birrell Street to Carrington Road) – 490 m

Construction of a bi-directional cycleway on the western side of the road will have the following impacts:

- Reducing lane widths of kerbside parking lanes for both eastern and western sides of the road;
- Re-marking / realignment of road lines (490 m);
- Removal of road verge along the western side (390 m, 1.2 m wide);
- Reduction of footpath widths around school zone, police station and commercial areas (100 m);
- Kerb realignment along western side of road (490 m);
- Relocation of signage poles (21);
- Relocation of light / power poles (16);
- Adjustment around bus stops (2);
- Removal of large trees (19);
- Relocation around Telstra public telephone (1).

An alternative design approach can be considered to reduce impacts along the Eastern side of the road by removing parking along the Western side of the road. The impacts associated with this option is as follows:

- Removal of kerbside parking along the western side of the road (approx. 63 spaces – 380 m length of parking, 6 m per space);
- Adjustment around bus stops (2).

Carrington Road (Bronte Road to Darley Road) – 420 m

Construction of a bi-directional cycleway on the western side of the road and along the eastern side of Queens Park (within Queens Park) will have the following impacts:

- Removal of road verge / wide footpaths along both eastern and western sides (220 m, 0.9 m wide on the western side and 1.9 m wide on the eastern side);
- Kerb realignment along both eastern and western sides (440 m);
- Re-marking / realignment of road lines (220 m);
- Construction of new bi-directional cycleway within Queens Park (200 m);
- Relocation around Telstra public telephone (1);
- Adjustment around bus stops (2);
- Relocation of signage poles (14);
- Relocation of light / power poles (20);
- Removal of large trees (14).

If construction within Queens Park is not possible, or not favoured, the cycleway can continue alongside the road with the following impacts:

- Removal of road verge / wide footpaths along both eastern and western sides (420 m, 0.9 m wide on the western side and 1.9 m wide on the eastern side);
- Kerb realignment along both eastern and western sides (840 m)
- Re-marking / realignment of road lines (420 m);
- Relocation around Telstra public telephone (1);
- Adjustment around bus stops (3);
- Relocation of signage poles (14);
- Relocation of light / power poles (20);
- Removal of large trees (14).

Another alternative design approach can be considered to reduce impacts along the Eastern side of the road by removing parking along the western side of the road. The impacts associated with this option is as follows:

- Removal of kerbside parking / lane (approx. 37 spaces – 220 m length of parking, 6 m per space);
- Adjustment around bus stops (2).

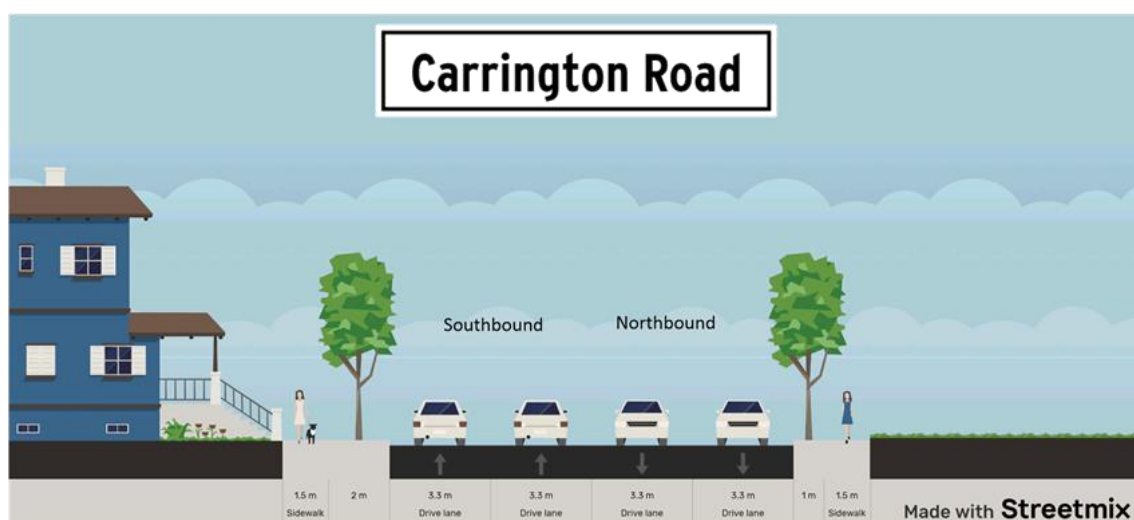


Figure 4-10 Cross Section of Existing Carrington Road (134 Carrington Road)

Source: Streetmix

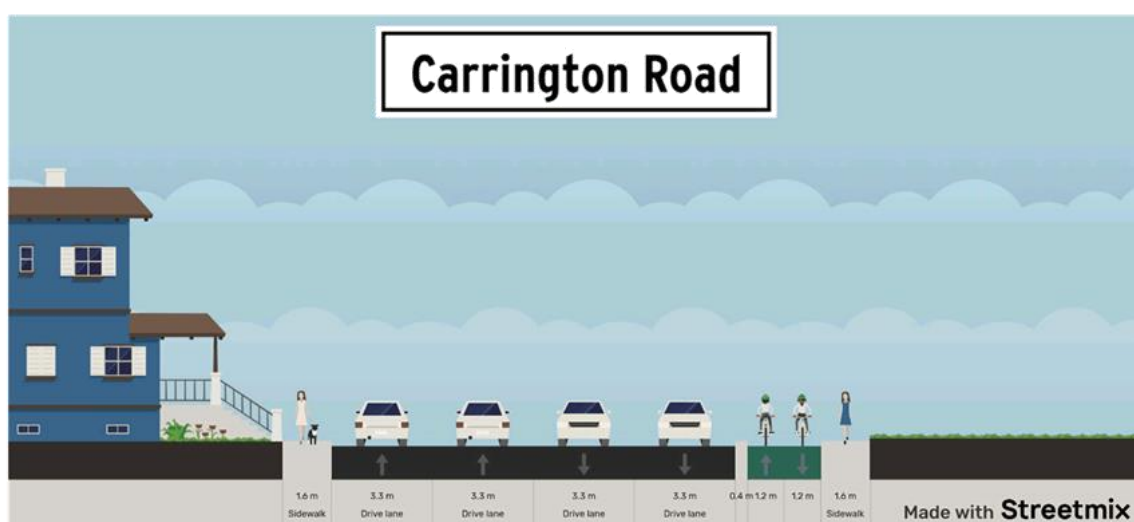


Figure 4-11 Cross Section of Proposed Carrington Road (134 Carrington Road)

Source: Streetmix

4.3.2 Social and environmental impacts

The Social impacts associated with the construction activities discussed for route Option 4 includes:

- Loss of parking along Bronte Road , which might cause issues with business owners and the local residents;
- Narrowing of the existing footpath within the Bondi Junction commercial precinct, which will impact pedestrian movement along Bronte Road;
- Widening the Road corridor along the highly trafficked Carrington Road will result in the loss of vegetated verges and trees, which might not be accepted by local residents;

- Removal of large trees will reduce the amount of shade along routes. Planting of new trees should be considered in the detailed design of the preferred route option.

5. Route Options Comparison

A summary of impacts for each of the different routes is provided in Table 1 and Table 2 below.

Table 1 summarises Option A for each route, which allows for the minimum amount of parking spaces to be removed to construct a bi-directional separated cycleway. This option prefers realignment of the kerb and the relocation of services over the removal of parking spaces.

Table 1 Impact Comparison between Routes – Option A

Impacts	Route 4	Route 5	Route 7
Option	A	A	A
Length of route (m)	1780	1510	1330
Removal of parking spaces (No.)	13	97	50
Removal of large trees (No.)	25	89	33
Kerb realignment (m)	370	1990	1050
Removal of verge (m ²)	864	1542	1242
Relocation of light/power poles (No.)	6	71	67
Relocation of signage poles (No.)	12	77	40
Adjustments around bus stops (No.)	3	11	5
Realignment of road (m)	610	1370	710
Telstra phone / transformer (No.)	0	2	2
Removal of parking meters (No.)	0	3	3

Table 2 considers Option B for each route, where the removal of parking spaces are preferred over kerb realignment. The removal of parking spaces would reduce the length of kerb realignment required and reduce the losses of trees and verge planting, realignment of electrical / light poles and signage.

Table 2 Impact Comparison between Routes – Option B

Impacts	Route 4	Route 5	Route 7
Option	B	B	B
Length of route (m)	1780	1510	1330
Removal of parking spaces (No.)	13	193	150
Removal of large trees (No.)	25	70	0
Kerb realignment (m)	120	940	740
Removal of verge (m ²)	98	398	98
Relocation of light/power poles (No.)	3	36	31
Relocation of signage poles (No.)	5	36	5
Adjustments around bus stops (No.)	3	10	5
Realignment of road (m)	450	880	310
Telstra phone / transformer (No.)	0	0	1
Removal of parking meters (No.)	0	3	3

6. Cost Benefit Analysis

As part of the assessment, a cost benefit analysis was undertaken using indicative construction costs from Rawlinson's Construction Handbook 2020. The cost benefit analysis compares each option using the following criteria:

- Indicative construction costs for each of the criteria identified in Section 5, as summarised in Table 3, with a cost per meter (\$/m) valuation for each cycleway;
- Identifying the social impacts, advantages and disadvantages of each route as summarised in Table 7.

Please note that the construction costs discussed in this section of the report is indicative only and may vary from the actual construction costs.

Costs have only been provided for the items listed in Table 3. High level items that have been excluded from the analysis and therefore costing are as follows (but not limited to):

- Relocation of subsurface services (e.g. stormwater, sewer, gas etc.);
- Application fees / approval fees (e.g. road permits, ASP3, RMS, etc);
- Planting of trees or vegetation;
- Contractor's preliminaries, establishment costs, etc.

Table 3 Itemised Costs

Item	Indicative Cost	Unit
Removal of parking spaces	\$12	Per space
Removal of trees	\$1,200	No.
Kerb realignment	\$90	Per m
Removal of verge	\$80	Per m ²
Relocation of power poles	\$10,000	No.
Relocation of signage poles	\$2,000	No.
Adjustments around bus stops	\$10,000	No.
Realignment of road	\$6	Per m
Public phone / Transformer impacts	\$20,000	No.
Removal of parking meters	\$5,000	No.
Dedicated cycleway, incl. 50 mm thick AC7, 150 mm thick DGB20 base course and subgrade compaction	\$100	Per m ²
Median strip 0.4 m wide and 0.15 m high	\$120	Per m

The costs associated with Option A for each route are shown in Table 4.

Table 4 Option A Indicative Costs

Impacts	Route 4	Route 5	Route 7
Removal of parking spaces	\$156	\$1,164	\$600
Removal of large trees	\$30,000	\$106,800	\$39,600
Kerb realignment	\$33,300	\$179,100	\$94,500
Removal of verge	\$69,120	\$123,360	\$99,360
Relocation of light/power poles	\$60,000	\$710,000	\$670,000
Relocation of signage poles	\$24,000	\$154,000	\$80,000
Adjustments around bus stops	\$30,000	\$110,000	\$50,000
Realignment of road using line marking	\$ 3,660	\$8,220	\$4,260
Telstra phone / transformer	\$-	\$40,000	\$40,000
Removal of parking meters	\$-	\$15,000	\$15,000
Dedicated cycleway	\$ 87,360.00	\$ 84,560.00	\$74,480.00
Concrete median	\$ 117,600.00	\$181,200.00	\$159,600.00
Total	\$455,196	\$1,713,404	\$1,327,400
\$/m	\$256	\$1,135	\$998

The costs associated with Option B for each route are shown in Table 5.

Table 5 Option B Indicative Costs

Impacts	Route 4	Route 5	Route 7
Removal of parking spaces	\$156	\$2,316	\$1,800
Removal of large trees	\$30,000	\$84,000	\$-
Kerb realignment	\$10,800	\$84,600	\$66,600
Removal of verge	\$7,840	\$31,840	\$7,840
Relocation of light/power poles	\$30,000	\$360,000	\$310,000
Relocation of signage poles	\$10,000	\$72,000	\$10,000
Adjustments around bus stops	\$30,000	\$100,000	\$50,000
Realignment of road	\$2,700	\$5,280	\$1,860
Telstra phone / transformer	\$432	\$-	\$20,000
Removal of parking meters	\$-	\$15,000	\$15,000
Dedicated cycleway	\$87,360.00	\$84,560.00	\$74,480.00
Concrete median	\$117,600.00	\$181,200.00	\$159,600.00
Total	\$326,456	\$1,020,796	\$717,180
\$/m	\$183	\$676	\$539

A summary of each route and the per meter cost for each option is provided in Table 6.

Table 6 Summary of Costs

Route	4	5	7
Option	\$/m		
Option A	\$256	\$1,135	\$998
Option B	\$183	\$676	\$539

A monetary value cannot be placed on some costs or benefits, therefore the advantages and disadvantages of each route are listed in Table 7.

Table 7 Advantages and Disadvantages of Each Route

	Route 4	Route 5	Route 7
Advantages	<p>Connects with the proposed Darley Road cycleway.</p> <p>Utilises Queens Park, reduces impacts on parking, and roads.</p> <p>Lowest \$/m cost for both Option A and Option B.</p> <p>Only a small section of commercial land use.</p> <p>Is an existing priority route (Bondi Junction to UNSW)</p>	<p>Based on STRAVA data, a large volume of cyclists use this route currently.</p> <p>Provides connections to existing cycleway infrastructure in the area, as well as the commercial precincts.</p>	<p>Shortest length</p> <p>Utilises western edge of Queens Park, which reduces impacts on parking and roads.</p> <p>Connects with the proposed Darley Road cycleway and multiple other cycleways in the area.</p> <p>Connects to the commercial precincts in Charing Cross and Randwick.</p> <p>Based on Strava data, a large volume of cyclists use this route currently.</p>
Disadvantages	<p>Whilst the option has the least amount of tree removal (Option A), a significant portion of the trees are large (especially along Brisbane Street). Removal of these trees will significantly impact the streetscape and visual character of the street.</p> <p>Based on STRAVA data, lower volume of cyclists use this route currently.</p> <p>Does not provide connections to local commercial precincts such as Charing Cross.</p>	<p>Longest length</p> <p>Highest \$/m cost for both Option A and Option B</p> <p>Space constraints and constructability issues through Charing Cross.</p> <p>Large stretches of commercial land use and shop fronts along Bronte Road.</p>	<p>Large stretches of commercial land use and shop fronts along Bronte Road.</p> <p>Requires the realignment of large sections of Carrington Road.</p>

7. Conclusion / Recommendation

From the findings presented in Sections 2, 5 and 6, an assessment has been undertaken on the current usage, connectivity potential, construction costs and social impacts of each route. The report assessed two options for each of the three route options. Option A, which prioritised the realignment of existing kerbs and gutters to accommodate the new bi-directional cycleway, and Option B, which prioritised the removal of parking to accommodate the new bi-directional cycleway and reduce construction costs. Option A is preferred for this assessment due to the large number of parking losses associated with Option B and the multiple social impacts related with parking losses in residential and commercial areas.

Each route has been ranked with 1 being the preferred option and 3 being the least preferred option. The following ranking and conclusions have been reached:

Route 5 – Rank 3

- Route 5 runs along Bronte Road through Charing Cross Village and provide connections to existing cycleway infrastructure in the area, as well as links to the commercial precincts in Charing Cross. There are significant social and construction impacts on the residents and business owners along this route.
- STRAVA data shows that this route is a popular cycling route for local cyclists, and therefore there will be a benefit from constructing a new bi-directional separated cycleway.
- The proposed cycleway will require significant amounts of kerb realignment and existing footpaths will need to be narrowed by approximately 1.1m on each side of the road through the Charing Cross Village. This would have significant social and economic impacts on business owners and commercial visitors.

Route 4 – Rank 2

- Route 4 is the most cost-effective route as it utilises sections of existing cycling infrastructure (Queens Park and the proposed Darley Road cycleway) and contains existing on-road cycleways for large sections of the route. The sections that contain existing on-road cycleways require less kerb re-alignment to convert the existing on-road cycleway to bi-directional separated cycleways, which is the reason Route 4 is cheaper than Routes 5 and 7.
- Route 4 provides connections to multiple existing cycleways, but does not connect to any of the commercial precincts in the area. Based on the STRAVA information discussed in Section 2 of this report, the existing on-road cycleways along Route 4 aren't used frequently, with cyclists preferring to cycle on Bronte Road and Carrington Road, even though neither of these roads have any existing cycleway infrastructure in place.
- The removal of large, potentially heritage listed, trees and long sections of streetscape will be the main social impact for this route.

Route 7 – Rank 1

- Routes 5 and 7 are very similar in alignment with the main difference being the alignments of the routes around Charing Cross Village. Route 5 runs along Bronte Road through Charing Cross Village, where Route 7 runs directly south from Bronte Road along Carrington Road. Both of these routes provide connections to existing cycleway infrastructure in the area, as well as links to the commercial precincts in Charing Cross.

- Route 7 is less expensive than Route 5, and only requires realignment of a 200 m section of kerb between Bronte Road and John Street to accommodate the new bi-directional cycleway. From John Street, the cycleway will run within Queens Park to where it will connect to the proposed new separated cycleway along Darley Road.
- Route 7 will have less social impacts than Route 5, as minimal trees will be removed between Bronte Road and John Street. Route 7 also avoids Charing Cross Village, which means it avoids significant social and construction impacts on the residents and business owners.
- STRAVA data shows that this route is a popular cycling route for local cyclists, and therefore there will be a benefit from constructing a new bi-directional separated cycleway.

Whilst all Routes may require removal of trees during the construction stage, there is potential to plant new trees and vegetation along the routes after construction. GHD recommends further investigation into planting during the detailed design stage to achieve a biodiversity offset.

Based on these conclusions, GHD recommends Route 7 (Option A) to be considered for a future cycleway between Bondi Junction and Randwick Junction. Whilst Option 4 is the cheapest solution, STRAVA information suggests Routes 5 and 7 would be best suited for a bi-directional cycleway due to the large number of existing cyclists currently using these routes.

Route Option 7 will be subject to TfNSW's approval as Carrington Road is a state-owned road, therefore GHD recommends Route 4 (Option A) as an alternative route if Route 7 is not approved.

Due to the impacts a bi-directional cycleway might have on the already heavily trafficked Charing Cross Village, GHD recommends avoiding the Village centre to minimise impacts on local businesses and commercial visitors, and therefore does not consider Route 5 as a feasible option.

Appendices

Appendix A – Cycle Route Feasibility Report



Charing Cross Cycle Route Feasibility Study

Waverley Council

April 2020

This report was prepared by

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2.0	25Mar20	Revised draft for client comment	various
3.0	20Apr20	Final report	various
4.0	28Apr20	Final report – revised	pp20, 44, 49, 53



Glossary

Bicycle Boulevard – low volume, low speed local street, typically traffic calmed with a cycling overlay to allow for way-finding, bicycle priority at intersections, filtered permeability, etc.

Bicycle Path – length of path for the exclusive use of bicycle riders beginning at a 'Bicycle Path' sign or bicycle path line marking, and ends at the nearest of (a) an 'End Bicycle Path' sign or end bicycle path linemarking; (b) a 'Separated Path' sign or separated path linemarking; (c) a road (except a road-related area); or (d) the end of the path.

Cycleway – generic term used to describe a bicycle route, bicycle lane, bicycle path or that part of a separated path used by riders.

Cycleway, Bi-Directional – an exclusive bicycle path on one side of the road related area designed for two-way bicycle traffic.

Cycleway, Uni-Directional – a pair of exclusive bicycle paths in the road related area designed for one-way bicycle traffic, one on each side of the road.

QTMR – Queensland Department of Transport and Main Roads.

Randwick – Randwick City Council, the Randwick City Council local government area.

RMS – NSW Roads and Maritime Services.

Separated Path – length of path where an exclusive bicycle path is laid adjoining a footpath. The separation may be visual (painted line) or physical (dividing strip or raised median). The facility begins at a separated path sign or separated path linemarking, and ends at the nearest of (a) an 'End Separated Path' sign or the end of the separated path linemarking; (b) a 'Bicycle Path' sign or bicycle path linemarking; (c) a 'No Bicycles' sign or no bicycles road marking; (d) a road (except a road-related area); or (e) the end of the path.

Shared Path – area open to the public (except a separated path) that is designated for use by both bicycle riders and pedestrians. The shared path begins at a 'Shared Path' sign and ends at the nearest of (a) an 'End Shared Path' sign; (b) a 'No Bicycles' sign or no bicycles road marking; (c) a 'Bicycle Path' sign; (d) a road (except a road-related area); or (e) the end of the path.

TfNSW – Transport for NSW.

Waverley – Waverley Council, the Waverley Council local government area.

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1 Introduction

Waverley Council is committed to improving cyclist safety and amenity. In accordance with Waverley's Transport Plan: People, Movement and Places 2017 (Waverley, 2017.1), as well as Bondi Junction Complete Streets (Waverley, 2013.2) and the Waverley Bike Plan 2013 (Waverley, 2013.1), Waverley Council is seeking to improve the number and proportion of trips made by cycling so as to reduce traffic congestion, parking pressure and greenhouse gas emissions generated in Waverley while improving the health and amenity of our area. Several streetscape improvements are currently underway, with the next focus on Bronte Road.

Transport for New South Wales (TfNSW) have released the Principal Bicycle Network draft map which identified Bronte Road as a Tier 1 separated cycleway linking Bondi Junction and Randwick strategic centres (Waverley, 2020.1). The business cases are not currently available.

Waverley Council engaged Barros van den Dool Active Transport Pty Ltd to independently identify and comparatively assess all the options for a separated cycleway linking Bondi Junction and Randwick so that these options can be discussed with key stakeholders and inform the design of the Bronte Road streetscape projects.

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Figure 1.1 – Waverley Bike Plan and the TfNSW Principal Bicycle Network





2 Study Area and Route Options

In this section the following issues are discussed and evaluated:

- Analysis of the study area including the identification of barriers and constraints
- Identification of preliminary routes for consideration
- Description of each route.

2.1 Analysis of the Study Area

Figure 2.1 shows the study area covering a section of the Bondi Junction commercial and residential area to the east and west of the main desire line linking the end points of existing cycle route facilities: at the northern end, the intersection of Bronte Road and Spring Street; and, at the southern end, the intersection of Avoca Street and Frenchmans Road, Randwick. It is recognised that the latter falls outside the Waverley local government area and it is used only as a reasonable, common end point for the routes under investigation. Limited research on the routes has been carried outside the Waverley local government area.

Seven possible route options were investigated as shown in Figure 2.2. All routes were walked or cycled to investigate existing conditions such as land-use, traffic, parking, bus operations, etc.

The western-most route options through the area are York Road, Denison Street and Newland Street. West of these routes lies Centennial Park with its own, albeit restricted, cycling access opportunities. Further west is the City of Sydney.

The eastern-most route options follow Carrington Road and a route through Waverley Park / Henrietta Street. Any possible route alignment options further east are deemed not to adequately serve the desire line from Bondi Junction to Randwick Junction.

The two central route options follow Bronte Road / Albion Street, and Brisbane Street / Bourke Street / Queens Park.

There is a blended route which follows Bronte Road north of Charing Cross and Carrington Road south thereof.

The main desire line of the proposed Bondi Junction Cycleway, shown in Figure 2.1 by the orange double-headed arrow line, roughly follows the route via Brisbane Street, Bourke Street and Queens Park.

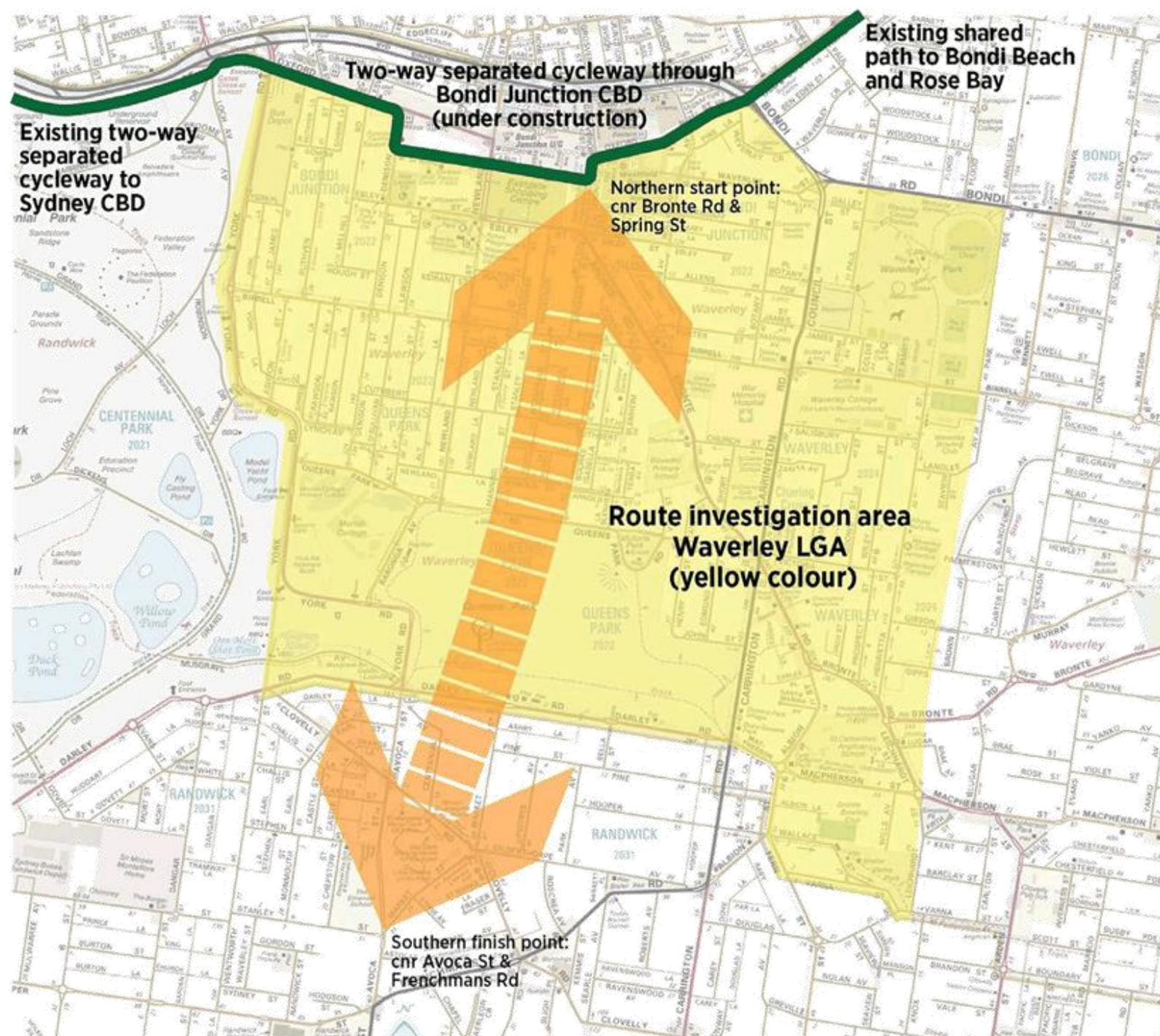
Even though other north-south routes are possible through the study area, these are affected by the arrangement of urban development blocks. All would require circuitous alignment of the routes, which adds costs and legibility complications without offering appreciable benefits.

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The topography of the area is a major factor to be considered. While the Bronte Road and Carrington Road route options generally follow the ridge line and with modest grades, all other routes involve a significant loss of height and some steep climbs back onto the ridge-line.

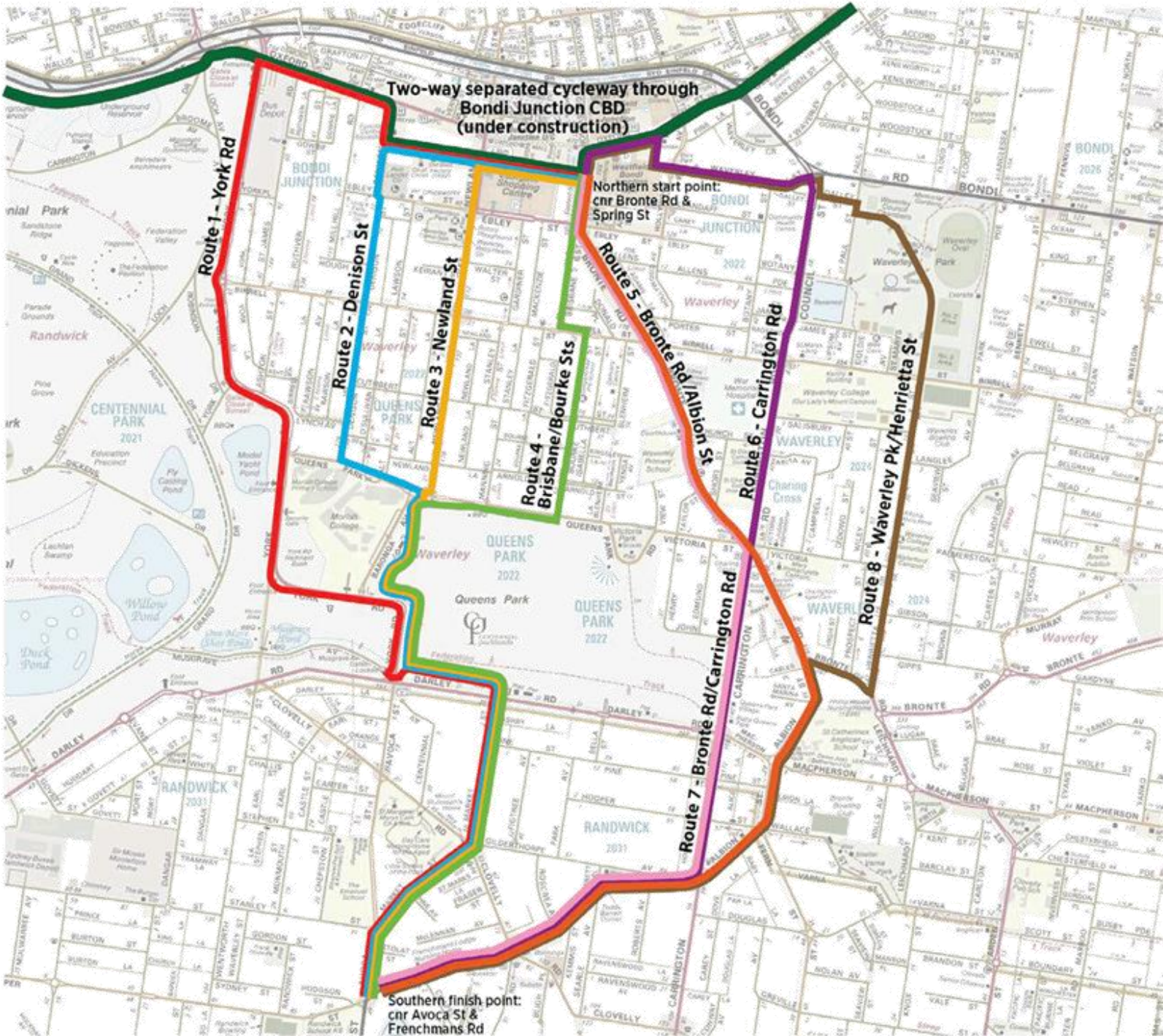
Figure 2.1 – Study area



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Figure 2.2 – Route options identified for preliminary assessment





2.2 Route Options

The route options identified for preliminary assessment following an analysis of the study area are shown in Figure 2.2 and include:

1. Oxford Street/Spring Street Separated Cycleway¹, **York Road**, Randwick streets
2. Oxford Street/Spring Street Separated Cycleway¹, **Denison Street**, Queens Park Road, Queens Park Shared Path, Randwick streets
3. Oxford Street/Spring Street Separated Cycleway¹, **Newland Street**, Queens Park Shared Path, Randwick streets
4. Bronte Road, **Brisbane Street**, **Bourke Street**, Queens Park Shared Path, Randwick streets
5. **Bronte Road**, Albion Street, other Randwick streets
6. Oxford Street/Spring Street Separated Cycleway¹, Waverley Street, Council Street, **Carrington Road**, other Randwick streets
7. **Bronte Road**, **Carrington Road**, other Randwick streets
8. Oxford Street/Spring Street Separated Cycleway¹, Waverley Street, Dalley Street, **Waverley Park** Shared Path, Henrietta Street, Bronte Road, Albion Street, other Randwick streets.

Routes 4 and 8 are identified as priority routes in the Waverley Bike Plan 2013, as well as Tier 2 routes in the TfNSW Principal Bicycle Network. It is noted that the Council plan identifies Route 4 as "Bondi Junction to UNSW". Both Routes are substantially complete, albeit not necessarily to the standard specified for the current investigations.

Route 5 is also included in the TfNSW Principal Bicycle Network and is identified as a Tier 1 route. Council has carried out some investigations for the section from Ebley Street to Birrell Street, while there is a streetscape project currently under way for the Charing Cross precinct.

The other routes have not previously been investigated.

¹ Under construction.

2.3 Route 1 – York Road

Figure 2.3 – York Road, north of Birrell Street



York Road is part of the RMS regional road network and carries substantial peak period traffic from New South Head Road at Edgecliff to Anzac Parade at Maroubra Junction (RMS, 2017). It generally provides one lane in each direction with turning lanes at select locations. There are a few traffic management devices to manage speeds, turning movements, safety and pedestrian crossings. The speed limit is 50km/h.

Much of York Road is used for bus access to the bus depot on Oxford Street, although no actual bus services are provided along the route.

On the western side of the road, there are a number of pedestrian gates for access into Centennial Park, although not all are supported by sealed paths within the Park.

There is a sealed footpath on the eastern side of the road starting from just south of Queens Park Road to Oxford Street. On the western side of the road, the sealed footpath is limited to the section from the York Road Gates to just south of Queens Park Road, as well as a short section near Oxford Street, the remainder being an unsealed verge. The western verge is generally in excess of 3.5m wide.

There are traffic signals at the intersection of York Road, Avoca Street and Darley Road, with marked foot crossing on all four approaches.

There is parking on both sides of the road, much of it being unrestricted and well used.

Centennial Park borders the entire western side of the York Road. The Waverley bus depot is located at southeastern side of the York Road / Oxford Street intersection with a key access point off York Road. Moriah College occupies the block southeast of the York Road / Queens Park Road intersection. Southeast of Moriah College is Queens Park. The remainder of the eastern side of the road is residential.

For the purposes of this assessment, it is assumed that an exclusive cycle path will be constructed for the full length of York Road on the western verge. There is a substantial narrowing of the verge in the curve east of Baronga Avenue, which requires detailed planning and design attention.

2.4 Route 2 – Denison Street

Figure 2.4 – Denison Street at Ebley Street



Denison Street is a local street under the care and control of Waverley Council. It is generally a 12.8m wide road in a 20m road reserve. The speed limit is 50km/h with plans by Council for a future 40km/h zone (Waverley, 2019.1), possibly with some supplementary traffic calming. Much of the parking along Denison Street is restricted, with some permit holder exemptions.

North of Ebley Street it has some traffic function and provides one traffic lane each direction with parallel parking on both sides. At the time of writing this report, this section was affected by road and building works. Land-use is mixed commercial and residential.

South of Ebley Street, the route is less trafficked and has some existing traffic management devices to control speeds. There are sections of 90° degree angle parking. Land-use is residential.

At its southern end, the route turns east along Queens Park Road and then joins the existing Shared Path along the western perimeter of Queens Park to Darley Road. Regular sporting events generate significant pedestrian movement along and across the path. The Queens Park section is common with Routes 3 and 4.

For the purposes of this assessment, it is assumed that there will be a mix of facilities, including:

- Continuation of the Oxford Street / Spring Street separated cycleway from Spring Street to Ebley Street, on the western side
- Bicycle Boulevard treatment south of Ebley Street
- Bi-directional separated cycleway along Queens Park Road
- Use of existing Shared Paths through Queens Park.

Detailed planning and design attention is required at key transition points and crossing locations such as Ebley Street, Birrell Street and Queens Park Road / Baronga Avenue. Some may require traffic signals. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path.

2.5 Route 3 – Newland Street

Figure 2.5 – Newland Street, eastern verge

Newland Street is a local street under the care and control of Waverley Council. It functions as a key access route to Bondi Junction and carries a substantial amount of peak period traffic. It operates in a complicated environment and features three different cross sections:

- Spring Street to Ebley Street – the traditional 20m road reserve appears to have been widened in the past to 21m allowing for 5 traffic/ turning/ parking lanes with a narrow footpath on the eastern verge. Traffic is heavy with significant turning movements at intersections. There is a carpark access at the Eastgate Shopping Centre. Buses service this section. Land-use is commercial.
- Ebley Street to Birrell Street – traditional 12.8m road in a 20m corridor with 4 traffic / parking lanes. Buses service this section. Land-use is mixed.
- South of Birrell Street – while the 20m corridor continues, the road is narrowed to about 8m with one parking lane (west side) and two traffic lanes. There is traffic calming to control speeds. There are no bus services. The verges are wide and feature a heavy tree canopy as well as lighting/ power poles. Most trees are mature. Some are figs with wide trunks and surface roots extending from the kerb to the footpath, with several squeeze points leaving room for no more than a 1.2m footpath, particularly along the western verge. Land-use is residential.



At its southern end the route joins the existing Shared Path through Queens Park, which is has in common with Routes 2 and 4.

For the purposes of this assessment, it is assumed there will be a mix of facilities:

- Bi-directional cycleway on the western side from Spring Street to Birrell Street
- South of Birrell Street, uni-directional cycleways on both sides, in addition to the existing footpaths
- Existing Shared Path through Queens Park.

It is noted that some of these facilities may not be achievable and/ or desirable. Transitions and crossings require detailed planning and design attention, eg Birrell Street and Queens Park Road. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path.

2.6 Route 4 – Brisbane & Bourke Streets

Figure 2.6 – Brisbane Street, south of Ebley Street



The Brisbane & Bourke Streets route commences at the northern end of Bronte Road, from Spring Street to Ebley Street, which it shares with Route 5.

While Bronte Road is classified as a main road, it is designated as a regional road for administrative purposes and falls under the care and control of Waverley Council. Bronte Road carries significant traffic volumes, bus traffic and service vehicles. Land-use is commercial.

At Ebley Street, the route enters the Brisbane/Bourke Streets corridor, which are local streets under the care and control of Waverley Council. Land-use is residential. The speed

limit is 50km/h with plans by Council for a future 40km/h zone, possibly with some supplementary traffic calming.

Brisbane Street forms a cul-de-sac at Ebley Street and only carries minimal local traffic. Bourke Street carries slightly more traffic as well as a low frequency bus route. There is a 50m offset between the termination of Brisbane Street at Birrell Street and the start of Bourke Street off Birrell Street.

At the southern end of Bourke Street, the route enters Queens Park and generally follows the existing Shared Path, which would need to be extended from Manning Street to Bourke Street. This extension has been recognised in the Queens Park Masterplan (Centennial Parklands, 2005).

For the purposes of this assessment, it is assumed that there will be a mix of facilities, including:

- Bi-directional cycleway on the western side of Bronte Road to Ebley Street
- Bicycle Boulevard treatment along Brisbane & Bourke Streets
- Separated path priority crossing of Birrell Street
- Short section of new Shared Path through Queens Park to join the existing Shared Path further west in the Park.

Transitions and crossings require detailed planning and design attention, eg Birrell Street and Queens Park Road. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path.

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2.7 Route 5 – Bronte Road

Figure 2.7 – Bronte Road, south of Ebley Street



The Bronte Road route shares a short part of its northern section with Route 4.

As discussed, it is classified as a main road and designated as a regional road for administrative purposes. It falls under the care and control of Waverley Council. It carries significant traffic volumes, bus traffic and service vehicles for its length.

Towards the south, the route runs through the Charing Cross Precinct.

The route continues along Albion Street, which is a local street under the care and control of Waverley Council. As with Bronte Road, it carries significant traffic volumes, bus traffic and service vehicles. There is a school

near the Macpherson Street roundabout.

The route then crosses into the Randwick street network to terminate at the common end point.

Land-use varies from commercial to mixed to residential.

Several sections of the route are or have been subject to Council improvement strategies, including:

- Spring Street to Ebley Street – 2020 12-months trial of alternate kerbside uses, such as parklets, park & ride, etc
- Ebley Street to Birrell Street – 2017 streetscape improvements (on hold; Waverley, 2017.3 and 2017.4)
- Charing Cross Precinct – 2020 travel study and streetscape design (Waverley, 2019.6).

To some extent Bronte Road and Carrington Road (Route 6) perform complementary network functions and changes in traffic and parking conditions along one route could influence the other, which could be important in the context of the Bronte Road urban improvement strategies.

For the purposes of this assessment, it is assumed that there will be a bi-directional cycleway for the length of the route. It is noted, however, that Bronte Road operates in a complex environment and is likely to require a more refined design approach, which responds more closely to localised changes in land-use and traffic patterns with a variety of cycling facilities and cross sections. Some broad concepts could include

filtered-permeability measures to reduce through traffic but encouraging pedestrians, bikes, buses and local access to business; select locations with intense place-based investments based on “shared space” principles (eg the Bronte Road/Spring Street intersection); more traditional sections to support longitudinal movement; and, increased setbacks for plazas at redevelopment sites.

2.8 Route 6 – Carrington Road

Figure 2.8 – Carrington Road, south of Bronte Road



The Carrington Road route commences at the intersection of Waverley Street and Oxford Street, then follows Waverley Street, Council Street and Carrington Road from where it continues into the Randwick street network to the common end point. The Waverley Street section is common with Route 8.

Waverley Street is a local street under the care and control of Waverley Council. The northern end of Waverley Street is a pedestrian mall; the eastern section is predominantly residential. The eastern end carries some traffic due its connectivity with Bondi Road and the Westfield carpark. Restricted parking is on the southern side only. It is marked as a cycle route with mixed traffic facilities.

Council Street and Carrington Road are classified State Roads under the care and control of RMS. Land-use is mixed, including a number of schools. As discussed earlier, the Carrington Road route to some extent performs complementary network functions to Bronte Road (Route 5). There are clearway-style parking and stopping restrictions for much of the way on both sides of the road. RMS have plans to formalise the clearway regime along the route which is opposed by Council (Waverley, 2019.5).

The RMS plans would require all four lanes along the route to be trafficable, preserving the full width between kerbs of about 12.8m. This would effectively preclude any exclusive cycleway in the corridor for much of its length. In the past, it would have been good engineering practice to adopt a conservative approach with a preference for the RMS position, which would prevent the route from being used for the purposes of this assessment.

Since the publication of the NSW Future Transport Strategy for 2056 (TfNSW, 2018), this has changed. The strategy introduces the principles of *Movement and Place* (refer Section 4.3), which recognises that roads are important *Places* that add vitality



to their neighbourhoods. This importance is further emphasised by more recent advice by the NSW Government Architect (GANSW, 2019 and 2020). This new emphasis allows a less conservative and more forward looking approach to the management of roads like Carrington Road, which has been adopted for this assessment.

Accordingly, it is assumed that there will be bi-directional cycleways along the length of the route. As with Bronte Road, there is both the need for and the opportunity to develop a variable cross section that responds closely to localised changes in land-use and traffic patterns, eg by limiting works to the northbound verge, which is wider at a few locations.

2.9 Route 7 – Bronte & Carrington Roads

This route is a blended route partly following Route 5, north of Charing Cross, and then following Route 6, south thereof.

As with Routes 5 and 6, it is assumed that there will be a bi-directional cycleway for the length of the route, again noting the need for an agile design response.

2.10 Route 8 – Waverley Park

As with Route 6, the Waverley Park route commences along Waverley Street, then Dalley Street, Waverley Park, Henrietta Street and then Bronte Road and Albion Street, which it shares with Route 5.

Dalley Street and Henrietta Street are quiet local streets under the care and control of Waverley Council. Land-use is generally residential.

Dalley Street has unrestricted parking on both sides and is marked as an on-road cycleway. Henrietta Street is a one-way street with one traffic lane, a contra-flow bicycle lane and generally one unrestricted parking lane. The traffic direction switches at Victoria Street. There are some traffic calming devices. There two schools: one at the northern end; and, one near Victoria Street.

For the purposes of this assessment, it is assumed that there will be a mix of facilities, including:

- Bi-directional cycleways along Waverley Street, Bronte Road and Albion Street
- Bicycle Boulevard treatment along Dalley Street
- Existing Shared Path through Waverley Park
- Existing contra-flow lanes in Henrietta Street, although not all traffic-shy user groups would be comfortable on such a facility.

Transitions and crossings require detailed planning and design attention, eg Council Street, Birrell Street, and Bronte Road. There is likely to be a need to upgrade the Shared Path in Waverley Park to a Separated Path.

Figure 2.9 – Henrietta Street, north of Victoria Street



2.11 Randwick Continuations

This assessment was commissioned by Waverley Council and limited research has been carried out for the route continuation through the Randwick local government area. Even so, the travel distance through Randwick is significant (700m-1000m). There are also some complications such as gradients and road classification.

The routes can be split into two groups with common alignments through Randwick:

- Routes 1, 2, 3 and 4 each cross the Council boundary at the intersection of Avoca Street, York Road and Darley Road. The most direct continuation through Randwick to the common end point is along Avoca Street. However, the gradient along Avoca Street is too steep for most user groups and the four routes are detoured by about 280m via Market Street, a little further to the east along Darley Road², as it offers a considerable improvement to the gradients. A second alternative was also considered further west along Darley Road at Dangar Street, but this route was not found to offer better gradients. It is also significantly longer. Market Street would need to be treated as a Bicycle Boulevard, including supplementary traffic calming measures and improved crossing facilities such as at Darley Road and Clovelly Road, possibly using traffic signals.

² Current proposals (Waverley, 2019.7) include a new Separated Path along Darley Road from York Road to Carrington Road, the design of which has been approved. The facility is currently awaiting funding.

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- Routes 5, 6, 7 and 8 each cross the Council boundary near the intersection of Carrington Road and Frenchmans Road to access the common end point. The most direct route with the best gradient is along Frenchmans Road, a classified State Road. As with Carrington Road, a forward looking approach has been adopted for this assessment with the continuation of the bi-directional cycleways along the length of the route.



3 Potential Cross Sections

As stated in the introduction, the brief specifically requires this report to “assess all the options for a separated cycleway”. These are a fairly narrow terms of reference and it seems appropriate to broaden the reference to include a range of facilities that could be used by all potential cyclists, particularly the traffic-shy riders such as the “interested but concerned”³ and “8-to-80” (years of age⁴), along of course with more confident riders.

While at this early stage in the route development process it is not possible to prepare site specific details, six generic cross sections have been prepared to inform the discussion (Figures 3.1 to 3.6). Typically, during future design development phases, the generic cross sections (and the related plans) will be refined to respond to specific road, traffic and land-use patterns.

All cross sections provided are suitable for the traffic-shy users groups discussed above and are in-line with the TfNSW Bicycle Network Planning and Design Strategy for the PBN Principal Bicycle Network (TfNSW, 2017). The PBN aims to provide its top level routes (Tier 1) with the highest level of separation from motor vehicle traffic and pedestrians (TfNSW, 2020). The requirements for Tier 2 routes are less defined.

- **Bi-directional Cycleway, kerbside**

This is now becoming the most commonly used facility for 12.8m wide roads in a 20m road reserve. Where the road is a little less than 12.8m, the cycleway could be raised flush with the footpath to gain the little extra width of the kerb and possibly some space behind it. Care is then required to ensure strong visual separation between pedestrians and cyclists. There is mounting evidence the flush cross section is also preferred at intersections and crossings with significant pedestrian movements across the cycleway due to trip hazards imposed by multiple steps or level differences between the footpath and the roadway.

- **Bi-directional Cycleway, pathside**

This is an alternate detail to the “kerbside” design. Rather than simply re-allocating space within the existing 12.8m roadway, it re-models the whole of the road reserve by narrowing the footpaths / road verges on both sides of the road. While considerably more expensive (it affects both kerbs, drainage, power poles, trees, etc), it may be appropriate where parking lanes are used for traffic movement during peak periods or where there are significant bus movements.

³ The term “interested but concerned” was first recognised by Portland City Council in 2005 (Portland, 2008) to describe a large cohort of potential bicycle riders, who would like to ride more but are concerned about traffic. The term is now widely used. Research in Australia has confirmed a similar size group of potential bicycle riders who would ride more if there were safe facilities, away from traffic.

⁴ “8-to-80 Cities” (2020) is a Canadian organisation, which “believes that if everything we do in our cities is great for an 8 year old and an 80 year old, then it will be great for all people” (www.880cities.org).



- **Uni-directional Cycleway**

To a large extent this cross section is preferred to bi-directional facilities due to the greater simplicity of intersection design. As with the “*pathside*” bi-directional facility, it is often difficult (expensive) to achieve in many 12.8/20m road corridors, without loss of on-street parking.

- **Shared Path**

This is the default facility still widely used around the country, both in the verges of the road corridor and in not-road-related-areas. There is mounting evidence that such facilities outdate quickly due to conflicts between pedestrians and cyclists, which are difficult to manage. Key examples include the Anzac Parade and Alison Road facilities and the new Bennelong Bridge at Homebush Bay. Separated paths provide a safer alternative for all path users.

- **Separated Path**

Twin paths: one exclusively for pedestrians; the other exclusively for cyclists; typically separated by a flush verge. Even at relatively modest volumes, this facility is known to significantly reduce conflicts between pedestrians and cyclists along with the related complaints to councils. Good examples are the pathway along the northern perimeter of Centennial Park and the Epping Road paths at Lane Cove and North Ryde.

- **Bicycle Boulevard**

This is a new concept slowly emerging in Australia from Europe and the USA. It is in essence a low volume, low speed local street, typically traffic calmed with a cycling overlay to allow for way-finding, bicycle priority at intersections, filtered permeability, etc. A design speed of 30km/h is critical and in some, but not all, Australian jurisdictions has also been adopted as the speed limit. There are a number of successful examples in Western Australia (Transport WA, 2020) and more recently in Victoria. There are excellent guidelines in Queensland (QTMR, 2018) and the ACT (2019), although there are no examples in either jurisdiction at this stage.

In addition to these facilities, consideration was given to split up-hill-down-hill facilities, which provide a uni-directional separated cycleway in the up-hill direction and a mixed traffic facility in the down-hill direction. However, this type of facility is only suitable for confident adult cyclists in the down-hill direction as it offers no protection from traffic for more vulnerable user groups such as the “*interested but concerned*” and “*8-to-80*” (years of age).

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Figure 3.1 – Bi-directional Cycleway, kerbside

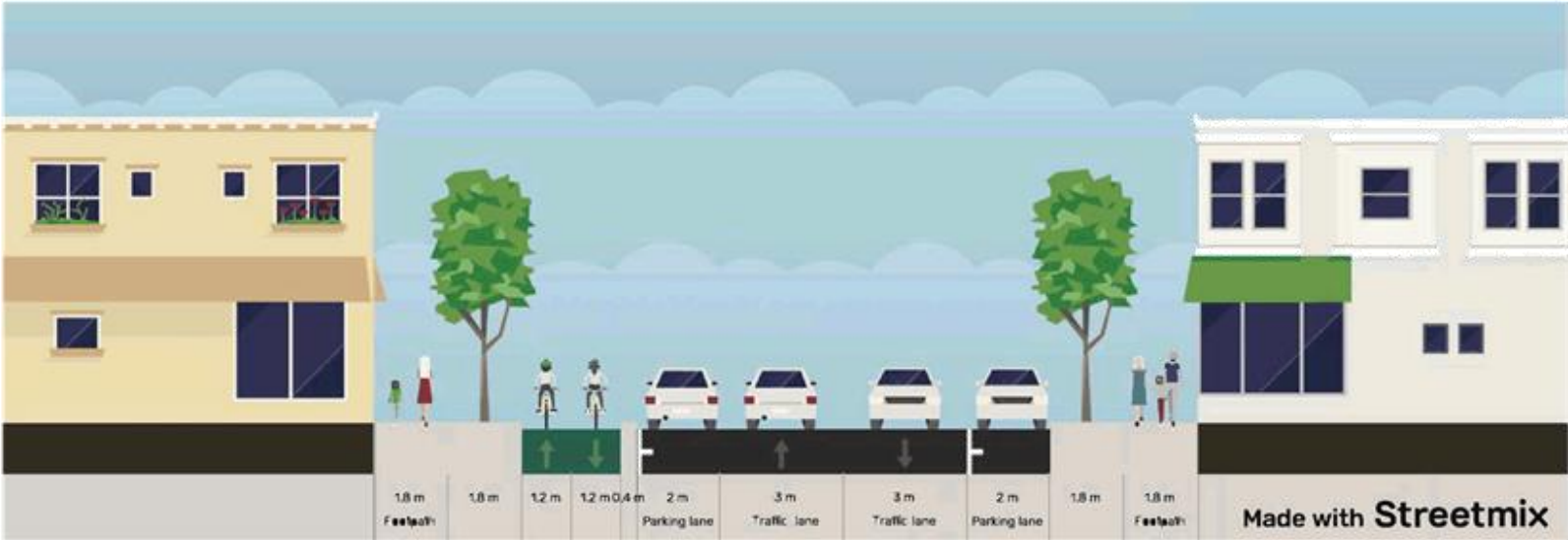


Figure 3.2 – Bi-directional Cycleway, pathside

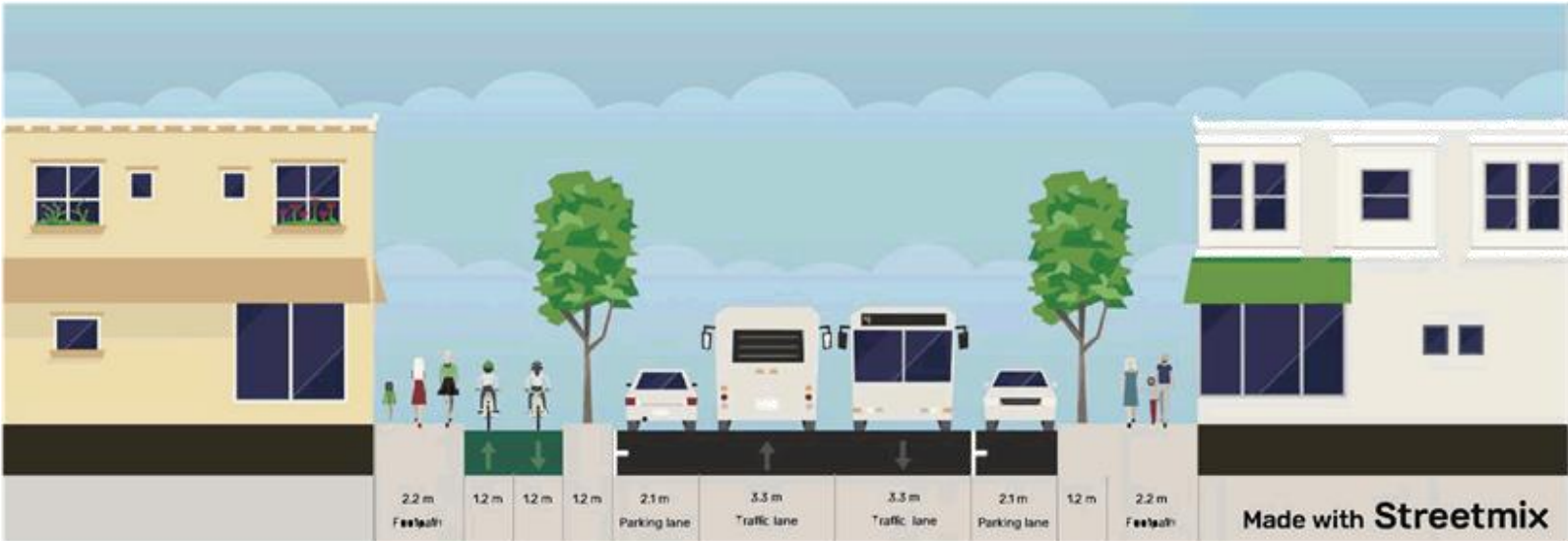
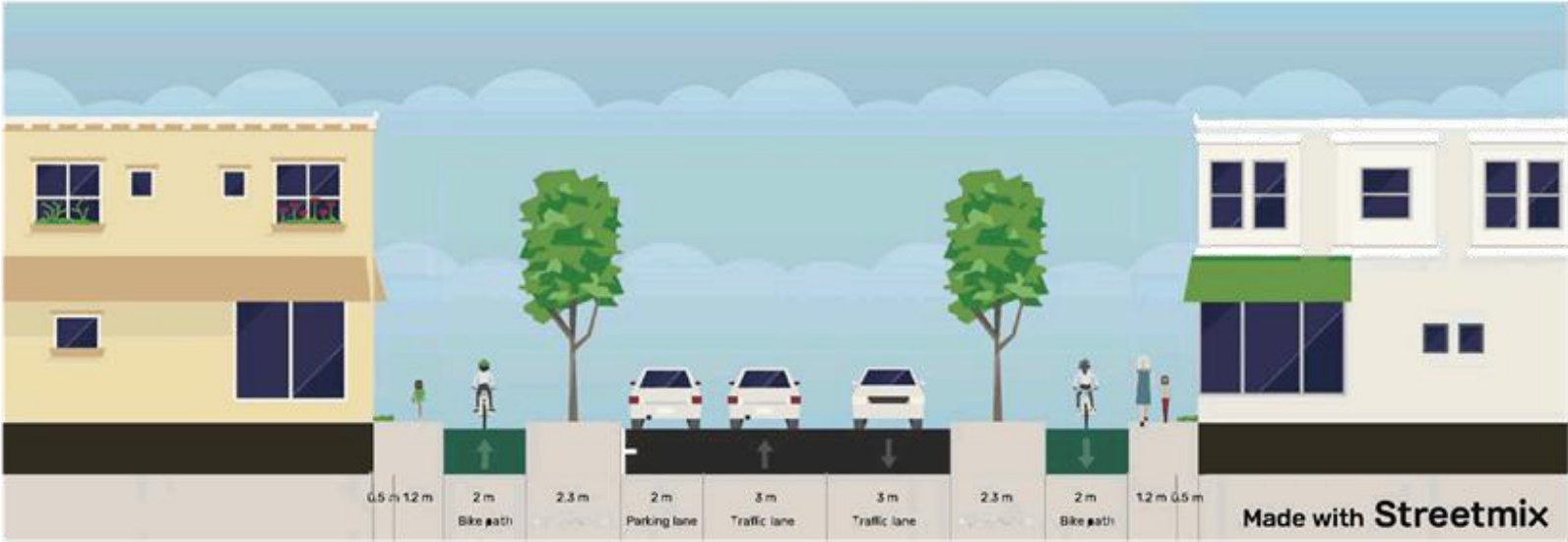


Figure 3.3 – Uni-directional Cycleway (one-way pair)



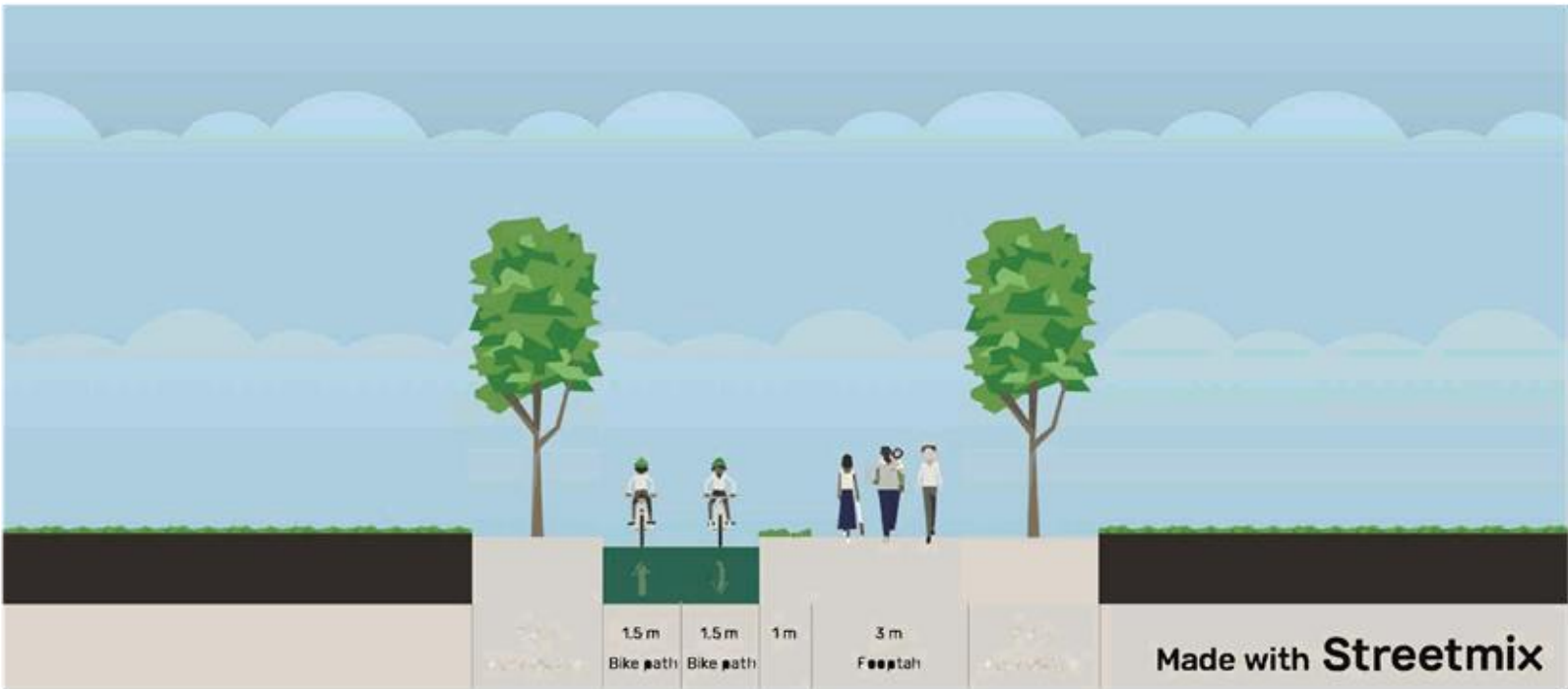
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Figure 3.4 – Shared Path



Figure 3.5 – Separated Path



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Figure 3.6 – Bicycle Boulevard



Source: QTMR, 2018

Charing Cross Cycle Route Feasibility Study



4 Evaluation Methodology

4.1 Base Methodology

The methodology used in this report to assess route suitability is derived from the generic cycle route assessment model detailed in Section 12 of the *NSW Bicycle Guidelines* (RTA, 2003). The RTA model was developed primarily to assess on-road bicycle routes and consists of a limited set of quantitative criteria to assess total distance, on-road distance, climbs, turns and stops. Sensitivity tests were also applied for total distance, turns, and on-road/off-road facilities.

The RTA model does not cover all considerations associated with the performance of a bicycle route. These limitations are discussed in Table 4.1. Five criteria critically affect route selection at an early stage (rows shown in light grey), therefore only these are used in the preliminary route analysis in Section 5. All nine criteria listed in Table 4.1 are used in the preferred route options analysis in Section 6.

In order to rate the above factors, a qualitative assessment has been used with a five stage performance indication shown in Table 4.2.

This assessment rating is used to evaluate the suitability of routes for both the preliminary route assessment in Section 5 and the preferred route options assessment in Section 6. The methodology has been tried and tested for Council (Waverley, 2019.2 and 2019.3; NSWLEC, 2020).

Table 4.1 – Criteria used in route evaluations and limitations of the RTA route analysis model

Criteria	Comment
Network legibility and cohesiveness	The RTA analysis does not consider the overall strategic fit with the intended Regional Route, such as its level of integration and ability to connect with other cycling corridors. The analysis also does not cover the degree of network legibility afforded, i.e. the ease with which the bicycle network can be negotiated. A cohesive and legible network connection is one which can be intuitively navigated as part of the broader cycling corridor. These issues are included in the directness and network connectivity criteria used in the detailed assessment in Section 4.
Corridor width and traffic constraints	It is an essential prerequisite of off-road separated facilities that sufficient physical space is available within the road corridor. Space for off-road bicycle facilities may be achieved by rearranging kerbs, travel lanes and on-street parking. Road network function and traffic amenity are determining factors.
Suitable facilities for a Tier 1 route	The Sydney Principal Bicycle Network aims to provide its top level routes (Tier 1) with the highest level of separation from motor vehicle traffic and pedestrians.

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Criteria	Comment
Constructability and cost	The analysis does not consider the likely cost and/or constructability of a route, its on-going maintenance cost and its impact on revenue (parking, footpath seating). This is a process of evaluating how much civil work would be required to make a route operational and safe.
Land ownership and government approvals	Land ownership issues and state government approvals to construct cycle facilities can directly impact on the viability of any route options affected.
Gradients	Whilst an overall measure of climbs is made, there is no ability within the RTA model to determine as to whether any climbing is done over a long or a short distance. For example, for a change of elevation of 100m, you could average 10% over 1km, or you could average 1% over 10km. This issue is included in the rider comfort and amenity criterion in Section 6.
Safety	There is no measure within the RMS model to be able to apply a subjective response to the perceived safety of a particular alignment. This includes the need to ride on roads which would have a high traffic demand or high speed differential, and also the level of safety provided at various types of crossings. It is noted that under the RTA analysis no penalty is included between the different types of crossings such as yield points, traffic signals, or sharp turns.
Travel time	The RTA model takes into consideration distance, which is arguably not the best way to evaluate potential bike routes; rather time is probably a better indicator of the burden on a rider. Cyclists are particularly sensitive to the burden of constantly decelerating and accelerating, especially in mixed traffic. This issue is included in the rider comfort and amenity criterion in Section 5.
Land-use and design impacts	The RTA model does not consider the important issue of the impacts a separated bicycle facility may have on adjoining land-uses, such as traffic flow, changes to on-street parking, changes to loading zones, changes in tree canopy, street events and other council initiatives.

Table 4.2 – Performance Indicators

Performance	Score
Excellent	5
Good	4
Neutral	3
Poor	2
Very poor	1



4.2 Alternate Methodologies

Multi-Criteria Analyses (MCA) are widely used to tackle complex evaluation processes. The evaluation methods are as varied as the topics they consider. The Base Methodology described in Section 4.1 is a fairly basic approach which equally considers all criteria on a qualitative five point scale (“excellent” to “very poor”) with a score in whole numbers (5 to 1). By the nature of the system, a number of routes are ranked equal and not all scores are used for each criterion.

A number of alternate methods have been considered, based on general experience and some examples provided by Council (Waverley, 2020.2):

- Increased score (eg 1 to 10) – this would broaden the score range and more clearly enunciate differences between routes. It is not clear that this would improve the understanding of the differences in route performance.
- Indexed score (eg relative distance or travel time) – to some extent this has been done in Tables 5.1 and 6.1. This is difficult to achieve more broadly as most criteria are qualitative.
- Weighted criteria – this is useful when there are strong value differences between the criteria. It is not clear that such strong value differences exist in this analysis.
- Additional criteria – the following criteria have been added to the base methodology previously developed for Council (Waverley, 2019.3):
 - Suitable facilities for a Tier 1 route (refer Table 4.1)
 - Maintenance and revenue
 - Impacts on events
 - Impacts on other Council initiatives
 - Place (refer Section 4.3).
- Alternate criteria – value for money, catchment, planning compliance and approvals, construction risks, environmental risks, education and public awareness, DDA compliance, performance and efficiency, etc. Most of these factors have been included in one form or another in the Base Methodology. The remainder is not so relevant for cycleway infrastructure planning. Some, eg DDA compliance, will need to be considered at the design stages.

4.3 Movement and Place

The network of roads and streets is a major part of the system of public space that helps connect places. Public space is where people can socialise and add vitality to their neighbourhoods, and streets and roads have an important role in that vitality. Aligning movement functions with the places they serve can make the transport networks and public spaces better contribute to the liveability of communities and productivity of NSW.

The Movement and Place framework by the Government Architect of NSW (GANSW, 2019 and 2020) creates a shared language and approach to help all stakeholders



achieve better place outcomes for the people of NSW. It seeks consideration of place when developing the transport systems, through collaborative working between the community, and movement and place practitioners, to ensure that transport systems better support places.

The framework aligns with Future Transport (TfNSW, 2018) outcome 'Successful Places' and the State Infrastructure Strategy by designing infrastructure to complement and enhance the function, rather than merely dictate the form, of the place.

Movement and Place considers the whole street including footpaths, from property line to property line. It considers the needs of all users of this space including pedestrians, cyclists, deliveries, private vehicles and public transport, as well as people spending time in those places, whether moving around the place or enjoying street life including outdoor dining, waiting for a bus or watching the world go by.

When considering cycleways, Movement and Place can be considered in two ways:

- It links places along the length of a movement corridor – users of the cycleway can join at any point along its length to connect to any other point along its length; being able to access multiple Places along a Movement corridor is an important factor that can help distinguish one corridor from another.
- The cycleway itself is an urban design element that contributes to the design of Place in a number of ways including:
 - It is a feature of the place and therefore adds a component to the locality in the same way that a footpath, a parking lane or street trees change the character of the place.
 - It provides separation of pedestrians from vehicles, which is a positive contribution to Place and the amenity of pedestrians.
 - There is increasing evidence (Heart Foundation, 2011; Victoria Walks, 2019) that bicycle riders stop at local shops more frequently than motorists, partly due to the ease of parking a bicycle, whereas motorists frequently find parking difficult in retail precincts.

In this context, Place has been added as the final criterion for the preferred route options assessment in Section 6.



5 Preliminary Route Options Assessment

In this section the following issues are discussed and evaluated:

- Directness and network connectivity
- Corridor width and traffic constraints
- Appropriate facilities provided for a Tier 1 route
- Constructability and costs
- Land ownership and government approvals
- Preliminary route assessment findings and recommendations.

A comparative route analysis was undertaken for the seven preliminary route options identified in Section 2 to determine their feasibility and eligibility for inclusion in the more detailed analysis (Section 6). This analysis uses the methodology set out in Section 4 and Table 4.1, to objectively identify the relative strengths and weaknesses of each of the preliminary routes.

Some criteria used in the route assessment methodology are more important for the preliminary route assessment. These are the grey-coloured rows shown in Table 4.1. The purpose of this preliminary route assessment is to determine if any routes may be fatally flawed by unresolvable issues relevant to each site – corridor width, land tenure, agency opposition. Each criterion is assessed using high level, qualitative performance indicators as shown in Table 4.2. All assessment criteria shown in Table 4.1 are used to evaluate routes in the Section 6 of this route assessment.

5.1 Directness and Network Connectivity

Routes were evaluated on their directness or the ability of the route to deliver cyclists efficiently from end to end without major detours or need to stop or slow significantly below a comfortable riding speed. Figure 1.1 shows the proposed/existing Waverley Bike Plan 2013 and the TfNSW Principal Bicycle Network. Key north-south network links are Nelson Street, Grosvenor Street, Adelaide Street, Paul Street and Leichhardt Street in Waverley and Dangar Street, Clovelly Road, Avoca Street, Albion Street / Frenchmans Road and Fern Street in Randwick. Key east-west links are the Oxford Street / Spring Street route (under construction), Old South Head Road, Birrell Street and Waverley Street / Bondi Road, Queens Park Road / Victoria Street and Darley Road / Macpherson Street.

Table 5.1 shows the qualitative assessment for route directness. Table 5.2 shows the assessment for route connectivity. Table 5.3 shows the assessment of the suitability of the proposed facilities for a Tier 1 route in the Sydney Principal Bicycle Network.

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Table 5.1 – Comparative options assessment for directness

Route	Performance	Notes
1. York Rd	Very poor	Distance 3,600m. This route is at the far western end of the study area and requires a significant detour from the Bondi-Randwick Junctions desire line. The route is lengthened somewhat as it utilises Market Street rather than Avoca Street.
2. Denison St	Neutral	Distance 2,830m. This route is at the western end of the study area and requires a detour from the Bondi-Randwick Junctions desire line. The route is lengthened somewhat as it utilises Market Street rather than Avoca Street.
3. Newland St	Good	Distance 2,480m. This route closely follows the Bondi-Randwick Junctions desire line. The route is lengthened somewhat as it utilises Market Street rather than Avoca Street.
4. Brisbane/ Bourke Sts	Good	Distance 2,540m. This route closely follows the Bondi-Randwick Junctions desire line. It is included in the Waverley Bike Plan and the TfNSW Principal Bicycle Network and earmarked as Bondi Junction to UNSW. The route is lengthened somewhat as it utilises Market Street rather than Avoca Street.
5. Bronte Rd	Good	Distance 2,650m. This route is at the eastern end of the study area and requires a short detour from the Bondi-Randwick Junctions desire line. It is included in the TfNSW Principal Bicycle Network.
6. Carrington Rd	Poor	Distance 3,050m. This route is at the eastern end of the study area and requires a medium detour from the Bondi-Randwick Junctions desire line.
7. Bronte & Carrington Rds	Good	Distance 2,510m. This route is at the eastern end of the study area and requires a short detour from the Bondi-Randwick Junctions desire line. It is partly included in the TfNSW Principal Bicycle Network. It is a little shorter than Route 5 as it doesn't travel as far east.
8. Waverley Park	Very Poor	Distance 3,500. This route is at the far eastern end of the study area and requires a significant detour from the Bondi-Randwick Junctions desire line.

Table 5.2 – Comparative options assessment for network connectivity

Route	Performance	Notes
1. York Rd	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.
2. Denison St	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.
3. Newland St	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.
4. Brisbane/ Bourke Sts	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.
5. Bronte Rd	Excellent	This route option has excellent connections to intersecting bicycle routes, trip attractors and the local street system. It differentiates from most other routes by virtue of the range of services along the route itself.

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Route	Performance	Notes
6. Carrington Rd	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.
7. Bronte & Carrington Rds	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system. It differentiates from most other routes by virtue of the range of services along the route itself, although it doesn't fully serve the Charing Cross precinct.
8. Waverley Park	Good	This route option has good connections to intersecting bicycle routes, trip attractors and the local street system.

Table 5.3 – Comparative options assessment for suitability for a Tier 1 route

Route	Performance	Notes
1. York Rd	Neutral	This route uses an exclusive bicycle path along York Rd, a planned separated path along Darley Rd and a bicycle boulevard treatment along Market St.
2. Denison St	Poor	This route uses a separated bi-directional cycleway to Ebley St and along Queens Park Rd, bicycle boulevards along Denison St and Market St, a shared path in Queens Park, and a planned separated path along Darley Rd.
3. Newland St	Poor	This route uses a separated bi-directional cycleway to Birrell Street, a separated uni-directional cycleway to Queens Park Rd, a shared path in Queens Park, a planned separated path along Darley Rd, and a bicycle boulevard treatment along Market St.
4. Brisbane/ Bourke Sts	Poor	This route uses a separated bi-directional cycleway to Ebley Street, bicycle boulevards to Queens Park Rd, a shared path in Queens Park, a planned separated path along Darley Rd and a bicycle boulevard treatment along Market St.
5. Bronte Rd	Excellent	This route uses a separated bi-directional cycleway along its entire route.
6. Carrington Rd	Excellent	This route uses a separated bi-directional cycleway along its entire route.
7. Bronte & Carrington Rds	Excellent	This route uses a separated bi-directional cycleway along its entire route.
8. Waverley Park	Very poor	This route uses a separated bi-directional cycleway on Waverley St, a bicycle boulevard along Dalley St, a shared path through Waverley Park, unprotected road lanes along Henrietta St, and separated bi-directional cycleways on Bronte Rd, Albion St and Frenchmans Rd.



5.2 Corridor Width and Traffic Constraints

It is essential that sufficient physical space is available within the route corridor to install the bicycle facilities identified in Section 3. Space for these facilities may be achieved by rearranging kerbs, reducing general travel lanes and removing/rearranging on-street parking. Road network function and traffic amenity are determining factors.

Waverley's People, Movement and Places transport plan (Waverley, 2017.1) recommends a transport hierarchy which puts pedestrians first, followed by people travelling by bicycle, public transport, service vehicles, shared mobility and then private motor vehicles.

Section 2 provides details of the proposed mix of facilities for each route. Section 3 provides details on the related cross sections.

Table 5.4 – Comparative options assessment for corridor width and traffic constraints

Route	Performance	Notes
1. York Rd	Good	Space for an exclusive bicycle path is readily available in the western verge. Special attention is required at the curve east of Baronga Ave. Pedestrians currently use some of the western verge and there may be a need for additional and/or improved crossing facilities.
2. Denison St	Good	The corridor provides adequate space to accommodate the proposed mix of facilities. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path. Detailed planning and design attention is required at key transition points and crossing locations such as Ebley St, Birrell St, and Queens Park Rd / Baronga Ave. Some may require traffic signals.
3. Newland St	Poor	The corridor has a number of pinch points along the proposed uni-directional section, which makes it difficult or undesirable to achieve. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path. Transitions and crossings require detailed planning and design attention, eg Birrell St and Queens Park Rd. Some may require traffic signals.
4. Brisbane/ Bourke Sts	Good	The corridor provides adequate space to accommodate the proposed mix of facilities. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path. Transitions and crossings require detailed planning and design attention, eg Birrell St and Queens Park Rd. Some may require traffic signals.
5. Bronte Rd	Neutral	Due to the significant use of the corridor by buses and service vehicles, a kerbside bi-directional facility is deemed unsuitable, requiring the selection of a pathside directional facility instead. While pathside facilities compromise pedestrian space, a more agile design approach may avoid this, as discussed in Section 2.7.

Route	Performance	Notes
6. Carrington Rd	Neutral	Due to the significant amount of traffic in the corridor, a kerbside bi-directional facility is deemed unsuitable, requiring the selection of a pathside directional facility. As discussed in Section 2.8, an agile design approach is required.
7. Bronte & Carrington Rds	Neutral	Due to the significant use of the corridor by buses and service vehicles, a kerbside bi-directional facility is deemed unsuitable, requiring the selection of a pathside directional facility instead. A more agile design approach may avoid this, as discussed in Section 2.9.
8. Waverley Park	Poor	The corridor provides adequate space to accommodate the proposed mix of facilities, although not all traffic-shy user groups would feel comfortable on the contra-flow facilities in Henrietta St. Much of it is already complete although some of the completed works may require upgrading.

5.3 Constructability and Costs

This criterion considers the likely cost and/or constructability of a route, as shown in Table 5.5. Maintenance costs and revenue (existing, potential/planned, parking, footpath dining) are evaluated in Table 5.6. Section 2 provides details of the proposed mix of facilities for each route. Section 3 provides details on the related cross sections.

Table 5.5 – Comparative options assessment for constructability and costs

Route	Performance	Notes
1. York Rd	Neutral	Costs for an exclusive bicycle path in the western verge are relatively modest. The curve east of Baronga Ave requires specific investment and likely land acquisition. Some additional and/or improved pedestrian crossing facilities may require investment.
2. Denison St	Good	The two sections of bi-directional facilities are relatively short and are thus relatively low in cost. Some investment is required in traffic calming for the Bicycle Boulevard, which could be supported by Council's 40km/h Strategy. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path. Some investment is required at key transition points and crossing locations such as Ebley St, Birrell St, and Queens Park Rd / Baronga Ave. Some may require traffic signals.

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Route	Performance	Notes
3. Newland St	Neutral	<p>The section of bi-directional cycleway is relatively short and is thus relatively low in cost.</p> <p>The section of uni-directional cycleway is higher in cost than the bi-directional facility. Parts are complicated/undesirable due to impacts from trees and their roots which further adds to costs.</p> <p>Some investment is required at key transition points and crossing locations such as Birrell St and Queens Park Rd. Some may require traffic signals.</p>
4. Brisbane/ Bourke Sts	Good	<p>The section of bi-directional facility is relatively short and is thus relatively low in cost.</p> <p>Much of the traffic calming for the Bicycle Boulevard is already in place, thus limiting costs. Further investment could be supported by Council's 40km/h Strategy.</p> <p>There is likely to be a need for some pavement upgrades.</p> <p>There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path.</p> <p>Some investment is required at key transition points and crossing locations such as Birrell St and Queens Park Rd. Some may require traffic signals.</p>
5. Bronte Rd	Good	<p>Although the costs of a pathside bi-directional facility are very high, much of these costs could be off-set against current council programs for streetscape improvements.</p>
6. Carrington Rd	Neutral	<p>The section of kerbside bi-directional facility is relatively short, but it expected to be difficult to achieve/ costly.</p> <p>Although the costs of a pathside bi-directional facility are very high, these costs could be reduced by a more agile design approach.</p>
7. Bronte & Carrington Rds	Good	<p>Although the costs of a pathside bi-directional facility are very high, much of these costs could be off-set against current council programs for streetscape improvements.</p>
8. Waverley Park	Neutral	<p>The sections of bi-directional facilities are significant and some are difficult to achieve/ costly. Some of these costs could be off-set against current council programs for streetscape improvements</p> <p>There is likely to be a need to upgrade the Shared Path in Waverley Park to a Separated Path.</p> <p>Some investment is required in traffic calming for the Bicycle Boulevard section.</p> <p>Some investment is required at key transition points and crossing locations such as Council St, Birrell St and Bronte Rd. Some may require traffic signals.</p>

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Table 5.6 – Comparative options assessment for maintenance and revenue

Route	Performance	Notes
1. York Rd	Good	Maintenance costs of an exclusive pathway in the verge are low, as are those for crossing facilities. There are no changes to parking conditions. There is no footpath dining.
2. Denison St	Good	Maintenance costs of bi-directional facilities are low, as are those for traffic calming and paths in not-road-related-areas. Traffic signals incur annual maintenance and operating costs. There are no changes to parking conditions. There is no footpath dining.
3. Newland St	Neutral	Maintenance costs of shared paths and separated facilities are low. The uni-directional facility may require some ongoing maintenance due to impacts from trees and their roots. There are some changes to parking conditions for a short section at the northern end which affect revenue. There is no footpath dining.
4. Brisbane/ Bourke Sts	Good	Maintenance costs of bi-directional facilities are low, as are those for traffic calming and paths in not-road-related-areas. Traffic signals incur annual maintenance and operating costs. There are some changes to parking conditions for a short section at the northern end which affect revenue. There is no current footpath dining, although the potential exists.
5. Bronte Rd	Neutral	Maintenance costs of bi-directional facilities are low. There are some changes to parking conditions at the northern end which affect revenue. An agile design approach may affect parking revenue further along the route. There is some existing footpath dining with potential for more, which may improve or reduce by the proposal.
6. Carrington Rd	Good	Maintenance costs of bi-directional facilities are low. There are no changes to parking conditions. There is no footpath dining.
7. Bronte & Carrington Rds	Neutral	Maintenance costs of bi-directional facilities are low. There are some changes to parking conditions at the northern end which affect revenue. An agile design approach may affect parking revenue further along the route. There is some existing footpath dining with potential for more, which may improve or reduce by the proposal.
8. Waverley Park	Good	Maintenance costs are low for bi-directional facilities, Bicycle Boulevards and paths in not-road-related-areas. There are no changes to parking conditions. There is no footpath dining.



5.4 Land Ownership and Government Approvals

This criterion considers land ownership issues and state government approvals to construct cycle facilities. These can directly impact on the viability of any route options affected.

Table 5.7 – Comparative options assessment for land ownership and government approvals

Route	Performance	Notes
1. York Rd	Neutral	While York Rd is part of the RMS regional road network, RMS is not likely to object to works in the verge. Concerns about land take / ownership at the curve east of Baronga Ave.
2. Denison St	Good	All street corridors used by this route option are under the control of Waverley Council. RMS approvals are required for any new or changed traffic signals.
3. Newland St	Good	All street corridors used by this route option are under the control of Waverley Council. RMS approvals are required for any new or changed traffic signals.
4. Brisbane/ Bourke Sts	Good	All street corridors used by this route option are under the control of Waverley Council. RMS approvals are required for any new or changed traffic signals.
5. Bronte Rd	Neutral	Bronte Rd is classified as a main road and designated as a regional road for administrative purposes. It falls under the care and control of Waverley Council. It carries significant traffic volumes, bus traffic and service vehicles and RMS is expected to take significant interest in any changes, noting previous objections (Waverley, 2017.2).
6. Carrington Rd	Neutral	Carrington Road is a classified State Road under the care and control of RMS. RMS is expected to take significant interest in any changes, although new, more supportive policies are emerging.
7. Bronte & Carrington Rds	Neutral	Bronte Rd is classified as a main road and designated as a regional road for administrative purposes. It falls under the care and control of Waverley Council. Carrington Road is a classified State Road under the care and control of RMS. Both roads carry significant traffic volumes, bus traffic and service vehicles and RMS is expected to take significant interest in any changes, noting previous objections, although new, more supportive policies are emerging.
8. Waverley Park	Neutral	Other than a short section of Bronte Rd, all street corridors used by this route option are under the control of Waverley Council. The crossing at Bondi Rd/Waverley St/Council St/Dalley St has been under dispute for some time (Waverley, 2020.2).



5.5 Preliminary Route Options Evaluation and Recommendations

Based on the route options analysis summarised in Table 5.8, Routes 4, 5 and 7 perform the best and will be further assessed in the Section 6 preferred route options assessment. Routes 2, 3 and 6 also perform within acceptable ranges and will be also included in the Section 6 assessment.

Routes 1 and 8 are too far off the desire line between Bondi Junction and Randwick which makes them unsuitable for further consideration. There are also concerns about land take (Route 1), facility suitability and traffic constraints (Route 8). These routes will be excluded from further assessment in Section 6.

Table 5.8 – Overall comparative options assessment

Route	Directness	Network connectivity	Suitability for a Tier 1 route	Corridor width and traffic constraints	Constructability and costs	Maintenance and revenue	Land ownership and government approvals	Score
1. York Rd	Very poor	Good	Neutral	Good	Neutral	Good	Neutral	22
2. Denison St	Neutral	Good	Poor	Good	Good	Good	Good	25
3. Newland St	Good	Good	Poor	Poor	Neutral	Neutral	Good	22
4. Brisbane/ Bourke Sts	Good	Good	Poor	Good	Good	Good	Good	26
5. Bronte Rd	Good	Excellent	Excellent	Neutral	Good	Neutral	Neutral	27
6. Carrington Rd	Poor	Good	Excellent	Neutral	Neutral	Good	Neutral	24
7. Bronte & Carrington Rds	Good	Good	Excellent	Neutral	Good	Neutral	Neutral	26
8. Waverley Park	Very poor	Good	Very Poor	Poor	Neutral	Good	Neutral	18



6 Preferred Route Options Assessment

In this section the following issues are discussed and evaluated:

- Rider comfort and amenity (including travel time, gradient and sun protection / tree coverage)
- Safety and personal security
- Land-use and design impacts (including parking, bus operations, business and community impacts, construction impacts, impacts on events, impacts on other Council initiatives)
- Place
- Overall route options evaluation and recommendations.

In assessing the preferred route options, the following criteria (used in Section 5) are also used:

- Directness and network connectivity
- Corridor width and traffic constraints
- Constructability and costs
- Land ownership and government approvals.

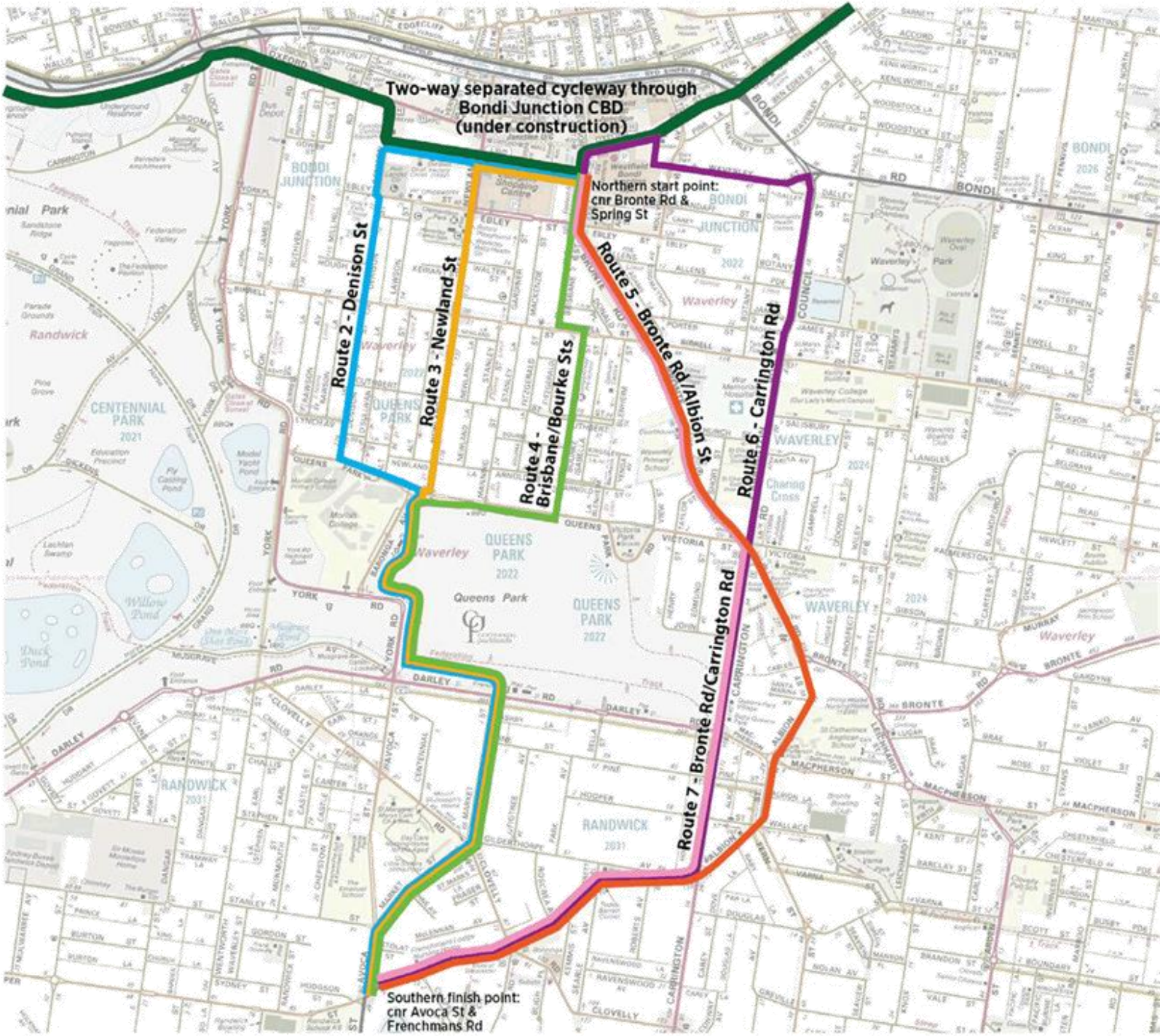
A comparative route analysis was undertaken for the five preferred route options identified in Section 5 to determine their feasibility and eligibility for final recommendation. This analysis uses the methodology set out in Section 4 and Table 4.1 to objectively identify the relative strengths and weaknesses of each of the preferred routes.

The assessment assumes the facilities set out in Section 2.

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Figure 6.1 – Preferred route options assessed in Section 5





6.1 Rider Comfort

This criterion considers the likely impact on riders for three key performance indicators: travel time, gradient and comfort.

Travel Time

Travel time is affected by delays caused by the need to stop (signals and signs) or the need to slow to below a comfortable travel speed (20-25 km/h) at uncontrolled intersections and in shared areas with pedestrians or on steeper gradients. The details provided in Appendix A have informed the ratings in Table 6.1.

Table 6.1 – Comparative options assessment for travel time

Route	Performance	Notes
2. Denison St	Good	1 existing signalised intersection and possibly 2 new ones (Darley Rd, Clovelly Rd). 2 non-priority crossings (Birrell St, Queens Park Rd). Slower speeds due to climbs in either direction. Steep grade on southern approach to Bondi Junction. Slower speeds on the Queens Park Shared Path (unless upgraded to Separated Paths).
3. Newland St	Neutral	3 existing signalised intersections (one with a two-stage crossing) and possibly 2 new ones (Darley Rd, Clovelly Rd). 1 non-priority crossings (Queens Park Rd). Significant pinch points along the uni-directional section. Slower speeds due to climbs in either direction. Steep grade on southern approach to Bondi Junction. Slower speeds on the Queens Park Shared Path (unless upgraded to Separated Paths).
4. Brisbane/ Bourke Sts	Excellent	1 existing signalised intersection and possibly 2 new ones (Darley Rd, Clovelly Rd). 1 non-priority crossings (Queens Park Rd). Slower speeds due to climbs in either direction. Steep grade on southern approach to Bondi Junction. Slower speeds on the Queens Park Shared Path (unless upgraded to Separated Paths).
5. Bronte Rd	Excellent	7 existing signalised intersections and crossings (near the courts and St Catherine's). 1 non-priority crossings (Macpherson St).
6. Carrington Rd	Poor	9 existing signalised intersections and crossings (near St Clare College).
7. Bronte & Carrington Rds	Excellent	7 existing signalised intersections and crossings (near the courts).

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Gradients

Figure 6.2: Comparative route elevations

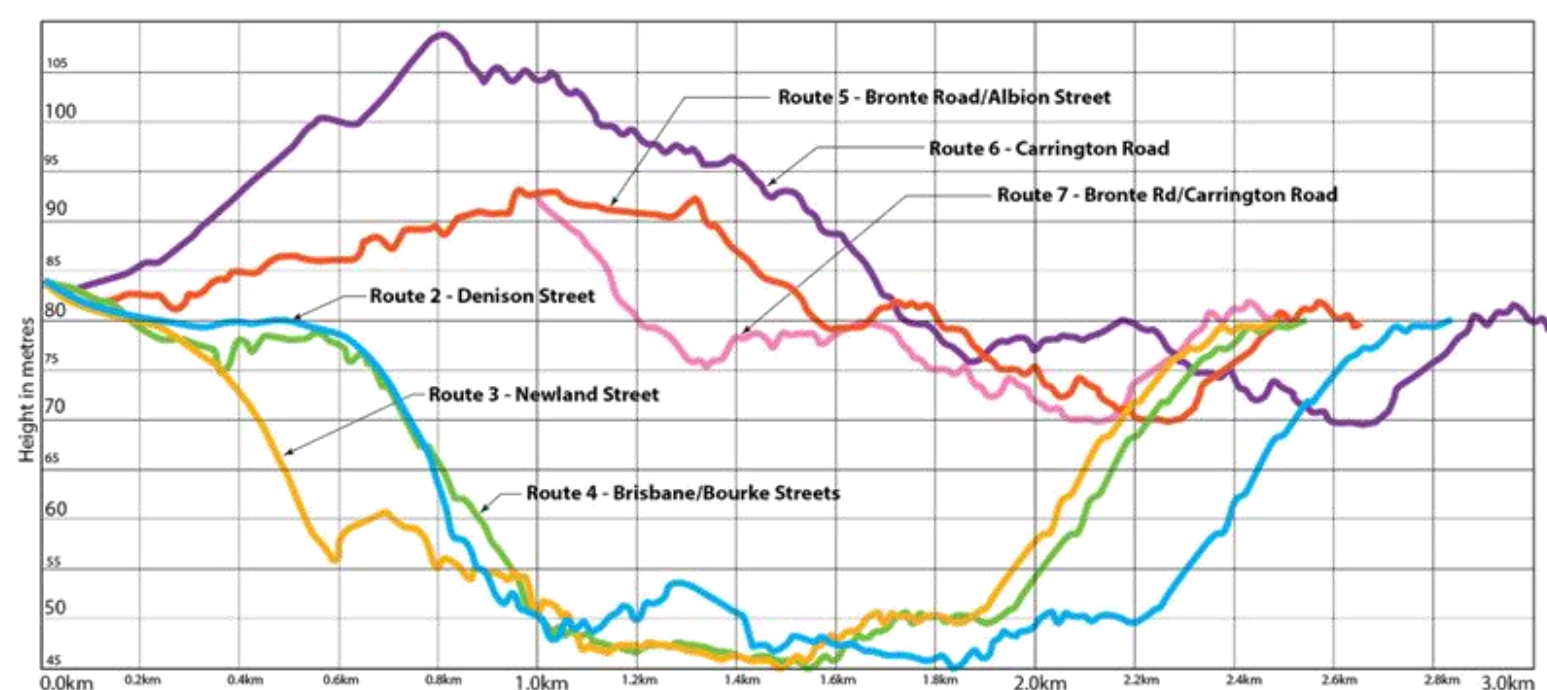


Table 6.2 – Comparative options assessment for gradient

Route	Performance	Notes
2. Denison St	Poor	Total elevation change is about 45m, mostly along Denison St and Market St. Steep grade on southern approach to Bondi Junction. Average grades are about 6-8%.
3. Newland St	Poor	Total elevation change is about 45m, mostly along Newland St and Market St. Steep grade on southern approach to Bondi Junction. Average grades are about 6-7%.
4. Brisbane/Bourke Sts	Poor	Total elevation change is about 45m, mostly along Brisbane St and Market St. Average grades are about 6-7%.
5. Bronte Rd	Good	Although the route nominally follows the ridge line, total elevation change is still about 25m, mostly along Albion St and Frenchmans Rd. Average grades are about 5%.
6. Carrington Rd	Neutral	Total elevation change is about 40m, with a gradual climb from Clovelly Rd to Bondi Rd. Average grades are about 5%.
7. Bronte & Carrington Rds	Good	Although the route nominally follows the ridge line, total elevation change is still about 25m, mostly along Carrington Rd and Frenchmans Rd. Average grades are about 5%.



Sun Protection and Tree Coverage

This criterion considers the remaining rider comfort issues of: smooth riding surface; protection from adverse climate (wind, sun and rain); and, the ease of finding popular destinations. As this assessment considers all options fitted with a separated or other high quality cycleway with a smooth riding surface and wayfinding signage throughout, Table 6.3 covers the remaining issue of protection from adverse climate, mainly focussed on sun protection / tree coverage.

Currently, all routes only afford minimal tree coverage except for a few select areas. However, all routes have significant potential for more extensive tree coverage which would move all ratings to "Excellent".

Table 6.3 – Comparative options assessment for sun protection and tree coverage

Route	Performance	Notes
2. Denison St	Neutral	Partial street tree coverage along the Denison Street section of the route, but otherwise below average protection from sun.
3. Newland St	Neutral	Significant street tree coverage along the southern section of Newland Street, but otherwise below average protection from sun.
4. Brisbane/ Bourke Sts	Neutral	Significant street tree coverage along Brisbane Street, but otherwise below average protection from sun. There is a need to upgrade the pavement surface along Brisbane Street.
5. Bronte Rd	Poor	Below average tree coverage along the route for protection from sun.
6. Carrington Rd	Poor	Below average tree coverage along the route for protection from sun.
7. Bronte & Carrington Rds	Poor	Below average tree coverage along the route for protection from sun.

6.2 Safety and Personal Security

This criterion considers the safety of riders from traffic and their personal security while using the facility particularly during evenings. Assessments in Table 6.4 assume a separated or other high quality cycleway between Bondi and Randwick Junctions, i.e.: base level assessments for all routes = Good.



Table 6.4 – Comparative options assessment for safety and personal security

Route	Performance	Notes
2. Denison St	Neutral	<p>2 non-priority crossings (Birrell St, Queens Park Rd) are a potential safety risk.</p> <p>The Queens Park Shared Path has potential for conflict with pedestrians unless the path is upgraded to Separated.</p> <p>Otherwise all of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>
3. Newland St	Good	<p>1 non-priority crossing (Queens Park Rd) is a potential safety risk.</p> <p>The Queens Park Shared Path has potential for conflict with pedestrians unless the path is upgraded to Separated.</p> <p>Otherwise all of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>
4. Brisbane/ Bourke Sts	Good	<p>1 non-priority crossings (Queens Park Rd) is a potential safety risk.</p> <p>The Queens Park Shared Path has potential for conflict with pedestrians unless the path is upgraded to Separated.</p> <p>Otherwise all of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>
5. Bronte Rd	Excellent	<p>1 non-priority crossings (Macpherson St) is a potential safety risk.</p> <p>All of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>
6. Carrington Rd	Excellent	<p>All of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>
7. Bronte & Carrington Rds	Excellent	<p>All of the route will be on a separated or other high quality cycleways with priority controlled intersections and risks of collisions with vehicular traffic are minimised.</p> <p>The whole route is on or near public streets with good passive surveillance for personal security.</p>

6.3 Land-use and Design Impacts

The major impacts on the community of constructing and operating a separated cycleway between Bondi and Randwick Junctions are assessed: on-street parking and bus operations; business and community impacts (including loading zones and taxi ranks); construction impacts (including early learnings from the Oxford Street / Spring Street project); impacts on events; and, impacts on other council initiatives. These are considered separately and the options are compared in Tables 6.5 to 6.10.

Parking and Bus Operations

Parking impacts are assessed in Table 6.5 and bus impacts in Table 6.6.

Experience gained during the planning and construction of at least five City of Sydney separated, **kerbside** bi-directional cycleways (Figure 3.1) shows that even though on-street parking may be affected this does not necessarily result in the loss of all these parking spaces.

However, as discussed in Section 2, the cross sections proposed for the six shortlisted routes only include a few, relatively short sections of **kerbside** bi-directional cycleways along Routes 2 and 3.

The cross section proposed for Bronte Road and Carrington Road (Routes 5, 6 and 7) is a **pathside** bi-directional cycleway (Figure 3.2), which narrows the footpaths / road verges on both sides of the road to accommodate bus movements as well as parking. The impacts on the footpaths are considered in Table 5.5 (cost), Table 6.8 (construction) and Table 6.11 (*Place*).

Table 6.5 – Comparative options assessment for on-street parking impacts

Route	Performance	Notes
2. Denison St	Excellent	There are no changes to parking conditions.
3. Newland St	Poor	Removal of parking lane (approx. 22 spaces, 14 paid) from Spring to Birrell Sts, western kerb. It appears most of these spaces could be off-set by angle parking in Keiran and Walter Sts.
4. Brisbane/ Bourke Sts	Excellent	Removal of southbound parking lane (1 space) btw Spring & Ebley Sts. There are no other changes to parking conditions.
5. Bronte Rd	Excellent	Removal of southbound parking lane (1 space) btw Spring & Ebley Sts. There are no other changes to parking conditions.
6. Carrington Rd	Excellent	There are no changes to parking conditions.
7. Bronte & Carrington Rds	Excellent	Removal of southbound parking lane (1 space) btw Spring & Ebley Sts. There are no other changes to parking conditions.



Table 6.6 – Comparative options assessment for bus operation impacts

Route	Performance	Notes
8. Denison St	Good	3 bus stops – 1 northbound, 2 southbound; 20-30 minute service; northbound services converted to in-lane stop.
9. Newland St	Good	4 bus stops – 2 northbound, 2 southbound; 20-30 minute service; northbound services converted to in-lane stops.
10. Brisbane/ Bourke Sts	Good	Adjusted cross section btw Spring & Ebley Sts which requires low impact adjustment to 2 very busy bus stops – one in each direction. 6 bus stops in Bourke St – equal north- and south-bound; none require adjustment. 1 southbound bus stop in Avoca St converted to in-lane stop.
11. Bronte Rd	Poor	Adjusted cross section btw Spring & Ebley Sts which requires low impact adjustment to 2 very busy bus stops – one in each direction. 19 busy bus stops btw Ebley St and Avoca St; northbound stops may require conversion to in-lane stops. This is the key factor informing the route performance.
12. Carrington Rd	Neutral	8 bus stops along Carrington Rd – 3 northbound, 5 southbound; 30 minute service; minor adjustments to northbound stops. 6 busy bus stops along Frenchmans Rd; northbound stops may require conversion to in-lane stops. This is the key factor informing the route performance.
13. Bronte & Carrington Rds	Poor	Adjusted cross section btw Spring & Ebley Sts which requires low impact adjustment to 2 very busy bus stops – one in each direction. 6 busy bus stops btw Ebley St and Carrington Rd; northbound stops may require conversion to in-lane stops. This is a key factor informing the route performance. 6 bus stops along Carrington Rd – 3 each way 30 minute service; minor adjustments to northbound stops. 6 busy bus stops along Frenchmans Rd; northbound stops may require conversion to in-lane stops. This is a key factor informing the route performance.

* Bus stop totals are for both sides of street. These will only be directly impacted if on the same side of the street as the cycleway.

Business and Community Impacts

Table 6.7 shows a comparative assessment for business and community impacts. These relate to the likely effect on business operations and active street life.

The City of Sydney has constructed in excess of five major separated cycleways during the past decade. Experience with these projects has shown that it is possible and desirable to work closely with business and the community to ensure that their practical needs are met in relation to deliveries, customer access and driveway access. A number of specialised treatments have been developed to cater for specific site requirements such as: special driveway and loading zone markings, regulation width loading zones with matching cycleway indent, raised sections of cycleways at commercial driveways to lessen the impact of street crossfall.



Table 6.7 – Comparative options assessment for business and community impacts

Route	Performance	Notes
2. Denison St	Excellent	No loading zones or taxi ranks. Low impact on street activity.
3. Newland St	Excellent	No loading zones or taxi ranks. Low impact on street activity.
4. Brisbane/ Bourke Sts	Excellent	There are two special zones north of Ebley St for Police vehicles and a public drop off zone, which are not affected by the proposals. No loading zones or taxi ranks. Low impact on street activity.
5. Bronte Rd	Neutral	There are two special zones north of Ebley St for Police vehicles and a public drop off zone, which are not affected by the proposed works. There are various loading zones, taxi ranks and other special zones south of Ebley St and while these are not directly affected by the proposals they require careful management through the design and implementation process.
6. Carrington Rd	Good	There is one special zone along Frenchmans Rd which is not directly affected by the proposals; careful management is required through the design and implementation process. No loading zones or taxi ranks elsewhere along the route. Low impact on street activity.
7. Bronte & Carrington Rds	Neutral	There are two special zones north of Ebley St for Police vehicles and a public drop off zone, which are not affected by the proposed works. There are various loading zones, taxi ranks and other special zones south of Ebley St (mostly along Bronte Rd) and while these are not directly affected by the proposals they require careful management through the design and implementation process.

Construction Impacts

The construction of a separated cycleway can have a major impact on traffic flow, business traffic (passing trade), bus operations and pedestrian access and amenity. Experience from the City of Sydney cycleway projects has shown that, to a large extent, the way construction is undertaken should always attempt to balance community impacts and cost. City of Sydney cycleway construction is generally carried out block by block to minimise full street impact with worksites strictly limited to the physical area of the cycleway, ensuring pedestrian and vehicular access around the site. Areas of high activity need special attention and timing of works to minimise impacts.

Early feedback from the construction of the Spring Street / Oxford Street cycleway indicates the need to diligently manage construction noise, pedestrian/customer access, parking, waste collection, and damage and disruption to utilities.



Other potential construction impacts to consider for Bronte Road and other routes includes access and safety of school children (esp at drop off/pick up times), bus timetabling impacts, traffic flow impacts, and pedestrian and cyclist safety.

Table 6.8 – Comparative options assessment for construction impacts

Route	Performance	Notes
2. Denison St	Good	Significant construction works are limited to two short sections of bi-directional separated cycleway along the northern end of Denison St and Queens Park Rd. Some impacts of new signalised crossings should these be required. The Bicycle Boulevard sections may require some low impact enhancements to traffic calming.
3. Newland St	Good	Significant construction works are limited to a short section of bi-directional separated cycleway along the northern end of Newland St. Some impacts on pedestrian access during construction of the uni-directional facilities Some impacts of new signalised crossings should these be required. The Bicycle Boulevard sections may require some low impact enhancements to traffic calming.
4. Brisbane/ Bourke Sts	Excellent	Significant construction works are limited to a short section of bi-directional separated cycleway north of Ebley St. Some impacts of new signalised crossings, should these be required. The Bicycle Boulevard sections may require some low impact enhancements to traffic calming and pavement rehabilitation.
5. Bronte Rd	Neutral	Assuming the works associated with the cycleway are fully integrated with current council programs for streetscape improvements, there are few or no direct construction impacts associated with the cycleway itself, although of course the impacts remain.
6. Carrington Rd	Poor	Significant construction impacts along the northbound side of whole route due to the required cross section.
7. Bronte & Carrington Rds	Neutral	Assuming the works along Bronte Rd are fully integrated with current council programs for streetscape improvements, there are few or no direct construction impacts associated with the cycleway itself, although of course the impacts remain. With an agile design approach, it may be feasible to avoid much of the construction impacts along Carrington Rd.



Impacts on Events

Council, the community, business and others arrange for various events throughout the year and throughout Waverley, eg markets, street fairs, etc. One specific event in the study area is in the Victoria Street carpark, which does not affect the operations of a future cycleway. There are regular sporting events in Queens Park which may occasionally affect the operations of the Shared Path, esp on Saturdays.

Table 6.9 – Comparative options assessment for impacts on events

Route	Performance	Notes
2. Denison St	Good	Regular sporting events in Queens Park which may occasionally affect the operations of the Shared Path, esp on Saturdays.
3. Newland St	Good	Regular sporting events in Queens Park which may occasionally affect the operations of the Shared Path, esp on Saturdays.
4. Brisbane/ Bourke Sts	Good	Regular sporting events in Queens Park which may occasionally affect the operations of the Shared Path, esp on Saturdays.
5. Bronte Rd	Excellent	No known events.
6. Carrington Rd	Excellent	No known events.
7. Bronte & Carrington Rds	Excellent	No known events.

Impacts on Other Council Initiatives

Council's forward works and planning programs include a range of initiatives for improvements to the public domain, road safety and other community activities. Key examples include the Village Centres Strategy (Waverley, 2019.4 and 2020.3), streetscape improvements along Bronte Road, and the introduction of 40km/h in Zone 1.

Table 6.10 – Comparative options assessment for impacts on other Council initiatives

Route	Performance	Notes
2. Denison St	Excellent	Introduction of 40km/h in Zone 1.
3. Newland St	Excellent	Introduction of 40km/h in Zone 1.
4. Brisbane/ Bourke Sts	Excellent	Introduction of 40km/h in Zone 1.
5. Bronte Rd	Excellent	Village Centres Strategy. Bronte Road streetscape improvements.
6. Carrington Rd	Neutral	None.
7. Bronte & Carrington Rds	Excellent	Village Centres Strategy. Bronte Road streetscape improvements.



6.4 Place

As discussed in Section 4.3, the *Movement and Place* framework by the Government Architect of NSW and Transport for NSW is an important aspect of the NSW Government long term planning strategies. It creates a shared language and approach to help all stakeholders achieve better place outcomes for the people of NSW.

Table 6.11 – Comparative options assessment for *Place*

Route	Performance	Notes
2. Denison St	Neutral	Links with <i>Places</i> at Bondi Junction, Queens Park, Centennial Park. Does not connect with the Charing Cross shops.
3. Newland St	Neutral	Links with <i>Places</i> at Bondi Junction, Queens Park, Centennial Park. Does not connect with the Charing Cross shops.
4. Brisbane/ Bourke Sts	Neutral	Links with <i>Places</i> at Bondi Junction, Queens Park, Centennial Park. Does not connect with the Charing Cross shops.
5. Bronte Rd	Excellent	Links with <i>Places</i> at Bondi Junction, Bronte Rd (Ebley St to Birrell St), Charing Cross shops, Queens Park, Frenchmans Rd shops. Adds to opportunities to enhance Council's Bronte Rd streetscape improvement program. While the proposed pathside bi-directional cycleway affects footpath widths, these impacts are expected to be off-set by an agile design response and the streetscape improvement program.
6. Carrington Rd	Good	Links with <i>Places</i> at Bondi Junction, Queens Park, Charing Cross shops, Frenchmans Rd shops. While the proposed pathside bi-directional cycleway affects footpath widths, these impacts are expected to be off-set by an agile design response.
7. Bronte & Carrington Rds	Excellent	Links with <i>Places</i> at Bondi Junction, Bronte Rd (Ebley St to Birrell St), Charing Cross shops, Queens Park, Frenchmans Rd shops. Adds to opportunities to enhance Council's Bronte Rd streetscape improvement program. While the proposed pathside bi-directional cycleway affects footpath widths, these impacts are expected to be off-set by an agile design response and the streetscape improvement program.



6.5 Overall Route Options Evaluation and Recommendations

Based on the route options analysis summarised in Table 6.12, Route 4 and Route 5 perform equally well. Route 7 is very similar to Route 5 and performs equally well. The other three routes perform significantly less well.

Route 4 closely follows the desire line between the two end points at Bondi Junction and Randwick. It is recognised in both the 2013 Waverley Bike Plan and the TfNSW Principal Bicycle Network (Tier 2). It is earmarked as the route from Bondi Junction to UNSW. The route is particularly attractive from a cost and constructability perspective as it requires no major investment, other than a short section of bi-directional separated cycleway north of Ebley Street and possibly two new signalised crossing facilities (at Darley Road and Clovelly Road). The rest of the route relies on existing local streets with minor enhancements to traffic calming and pavement quality as part of a Bicycle Boulevard treatment. Arguably, Bicycle Boulevards are not suitable for the Sydney Principal Bicycle Network Tier 1 network. It appears feasible to provide a separated facility along Bourke Street (and Market Street) but probably not along Brisbane Street due to its narrower cross section and tree canopy. A further drawback is that this route (compared to Route 5) is off the main ridge line and grades can be difficult for some users. There is an opportunity to shorten the route by about 500m through a new, more direct connection through Queens Park from Bourke Street to Market Street, between the playing fields. To some extent, this connection is recognised in the Queens Park Masterplan, although it may be preferred as a pedestrian only link.

Route 5 along Bronte Road is recognised as a Tier 1 route in the TfNSW Principal Bicycle Network. To a large extent this route is currently preferred by many cyclists due its gradient. It offers superior performance for access to services, schools, retail, etc (Network Connectivity, *Place*). On the other hand, these services, etc create a complex environment, which is intensified by frequent bus services, general traffic and parking. As discussed in Section 2.7, a blanket design with a bi-directional cycleway (kerbside, pathside or otherwise) is not likely to be effective and a more refined design approach is required, which responds more closely to localised changes in land-use and traffic patterns with a variety of cycling facilities and cross sections. This requires significant investment and forward planning. Council has a number of streetscape and urban design plans for much of Bronte Road, which may be able to counter or off-set some of these requirements, eg under-grounding of utilities and any changes to parking patterns.

Route 7 is very similar to Route 5, using Carrington Road south of Victoria Street rather than Bronte Road. On the one hand, this slightly shortens the route and improves travel times. On the other hand, the construction costs and impacts cannot be off-set against Council's streetscape improvement program along Bronte Road. These differences are relatively subtle and do not significantly change the evaluation outcomes.

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Table 6.12 – Overall comparative options assessment

Route	Directness	Network connectivity	Suitability for a Tier 1 route	Corridor width and traffic constraints	Constructability and costs	Maintenance and revenue	Land ownership and government approvals	Travel time	Gradient	Sun protection / tree coverage	Safety & personal security	Parking impacts	Bus impacts	Business community impacts	Construction impacts	Impacts on events	Impacts on Council initiatives	Place	Total score
2. Denison St	3	4	2	4	4	4	4	4	2	3	3	5	4	5	4	4	5	3	67
3. Newland St	4	4	2	2	3	3	4	3	2	3	4	2	4	5	4	4	5	3	61
4. Brisbane/ Bourke Sts	4	4	2	4	4	4	4	5	2	3	4	5	4	5	5	4	5	3	71
5. Bronte Rd	4	5	5	3	4	3	3	5	4	2	5	5	2	3	3	5	5	5	71
6. Carrington Rd	2	4	5	3	3	4	3	2	3	2	5	5	3	4	2	5	3	4	62
7. Bronte & Carrington Rds	4	4	5	3	4	3	3	5	4	2	5	5	2	3	3	5	5	5	70



7 Conclusions and Recommendations

This independent analysis has identified two routes as performing equally strong – Route 4 via Brisbane Street and Bourke Street; and Route 5 via Bronte Road. Both routes form part of the regional cycleway network and are recognised as such in local and/or State plans and strategies.

Route 7 is very similar to Route 5 and performs almost as well.

In implementing one or more route options there are various ways to capitalise on their strengths, address any weaknesses, seize opportunities and mitigate threats.

7.1 Route 4 – Brisbane & Bourke Streets

Strengths

The route provides a direct connection between Bondi Junction and Randwick Junction and follows closely the main desire line. It provides one of the most direct alignments and competitive travel times. It is supported by current bicycle plans and safety strategies and is among the most cost-effective for construction.

Weaknesses

The section along the existing Shared Path through Queens Park presents a slight detour off the desire line and also introduces potential for conflict with pedestrians, especially during sporting events which can be intensive on Saturdays. There is likely to be a need to upgrade the Shared Path in Queens Park to a Separated Path. To some extent the Park recognises this as is evident through the current design for the proposed Separated Path along Darley Road, east of York Road⁵. The Park Masterplan also acknowledges a more direct link between Bourke Street and Market Street (about 500m reduction in length), although such a route may be for pedestrians only given its proximity to playing fields.

For much of its length, the route consists of Bicycle Boulevards treatments, which arguably are not ideal for the Tier 1 Sydney Principal Bicycle Network. It appears feasible to provide a separated facility along Bourke Street (and Market Street) but probably not along Brisbane Street due to its narrower cross section and tree canopy.

A further drawback is that this route (compared to Routes 5 and 7) is off the main ridge line and grades can be difficult for some users.

⁵ Design approved; awaiting funding.



7.2 Routes 5 and 7 – Bronte Road (and Carrington Road)

Strengths

To a large extent Route 5 is currently preferred by many cyclists due its gradient. It offers superior performance for access to services, schools, retail, etc. Council has a number of streetscape and urban design plans for much of the route, which will support its significant investment and forward planning requirements.

Route 7 is slightly shorter than Route 5 but not all of its construction costs and impacts can be off-set against Council's streetscape improvement program along Bronte Road. These differences are relatively subtle and do not change the evaluation outcomes.

Weaknesses

The route operates in a complex environment that requires an agile and integrated approach to the planning and design of any new infrastructure in the corridor, which responds closely to localised changes in land-use and traffic patterns with a variety of cycling facilities and cross sections. Some broad concepts could include filtered-permeability measures to reduce through traffic but encouraging pedestrians, bikes, buses and local access to business; select locations with intense place-based investments based on "shared space" principles (eg the intersection of Bronte Road and Spring Street); more traditional sections to support longitudinal movement; and, increased setbacks for plazas at redevelopment sites.

While the proposed **pathside** bi-directional cycleway affects footpath widths, these impacts are expected to be off-set by the agile design response and the streetscape improvement program.

As indicated above, the construction costs and impacts of the required works are substantial, possibly a magnitude greater than that required for Route 4. Arguably, off-setting these costs against other Council programs is not equitable.

7.3 General

Opportunities

In the experience of other councils in implementing separated cycle facilities, principally City of Sydney, there is often initial opposition and resistance to changes in the urban streetscape. With careful implementation and after an early period of adjustment, it is likely that the community will embrace these facilities as a benefit.

City of Sydney has reported increased bicycle use (particularly with school age children) across its network since it began to roll out its core network of separated cycleways and similar high quality cycling facilities.

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Bicycle Boulevards have similar potential, noting well-documented evidence of the community and safety benefits of traffic calming generally. These streets are usually considered as more attractive and liveable places as they support a broad range of community activity for cyclists, pedestrians and drivers.

Threats

Potential impacts during both construction and operation of the route (such as to parking, loading, bus stops and bus operations) require careful management and agile responses, both at the design and construction stages. Ongoing monitoring on completion of the works may identify the need for further fine-tuning.

Early feedback from the construction of the Spring Street / Oxford Street cycleway indicates the need to diligently manage construction noise, pedestrian/customer access, parking, waste collection, and damage and disruption to utilities.



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Appendix A – Travel Times

Charing Cross Cycle Route Feasibility Study

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Mar-20



Nominal Bike Speed

20 km/h

Dist (m)	Travel Time (min)			Route	% Shortest	Impediments
	% Nominal Speed	100%	80%	60%		
100		0.3	0.4	0.5		
200		0.6	0.8	1.0		
300		0.9	1.1	1.5		
400		1.2	1.5	2.0		
500		1.5	1.9	2.5		
600		1.8	2.3	3.0		
700		2.1	2.6	3.5		
800		2.4	3.0	4.0		
900		2.7	3.4	4.5		
1000		3.0	3.8	5.0		
1100		3.3	4.1	5.5		
1200		3.6	4.5	6.0		
1300		3.9	4.9	6.5		
1400		4.2	5.3	7.0		
1500		4.5	5.6	7.5		
1600		4.8	6.0	8.0		
1700		5.1	6.4	8.5		
1800		5.4	6.8	9.0		
1900		5.7	7.1	9.5		
2000		6.0	7.5	10.0		
2100		6.3	7.9	10.5		
2200		6.6	8.3	11.0		
2300		6.9	8.6	11.5		
2400		7.2	9.0	12.0		
2480		7.4	9.3	12.4	Route 3	100%
2500		7.5	9.4	12.5		10
2510		7.5	9.4	12.6	Route 7	76%
2540		7.6	9.5	12.7	Route 4	77%
2600		7.8	9.8	13.0		6
2650		8.0	9.9	13.3	Route 5	80%
2700		8.1	10.1	13.5		
2800		8.4	10.5	14.0		
2830		8.5	10.6	14.2	Route 2	86%
2900		8.7	10.9	14.5		7
3000		9.0	11.3	15.0		
3050		9.2	11.4	15.3	Route 6	123%
3100		9.3	11.6	15.5		9
3200		9.6	12.0	16.0		
3300		9.9	12.4	16.5		
3400		10.2	12.8	17.0		
3500		10.5	13.1	17.5	Route 8	141%
3600		10.8	13.5	18.0	Route 1	109%
3700		11.1	13.9	18.5		6
3800		11.4	14.3	19.0		
3900		11.7	14.6	19.5		
4000		12.0	15.0	20.0		
20000		60.0	75.0	100.0		

Notes

1 - Distance for each route from Table 5.1

2 - Impediments for each route from Table 6.1, incl traffic signals, non-priority crossings, climbs and shared paths

Appendix B – Cycleway Route Option Sketches



PLAN
SCALE 1:2000



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B	FINAL ISSUE		02.07.20
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CHARING CROSS
ROUTE 4 - BRISBANE STREET / BOURKE STREET
PLAN - SHEET 1 OF 2



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approved (PD) SK101



- RE-MARKING/REALIGNMENT OF ROAD LINES REMOVING THE EXISTING CYCLEWAY THAT IS RUNNING ALONG THE NORTHERN SIDE OF THE ROAD
- TIE INTO DARLEY ROAD CYCLEWAY
- UPGRADE EXISTING SHARED PATH WITHIN THE PARK

PLAN
SCALE 1:2000

LEGEND:

- PROPOSED BI-DIRECTIONAL CYCLEWAY
- INDICATIVE ROUTE OUTSIDE OF WAVERLEY COUNCIL LGA



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LEGEND:

- PROPOSED BI-DIRECTIONAL CYCLEWAY
- INDICATIVE ROUTE OUTSIDE OF WAVERLEY COUNCIL LGA

- REDUCE LANE WIDTHS OF KERBSIDE PARKING LANES IN BOTH DIRECTIONS
 - REMOVAL OF ROAD VERGE ON THE WESTERN SIDE OF THE ROAD
 - KERB REALIGNMENT ALONG WESTERN SIDE OF THE ROAD
 - 12 SIGNAGE POLES IMPACTED
 - 5 LIGHT/POWER POLES IMPACTED
 - 18 LARGE TREES TO BE REMOVED
- REDUCE LANE WIDTHS OF KERBSIDE PARKING LANES IN BOTH DIRECTIONS
 - REMOVAL OF APPROX 14 KERBSIDE PARKING SPACES ON THE WESTERN SIDE OF THE ROAD

PLAN
SCALE 1:2000



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LEGEND:

- PROPOSED BI-DIRECTIONAL CYCLEWAY
- INDICATIVE ROUTE OUTSIDE OF WAVERLEY COUNCIL LGA

PLAN
SCALE 1:2000



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Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	JZ/GdS	Matt Presswell	*On file	Lee Allen		02/07/20

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Waverley Council

Bronte Cutting Safety Upgrade Options Assessment Report

July 2020

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Appendices

Appendix A – Advisian Heritage Memorandum

Appendix B – Cutting Photograph Mosaics

Appendix C – Option Sketches

Appendix D – Rendered Sketches

1. Introduction

Bronte Cutting is located on Calga Place in Bronte and is a popular route for pedestrian and vehicle users, especially during the summer months. The popularity and the flow of traffic through this narrow section of road has given rise to safety concerns for those using it. Waverley Council (WC) has engaged GHD to undertake the design for the Bronte Cutting Safety Upgrades project.

1.1 Background

Bronte Cutting forms part of one of the most significant coastal walks in the world. The Bondi to Bronte coastal walk attracts an estimated one million walkers per year and during peak times (such as when the free Sculpture by the Sea event is held in Spring each year), as many as 500 pedestrians per hour. This causes a conflict between pedestrians and vehicles, as there is no pedestrian facilities in place to accommodate such high pedestrian numbers.

In addition to the Sculptures by the Sea event, the route serves multiple pedestrian user groups, including:

- Locals undertaking their daily exercise jogs/walks;
- Dog walkers;
- Walkers of all ages - the elderly, young people and children;
- Local and international tourists, both in organised tours and individually.

The overwhelming success of the walk has resulted in the need to review the existing 'weak spots' for pedestrians – most notably an almost 500 m stretch of Calga Place. In this location pedestrians walk on the road, mixing with vehicle traffic accessing beach parking. It is noted that WC is currently trialling a separated walkway (temporarily) through the cutting section on Calga Place, which required the removal of a stretch of the on-street parking.

Although there have been no recorded crashes between vehicles and pedestrians in the last five years, it is important to reach beyond crash statistics to understand the related issues of pedestrian comfort and convenience. Some examples of the pedestrian discomfort and inconveniences that are likely to occur at Bronte Cutting include:

- Moving aside for traffic;
- Waiting for a car to parallel park;
- Car door/s opening in their 'path'.

1.2 Scope of this report

The scope of works for this report includes the development and assessment of two design options that will improve pedestrian and vehicle movement on Calga Place, as well as improve pedestrian user safety through the cutting. The report will discuss the following two design options:

- Provision of a separated path for pedestrians along the eastern side of the cutting. This path will replace the temporary path installed by WC approximately 18 months ago, and will include the widening of the existing footpaths further north of the cutting where possible;
- Upgrade of the existing road to a shared space that facilitates the safety of both pedestrians and vehicles. The shared space or 'zone' will change the colour of the asphalt on Calga Place and widen the road corridor for pedestrians and vehicles to share.

2. Existing Conditions

2.1 Site overview

Calga Place is a one-way street that commences from Bronte Road and ends at Macpherson Street, with an approximate length of 470 m. The existing arrangement along the road comprises of two parallel parking lanes on either side of the road with one trafficable lane down the middle. A section of Calga Place to the north of the cutting has an existing concrete footpath along the eastern side of the road. The 135 m section of Calga Place through the cutting and the 107 m section to the south of the cutting does not have any permanent pedestrian infrastructure. As mentioned in Section 1.1, WC demarcated a temporary pedestrian walkway using temporary bollards through the cutting section by removing parking (22 spaces).

2.2 Traffic and pedestrian study

A traffic and pedestrian study was undertaken to understand the pedestrian and vehicle movements within the vicinity of the Bronte Cutting site. The traffic and pedestrian study analysed data from previous studies provided by Council, which included:

- The Bronte Village Streetscape Traffic Study by Bitzios Consulting in 2018;
- The Bronte Cutting Pedestrian Link Project Analysis by DJN Traffic and Safety Solutions in 2018.

As part of the study, GHD assessed the studies provided and summarised the existing conditions for pedestrians, vehicles, cyclists and parking. This section of the report will discuss these conditions and the safety impacts they have on the users.

2.2.1 Pedestrians

One million people use the Coastal Walk from Bronte to Bondi every year, and during peak times, as many as 500 pedestrians per hour use Calga Place (Bronte Cutting Pedestrian Link Project Analysis, DJN Traffic and Safety Solutions, 2018).

These peak times include:

- Summer months; and
- Sculpture by the Sea event that is held for three weeks in Spring.

A summary of the typical traffic volumes during the Sculptures by the Sea event is shown in Figure 2-1 below.

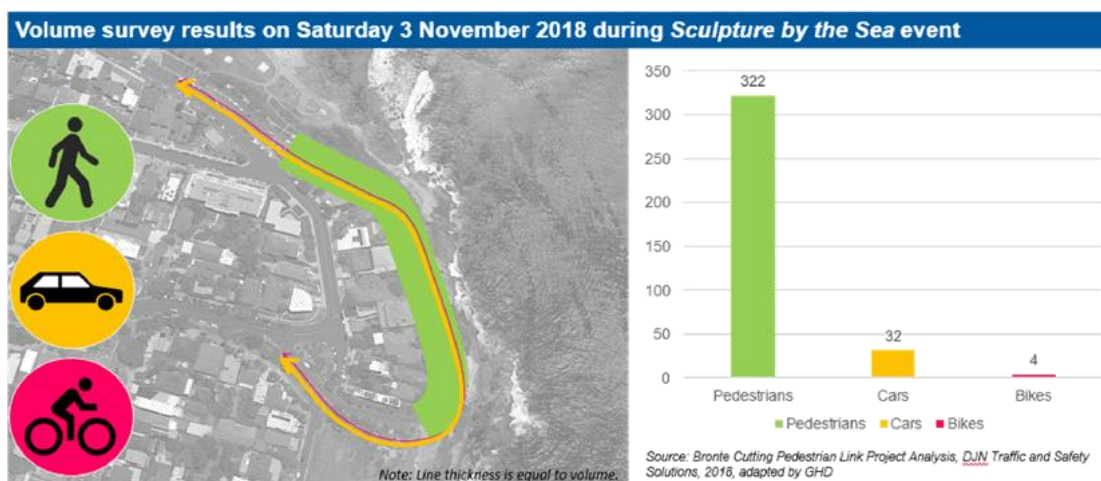


Figure 2-1 Volume survey during sculptures by the sea

The analysed data shows that a significant proportion of pedestrians frequent the area between the hours of 10 am to 2 pm and that movement is fairly even in both directions. The morning period outside of these hours also experiences high pedestrian volumes likely representative of morning walkers out for exercise.

The previous arrangement of Bronte Cutting, prior to the installation of the temporary walkway, where pedestrians were required to walk along the road as shown in (Figure 2-2), created the following problems:

- Safety:
 - On-road conflict between pedestrians and vehicles;
 - Car doors opening onto pedestrians;
 - Cars reversing into car parking spaces in high pedestrian activity area;
 - 'Jay-walking' occurs to a high degree across Bronte Road, suggesting that infrastructure in the area does not cater well for pedestrians.
- Comfort:
 - Pedestrians having to move to the side to let cars through;
 - Pedestrians not having 'right of way', including having to wait while cars are parking;
 - High stress environment for pedestrians with mobility issues including those using wheelchairs, mobility aides and parents/carers using pushers and walking with children.

The implementation of a temporary footpath (Figure 2-3) has assisted with the issues outlined above.



Figure 2-2 Bronte Cutting - configuration pre-October 2018



Figure 2-3 Bronte Cutting - configuration post October 2018

2.2.2 Cyclists

As shown by Figure 2-4, there are two existing routes for cyclists between the Bronte Shops and the Macpherson Street / Calga Place intersection. These are:

- Bronte Road and Macpherson Street (main route);
- Calga Place (secondary route).

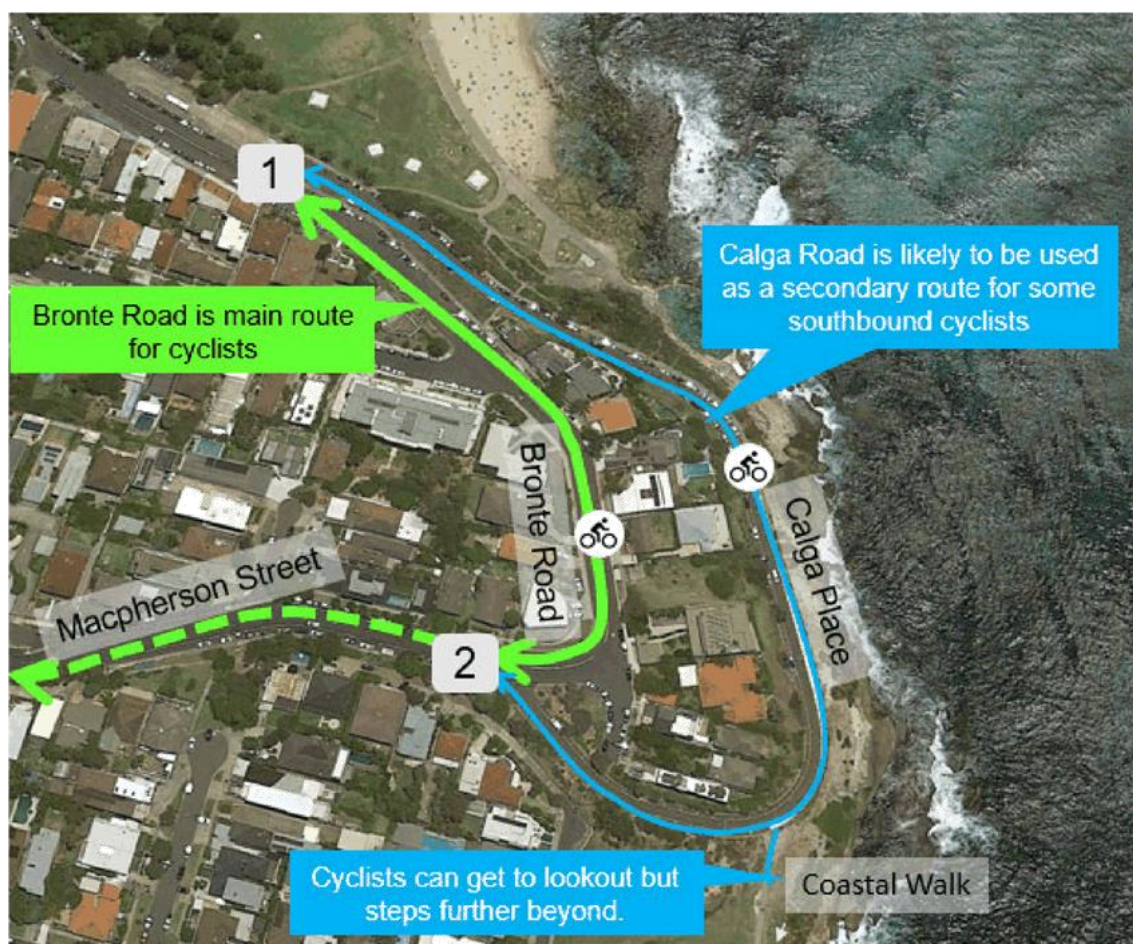


Figure 2-4 Cycle routes

It is likely that most cyclists will use the Bronte Road and Macpherson Street route, due to the route being shorter:

- 280 m on the Macpherson/Bronte route;
- 500 m on the Calga Place route.

However, Calga Place is likely to be used as an alternative route for cyclists who prefer a quieter and less steep road, as shown in Figure 2-5 below.



Figure 2-5 Gradient comparison between cycle routes

2.2.3 Vehicles

The annual average daily traffic (AADT) count for vehicles across the three counter locations, as shown in Figure 2-6, is 588 and falls within the $\pm 2\%$ difference of the actual recorded counts. Analysis of the traffic data identified the following:

- Vehicle traffic numbers at the three count locations are relatively similar, with an average over the three counters of 55 in the AM Peak and 46 in the PM Peak;
- A greater volume (19% greater) of vehicles is recorded in the morning peak as compared to the evening peak. This could be attributed to patrons accessing the beach area in the earlier hours of the day;
- The proportion of traffic volumes for a 7 day average across the three locations is consistent with the 5 day average. However, it is evident that a greater volume of vehicles is recorded. On average, there are 3 more vehicles in the AM Peak and 4 more vehicles in the PM Peak in the 7 day average.



Figure 2-6 Location of traffic survey

The signposted speed at Calga Place is 40 km/h, however the average vehicle speeds recorded through this area are lower and have been summarised below:

- The entry of Calga Place (3. Calga PI) showed the lowest speed of 17 km/h;
- The middle of Calga Place (4. Calga PI) showed the highest mean speed of 21 km/h;
- The exit of Calga Place (5. Calga PI) showed a mean speed of 19 km/h.

2.2.4 Parking

There are a number of parking areas in the study - and surrounding areas. The parking in these areas are time restricted and ticketed with varying restrictions. A summary of the parking zones in the vicinity of the project is provided in Figure 2-7.

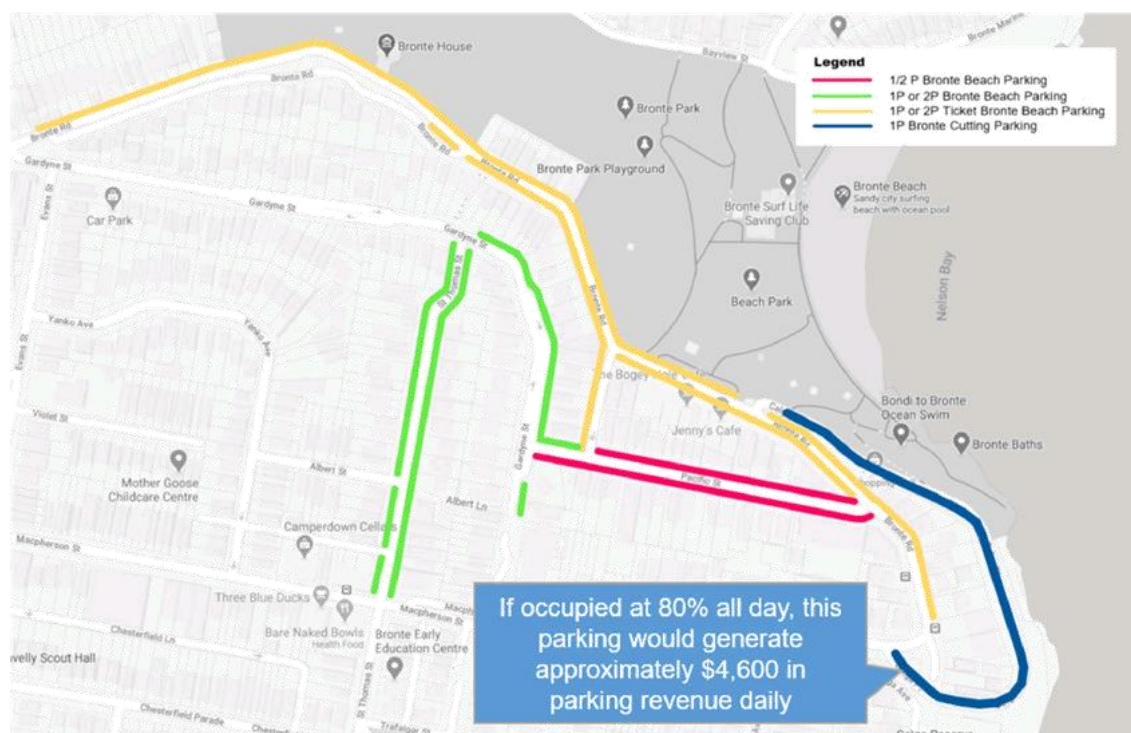


Figure 2-7 Parking zones

Bronte Cutting parking

The Bronte Cutting Parking Area is a seasonal ticket parking area with the following restrictions:

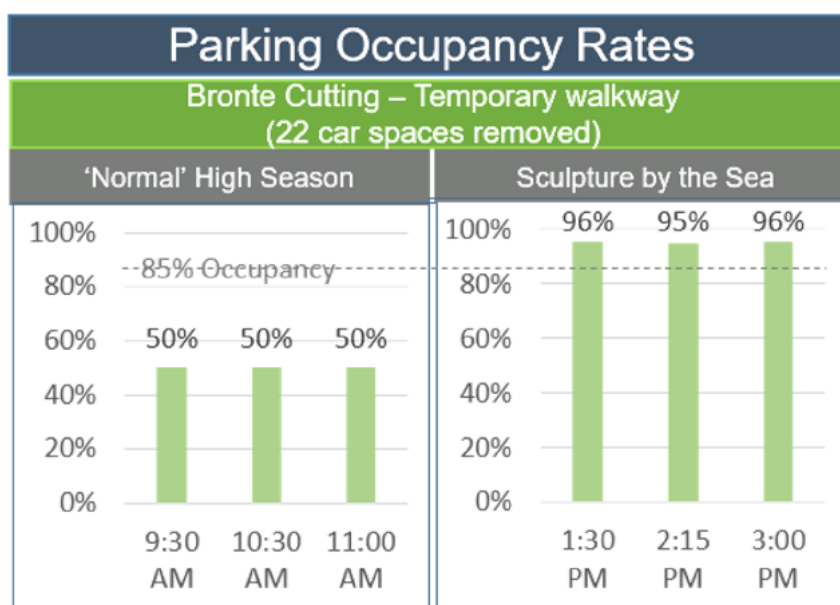
- 1P Ticket Parking 9am-8pm September through to May.

The Bronte Cutting car park includes:

- 140 parking spaces in total, including:
 - Two accessible (PWD) parking spaces;
 - Six Bronte Surf Life Saving permit spaces.

The temporary walkway implemented by WC on Calga Place in October 2018 has resulted in the removal of 22 spaces.

An analysis was undertaken on the parking occupancy rates after the construction of the temporary walkway. Figure 2-8 shows that on a 'normal' high season weekend there is an abundance of parking available with just 50% of parking being occupied. During the Sculpture by the Sea period, parking occupancy peaks to being in excess of 95% occupied. Usually an 85% occupancy rate is considered ideal.



Data Source: Bronte Cutting Pedestrian Link Project Analysis, DJN Traffic and Safety Solutions, 2018, adapted by GHD.

Note 1: Counts undertaken on Sat 3 Nov 2018 and Sat 17 Nov 2018

Note 2: No of vacant car spaces includes some disabled spaces and those available only for Council/Surf Rescue

Figure 2-8 Parking occupancy rates

2.2.5 Safety

Over the last 5 years, only three crashes were recorded with none resulting in fatalities. All crashes occurred during fine weather conditions, which does not indicate any trend. Table 1 and Figure 2-8 show the locations and types of crashes that have occurred.

Table 1 Crash analysis

ID	Location	Crash type	Weather	Surface condition
	Calga Place	Vehicle door	Fine	Dry
	Bronte Road	Off end of road	Fine	Dry
	Macpherson Street	Rear end	Fine	Dry



Source: Google Maps 2020 & TfNSW 2020, Modified by GHD

Figure 2-9 Crash locations

2.3 Lighting

Currently there is no lighting along Calga Place, reducing the experience of the coastal walkway for pedestrians. An objective of this project is to provide lighting to enhance the pedestrian experience in the early morning and late afternoon to evening. The design options have considered this objective in accordance with the Waverley Creative Lighting Strategy. Refer to Section 3.3 for GHD's proposed lighting design options.

2.4 Heritage

The site is located within the curtilage of the South Bronte Headland Landscape Conservation Area (LCA) and is in the vicinity of a number of other heritage items. Advisian was engaged to provide preliminary advice on the heritage aspects of the site and the impacts that each option would have.

The two main heritage elements listed within Advisian's Heritage Assessment which will be considered in the design are:

- The sandstone cutting through Calga Place - The sandstone cutting element of the LCA is a rare and significant modification to the natural landscape and is evidence of Sydney's tram network. The exposed sandstone is of exceptional historic and aesthetic historical interest;
- The sandstone cliffs and rock shelving - The LCA's sandstone cliffs and rock shelving is of "High" heritage significance to the Site. The sandstone cliffs are of high natural and scenic value and offer a vantage point for views along the coastline. Seating that has been

installed on to the sandstone cliffs do not detract from the significance of the element. This element is the key element in the LCA's significance.

As part of their assessment, Advisian also reviewed GHD's proposed design options, and provided the following feedback:

- Installation of a separated footpath along the eastern edge of the cutting is not anticipated to detract from the significance of the sandstone cutting element of the LGA. The footpath would also reduce the risk of vehicles damaging the cutting by relocating the parking to the west by 2 m;
- Changing Calga Place to a shared zone is considered to be minor to the heritage significance of the site, as the road is already a highly disturbed area and will not detract from the historic and rarity significance of the sandstone cutting element of the LCA;
- Installation of freestanding lights would have a moderate negative impact on the physical elements of the LCA and alter the aesthetic significance of the area through the contemporary addition of lighting elements;
- The installation of lighting poles that are fixed to the cutting would require drilling and bolting into the sandstone cutting which would have an irreversible impact on the sandstone cutting element of the LCA, which is graded as being of exceptional significance. This option is not recommended;

Based on the heritage elements and options discussed above, Advisian has recommended the following mitigation measures be considered in the development of the design:

- A Statement of Heritage Impact be prepared for the project;
- The design of the pedestrian walkway, including any art designs and other physical elements of the walkway, considers the visual setting of the surrounding locale and does not detract from the visual amenity of the LCA;
- Design should consider lighting options that do not involve drilling into the sandstone cutting and reversible interventions are preferred;
- Freestanding lighting pole design options should consider the context of the area as a significant heritage conservation area and be sympathetic to the surroundings. Where possible, lighting poles should have a minimalist design and seek to accentuate the elements of the LCA that are graded as being of high or exceptional heritage significance;
- In the event that historical archaeological resources are encountered, the Roads and Maritime Services Unexpected Heritage Items Heritage Procedure 02 (2015) is to be carried out.

Refer to Appendix A for Advisian's complete Heritage Memorandum.

2.5 Geotechnical conditions

As part of GHD's options assessment, a geotechnical site investigation of the cutting and surrounding area was undertaken. This section of the report presents and discusses the geotechnical site investigation and findings, which will be considered in the design going forward.

2.5.1 Geological setting

The Sydney 1:100,000 Geological Map (sheet 9130) shows the site lithology as Hawkesbury Sandstone, which typically comprises sub-horizontally bedded, medium to coarse grained quartz sandstone, with minor shale, mudstone, siltstone and laminate lenses.

2.5.2 Site walkover

An experienced GHD geotechnical engineer undertook a site walkover and high-level geological mapping on 11 June 2020. Both sides of the Calga Place cutting were appraised, including the 135 m section of footpath being considered in the options assessment, as described in Section 2.1 of this report. Observations from the site walkover are summarised below.

General

The surrounding topography is relatively steep, with approximately 30 m of elevation change between the top and bottom of Calga Place. The road is built at a consistent incline (suitable for trams at the time) with an average gradient of approximately 7%.

The 135 m section of footpath being considered is located within a box cutting through Hawkesbury Sandstone. The cutting is formed with vertical (90°) batters on either side of the road, with cutting heights ranging from 1 m up to 5 m above the current temporary footpath. The cutting extends up to 8 m high further along Calga Place, closer to Calga Avenue.

For the purposes of this geotechnical assessment, the full length of both cuttings were assessed with the eastern side (temporary footpath) covering Ch0 – Ch230 and the western side covering Ch0 – Ch220.

Sandstone cutting faces

The cutting generally exposed slightly weathered to fresh sandstone, with sub-horizontal bedding partings, with spacing generally observed to be between 0.3 m to 1 m or greater. Preferentially weathered beds were also observed, leading to some minor overhangs. The largest overhang has already been underpinned, located at approximately Ch65 on the eastern side, along the temporary footpath. Some overhangs (likely created during the road's construction) were observed opposite the footpath, approximately Ch85 on the western side.

Two sets of sub-vertical, orthogonally intersecting joints were observed within the bedrock, striking approximately NNE (~010°) & ESE (~100°). The joints were often discontinuous, constrained to single beds.

Figures 2-14 to 2-16 below show typical features observed in the rock cutting.



Figure 2-10 - Typical cutting face and small overhang



Figure 2-11 - Preferentially weathered beds and underpinned overhang

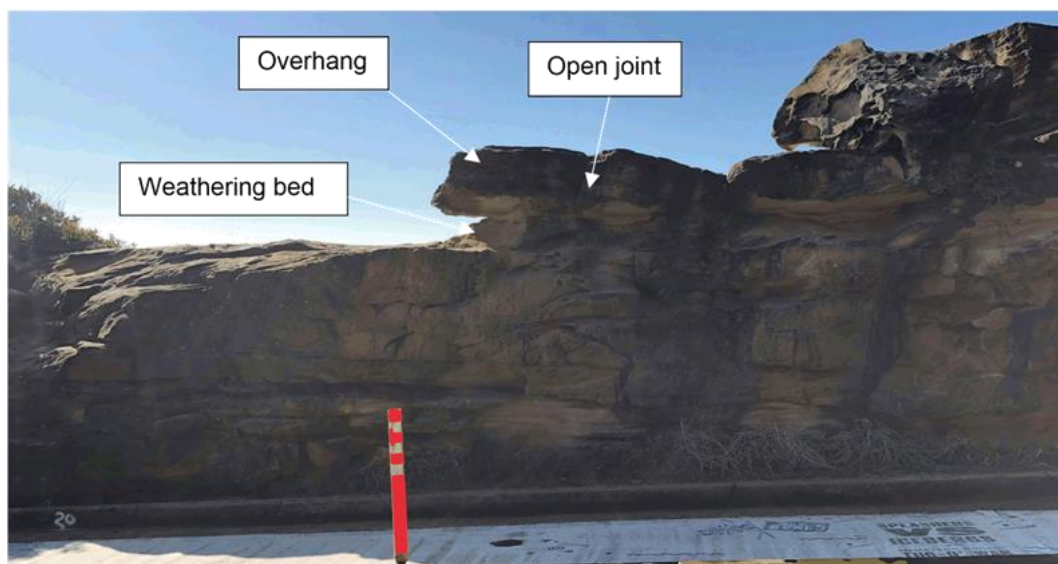


Figure 2-12 - Preferentially weathering beds causing undermining

Figure 2-12 shows an undermined sandstone overhang, caused by preferential weathering of the bed below. Adversely-oriented joints were observed in close proximity to the overhang, potentially allowing a block fall if the undermining further progresses. Potential hazards like this could occur along the cutting face and stabilisation should be considered during the later phases of design (outside of GHD's current scope).

Other notable features within the cutting have been highlighted in the photo mosaics found in Appendix B.

Cutting crests

The eastern crest is dominated by outcropping sandstone bedrock, with large defect driven steps formed by weathering and erosion. The western crest comprises a thin layer of soil overlying sandstone bedrock. Refer to Figure 2-13 and Figure 2-14.



Figure 2-13 - Eastern crest



Figure 2-14 - Western crest

Road formation

With the current temporary footpath being located solely within the box cutting, it is expected that there would be minimal fill below the pavement, likely associated with the construction of the pavement or legacy fill from previous uses of the cutting (tramway). It is expected that sandstone bedrock of similar condition observed in the cutting faces underlie the fill and could be classified as Class III or better sandstone. This is based on the classification system for Foundations on Sandstone and Shale in the Sydney Region, (Pells et al., 1998) and Geotechnical Parameters of Sydney Sandstone and Shale (Pells, Bertuizzi, 2002).

3. Design Options

As discussed in Section 1.2 of this report, GHD have considered two design options for the pedestrian safety improvements along Calga Place. These options include the following elements:

- Option 1 – Considers the replacement of the temporary walkway constructed by WC with a permanent concrete footpath that connects to the existing footpath to the north of the cutting and extends to Macpherson Street. This option also considers the widening of existing footpaths along Calga Place to the north of the cutting, where possible, to facilitate pedestrian usage.
- Option 2 – Considers converting Calga Place, starting at Bronte Road and ending at Macpherson Street, to a shared zone for both pedestrian and vehicle usage in accordance with Roads and Maritime Services (RMS) Technical Direction – Traffic Management and Road Safety Practice, TTD 2016/001. This option requires the removal of the existing footpath and relocation of existing parking spaces along the eastern side of Calga Place.

Alternative options that have also been considered include:

- Providing a path on top of the cutting with a viewing platform. This option proved to be infeasible due to the visual and construction impacts on the heritage conservation area;
- Alternative Option 1 arrangements, 1A and 1B, that include variances within Option 1 (see section 3.1.4);
- Alternative Option 2 arrangements, 2A, 2B and 2C, that include variances within Option 2 (see section 3.2.4).

3.1 Option 1 – Concrete footpath

Option 1 considers the removal of the temporary walkway (approximate length 130 m) along the eastern side of Bronte Cutting and replacing the temporary walkway with a permanent footpath. The permanent footpath will be installed from the start of the existing temporary walkway at the northern end of the cutting to the Calga Place intersection with Macpherson Street. Option 1 also seeks to improve pedestrian amenity further north of the cutting by widening existing footpaths along Calga Place to a minimum width of 2 m where possible.

Refer to Appendix C for sketch drawings of Option 1.

3.1.1 Civil and road infrastructure

Works associated with formalising the pedestrian footpath along Calga Place include:

- Removal of the temporary walkway and replacing it with a new 2 m wide concrete footpath (approximate length 130 m);
- Extending the 2 m wide concrete footpath to Macpherson Street (to be confirmed by Council);
- Widening existing concrete footpaths:
 - Approximate 90 m section of existing 1.2 – 1.5 m wide concrete footpath to be widened to 2.0 m wide;
 - Approximate 45 m section of existing 1.3 m wide concrete footpath to be widened to 1.8 m wide;
- Reconstruction of existing kerb and gutter for all footpath widening sections;

- New kerb and gutter where new pedestrian footpath is to be constructed;
- Re-marking of parking spaces impacted by footpath widening;
- Trafficable lane widths reduced up to a minimum of 2.8 m where existing footpaths are widened;
- Construction of new kerb inlet pits on the new kerb alignment with stormwater pipes to connect the new pits to the existing stormwater pits.

3.1.2 Traffic and parking

Option 1 will have the following impacts on traffic:

- Reduced lanes widths where the existing footpaths are widened could result in reduced traffic speeds;
- Permanent removal of 39 parking spaces along the eastern side of Bronte Cutting.

3.1.3 Key risks

The key risks associated with this option are:

- Pedestrians not using the footpath provided and choosing to walk on the road.

3.1.4 Alternative Option 1 arrangements

- Option 1A – Replacing only the temporary walkway section with a permanent footpath as per Option 1 without the extension to Macpherson Street, while also widening the existing footpath to the north of the cutting where possible. This option proposes to only construct a new footpath for Stage 1 and 2 of the works, which would result in 17 less parking spaces removed;
- Option 1B – Widening the existing footpaths from the northern end of Calga Place to the start of the cutting to a width of 2.5 m by realigning a section of the western kerb line and retaining wall near the steps from Bronte Road (refer to Figure 3-1 below). This option also considers reducing the traffic lane width within the cutting to 3 m, which provides an opportunity for a 3 m concrete footpath to be installed through the cutting. This option also provides a 1.2 m wide footpath from the southern end of the cutting to Macpherson Street while retaining parking along that section.



Figure 3-1: Proposed kerb and retaining wall realignment

3.2 Option 2 – Shared zone

Option 2 considers formalising a shared zone on Calga Place (Bronte Cutting) to manage pedestrian/vehicle conflicts in this low vehicle and high pedestrian activity area. The shared zone would feature a 10 km/h speed limit and require traffic calming devices to cause drivers to reduce their speed when travelling along Calga Place. Within a shared zone, pedestrian users have right of way over vehicles, which would significantly improve pedestrian safety.

Currently, Calga Place complies with the majority of the Transport for New South Wales' (TfNSW) Safer Speeds Policy and Guidelines SS/12/01 – Shared Zone Policy. A summary of these requirements has been provided in Table 2 below.

Table 2 Shared zone requirements

Warrant Requirements	Requirements Check	Degree Met
Current Traffic Flows – ≤ 100 vehicles per hour and ≤ 1000 vehicles per day	Peak hour vehicle volumes do not exceed 100 vehicles per hour	Degree met
Current Speed Limit – ≤ 50 km/h	Sign posted speed limit is 40 km/h	Degree met
Length of Proposed Shared Zone – ≤ 400 metres	Proposed shared zone area has approximate length of 460 m	Degree not met
Current Speed Limit of Adjoining Roads – ≤ 50 km/h	Adjoining roads are Bronte Road with a speed limit of 40 km/h and Macpherson Street with a speed limit of 50 km/h	Degree met

Warrant Requirements	Requirements Check	Degree Met
Current Carriageway Width – Minimum trafficable width of 2.8 m	Trafficable widths of Calga Place are greater than 3 m	Degree met
Route Access – Must not be located along bus route or heavy vehicle routes except delivery or garbage trucks	No bus routes or heavy vehicle routes service this road	Degree met
Streets with Narrow or No Footpath – Where pedestrians are forced to use the road	Pedestrians have little to no choice but to use the road to access this area	Degree met
Kerbs – Kerbs must be removed unless excepted by Roads and Maritime Services	Kerbs are currently in place due to current parking infrastructure and drainage system	Degree not met

As shown in Table 2, the length of the shared zone in GHD's design is currently 460 m for the full length of Calga Place, which is larger than the recommended maximum length of 400 m. The recommended length of 400 m is only a recommendation, and if required, the length of the shared zone can be extended to suit the requirements of the site.

In addition to the length of the existing shared zone, Calga Place has kerb and gutters along the eastern side of the road, which does not comply with the shared zone requirements listed in Table 2. GHD's design addresses this requirement, in Section 3.2.1, by removing the existing footpaths and relocating existing parking towards the eastern edge of Calga Place.

Refer to Appendix C for sketch drawings of Option 2.

3.2.1 Civil and road infrastructure

The impact of implementing a shared zone through the Bronte Cutting involves complying with RMS Technical Direction – Traffic Management and Road Safety Practice, TTD 2016/001, which requires:

- Additional signage throughout the extent of the shared zone, including signage advising the start and end of the shared zone, signage for vehicles to park in bays only, and give way to pedestrian signage;
- Additional traffic calming devices in the form of speed humps;
- Replacement of existing pavement surface with one of a different texture and colour;
- Realignment of the existing eastern kerb and gutter by 1 m to the east to allow for parking to be relocated to the east along the edge of the existing fence;
- Removal of existing footpaths;

In addition to the requirements of the RMS technical specifications, the following modifications will also be required to accommodate the shared zone along Calga Place:

- Installation of traffic barriers along the eastern edge of Calga Place to mitigate the risk of vehicles driving down the embankment;
- Installation of a capping beam or retaining wall along the eastern edge of the cutting to support the additional loads from vehicles parking along the edge of the road. The extent of

the retaining wall or capping beam is to be confirmed prior to the finalisation of the concept design should option 2 be selected as the preferred option;

- Modification of existing stormwater pits by installing new inlet pits within the new gutter alignment and connecting these pits to the existing stormwater pits.

3.2.2 Traffic

A shared zone will have the following impacts on the existing traffic conditions along Calga Place:

- A reduction of the existing speed limit (40 km/h) to 10 km/h would be required through the extent of the shared zone. As described in Section 2.2, existing traffic speeds are between 17 and 21 km/h;
- Pedestrians will have right of way, which will increase travel time along Calga Place;
- Relocation of parallel parking spaces along the eastern side of the road closer to the edge of the embankment. This will not impact the number of spaces available for parking (139 spaces).

3.2.3 Key risks

The key risks associated with this option are as follows:

- There is the risk that vehicles could drive over the embankment, which means barriers, bollards or other protection measures will be required along the eastern edge of Calga Place to mitigate this risk. This will have a significant impact on the construction costs for this option, and therefore a Provisional Sum for this has been allowed in the cost estimate of Option 2 (see Section 4);
- With the removal of the existing footpath, converting the area to a shared zone, and relocation of parking, vehicles will drive and will park close to the edge of the embankment on the eastern side of Calga Place. The embankment is not currently required to support these vehicle loadings, and parking vehicles in this zone could cause stability issues. Based on the visual site investigation undertaken by GHD's geotechnical engineer, during which differential settlement of the existing footpath in localised areas was observed (refer to Figure 3-2), the design for Option 2 will have to consider the installation of a retaining wall or capping beam along the eastern edge of Calga Place to mitigate the risk of embankment failure. A Provisional Sum has therefore been included in the cost for Option 2 (see Section 4) to allow for the construction of these mitigation measures. If selected as the preferred option, the next step for the design will require intrusive investigations of the eastern edge of the road to determine the extent of the retaining wall or capping beam required.



Figure 3-2: Existing footpath settlement and separation from kerb

3.2.4 Alternative Option 2 arrangements

- Option 2A – Includes a shared zone starting at Bronte Road and finishing at the end of the existing temporary walkway section, without the extension to Macpherson Street. This option would reduce the length of the proposed shared zone by 100 m (approximate length), which means it would comply with TfNSW's requirement for the shared zone (shorter than 400 m);
- Option 2B – Similar to Option 2, but instead of replacing the existing wearing course with a coloured wearing course, we allow for a colour coating / paint to be applied to the existing pavement surface. This is a much cheaper solution, but is less permanent and might require regular maintenance as the colour of the paint fades;
- Option 2C – Considers a shared zone along the eastern side of Calga Place, converting parking on the western side of the road from Bronte Road to the start of Bronte Cutting to 45 degree angled parking (52 angled parking spaces) and removing the parallel parking along the eastern side of the road (35 removed). This would result in a loss of 16 parking spaces along the length of Calga Place. This option was compared to Option 2, and due to the additional width required for the 45 degree parking, less space will be available for the shared zone than in Option 2, therefore this option was not considered in the cost estimates in Section 4 of this report.

3.3 Lighting

GHD's lighting design will look to split Calga Place into three different sections. The three different lighting sections would be based on the natural environment changing along the street and would be applicable for either of the two design options. The three different sections are shown in Figure 3-3 below.



Figure 3-3: Three different sections of Calga Place

It is proposed that pole top lighting would be used in Sections 1 and 3 as there appears to be sufficient space for new light poles to be installed on the side of the road. The lighting throughout Section 2 (Bronte Cutting) will likely have to be of a different type as the space is restricted in that section due to the sandstone on either side of the road. The lighting design will comply with Waverley Council's Creative Lighting Strategy (October 2018), which recommends a lighting level category of P4 or P5 for coastal walkways. The spacing of the lighting allowed for in the options assessment might change once further analysis is undertaken in the concept design stage.

3.3.1 Pole top lighting

The pole top lighting would have a similar specification to what is set out in the Waverley Creative Lighting Strategy and would provide a comfortable level of lighting for the pedestrian area. Refer to Figure 3-4 below for a potential option.



Figure 3-4 Pole top light installed at Bondi Beach

3.3.2 Other lighting options

Alternative lighting could be considered throughout Section 2 so that the effects on the sandstone throughout the cutting can be expressed in accordance with the Waverly Creative Lighting Strategy. Different lighting types for this area could include bollard lighting or in-ground lighting. Refer to Figure 3-5 below for potential options.



Figure 3-5: In-ground LED lighting on the left. Bollard lighting on the right.

3.3.3 Power requirements

Pedestrian lighting to the bus drop off area along Bronte Road was recently upgraded and this lighting is supplied from a main switchboard located in the corner of the bus drop off area. A meeting with Waverley Council on 16 June 2020 was held and it was confirmed in that meeting that there is sufficient space in the main switchboard to supply the lighting upgrades to Calga Place. Figure 3-6 below shows the location of main switchboard.



Figure 3-6: Location of existing private pillar and main switchboard

4. Cost Estimates

This section of the report provides a summary of the construction cost estimates for each of the design options discussed in section 3.

As discussed in section 3.2.3, a provisional sum has been included for Option 2 to allow for the installation of traffic barriers along the eastern kerb line. A provisional sum for embankment stabilisation is also included, should it prove to be required.

Table 3: Construction cost summary

Option	Total Cost	Staged Cost
Option 1	\$838,094	Stage 1: \$232,150 Stage 2: \$394,784 Stage 3: \$211,160
Option 1A	\$626,934	Stage 1: \$232,150 Stage 2: \$394,784
Option 1B	\$916,810	Stage 1: \$242,150 Stage 2: \$463,500 Stage 3: \$211,160
Option 2	\$1,209,126 (\$1,809,126 including provisional sums)	Stage 1: \$258,819 Stage 2: \$749,870 Stage 3: \$200,437 Traffic Barrier: \$100,000 (Prov. Sum) Slope Stabilisation: \$500,000 (Prov. Sum)
Option 2A	\$1,008,689 (\$1, 608,689 including provisional sums)	Stage 1: \$258,819 Stage 2: \$749,870 Traffic Barrier: \$100,000 (Prov. Sum) Slope Stabilisation: \$500,000 (Prov. Sum)
Option 2B	\$1,012,399 (\$1,612,399 including provisional sums)	Stage 1: \$204,243 Stage 2: \$647,902 Stage 3: \$160,254 Traffic Barrier: \$100,000 (Prov. Sum) Slope Stabilisation: \$500,000 (Prov. Sum)

The costs summarised in Table 3 are based on the preliminary cost estimates undertaken by Vasey Consulting and additional calculations using the Rawlinson's Construction Handbook (2020).

5. Options Comparison

The advantages and disadvantages of each option are summarised in Table 4.

Table 4 Pros and cons comparison for each base option

Option 1, Option 1A and Option 1B	
Advantages	Disadvantages
Existing temporary walkway has been tested and for the most part is working.	People can still be seen to walk on the road at times even with the implementation of the temporary walkway.
Widening of existing footpaths should incentivise pedestrian use.	Requires permanent removal of 39 parking spaces resulting in a loss of revenue for WC. (Can be reduced to 22 if parking is retained south of the cutting area).
Cheaper construction costs than Option 2	
Removal of parking spaces will lower the risk of car related damage to the side of the cutting area (heritage).	
Option 1B retains the parking spaces (17) between the cutting and Macpherson Street.	
Provides clear separation between pedestrians and vehicles	
Option 2, Option 2A and Option 2B	
Advantages	Disadvantages
Increased safety for pedestrians who currently choose to walk on the road rather than use the temporary walkway provided.	Requires replacement of a significant area of road pavement with paving / other textured material - recolouring of large amounts of pavement.
Increased number of parking spaces	Will require night works / road closure to replace pavement.
	Most expensive to construct
	Required guard rails or traffic barriers along the eastern edge of the road
	Requires retaining walls or capping beams to stabilise embankment
	Will increase travel time along Calga Place for vehicles with pedestrians taking priority within the road

6. Conclusion / Recommendation

Based on the existing conditions discussed in section 2 of this report, GHD has undertaken a detailed options assessment for the safety upgrades to Calga Place and the Bronte Cutting within Bronte. The options assessment focussed on two different design solutions, with some minor alterations of these options also discussed as sub-options. Based on the assessments of the options, the following provides a short summary of each option, the risks and constraints associated with each option and provides Council with a recommendation for a preferred option.

Lighting – The preferred lighting solution will be based on the safety upgrade solution selected. Should Option 1 be selected, GHD recommends using poles with top lights in Stage 2 and 3, with bollard lights through the cutting section (Stage 1). If Option 2 is selected, poles with top lights will be the only solution along the full length of Calga Place. Option 2 will require more light poles with shorter spacing's in between due to the increased surface area that has to be illuminated to the specified lighting Category (P4 or P5) as per the Creative Lighting Strategy. Once the preferred pedestrian / traffic options are confirmed, GHD will undertake a detailed assessment of the lighting design to confirm the spacing's of the poles / bollards and the lighting category achievable.

Option 1 – Includes the provision of a new concrete footpath along the eastern end of Calga Place from the northern end of the cutting to Macpherson Street, which results in a loss of 39 parking spaces. It also allows for the widening of the existing footpath to the north of the cutting to a minimum width of 2 m. Option 1 is overall the second cheapest option, with the main risk being pedestrians not using the footpaths and deciding to walk on the road. The traffic lanes remains the same, which means vehicles speeds will remain similar to the existing.

Option 1A – Includes the same upgrades as in Option 1, but does not allow for the construction of the Stage 3 works, which is the footpath that runs from the southern end of the cutting to Macpherson Street. Option 1A results in a loss of only 22 parking spaces in comparison to Option 1's 39 spaces, but has similar risks, with the trafficable lanes staying the same and the footpath widths being limited to 2 m. This option is the cheapest of all the options discussed, but mainly due to the exclusion of the Stage 3 works from the scope.

Option 1B – Proposes to reduce the trafficable lane width to 3 m for the full length of Calga Place and realign a 50 m section of the existing kerb and retaining wall along the western edge of the road near the steps from Bronte Road. This will allow the installation of a new 3 m wide concrete footpath through the cutting, and widening of the existing footpaths north of the cutting to 2.5-3 m. Option 1B also allows for the installation of a 1-1.2 m wide footpath to the south of the cutting to connect to Macpherson Street, while also retaining the 17 parking spaces through this section. The risk of pedestrians using the road for travel is reduced for this option due to the reduced traffic lanes and the widened footpaths. Option 1B is the most expensive of all Option 1 alternatives, but has the least impacts and risks for pedestrian and vehicle users.

Option 2 – Includes changing Calga Place to a shared zone for pedestrians and vehicles to use. This option requires the changing of the pavement colour and surface type, as well as the removal of all the existing footpaths along the eastern edge of the road. Option 2 would provide a shared zone corridor width of 4 m through the cutting and 4-5.8 m to the north of the cutting in which pedestrians and vehicles can move freely. Option 2 is the most expensive option of all the options, and has the most significant risks. By removing the footpaths along the eastern edge of Calga Place, the road will require a guard rail or traffic barrier to protect vehicles from driving down the embankment, which adds additional costs to the option. The other risk is the stability of the embankment, which isn't currently affected by vehicle loads due to the 2 m wide footpath. Once the footpath is removed, vehicles will be parking within 500 mm of the edge of the

embankment, which could have a significant impact on the stability of the slope. Based on the risks for this option, and the early signs of differential settlement of the footpath noted on site, GHD recommends including a provisional sum of \$500,000 for the construction of retaining walls or capping beams to mitigate the risk of embankment failure.

Option 2A – Similar to Option 2, but does not allow for the construction of the works within Stage 3. Option 2A is slightly cheaper than Option 2, but has all the same risks and is significantly more expensive than any of the Option 1 solutions.

Option 2B – Similar to Option 2, but instead of replacing the existing wearing course (WC) of the road with a coloured WC, Option 2 proposes the use of a paint coating to colour the existing pavement. This is the cheapest solution of all three Option 2 alternatives, but is a less permanent solution and still carries the same risks as Option 2, which makes it significantly more expensive than Option 1.

Based on the summaries provided for each Option, GHD recommends Option 1B as the preferred design solution to be developed further. The recommendation is based on the significant risks that Option 2 has with regards to vehicle safety and embankment stability, which could also have significant cost implications for the project. Although Option 1B is slightly more expensive than the other Option 1 alternatives, it reduces the risks of pedestrians walking within the road by providing a much wider footpath and also reduces the width of the traffic lanes. It also retains the 17 parking spaces to the south of the cutting while installing a footpath to connect the cutting to Macpherson Street.

Appendices

Appendix A – Advisian Heritage Memorandum

Memorandum

Subject	Bronte Cutting Safety Upgrade – Heritage Advice for Options Considered		
Date	Wednesday, 24 June 2020	Pages	11
To	Guillaume de Swardt (GHD)	From	Thea Kane (Advisian)
CC	Waverley Council Claire Jones (Advisian)		
Project	Bronte Cutting Safety Upgrade		

Advisian provides the below preliminary advice on the potential impacts of the safety upgrade options proposed by GHD (the Client) and Waverley Council (the Council) on the heritage significance of the Bronte Cutting Pedestrian Link located within the curtilage of the "South Bronte Headland Landscape Conservation Area" (the LCA). These options are described by GHD as follows:

Option 1A – Replace the existing temporary footpath that the Council installed approximately 18 months ago with a permanent footpath along the eastern side of Calga Place with freestanding lighting poles.

Option 1B – Replace the existing temporary footpath that the Council installed approximately 18 months ago with a permanent footpath along the eastern side of Calga Place with lighting fixed to the sandstone cutting.

Option 2A – Change Calga Place to a pedestrian / vehicle shared zone with freestanding lighting poles.

Option 2B – Change Calga Place to a pedestrian / vehicle shared zone with lighting fixed to the sandstone cutting.

Option 3 – 'Do nothing'.

In preparing this advice, Advisian has reviewed the following information:

- Waverley Local Environmental Plan 2012 (the LEP).
- Waverley Development Control Plan 2012 (the DCP).
- NSW State Heritage Inventory (SHI).
- Aboriginal Heritage Information Management System (AHIMS).
- Draft State Heritage Inventory – South Bronte Landscape Conservation Area Extension.
- Photographs from Advisian site inspection on 5 June, 2020.
- Draft Waverley Cultural Plan 2020 – 2025.
- Waverley Aboriginal Cultural Heritage Study.

The Site and History

The proposed project footprint (the Site) consists of a one-way road known as Calga Place which makes up a portion of the Coastal Walk from Bronte to Bondi in Sydney's Eastern Suburbs. This portion of the Coastal Walk through Calga Place is commonly known as "*Bronte Cutting*" and does not include a permanent footpath for pedestrians. Over one million people use the Coastal Walk every year, and this missing link in the footpath through Bronte Cutting means that during peak times, as many as 500 pedestrians per hour are forced to walk along the road creating conflict between pedestrians and vehicles. A temporary footpath was implemented in November 2018 through the Bronte Cutting which temporarily replaced 20 car parking spaces on the eastern side of the road.

Prior to the appropriation of their lands by Europeans, the Sydney region was made up of over twenty different Aboriginal clan groups. The Waverley area formed part of the traditional lands of the clan known as the Cadi-gal (Dominic Steele Consulting Archaeology, 2009). The coastal cliffs along Calga Place were previously assessed as having Aboriginal archaeological potential, however there are no known deposits or items within the site.

The Bronte Cutting was constructed around 1910 to provide a suitable grade for trams out of Bronte Beach, which began running in 1911. Sydney trams were particularly important in providing access to the eastern beaches. The Bronte Cutting allowed the tramline to be extended to Bronte Beach from its previous terminus at Waverley Cemetery. The cultural fabric of the tram line at the Bronte Cutting corridor has remained virtually intact since construction, with the exception of removal of tram infrastructure (State Heritage Register, n.d.).

The Site (shown below in red) is located within the curtilage of the "*South Bronte Headland Landscape Conservation Area*" (No. C59) listed under Schedule 5 of the LEP, and in the vicinity of a number of other heritage items, as shown in Figure 1. GML Heritage (on behalf of the Council) prepared a draft State Heritage Inventory sheet for extending the current LCA to list the entire length of the Bronte Cutting to include the former tram terminus site at Bronte to Calga Cutting's junction with Macpherson Street. The extension would also include the current Bronte Bath heritage item (I280) and Calga Avenue Landscape Conservation Area (C32) and Bronte Reserve (not currently listed). The proposed extension is outlined in black in Figure 1 below.



Figure 1 Current LCA boundary and proposed extension of the LCA (Source: GLM Heritage, 2019)



Figure 3 Present day Bronte Cutting (Source: Advisian, 2020)

Bronte Cutting Safety Upgrade – Heritage Advice for Options Considered



Figure 2 Tram passing through the Bronte Cutting (Source: unknown, n.d.)

Advisian 4

Heritage Significance of the Site

For the purposes of providing an understanding of the heritage significance of the site and the context, the Statement of Significance of the "South Bronte Headland Landscape Conservation Area" from its State Heritage Inventory entry is provided as follows:

Outstanding sandstone cliffs and rock shelving of natural and scenic value. Vantage point for spectacular views along coastline. Conserves vestiges of native vegetation. Local significance.

The Assessment of Significance for the "South Bronte Headland Landscape Conservation Area" from its State Heritage Inventory entry records its significance as follows:

Table 1 NSW State Heritage Register Assessment of Significance

Criteria	"South Bronte Headland Landscape Conservation Area" Description
SHR Criteria c) [Aesthetic significance]	This item is of natural and streetscape/landscape significance

The above statement of significance and assessment of significance of the site does not take into account the rarity value and cultural history value associated with the site's history as a former tram route. A previous heritage item at the location named "Sandstone Cutting – Former Tram Route" was listed in the Waverley Local Environmental Plan 1996 but was not included in the current LEP. For this reason, Advisian has prepared an independent statement of significance and additional assessment of significance in line with the Council's proposed SHI extension for the LCA to account for the omission of former tram route elements in the current LCA's listing. Advisian's statement of significance is provided as follows:

South Bronte Headland Landscape Conservation Area has significant natural and cultural heritage values. The headland has significant aesthetic value for its outstanding sandstone cliffs and rock shelving which held in high esteem by locals and tourists who use the area to traverse the Bondi to Bronte Coastal Walk. Calga Place is a rare reminder of a former dedicated route for Sydney's trams, which were an important link to Sydney's eastern beaches. The cutting is direct evidence of the primary theme of transport and the exposure of natural sandstone is of high aesthetic and historical interest. The sandstone cutting has technical value as an engineering exemplar of early 20th century municipal council coastal landscape civic works to improve access to the city's beaches.

Advisian's Assessment of Significance has been developed in line with the Council's draft SHI extension for the LCA and is as follows:

Table 2 Advisian Assessment of Significance

Criteria	"South Bronte Headland Landscape Conservation Area" Description
SHR Criteria a) [Historical significance]	The LCA demonstrates development of coastal public lands and civic improvement as an integral part of the local history. It demonstrates the emergence of beach culture as an element of national identity

Criteria	"South Bronte Headland Landscape Conservation Area" Description
	that has shaped landscapes into significant cultural and recreational facilities. The LCA demonstrates the role public recreation and improved public transportation had on the development of Bronte as a tourism and residential destination from the late 19 th century and is of historical significance.
SHR Criteria c) [Aesthetic significance]	The South Bronte Headland has natural landscape significance and is one of a number of popular vantage points along the <i>Bondi to Bronte Coastal Walk</i> . The dramatic sandstone cliffs offer expansive views north toward Bondi Beach. The area is held in high esteem by local residents and tourists as a natural landscape setting.
SHR Criteria e) [Technical / research potential]	The LCA is of scientific significance as the cliffs of the LCA have been previously assessed as having potential to contain Aboriginal archaeological deposits, rock engravings, and grinding grooves.
SHR Criteria f) [Rarity]	The Bronte Cutting element of the LCA is a rare exemplar of landform modification for the purposes of establishing a dedicated tram route to the eastern beaches.

Grading of Significance

A grading of the main elements within the Site (Table 4) has been undertaken in accordance with Section 6 of the NSW Heritage Office's "*Assessing heritage significance*" guideline (Table 3) to determine which elements contribute to the heritage significance of the Site and inform the assessment of impact of the options.

Table 3 NSW Heritage Office's Gradings of Significance

Grading	Justification	Status
Exceptional	Rare or outstanding element directly contributing to an item's local and State significance	Fulfils criteria for local or State listing.
High	High degree of original fabric. Demonstrates a key element of the item's significance. Alterations do not detract from significance.	Fulfils criteria for local or State listing.
Moderate	Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the item.	Fulfils criteria for local or State listing.
Little	Alterations detract from significance. Difficult to interpret.	Does not fulfil criteria for local or State listing.
Intrusive	Damaging to the item's heritage significance	Does not fulfil criteria for local or State listing.

Table 4 Grading of the elements

Element	Grading	Assessment
Sandstone cutting through Calga Place	Exceptional	The sandstone cutting element of the LCA is a rare and significant modification to the natural landscape and is evidence of Sydney's tram network. The exposed sandstone is of exceptional historic and aesthetic historical interest.
Sandstone cliffs and rock shelving	High	<p>The LCA's sandstone cliffs and rock shelving is of "High" heritage significance to the Site. The sandstone cliffs are of high natural and scenic value and offer a vantage point for views along the coastline.</p> <p>Seating that has been installed on to the sandstone cliffs do not detract from the significance of the element.</p> <p>This element is the key element in the LCA's significance.</p>
Car parking spaces, car parking meters and bitumen road	Little / Intrusive	The car parking spaces, car parking meters and bitumen road are considered to detract from the significance of the LCA.
Native and introduced vegetation, some newly planted.	Little	Vegetation within the LCA are not original and some have been newly planted by the Council. Many of the species are introduced species. These are considered to be of little heritage significance.
Timber and steel fencing	Little / Intrusive	The timber and steel fencing along the Site detract from its heritage significance.
Turfed park area	Little	The grass park area connects the sandstone cutting part of the LCA to the "Bondi to Bronte Coastal Walk". The area is highly modified and includes a concrete path, water stations, a marble sculpture, council bins, park benches, and native vegetated areas. These elements detract from the heritage significance of the LCA.

Heritage Impact of Proposed Options

In consideration of the aforementioned sections which provided context for the heritage significance of the *Bronte Cutting* located within the curtilage of the LCA, Table 5 has assessed the potential impact of pedestrian link options on the conservation values of the Site.

Table 5 Preliminary Heritage Impact Assessment of Proposed Options

Works	Heritage Impact
Option 1A - Installation of a permanent footpath along the eastern side of Calga Place with freestanding lighting poles.	
Installation of permanent raised pedestrian footpath to replace existing temporary footpath along the eastern side of Calga Place.	The installation of a permanent footpath along the eastern side of Calga Place would be upon an existing highly disturbed section of the LCA. That section of the roadway has had a temporary footpath installed since November of 2018. This temporary

Works	Heritage Impact
Installation of freestanding lighting poles through the cutting.	<p>footpath has had inconsequential impacts on the LCA. The proposed permanent footpath would be visually similar to the existing temporary footpath, but would be raised approximately 20cm from the road surface.</p> <p>This option is not anticipated to detract from the significance of the sandstone cutting element of the LCA as this option would not include any physical changes to the exposed sandstone and will not detract from the historic importance of the element as a former tram route.</p> <p>The installation of a permanent footpath would remove car parking spaces on the eastern side of the roadway, which would lower the risk of car related damage to the side of the cutting area of the LCA.</p> <p>The installation of freestanding lights would have a moderate negative impact on the physical elements of the LCA and alter the aesthetic significance of the area through the contemporary addition of lighting elements.</p> <p>This option would have negative impacts on the elements of the LCA that are graded as having high to exceptional heritage significance, that is the sandstone cutting, and sandstone cliffs and rock shelving. These impacts could be managed through the adoption of appropriate mitigation measures.</p>
Option 1B - Installation of a permanent footpath along the eastern side of Calga Place with lighting fixed to the cutting.	
<p>Installation of permanent raised pedestrian footpath to replace existing temporary footpath along the eastern side of Calga Place.</p> <p>Installation of lighting fixed to the cutting.</p>	<p>Heritage impacts as above for the permanent footpath in Option 1A.</p> <p>The installation of lighting poles that are fixed to the cutting would require drilling and bolting into the sandstone cutting which would have an irreversible impact on the sandstone cutting element of the LCA which is graded as being of exceptional significance.</p> <p>This option would have a significant negative physical and aesthetic impact on the elements of the LCA that are graded as having high or exceptional heritage significance by creating irreversible lateral holes into the sandstone to hold lighting in place.</p>
Option 2A - Change Calga Place to a pedestrian / vehicle shared zone with freestanding lighting poles.	
<p>Resurfacing of Calga Place including removal of existing bitumen road.</p> <p>Installation of freestanding lighting poles through the cutting or installation of lighting poles fixed to the sandstone cutting.</p>	<p>Changing Calga Place to a pedestrian / vehicle shared zone would involve the resurfacing of the entire Calga Place through the Bronte Cutting. This option would include removing the existing road surface and installing paving through the Site. If a coloured asphalt is proposed, only a small layer of the existing asphalt would need to be removed.</p> <p>The physical impacts of resurfacing would be limited to the elements of the LCA that are graded as having little / intrusive</p>

Works	Heritage Impact
	<p>heritage significance, including car parking spaces, car parking meters and the bitumen road.</p> <p>The construction and operational impacts of this option is considered to be minor to the heritage significance of the Site, as the road is already a highly disturbed area and will not detract from the historic and rarity significance of the sandstone cutting element of the LCA.</p> <p>The installation of freestanding lights would have a moderate negative impact on the physical elements of the LCA and alter the aesthetic significance of the area through the contemporary addition of lighting elements.</p> <p>This option would have negative impacts on the elements of the LCA that are graded as having high to exceptional heritage significance, that is the sandstone cutting, and sandstone cliffs and rock shelving. These impacts could be managed through the adoption of appropriate mitigation measures.</p>
Option 2B - Change Calga Place to a pedestrian / vehicle shared zone with lighting fixed to the cutting	
<p>Resurfacing of Calga Place including removal of existing bitumen road.</p> <p>Installation of lighting fixed to the sandstone cutting.</p>	<p>Heritage impacts as above for resurfacing in Option 2A.</p> <p>The installation of lighting poles that are fixed to the cutting would require drilling and bolting into the sandstone cutting which would have an irreversible impact on the sandstone cutting element of the LCA which is graded as being of exceptional significance.</p> <p>This option would have a significant negative physical and aesthetic impact on the elements of the LCA that are graded as having high or exceptional heritage significance by creating irreversible lateral holes into the sandstone to hold lighting in place.</p>
Option 3 – ‘Do nothing’	
No works	<p>The ‘do nothing’ approach is not feasible on the basis of not fulfilling Council’s responsibility to provide safe pedestrian access at the Site.</p>

Recommended Mitigation Measures

The recommended management of works within the curtilage of “*South Bronte Headland Landscape Conservation Area*” is as follows:

- It is recommended that a Statement of Heritage Impact be prepared for the project.
- It is recommended that the design of the pedestrian walkway, including any art designs and other physical elements of the walkway, considers the visual setting of the surrounding locale and does not detract from the visual amenity of the LCA.

- It is recommended that lighting options that do not involve drilling into the sandstone cutting and are reversible interventions are preferred.
- Freestanding lighting pole design options should consider the context of the area as a significant heritage conservation area and be sympathetic to the surroundings. Where possible, lighting poles should have a minimalist design and seek to accentuate the elements of the LCA that are graded as being of high or exceptional heritage significance.
- In the event that historical archaeological resources are encountered, the *Roads and Maritime Services Unexpected Heritage Items Heritage Procedure 02* (2015) is to be carried out.

Aboriginal Heritage

The lands of the Cadi-gal people extended along the southern shore of Port Jackson from South Head to around Pyrmont. The southern boundary is less defined, however, it is believed to have reached to around present day Botany Bay. The Waverley area is thought to have represented around 10% of the area at the eastern end of Cadi-gal land and was possibly unoccupied during some parts of the year (Dominic Steele Consulting Archaeology, 2009).

Previous assessment of the coastal cliffs at Calga Avenue found the area has potential to contain Aboriginal archaeological deposits and / or rock engravings or grinding grooves, however there are currently no known Aboriginal cultural heritage items at the site (GML Heritage, 2019). The area is also mapped in the DCP as having high Aboriginal cultural sensitivity, requiring all developments in this area to gain consent and to exercise due diligence to determine whether an Aboriginal heritage impact permit (AHIP) is required for a project.

Background review

Waverley Aboriginal Cultural Heritage Study

The “*Waverley Aboriginal Cultural Heritage Study*” was prepared by Dominic Steele Consulting Archaeology in 2009 to research and identify Aboriginal cultural heritage sites documented to occur within the Waverley Local Government Area (LGA) for inclusion in the LEP. The document was established in consultation with the *La Perouse Local Aboriginal Land Council* and the *Dharawal Elders Group* to provide the Council with a recommended strategy for recording and managing currently undocumented items and sites of Aboriginal heritage within the Waverley LGA that may be identified within future development contexts.

The study resulted in the identification of eleven (11) Aboriginal cultural heritage sites for inclusion on the Waverley LEP 2010 (since superseded by the Waverley LEP 2012).

Aboriginal Heritage Information Management System Web Services Extensive Search Result

An extensive AHIMS Search was carried out on 5 June 2020 and showed that there is three (3) Aboriginal sites recorded within a 1km radius of Calga Place (Lot7123/DP1058515). These sites are given in Table 6 below. None of the Aboriginal cultural heritage items lie within 200 metres of the proposed Site, therefore the proposed works are not anticipated to have an impact on any of the below sites.

Table 6 AHIMS Extensive Search result

Site Name	Site ID	Site Feature/Types	Approximate distance from Site
Middle Head; Port Jackson*	45-6-0694	Art (pigment or engraved)	7000 metres
Tamarama Beach Cave	45-6-1947	Shell, artefact	750 metres
Marks Park; Tamarama, Bondi Beach	45-6-0750	Art (pigment or engraved)	950 metres

* This site has incorrect coordinates listed under the AHIMS and is in fact located at Middle Head and will therefore be discounted from this study.

Recommendations

It is recommended that the following be taken into consideration for the proposed works for the Bronte Cutting Safety Upgrade Project:

- Undertake an assessment of the potential impact on the Aboriginal site, given the scope of works, to determine whether the project is likely to impact Aboriginal cultural heritage. The assessment would be carried out with input from Council Heritage and Environmental Officers and in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW*.
- The assessment would determine whether:
 - The project is unlikely to harm Aboriginal cultural heritage on site and therefore would not require formal consultation with the Aboriginal community or any further assessment; or
 - The project is likely to harm Aboriginal cultural heritage (including objects) and would require formal consultation with Aboriginal stakeholders, preparation of an Aboriginal Cultural Heritage Assessment and submission of an application for an Aboriginal Heritage Impact Permit under Section 90 of the *National Parks and Wildlife Act 1974*, as required.
- In the event that Aboriginal archaeological resources are encountered, the *Roads and Maritime Services Unexpected Heritage Items Heritage Procedure 02* (2015) is to be carried out.

Appendix B – Cutting Photograph Mosaics




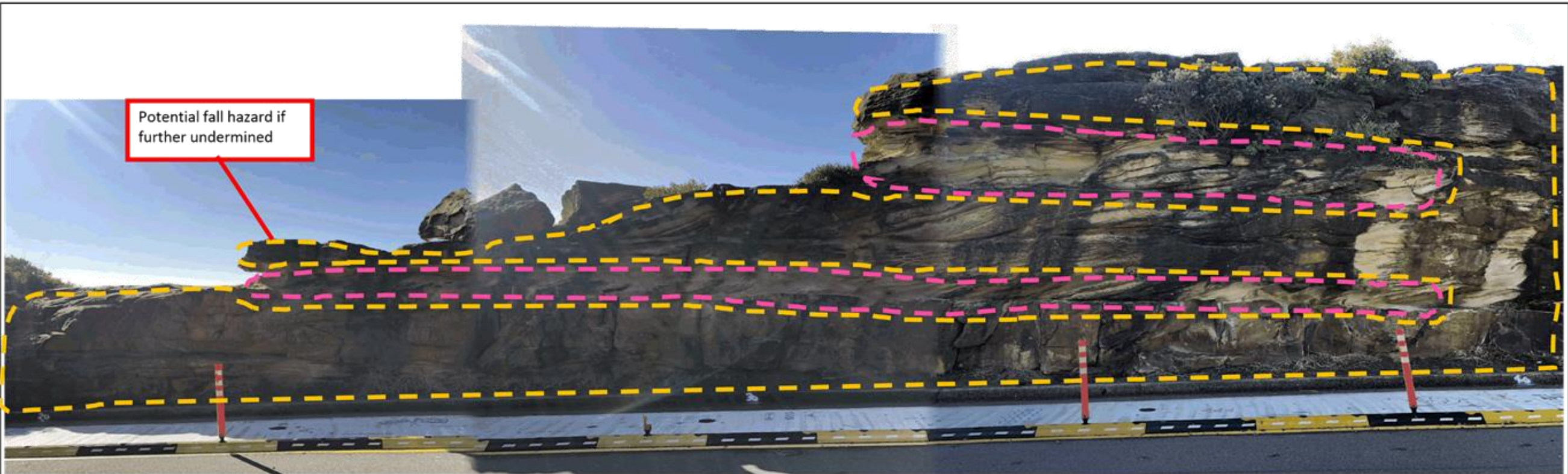
Legend

 Sandstone

Medium bedded


Slightly weathered

No	Revision	Date	Check	Auth		CLIENT: Waverly Council	Photomosaic Date: 11/06/2020	Sheet No: 1	of 12
A	Draft Preliminary Issue	30/06/20	JK			GEOLOGICAL MAPPING PHOTOMOSAICS	Mapped By: CT	Date: 16/06/2020	
						Location: East Bronte Cutting - Calga Place	Checked By: JK	Date: 30/06/2020	
						Approximate CH: 0 m to 20 m	GHD Job No: 12526408	File Ref:	



Legend

 Sandstone
Medium to thickly bedded
Slightly weathered to fresh

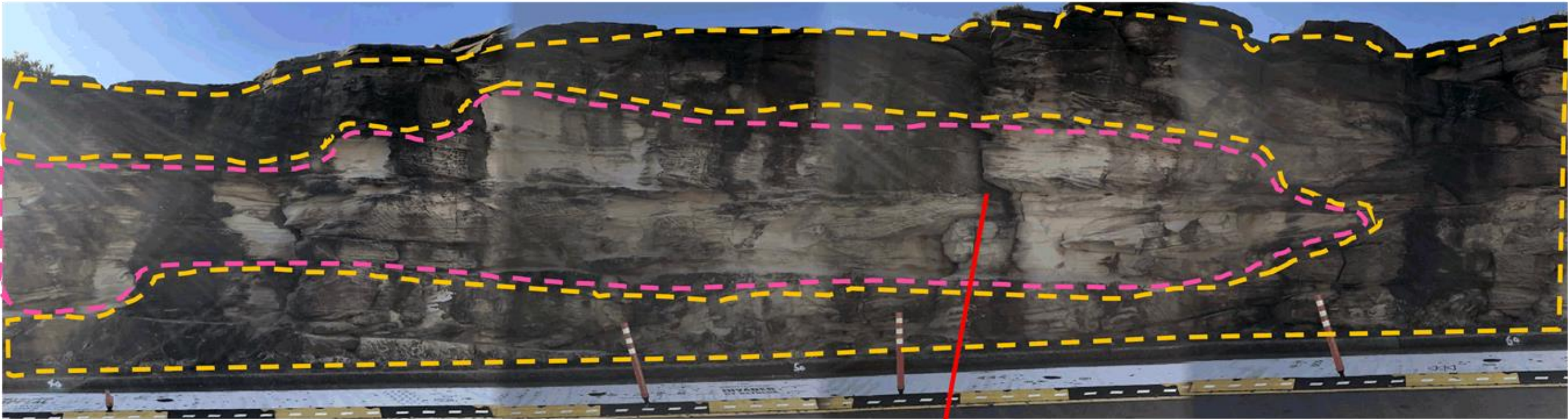
 Preferentially weathering seam/bed
Sandstone bed preferentially weathering

No	Revision	Date	Check	Auth
A	Draft Preliminary Issue	30/06/20	JK	



CLIENT: Waverly Council
GEOLOGICAL MAPPING PHOTOMOSAICS
Location: East Bronte Cutting - Calga Place
Approximate CH: 20 m to 40 m

Photomosaic Date: 11/06/2020 Sheet No: 2 of 12
Mapped By: CT Date: 16/06/2020
Checked By: JK Date: 30/06/2020
GHD Job No: 12526408 File Ref:



Join - open approximately
200m at the top. Exiting the
face at 45°

Legend

- Sandstone
Medium to thickly bedded
Slightly weathered to fresh
- Preferentially weathering seam/bed
Sandstone bed preferentially weathering


No	Revision	Date	Check	Auth		CLIENT: Waverly Council GEOLOGICAL MAPPING PHOTOMOSAICS Location: East Bronte Cutting - Calga Place Approximate CH: 40 m to 60 m	Photomosaic Date: 11/06/2020 Sheet No: 3 of 12		
A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
							Checked By: JK	Date: 30/06/2020	
							GHD Job No: 12526408	File Ref:	



Underpinned overhang

Legend


-  Sandstone
Medium to thickly bedded
Slightly weathered to fresh
-  Preferentially weathering seam/bed
Sandstone bed preferentially weathering

No	Revision	Date	Check	Auth		CLIENT: Waverly Council GEOLOGICAL MAPPING PHOTOMOSAICS Location: East Bronte Cutting - Calga Place Approximate CH: 60 m to 80 m	Photomosaic Date: 11/06/2020 Sheet No: 4 of 12		
A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
							Checked By: JK	Date: 30/06/2020	
							GHD Job No: 12526408	File Ref:	




Legend

-  Sandstone
Medium to thickly bedded
Slightly weathered to fresh
-  Preferentially weathering seam/bed
Sandstone bed preferentially weathering

No	Revision	Date	Check	Auth		CLIENT: Waverly Council GEOLOGICAL MAPPING PHOTOMOSAICS Location: East Bronte Cutting - Calga Place Approximate CH: 80 m to 100 m	Photomosaic Date: 11/06/2020 Sheet No: 5 of 12		
A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
							Checked By: JK	Date: 30/06/2020	
							GHD Job No: 12526408	File Ref:	



- Legend**
-  Sandstone
Medium to thickly bedded
Slightly weathered to fresh
 -  Sandstone block retaining wall
Vertical grouted retaining wall

No	Revision	Date	Check	Auth		CLIENT: Waverly Council GEOLOGICAL MAPPING PHOTOMOSAICS Location: East Bronte Cutting - Calga Place Approximate CH: 100 m to 120 m	Photomosaic Date: 11/06/2020 Sheet No: 6 of 12		
A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
							Checked By: JK	Date: 30/06/2020	
							GHD Job No: 12526408	File Ref:	



Legend

 Sandstone
Medium to thickly bedded
Slightly weathered

No	Revision	Date	Check	Auth
A	Draft Preliminary Issue	30/06/20	JK	



CLIENT: Waverly Council
GEOLOGICAL MAPPING PHOTOMOSAICS
Location: East Bronte Cutting - Calga Place
Approximate CH: 120 m to 140 m

Photomosaic Date: 11/06/2020 Sheet No: 7 of 12
Mapped By: CT Date: 16/06/2020
Checked By: JK Date: 30/06/2020
GHD Job No: 12526408 File Ref:



Legend

- Sandstone

Thickly bedded

Slightly weathered
- Weathered Sandstone

Highly to extremely weathered

Thinly to medium bedded
- Preferentially weathering seam/bed

Sandstone bed preferentially weathering

No	Revision	Date	Check	Auth		CLIENT: Waverly Council GEOLOGICAL MAPPING PHOTOMOSAICS Location: East Bronte Cutting - Calga Place Approximate CH: 140 m to 160 m	Photomosaic Date: 11/06/2020 Sheet No: 8 of 12		
A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
							Checked By: JK	Date: 30/06/2020	
							GHD Job No: 12526408	File Ref:	



Legend

Sandstone
Medium to thickly bedded
Slightly weathered

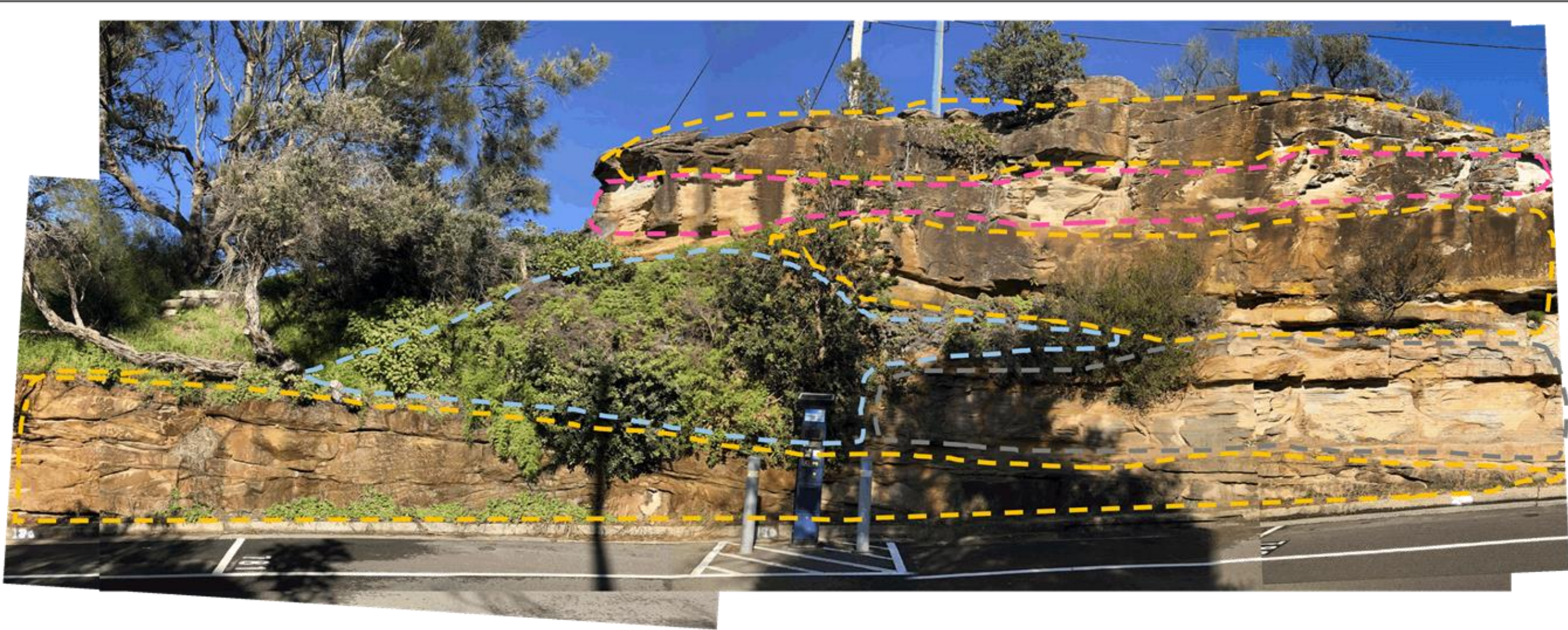
Weathered Sandstone
Highly to extremely weathered
Thinly to medium bedded

No	Revision	Date	Check	Auth
A	Draft Preliminary Issue	30/06/20	JK	



CLIENT: Waverly Council
GEOLOGICAL MAPPING PHOTOMOSAICS
Location: East Bronte Cutting - Calga Place
Approximate CH: 160 m to 180 m

Photomosaic Date: 11/06/2020 Sheet No: 9 of 12
Mapped By: CT Date: 16/06/2020
Checked By: JK Date: 30/06/2020
GHD Job No: 12526408 File Ref:



Legend

- Sandstone
Medium to thickly bedded
Slightly weathered
- Vegetated slope
Sandstone cutting covered in dense vegetation.
Unable to assess rock condition.
- Preferentially weathering seam/bed
Sandstone bed preferentially weathering


- Interbedded Shale/siltstone
Laminated
Slightly weathered

No	Revision	Date	Check	Auth		CLIENT: Waverly Council GEOLOGICAL MAPPING PHOTOMOSAICS Location: East Bronte Cutting - Calga Place Approximate CH: 180 m to 200 m	Photomosaic Date: 11/06/2020 Sheet No: 10 of 12		
A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
							Checked By: JK	Date: 30/06/2020	
							GHD Job No: 12526408	File Ref:	



Legend


-  Sandstone
Medium to thickly bedded
Slightly weathered to fresh
-  Shale/siltstone
Laminated
Slightly weathered
-  Preferentially weathering seam/bed
Sandstone bed preferentially weathering

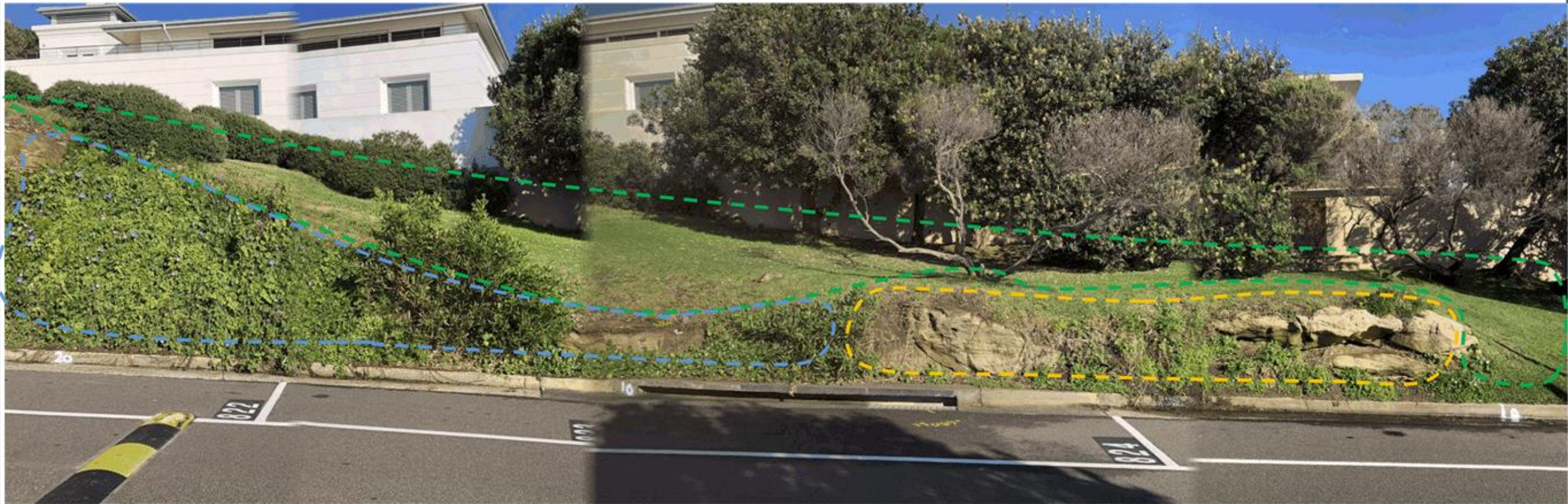
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A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
							Checked By: JK	Date: 30/06/2020	
							GHD Job No: 12526408	File Ref:	



Legend

-  Sandstone
- Medium to thickly bedded
- Slightly weathered to fresh


No	Revision	Date	Check	Auth		CLIENT: Waverly Council GEOLOGICAL MAPPING PHOTOMOSAICS Location: East Bronte Cutting - Calga Place Approximate CH: 210 m to 230 m	Photomosaic Date: 11/06/2020 Sheet No: 12 of 12		
A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
							Checked By: JK	Date: 30/06/2020	
							GHD Job No: 12526408	File Ref:	



Legend

 Grass slope above
Aproximally 0-5°

 Sandstone
Medium bedded
Slightly weathered

 Vegetated slope
Weathered sandstone cutting covered in dense vegetation.
Unable to assess rock condition.

No	Revision	Date	Check	Auth
A	Draft Preliminary Issue	30/06/20	JK	



CLIENT: Waverly Council
GEOLOGICAL MAPPING PHOTOMOSAICS
Location: West Bronte Cutting - Calga Place
Approximate CH: 0 m to 20 m

Photomosaic Date: 11/06/2020 Sheet No: 1 of 11
Mapped By: CT Date: 16/06/2020
Checked By: JK Date: 30/06/2020
GHD Job No: 12526408 File Ref:



Legend

- Vegetated slope

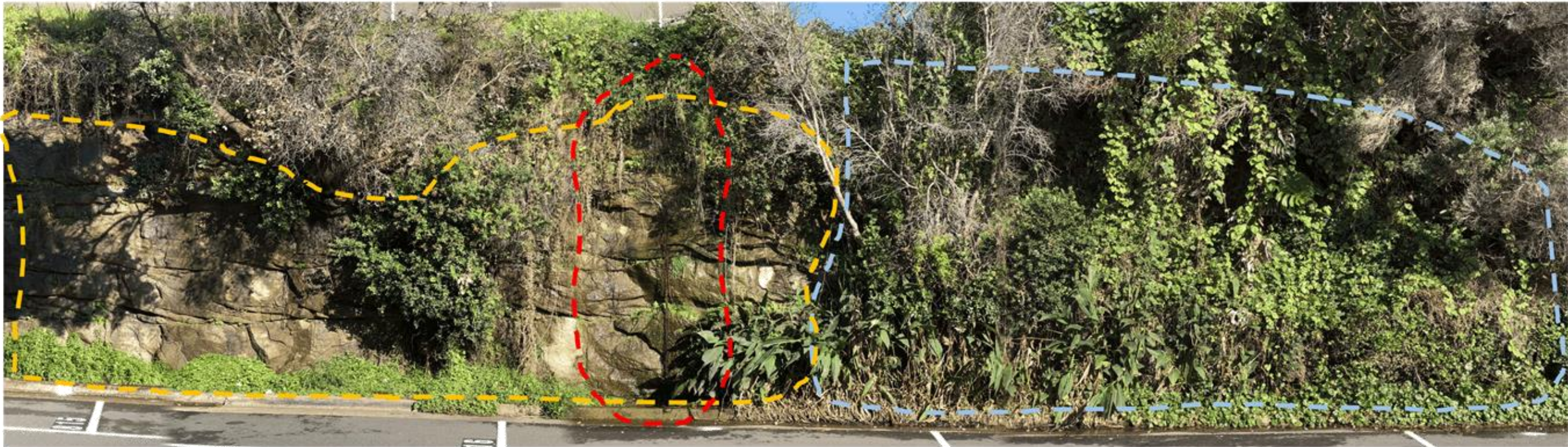
Sandstone cutting covered in dense vegetation.

Unable to assess rock condition.
- Sandstone

Medium bedded

Slightly weathered


No	Revision	Date	Check	Auth		CLIENT: Waverly Council GEOLOGICAL MAPPING PHOTOMOSAICS Location: West Bronte Cutting - Calga Place Approximate CH: 20 m to 40 m	Photomosaic Date: 11/06/2020 Sheet No: 2 of 11		
A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
							Checked By: JK	Date: 30/06/2020	
							GHD Job No: 12526408	File Ref:	



Legend

 **Vegetated slope**
Sandstone cutting covered in dense vegetation.
Unable to assess rock condition.

 **Sandstone**
Medium bedded
Slightly weathered

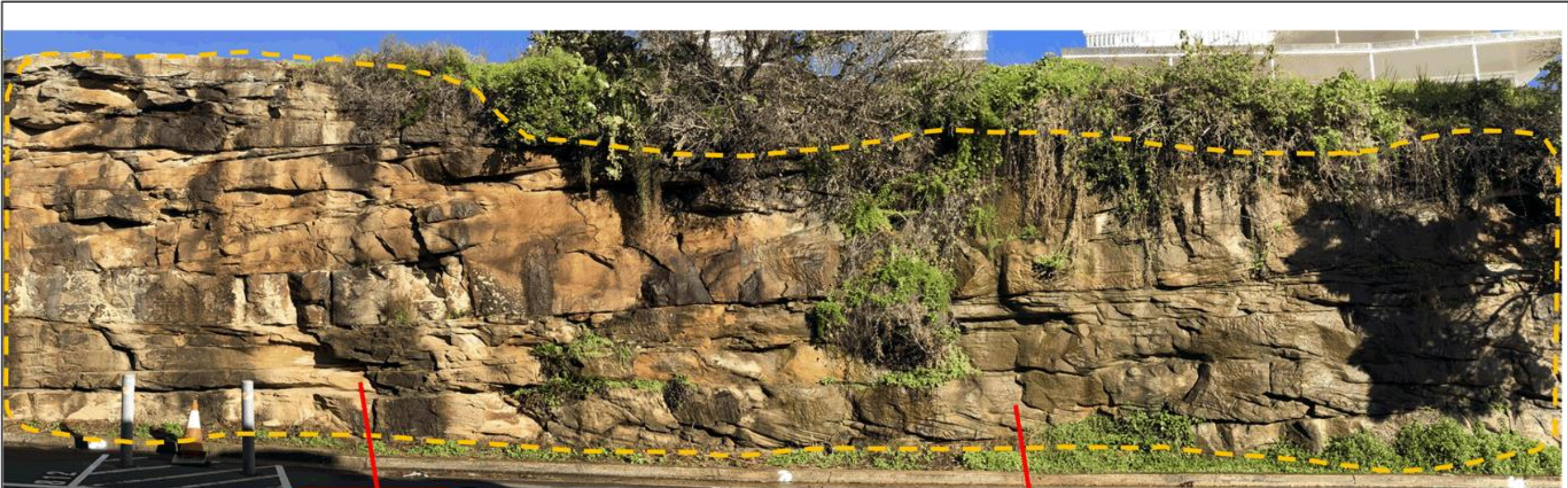
 **Water Seepage**
Significant seepage from near crest
Unsure of origin, potential service?

No	Revision	Date	Check	Auth
A	Draft Preliminary Issue	30/06/20	JK	



CLIENT: Waverly Council
GEOLOGICAL MAPPING PHOTOMOSAICS
Location: West Bronte Cutting - Calga Place
Approximate CH: 40 m to 60 m

Photomosaic Date: 11/06/2020 Sheet No: 3 of 11
Mapped By: CT Date: 16/06/2020
Checked By: JK Date: 30/06/2020
GHD Job No: 12526408 File Ref:



Subvertical joints
exiting the face at

Subvertical joints
exiting the face at

Legend
 Sandstone
Medium to thickly bedded
Slightly weathered to fresh

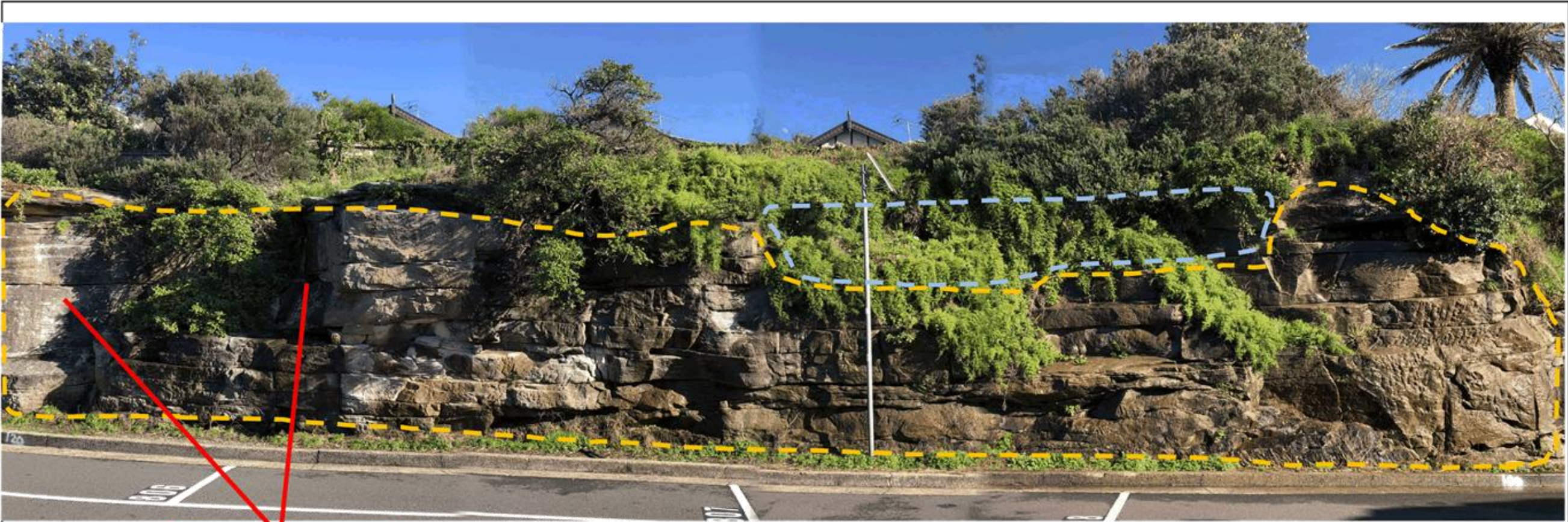
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A	Draft Preliminary Issue	30/06/20	JK	



CLIENT: Waverly Council
GEOLOGICAL MAPPING PHOTOMOSAICS
Location: West Bronte Cutting - Calga Place
Approximate CH: 60 m to 80 m

Photomosaic Date: 11/06/2020 Sheet No: 4 of 11
Mapped By: CT Date: 16/06/2020
Checked By: JK Date: 30/06/2020
GHD Job No: 12526408 File Ref:






Subvertical joints
exiting the face at 60°.
Wedge may have been
previously removed.

Legend

 Sandstone
Medium to thickly bedded
Slightly weathered to fresh


 Vegetated slope
Sandstone cutting covered in dense vegetation.
Unable to assess rock condition.

No	Revision	Date	Check	Auth		CLIENT: Waverly Council	Photomosaic Date: 11/06/2020	Sheet No: 6	of 11
A	Draft Preliminary Issue	30/06/20	JK			GEOLOGICAL MAPPING PHOTOMOSAICS	Mapped By: CT	Date: 16/06/2020	
						Location: West Bronte Cutting - Calga Place	Checked By: JK	Date: 30/06/2020	
						Approximate CH: 100 m to 120 m	GHD Job No: 12526408	File Ref:	



Legend

 **Sandstone**
Medium to thickly bedded
Slightly weathered to fresh

No	Revision	Date	Check	Auth		CLIENT: Waverly Council	Photomosaic Date: 11/06/2020	Sheet No: 7	of 11
A	Draft Preliminary Issue	30/06/20	JK			GEOLOGICAL MAPPING PHOTOMOSAICS	Mapped By: CT	Date: 16/06/2020	
						Location: West Bronte Cutting - Calga Place	Checked By: JK	Date: 30/06/2020	
						Approximate CH: 120 m to 140 m	GHD Job No: 12526408	File Ref:	



Legend

 Sandstone
Medium to thickly bedded
Slightly weathered to fresh

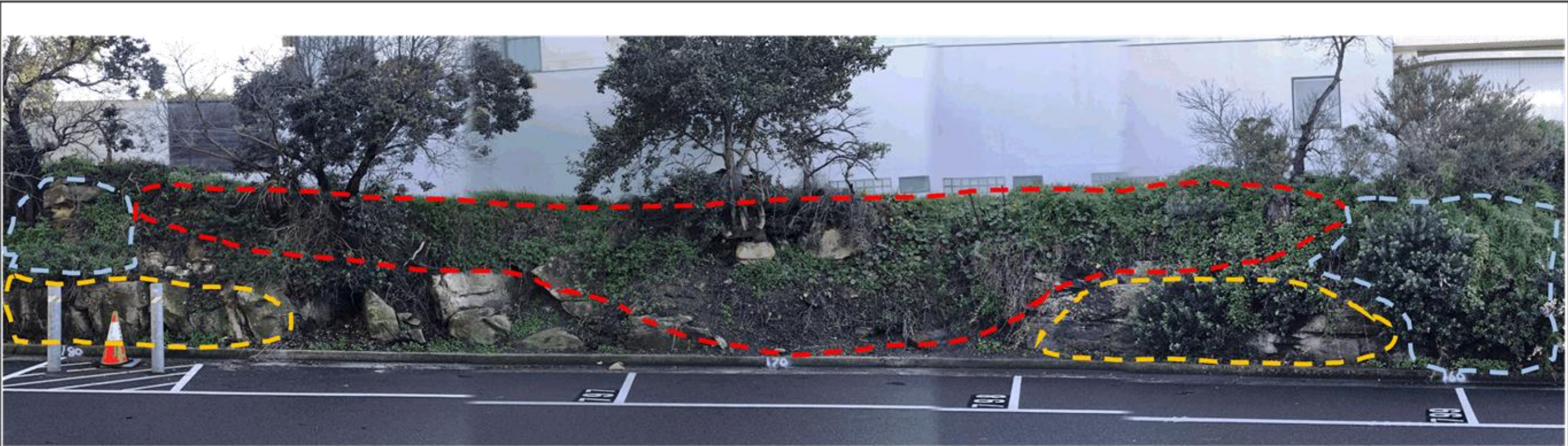
 Vegetated slope
Sandstone cutting covered in dense vegetation.
Unable to assess rock condition.

No	Revision	Date	Check	Auth
A	Draft Preliminary Issue	30/06/20	JK	



CLIENT: Waverly Council
GEOLOGICAL MAPPING PHOTOMOSAICS
Location: West Bronte Cutting - Calga Place
Approximate CH: 140 m to 160 m

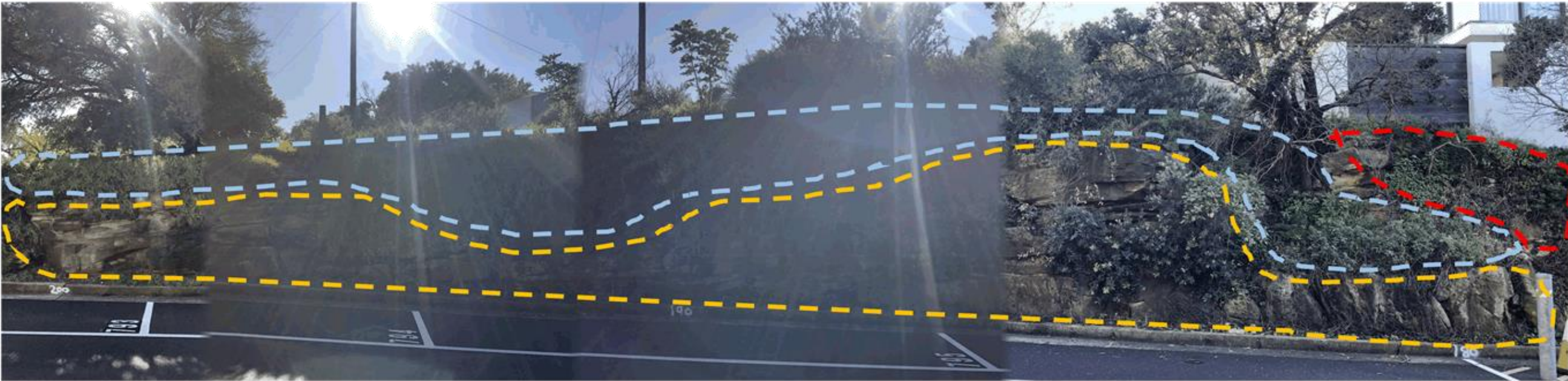
Photomosaic Date: 11/06/2020 Sheet No: 8 of 11
Mapped By: CT Date: 16/06/2020
Checked By: JK Date: 30/06/2020
GHD Job No: 12526408 File Ref:



Legend


-  Sandstone
Medium bedded
Moderate to slightly weathered
-  Weathered Sandstone
Extremely weathered
Residual or colluvial soils
-  Vegetated slope
Sandstone cutting covered in dense vegetation.

No	Revision	Date	Check	Auth		CLIENT: Waverly Council GEOLOGICAL MAPPING PHOTOMOSAICS Location: West Bronte Cutting - Calga Place Approximate CH: 160 m to 180 m	Photomosaic Date: 11/06/2020 Sheet No: 9 of 11		
A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
							Checked By: JK	Date: 30/06/2020	
							GHD Job No: 12526408	File Ref:	




Legend

-  **Sandstone**
Medium bedded
Moderate to slightly weathered
-  **Weathered Sandstone**
Extremely weathered
Residual or colluvial soils
-  **Vegetated slope**
Sandstone cutting covered in dense vegetation.


No	Revision	Date	Check	Auth		CLIENT: Waverly Council GEOLOGICAL MAPPING PHOTOMOSAICS Location: West Bronte Cutting - Calga Place Approximate CH: 180 m to 200 m	Photomosaic Date: 11/06/2020 Sheet No: 10 of 11		
A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
							Checked By: JK	Date: 30/06/2020	
							GHD Job No: 12526408	File Ref:	



Legend

 Sandstone
Medium bedded
Moderate to slightly weathered

 Vegetated slope
Sandstone cutting covered in dense vegetation.

No	Revision	Date	Check	Auth.		CLIENT: Waverly Council GEOLOGICAL MAPPING PHOTOMOSAICS Location: West Bronte Cutting - Calga Place Approximate CH: 200 m to 220 m	Photomosaic Date: 11/06/2020 Sheet No: 11 of 11		
A	Draft Preliminary Issue	30/06/20	JK				Mapped By: CT	Date: 16/06/2020	
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							GHD Job No: 12526408	File Ref:	

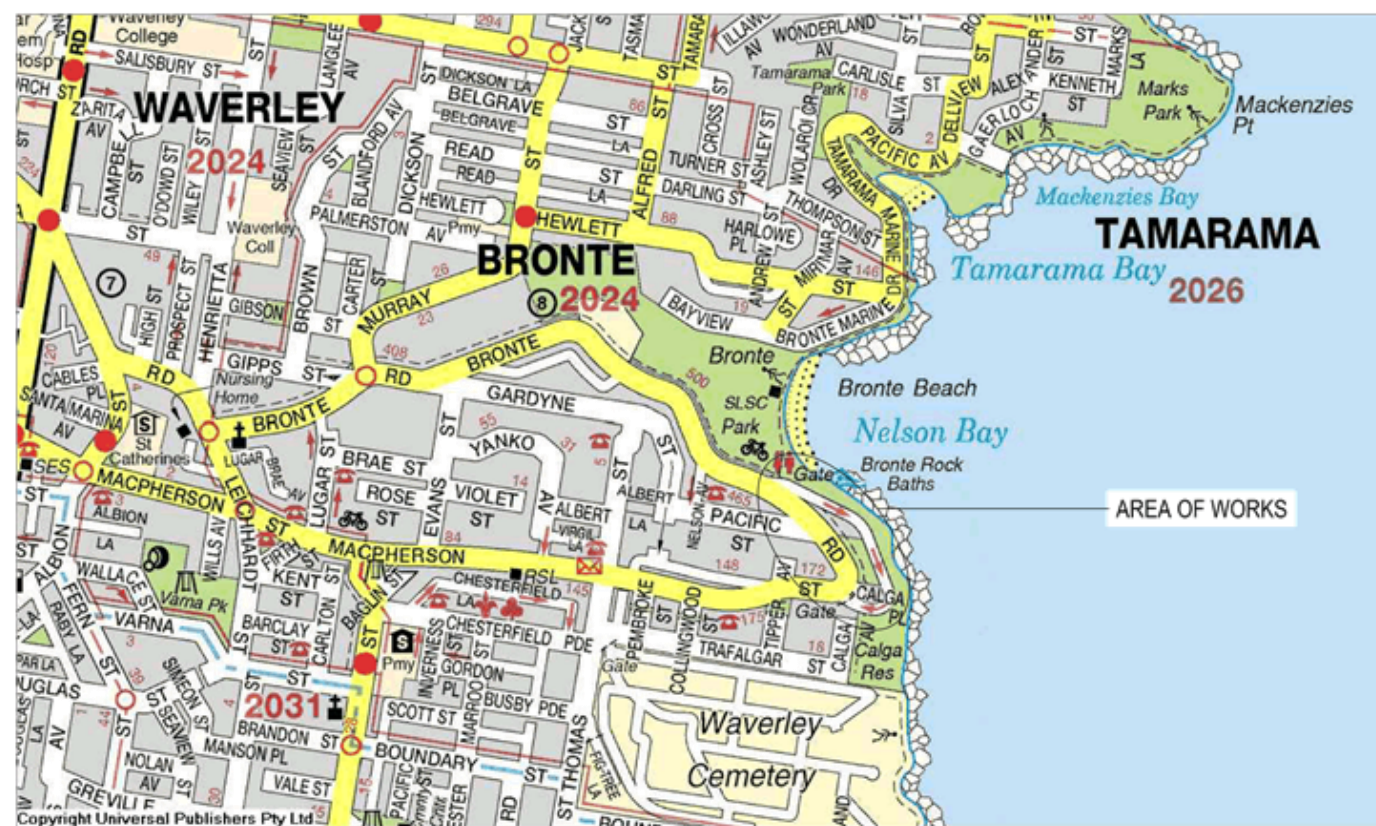
Appendix C – Option Sketches



WAVERLEY COUNCIL

BRONTE CUTTING SAFETY UPGRADE

12526408



LOCALITY PLAN
NTS

DRAWING LIST:

DRG No.	DRAWING TITLE
12526408-G001	COVER SHEET, DRAWING LIST AND LOCALITY PLAN
12526408-C011	SITE PLAN OPTION 1 - SHEET 1 OF 8
12526408-C012	SITE PLAN OPTION 1 - SHEET 2 OF 8
12526408-C013	SITE PLAN OPTION 1 - SHEET 3 OF 8
12526408-C014	SITE PLAN OPTION 1 - SHEET 4 OF 8
12526408-C015	SITE PLAN OPTION 1 - SHEET 5 OF 8
12526408-C016	SITE PLAN OPTION 1 - SHEET 6 OF 8
12526408-C017	SITE PLAN OPTION 1 - SHEET 7 OF 8
12526408-C018	SITE PLAN OPTION 1 - SHEET 8 OF 8
12526408-C111	SITE PLAN OPTION 2 - SHEET 1 OF 8
12526408-C112	SITE PLAN OPTION 2 - SHEET 2 OF 8
12526408-C113	SITE PLAN OPTION 2 - SHEET 3 OF 8
12526408-C114	SITE PLAN OPTION 2 - SHEET 4 OF 8
12526408-C115	SITE PLAN OPTION 2 - SHEET 5 OF 8
12526408-C116	SITE PLAN OPTION 2 - SHEET 6 OF 8
12526408-C117	SITE PLAN OPTION 2 - SHEET 7 OF 8
12526408-C118	SITE PLAN OPTION 2 - SHEET 8 OF 8

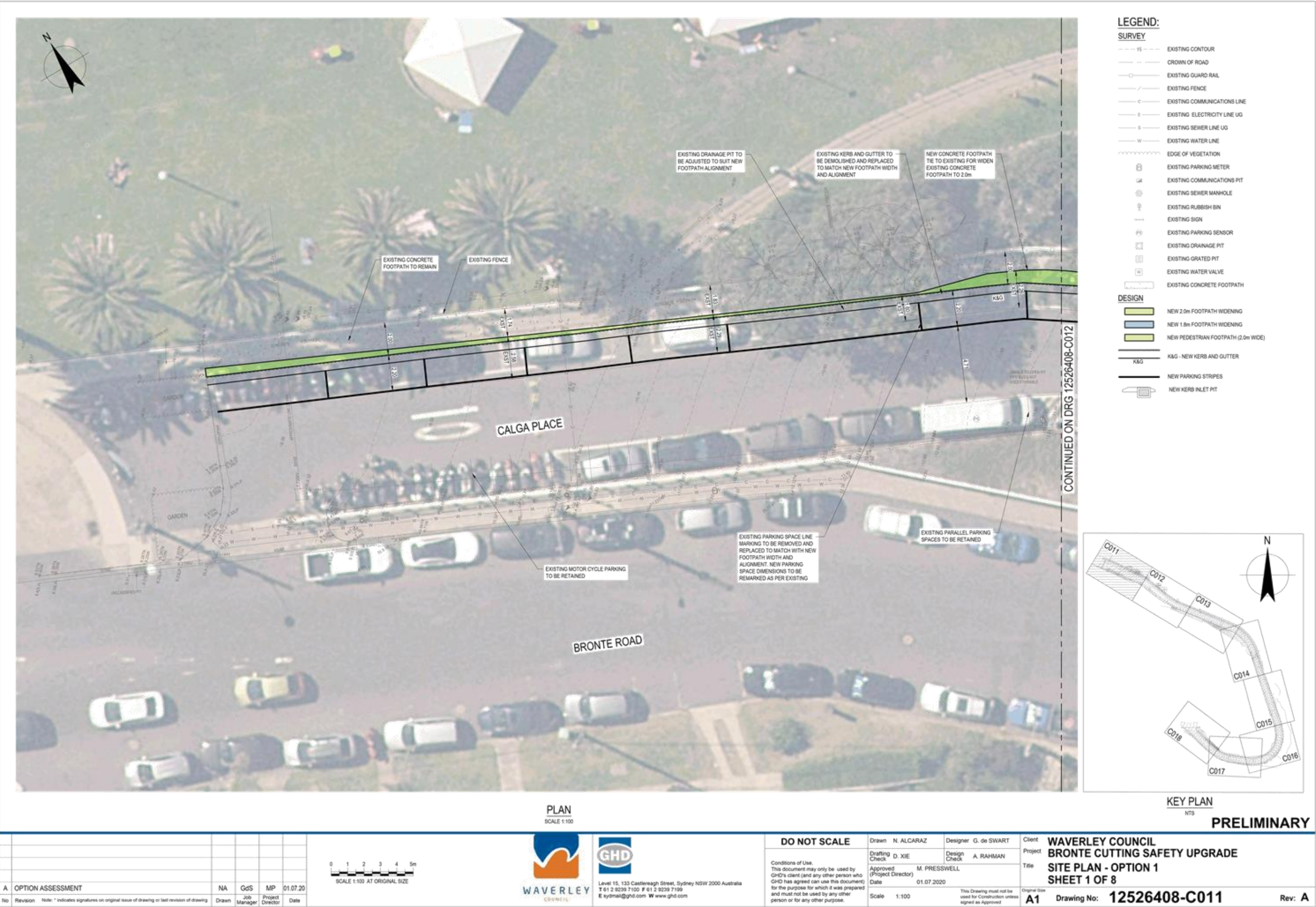
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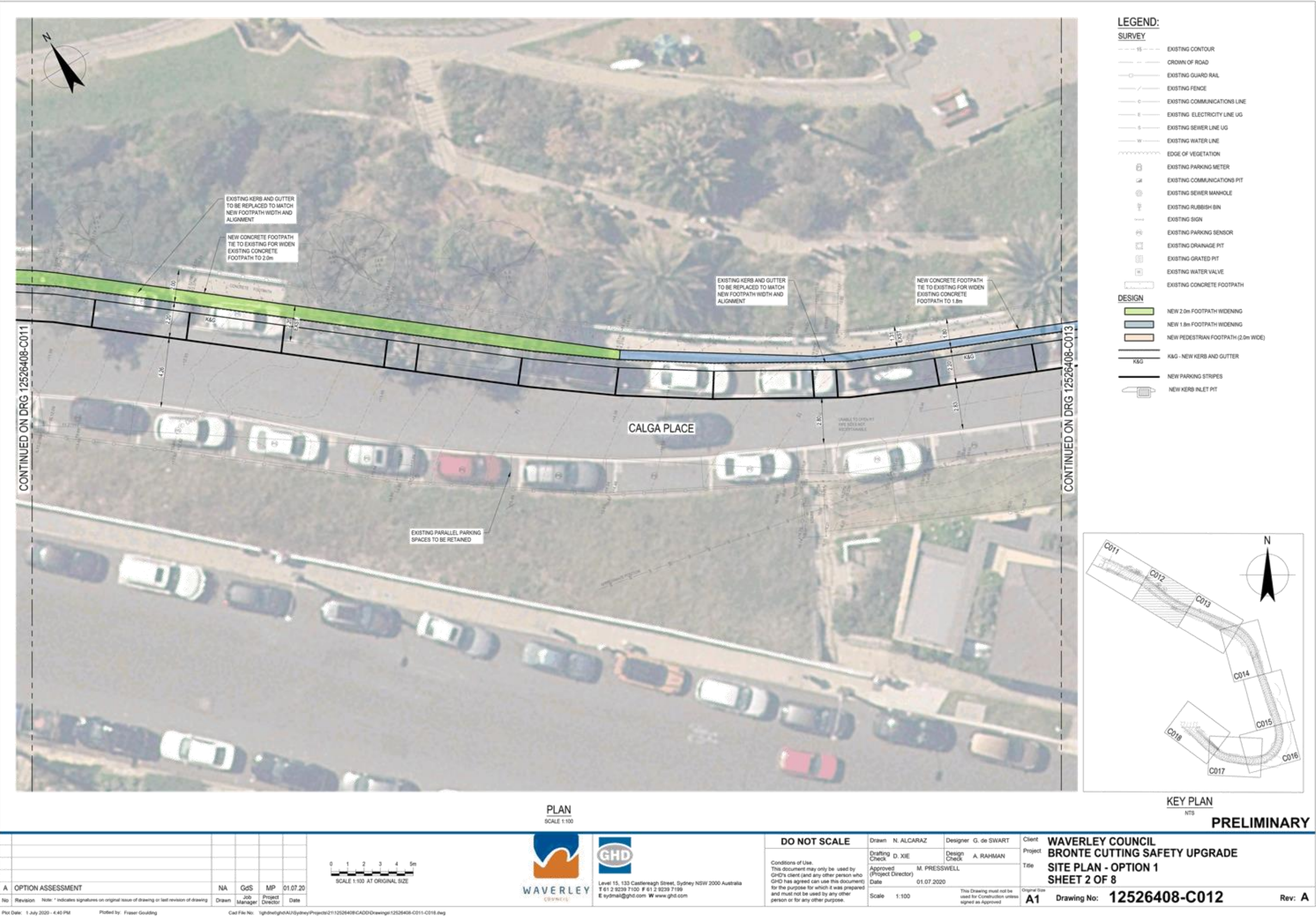
- ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
- CO-ORDINATES ARE IN MAP GRID OF AUSTRALIA (MGA2020) CO-ORDINATE SYSTEM.
- LEVELS ARE IN AUSTRALIAN HEIGHT DATUM (AHD).
- ALL WORKS SHALL BE CARRIED OUT IN CONJUNCTION WITH ALL DRAWINGS, SPECIFICATIONS AND THE WAVERLEY COUNCIL'S STANDARD DRAWINGS AND SPECIFICATIONS.
- ALL LEVELS SHALL BE OBTAINED FROM ESTABLISHED BENCH MARKS ONLY.
- ALL SERVICE LOCATIONS SHALL BE VERIFIED PRIOR TO CONSTRUCTION.
- NO WORK SHALL BE CARRIED OUT OUTSIDE THE COUNCIL'S INDICATED SITE EXTENT WITHOUT WRITTEN PERMISSION.
- DESIGN BASED ON SURVEY BY AXIOM SPATIAL SURVEYORS, DRAWING 2023901-00.DWG, REV 00, DATED 19/05/2020.
- BOUNDARIES SHALL BE CLEARLY MARKED ON SITE PRIOR TO CONSTRUCTION.
- CIVIL WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH WAVERLEY COUNCIL'S PUBLIC DOMAIN TECHNICAL MANUAL.

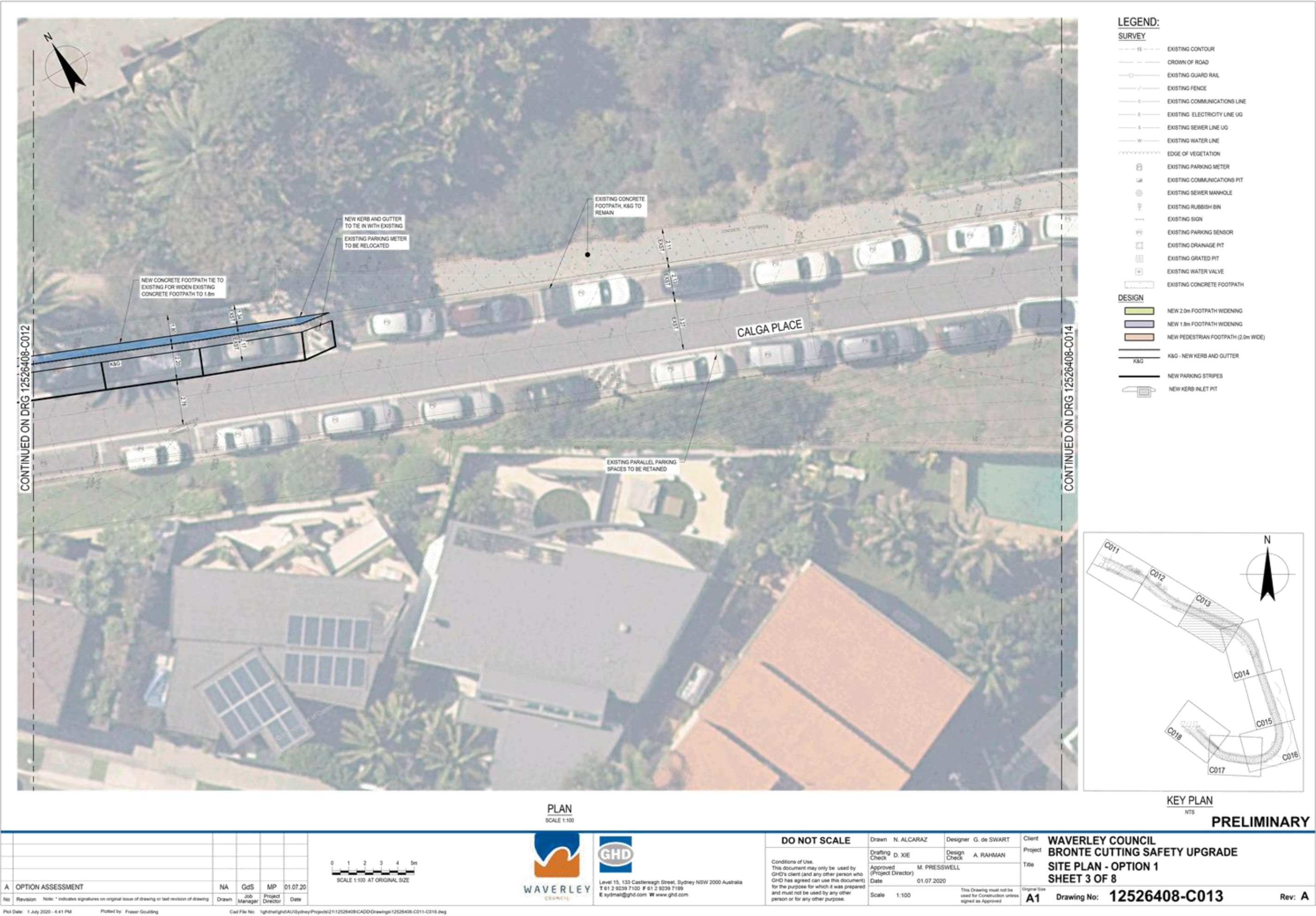
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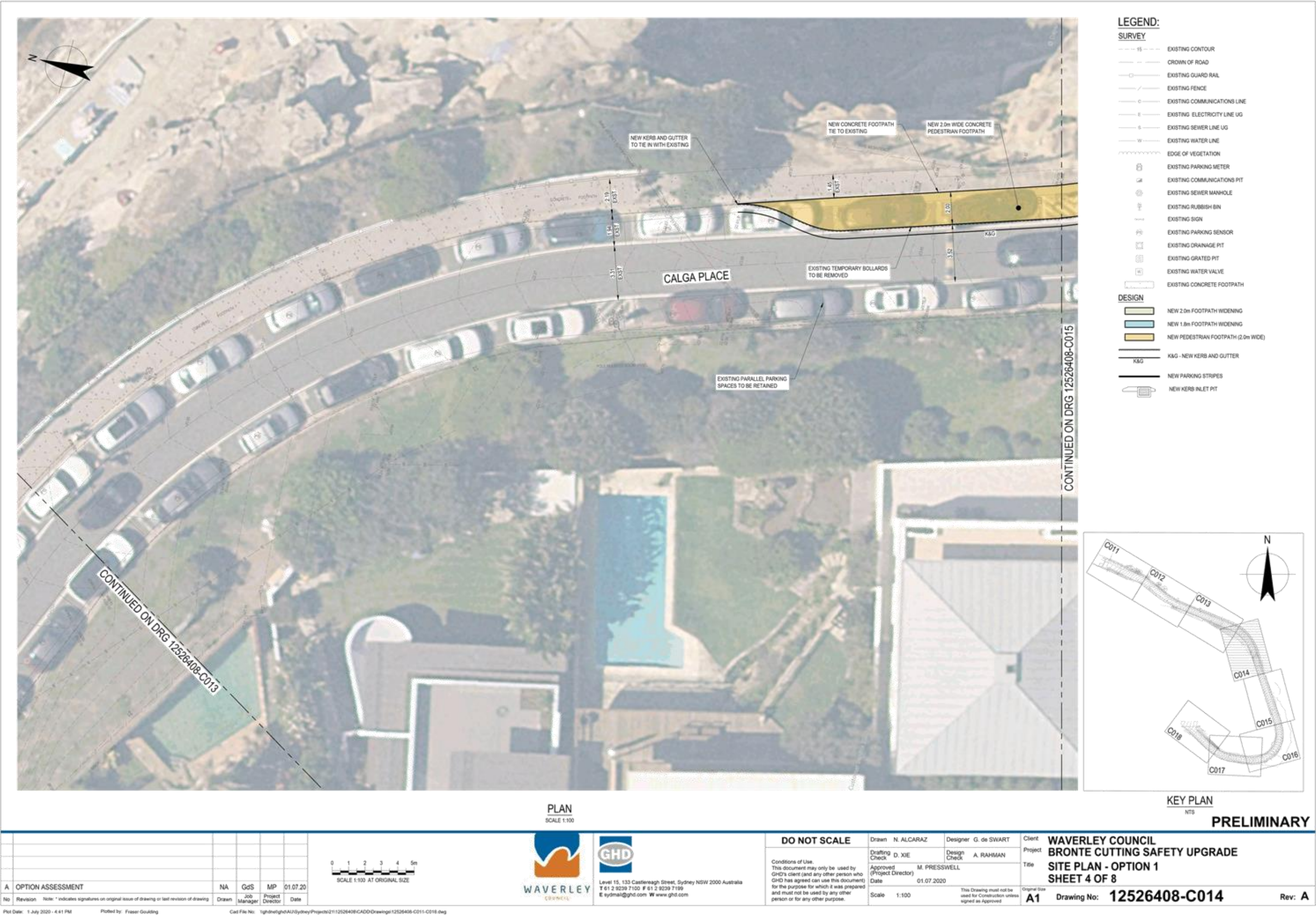
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A OPTION ASSESSMENT No Revision Note: * indicates signatures on original issue of drawing or last revision of drawing Drawn NA GdS MP 01.07.20 Job Manager Project Director Date				Conditions of Use: This document may only be used by GHD's client (and any other person who GHD has agreed can use this document) for the purpose for which it was prepared and must not be used by any other person or for any other purpose.		Scale NTS This Drawing must not be used for Construction unless signed as Approved	Original Size A1 Drawing No: 12526408-G001 Rev: A

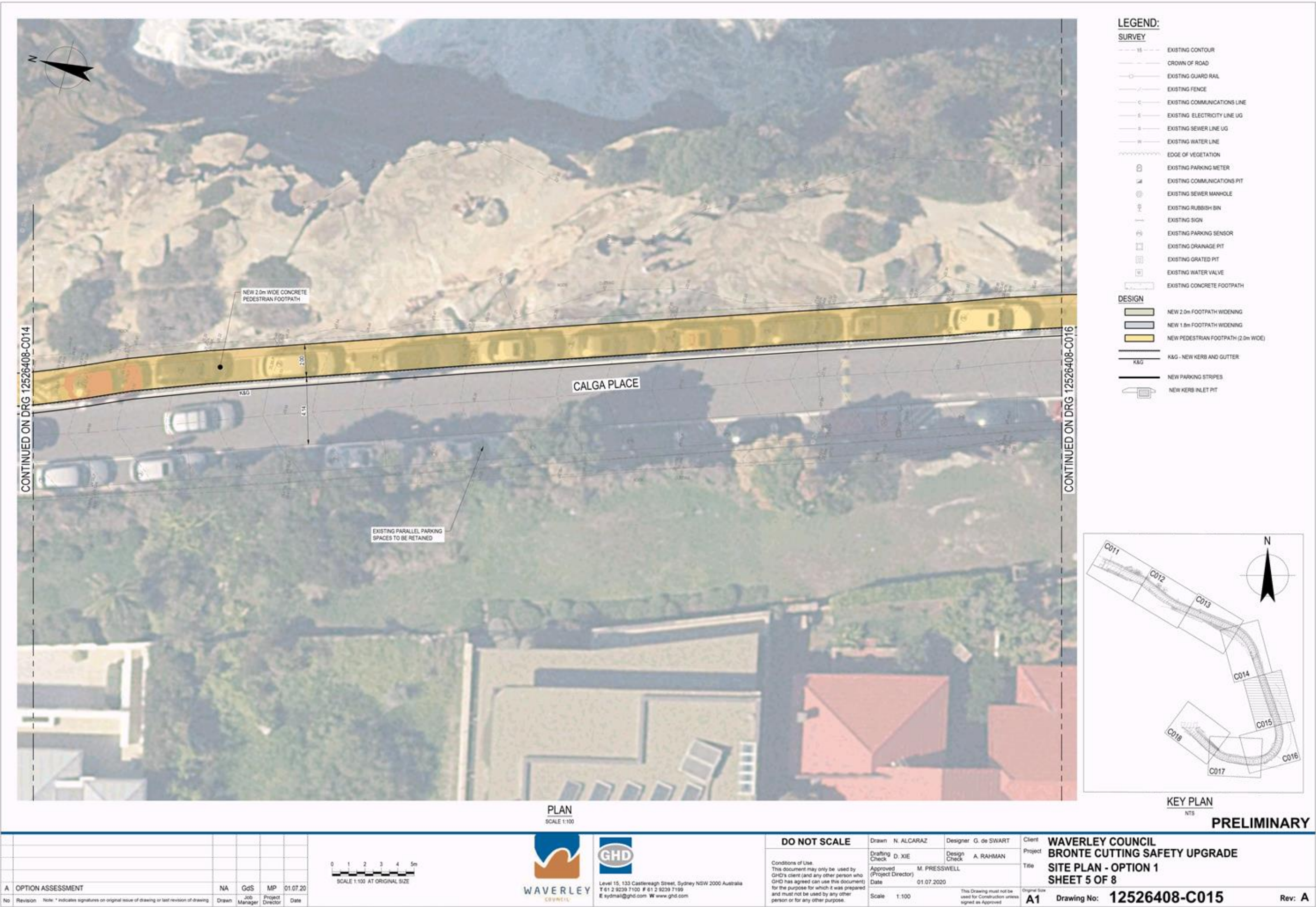
Plot Date: 29 June 2020 - 9:30 AM Plotted by: Nicol Alcaraz Cad File No: I:\ghd\ghd\AU\Sydney\Projects\2112526408\CADD\Drawings\12526408-G001.dwg

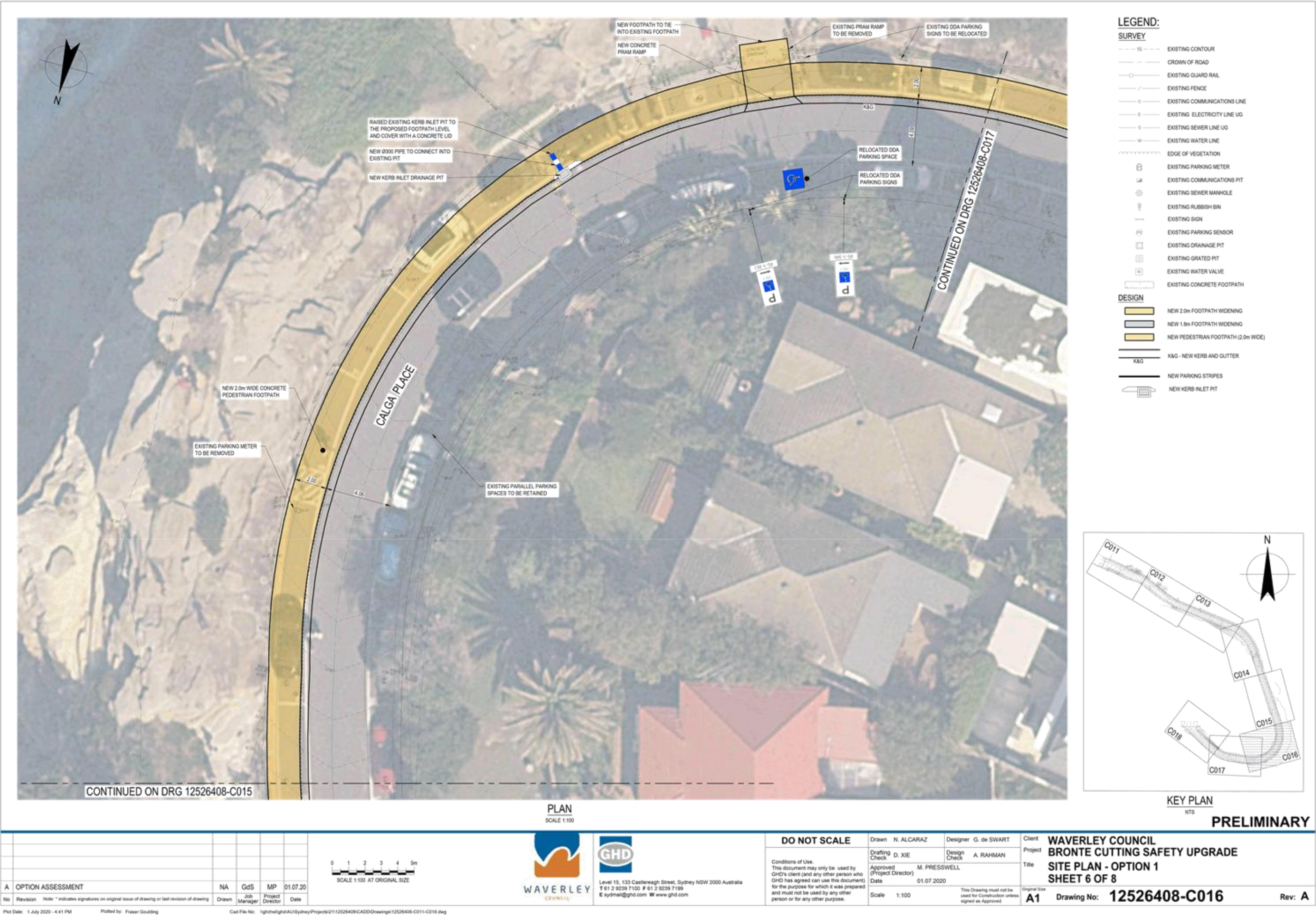


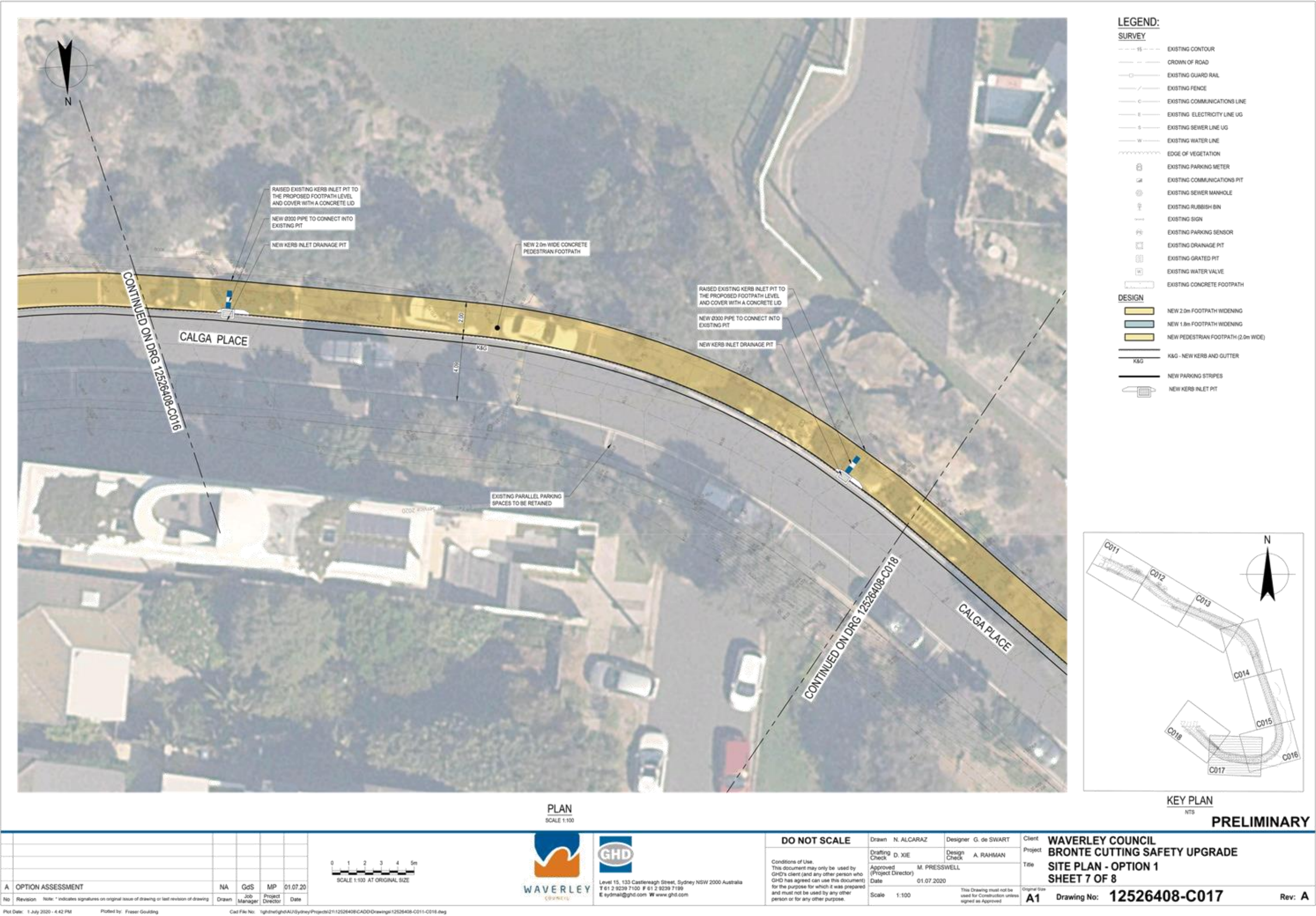






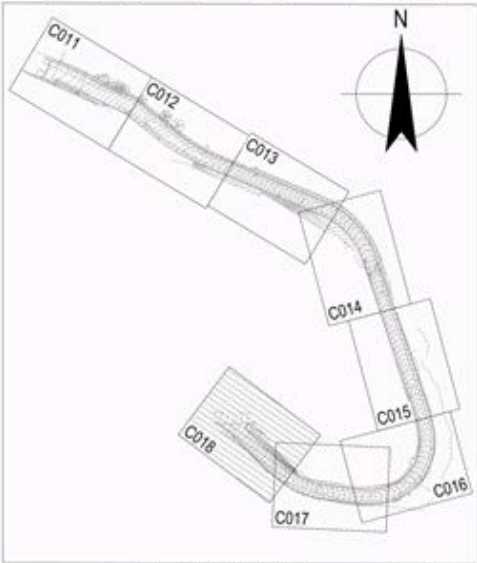








- LEGEND:**
- SURVEY**
- EXISTING CONTOUR
 - CROWN OF ROAD
 - EXISTING GUARD RAIL
 - EXISTING FENCE
 - EXISTING COMMUNICATIONS LINE
 - EXISTING ELECTRICITY LINE UG
 - EXISTING SEWER LINE UG
 - EXISTING WATER LINE
 - EDGE OF VEGETATION
 - EXISTING PARKING METER
 - EXISTING COMMUNICATIONS PIT
 - EXISTING SEWER MANHOLE
 - EXISTING RUBBISH BIN
 - EXISTING SIGN
 - EXISTING PARKING SENSOR
 - EXISTING DRAINAGE PIT
 - EXISTING GRATED PIT
 - EXISTING WATER VALVE
 - EXISTING CONCRETE FOOTPATH
- DESIGN**
- NEW 2.0m FOOTPATH WIDENING
 - NEW 1.5m FOOTPATH WIDENING
 - NEW PEDESTRIAN FOOTPATH (2.0m WIDE)
 - K&G - NEW KERB AND GUTTER
 - NEW PARKING STRIPES
 - NEW KERB INLET PIT



PLAN
SCALE 1:100

KEY PLAN
NTS
PRELIMINARY

A	OPTION ASSESSMENT			NA	GdS	MP	01.07.20
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing			Drawn	Job Manager	Project Director
							Date

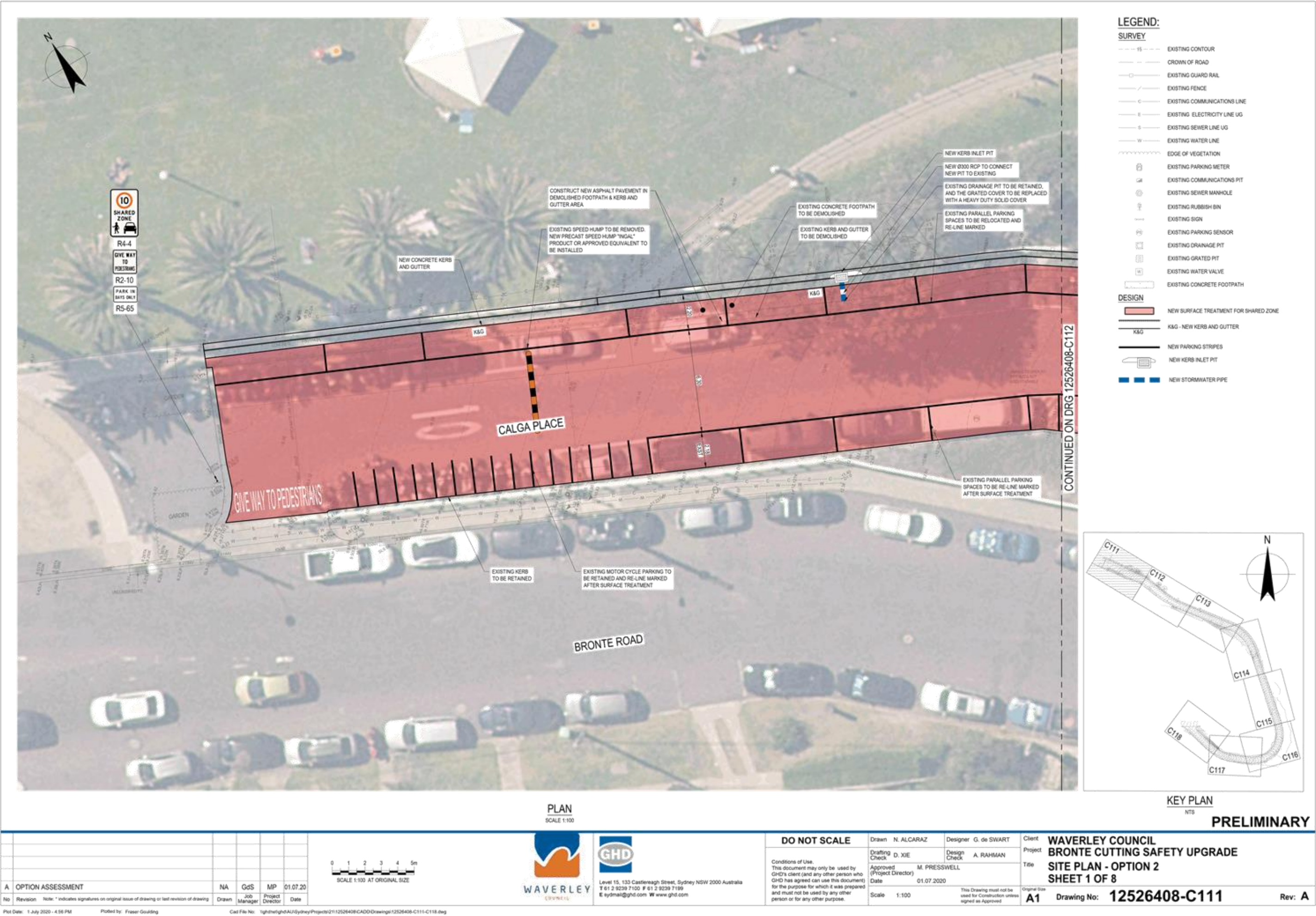


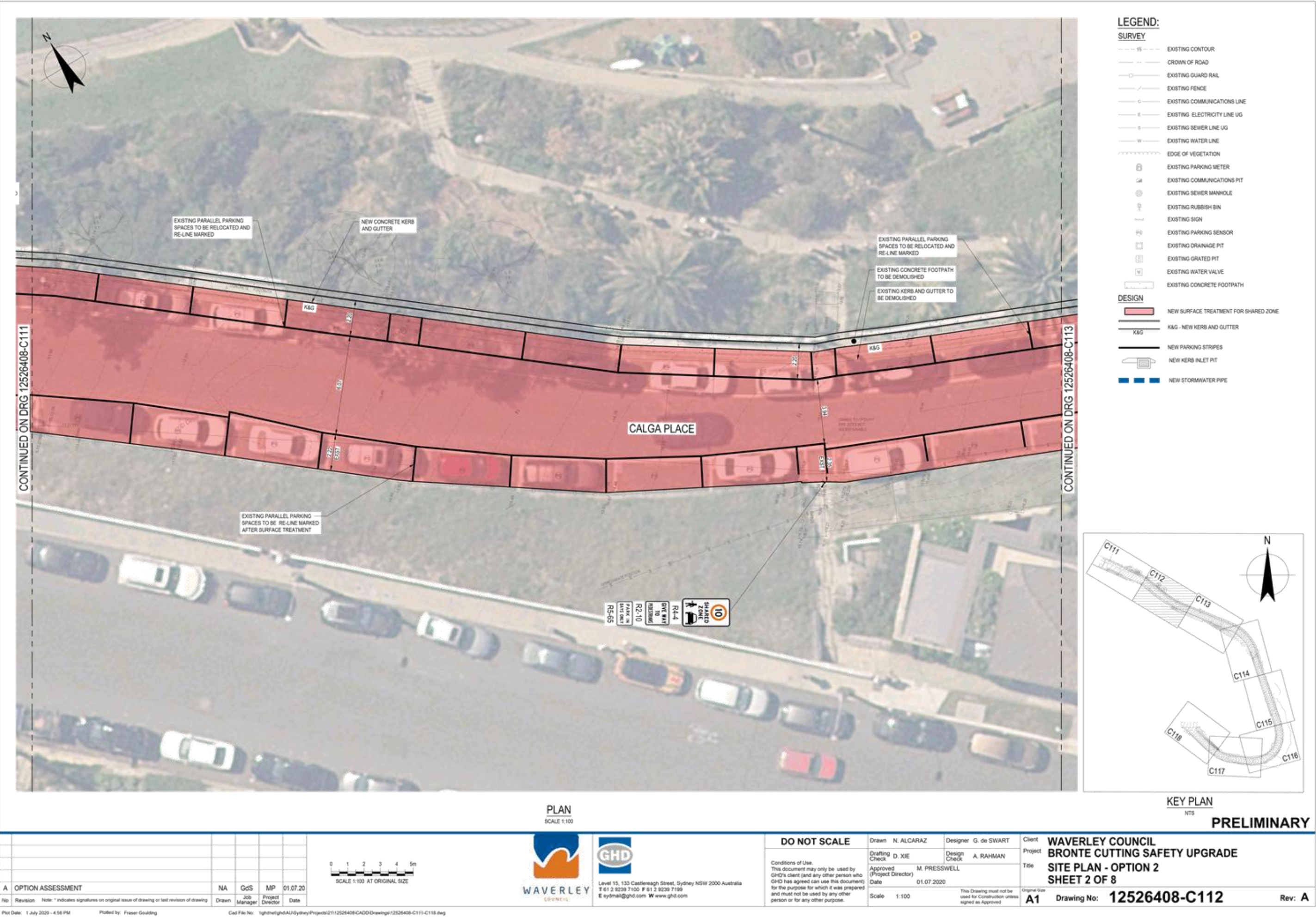
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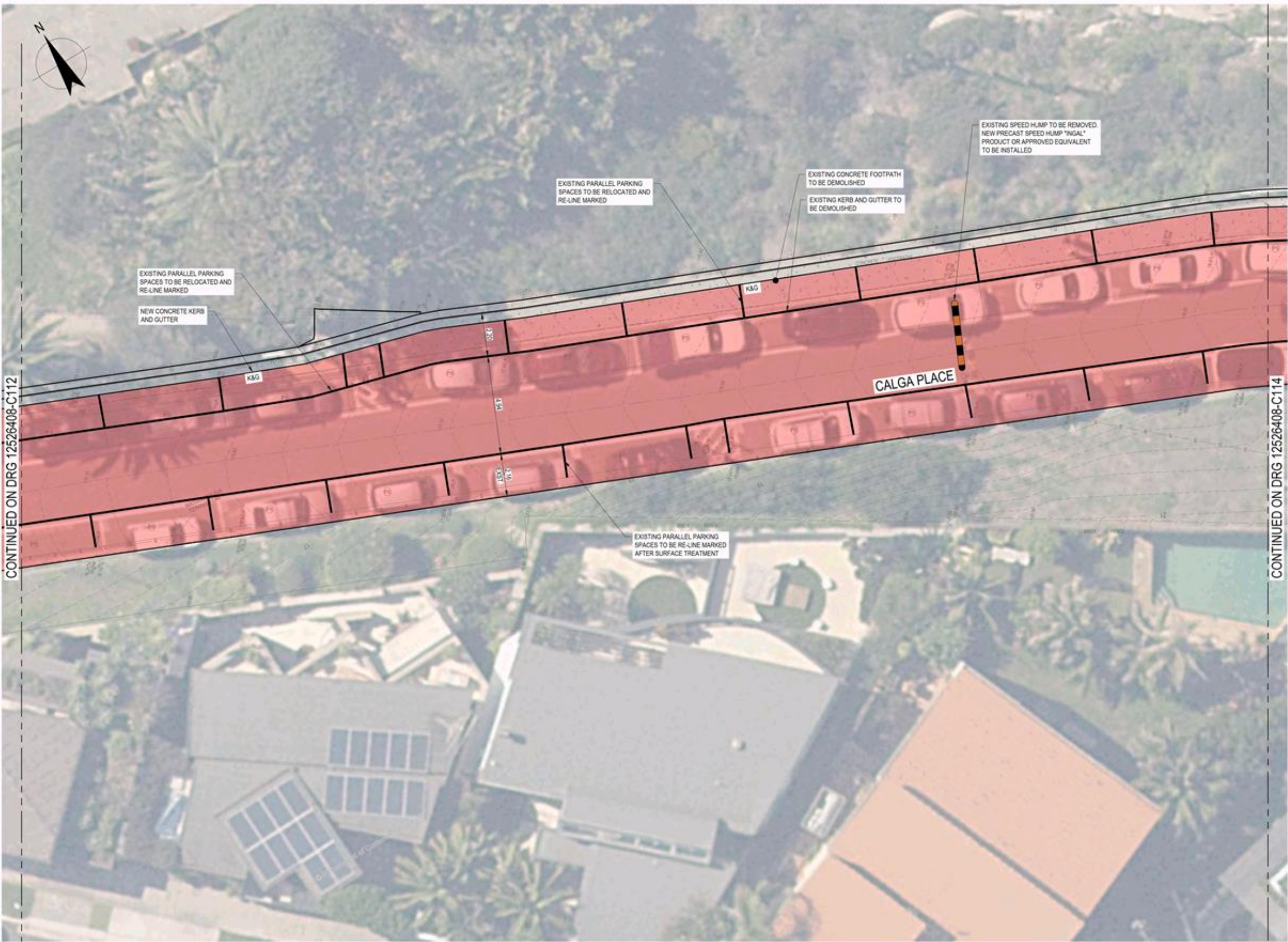
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Drawn	N. ALCARAZ	Designer	G. de SWART
Drafting Check	D. XIE	Design Check	A. RAHMAN
Approved (Project Director)	M. PRESSWELL	Date	01.07.2020
Scale	1:100	This Drawing must not be used for Construction unless signed as Approved	

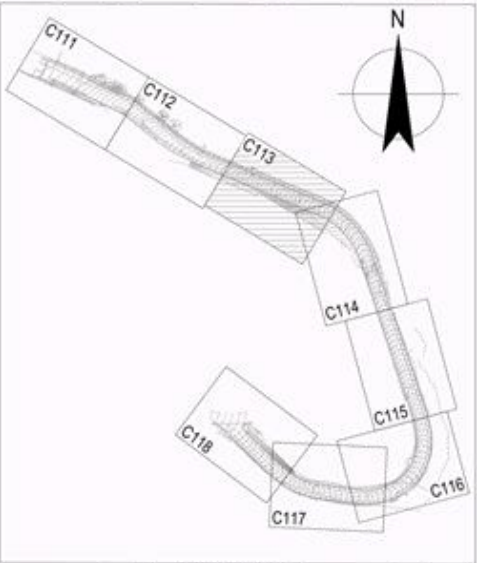
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Project	BRONTE CUTTING SAFETY UPGRADE		
Title	SITE PLAN - OPTION 1		
	SHEET 8 OF 8		
Original Size	A1	Drawing No:	12526408-C018
Rev:	A		





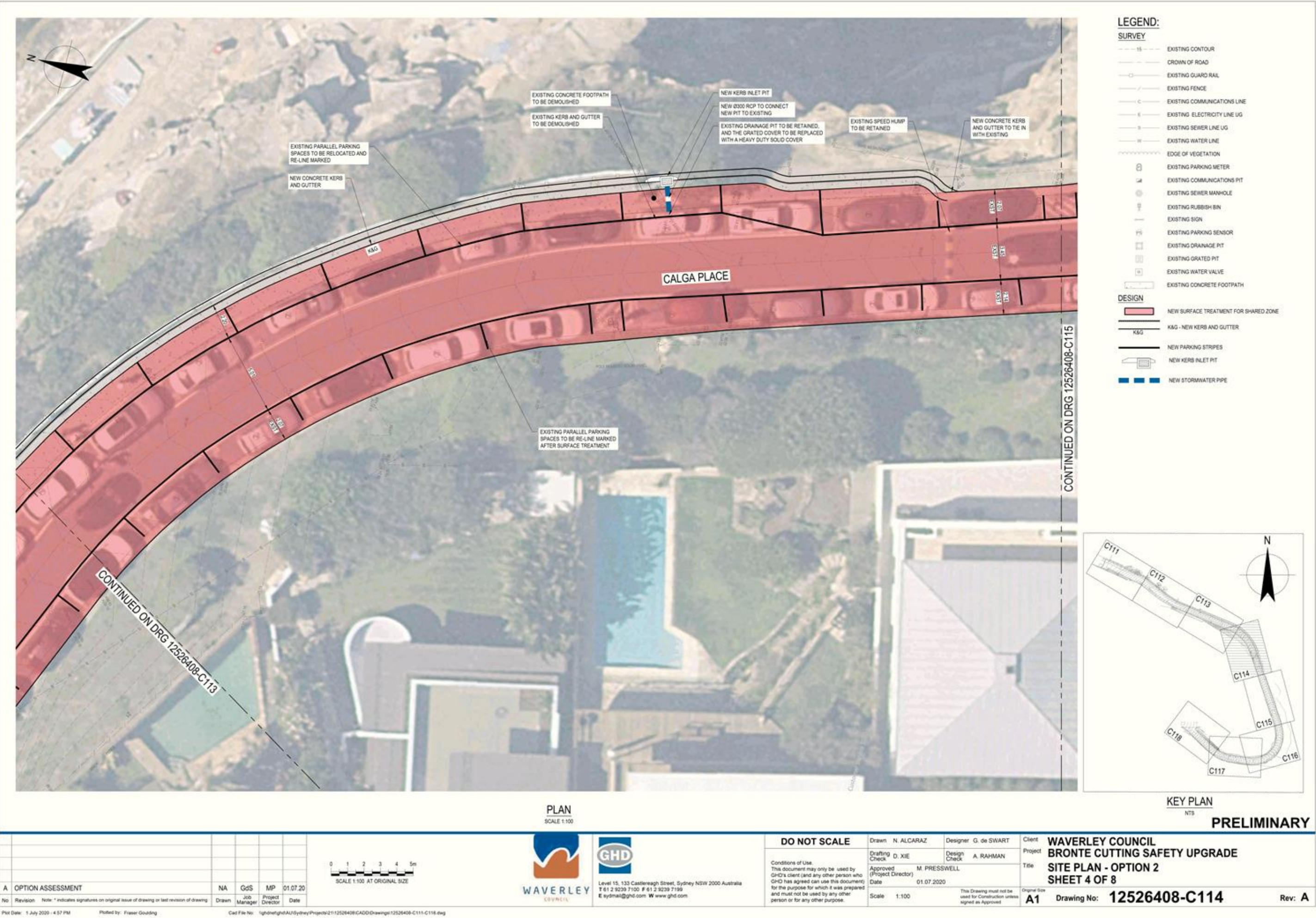


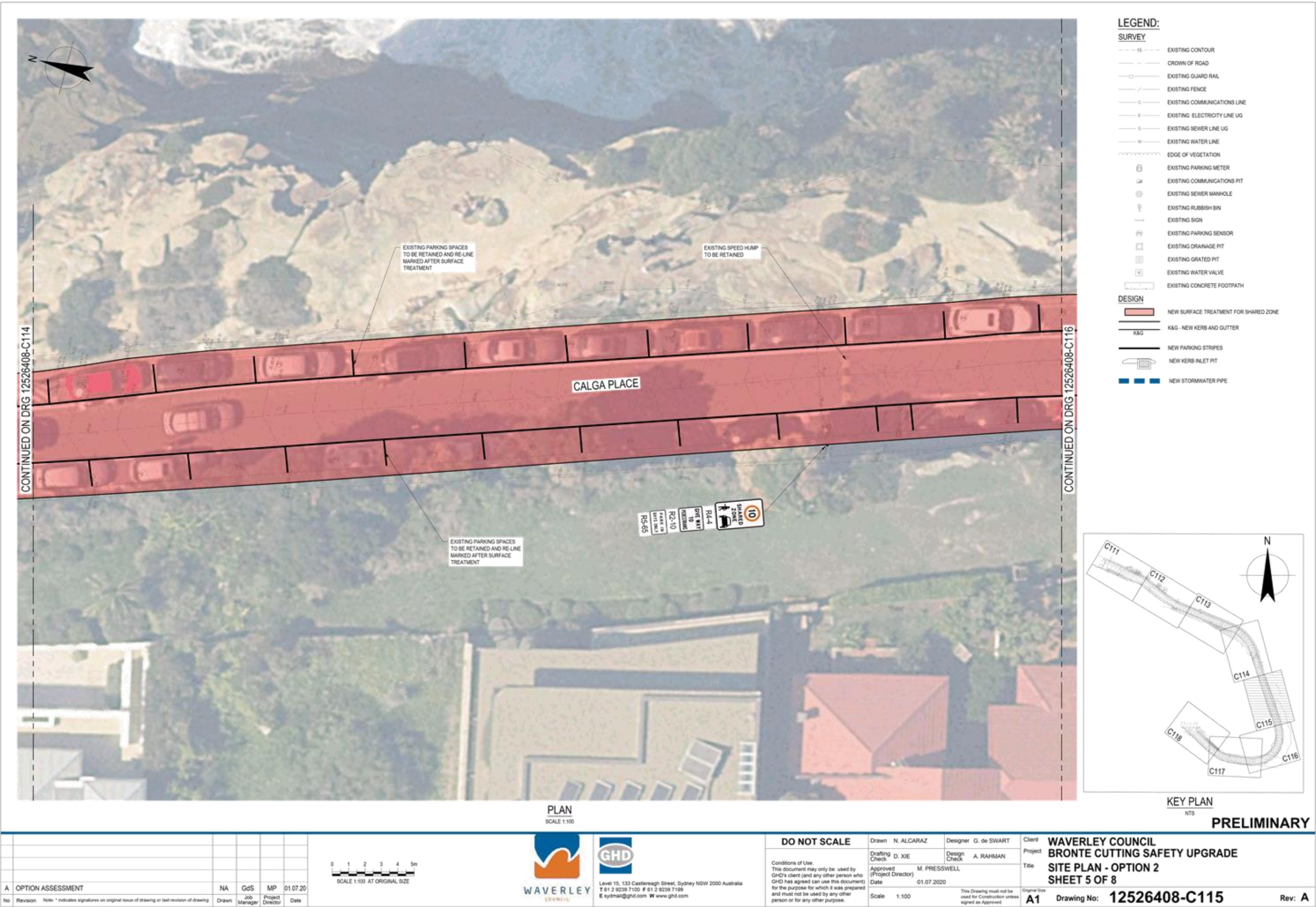
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- SURVEY**
- EXISTING CONTOUR
 - CROWN OF ROAD
 - EXISTING GUARD RAIL
 - EXISTING FENCE
 - EXISTING COMMUNICATIONS LINE
 - EXISTING ELECTRICITY LINE UG
 - EXISTING SEWER LINE UG
 - EXISTING WATER LINE
 - EDGE OF VEGETATION
 - EXISTING PARKING METER
 - EXISTING COMMUNICATIONS PIT
 - EXISTING SEWER MANHOLE
 - EXISTING RUBBISH BIN
 - EXISTING SIGN
 - EXISTING PARKING SENSOR
 - EXISTING DRAINAGE PIT
 - EXISTING GRATED PIT
 - EXISTING WATER VALVE
 - EXISTING CONCRETE FOOTPATH
- DESIGN**
- NEW SURFACE TREATMENT FOR SHARED ZONE
 - K&G - NEW KERB AND GUTTER
 - NEW PARKING STRIPES
 - NEW KERB INLET PIT
 - NEW STORMWATER PIPE

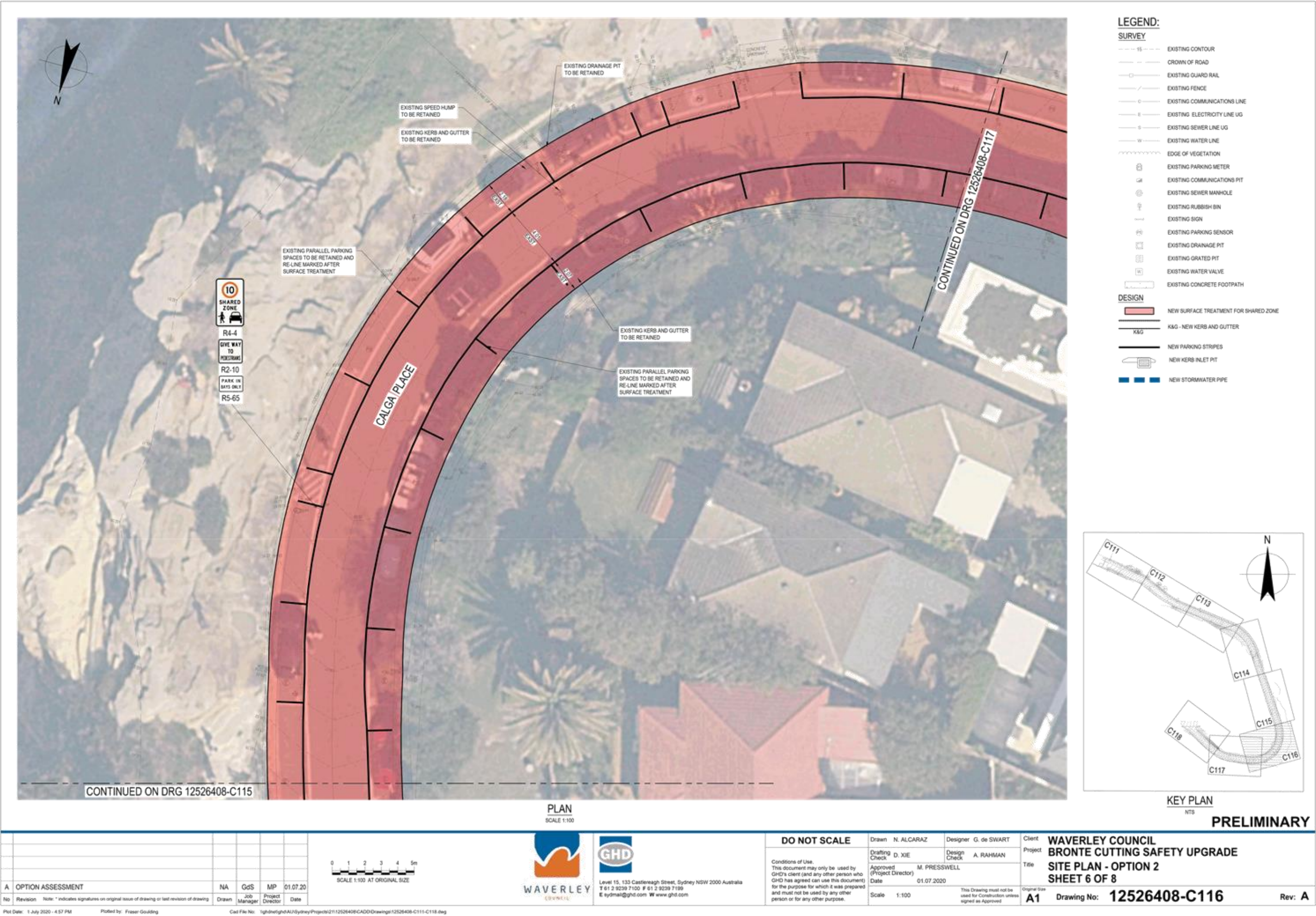


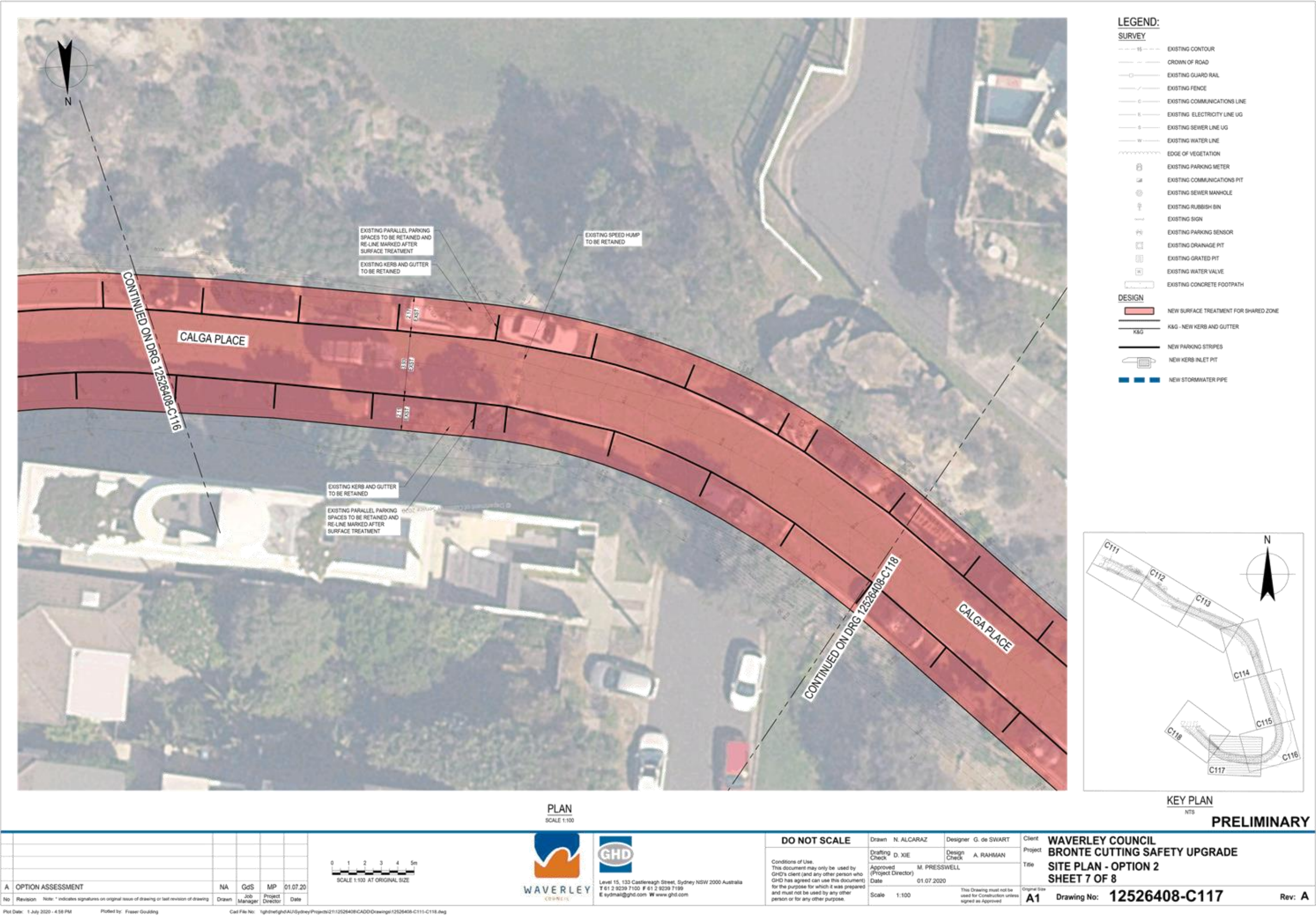
KEY PLAN
NTS
PRELIMINARY

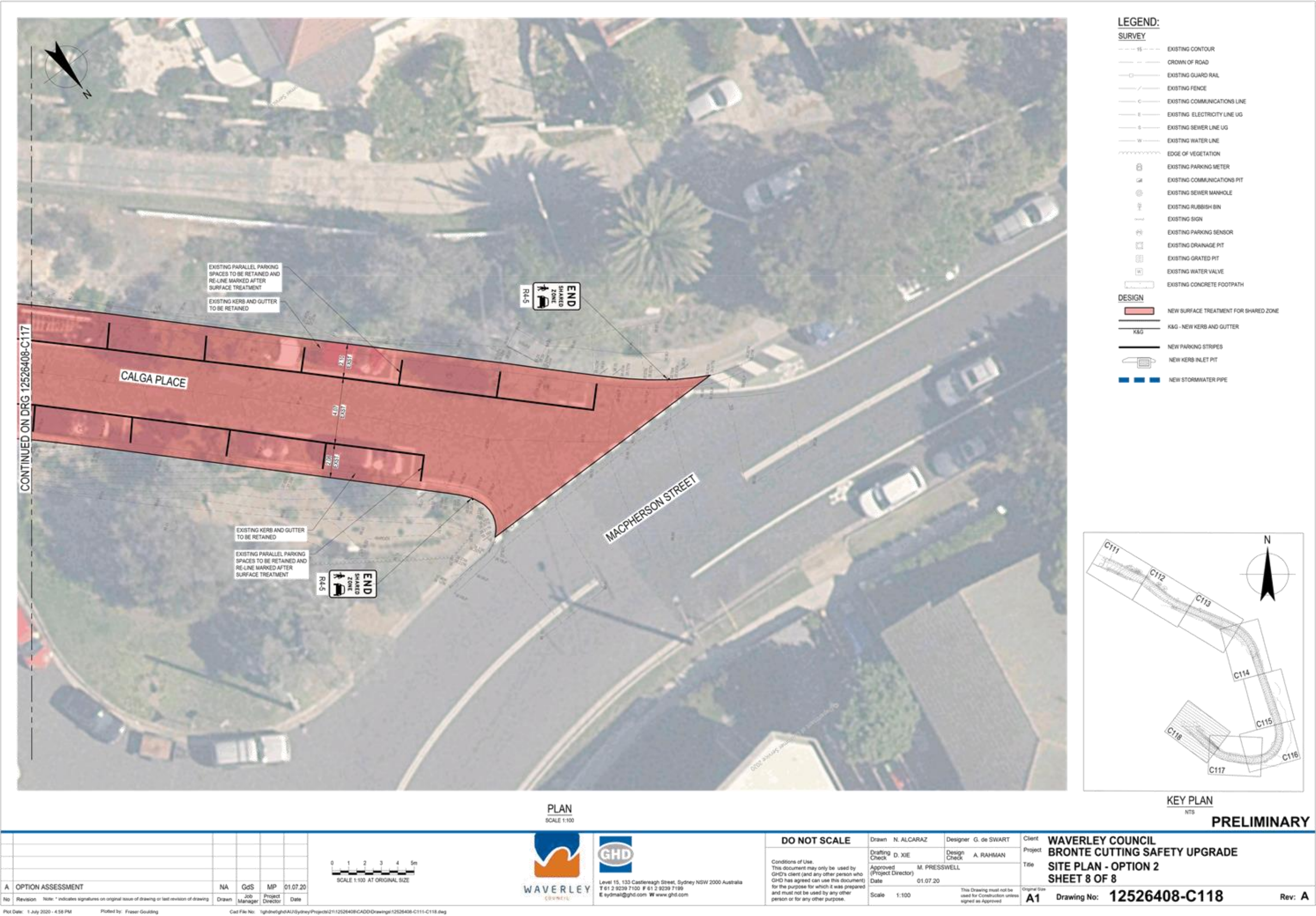
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A OPTION ASSESSMENT					Conditions of Use: This document may only be used by GHD's client (and any other person who GHD has agreed can use this document) for the purpose for which it was prepared and must not be used by any other person or for any other purpose.		Drafting Check D. XIE Design Check A. RAHMAN		Project BRONTE CUTTING SAFETY UPGRADE	
No Revision Note: * indicates signatures on original issue of drawing or last revision of drawing					Approved (Project Director) M. PRESSWELL Date 01.07.2020		Scale 1:100		Title SITE PLAN - OPTION 2	
Plot Date: 1 July 2020 - 4:57 PM Plotted by: Fraser Goulding					This Drawing must not be used for Construction unless signed as Approved		Original Size A1		Drawing No: 12526408-C113	
Cad File No: I:\ghd\sydney\Projects\2112526408\CADD\Drawings\12526408-C111-C118.dwg									Rev: A	











Appendix D – Rendered Sketches



WAVERLEY COUNCIL
BRONTE CUTTING SAFETY UPGRADE
12526408



OPTION 1 - SEPARATED FOOTPATH - SITE PLAN A

PRELIMINARY

A				OPTION ASSESSMENT	NA	GdS	MP	10.07.20
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing			Drawn	JOB Manager	Project Director	Date

Plot Date: 10 July 2020 - 9:53 AM

Plotted by: Rachel Venter

Cad File No: N:\AU\Sydney\Projects\2112526408\CAD\Drawings\12526408-LANDSCAPE.dwg



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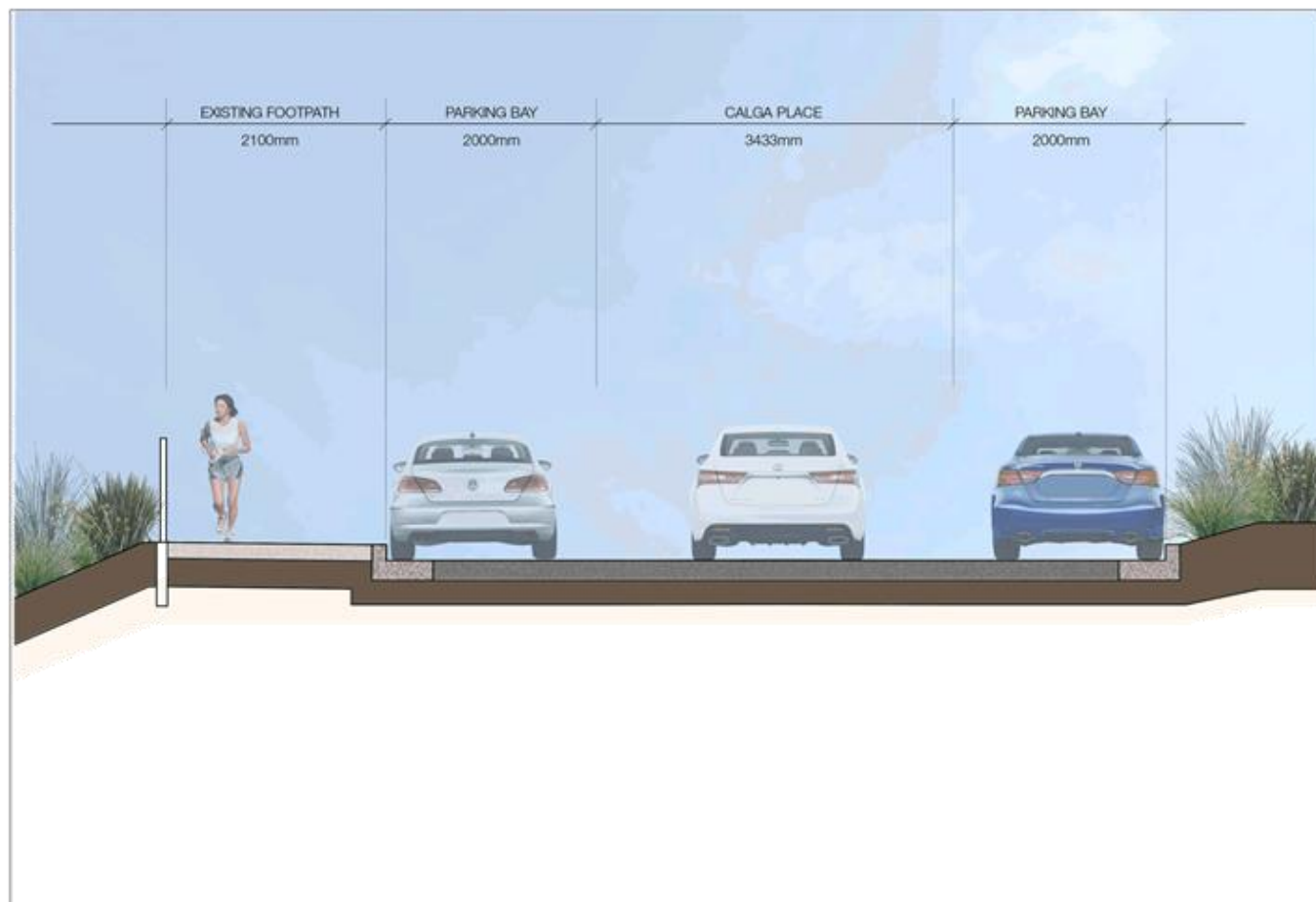
Drawn	N. ALCARAZ	Designer	G. de SWART
Drafting Check	D. XIE	Design Check	A. RAHMAN
Approved (Project Director)	M. PRESSWELL		
Date	01.07.2020		
Scale	NTS		

This Drawing must not be used for Construction unless signed as Approved

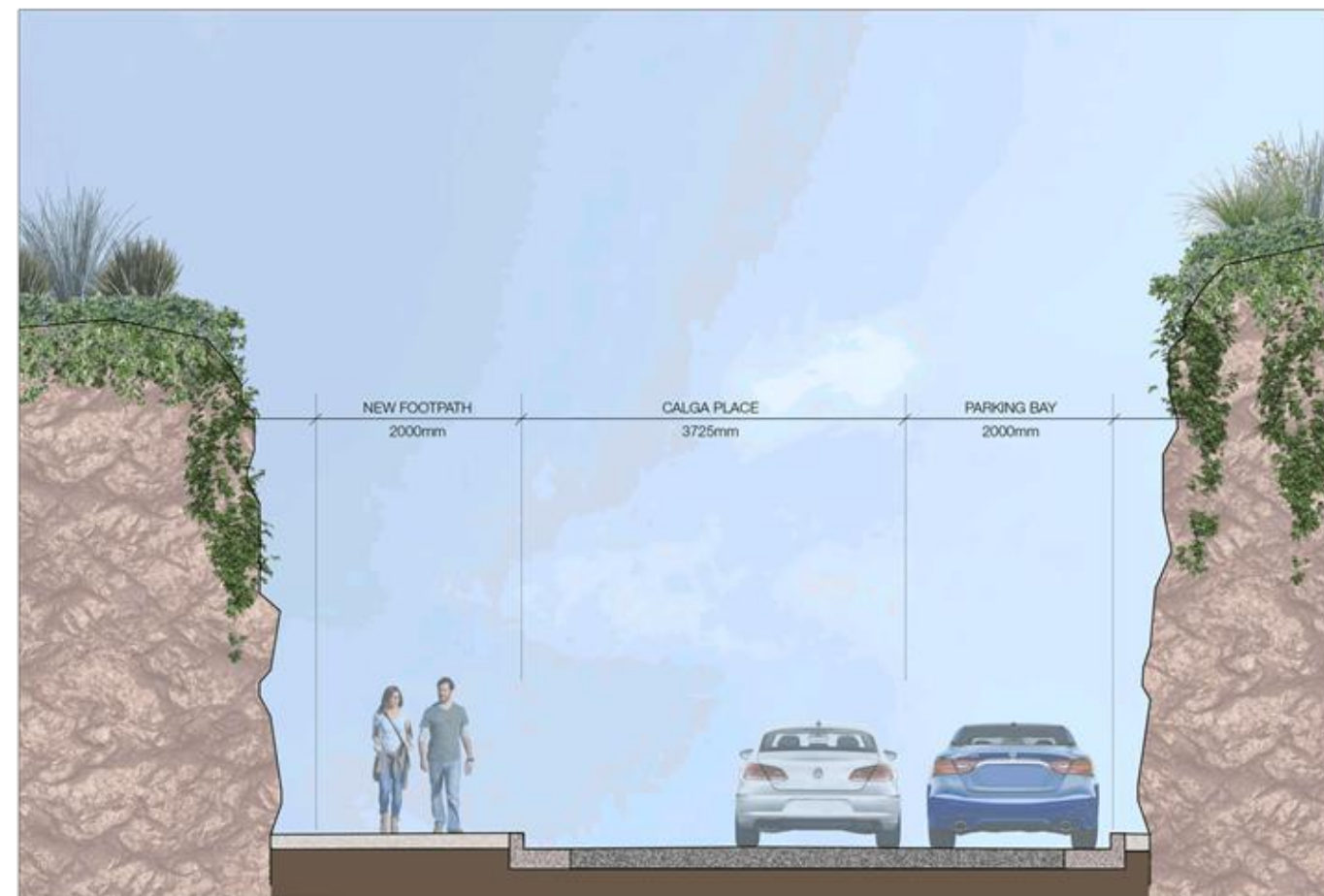
Client	WAVERLEY COUNCIL		
Project	BRONTE CUTTING SAFETY UPGRADE		
Title	OPTION 1 - SEPARATED FOOTPATH		
Original Size	A1	Drawing No:	12526408-LS-001
Rev:	A		



WAVERLEY COUNCIL BRONTE CUTTING SAFETY UPGRADE 12526408



OPTION 1 - SEPARATED FOOTPATH - SECTION A



OPTION 1 - SEPARATED FOOTPATH - SECTION B

PRELIMINARY

A	OPTION ASSESSMENT		NA	GdS	MP	10.07.20
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	JOB Manager	Project Director	Date

Plot Date: 10 July 2020 - 9:54 AM

Plotted by: Rachel Venter

Cad File No: N:\AU\Sydney\Projects\2112526408\CADD\Drawings\12526408 LANDSCAPE.dwg



DO NOT SCALE	Drawn: N. ALCARAZ	Designer: G. de SWART
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	Approved (Project Director): M. PRESSWELL	Date: 01.07.2020
	Scale: NTS	This Drawing must not be used for Construction unless signed as Approved

Client	WAVERLEY COUNCIL
Project	BRONTE CUTTING SAFETY UPGRADE
Title	OPTION 1- SEPARATED FOOTPATH
Original Size	A1
Drawing No:	12526408-LS-002
Rev:	A



WAVERLEY COUNCIL BRONTE CUTTING SAFETY UPGRADE 12526408



OPTION 2 - SHARED ZONE - SITE PLAN A

PRELIMINARY

				DO NOT SCALE		Drawn: N. ALCARAZ Designer: G. de SWART Drafting Check: D. XIE Design Check: A. RAHMAN Approved (Project Director): M. PRESSWELL Date: 01.07.2020	Client: WAVERLEY COUNCIL Project: BRONTE CUTTING SAFETY UPGRADE Title: OPTION 2 - SHARED ZONE
A OPTION ASSESSMENT NA GdS MP 10.07.20	Drawn: NA Job Manager: GdS Project Director: MP Date: 10.07.20	Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydney@ghd.com W www.ghd.com		Conditions of Use: This document may only be used by GHD's client (and any other person who GHD has agreed can use this document) for the purpose for which it was prepared and must not be used by any other person or for any other purpose.		Scale: NTS This Drawing must not be used for Construction unless signed as Approved	Original Size: A1 Drawing No: 12526408-LS-003 Rev: A

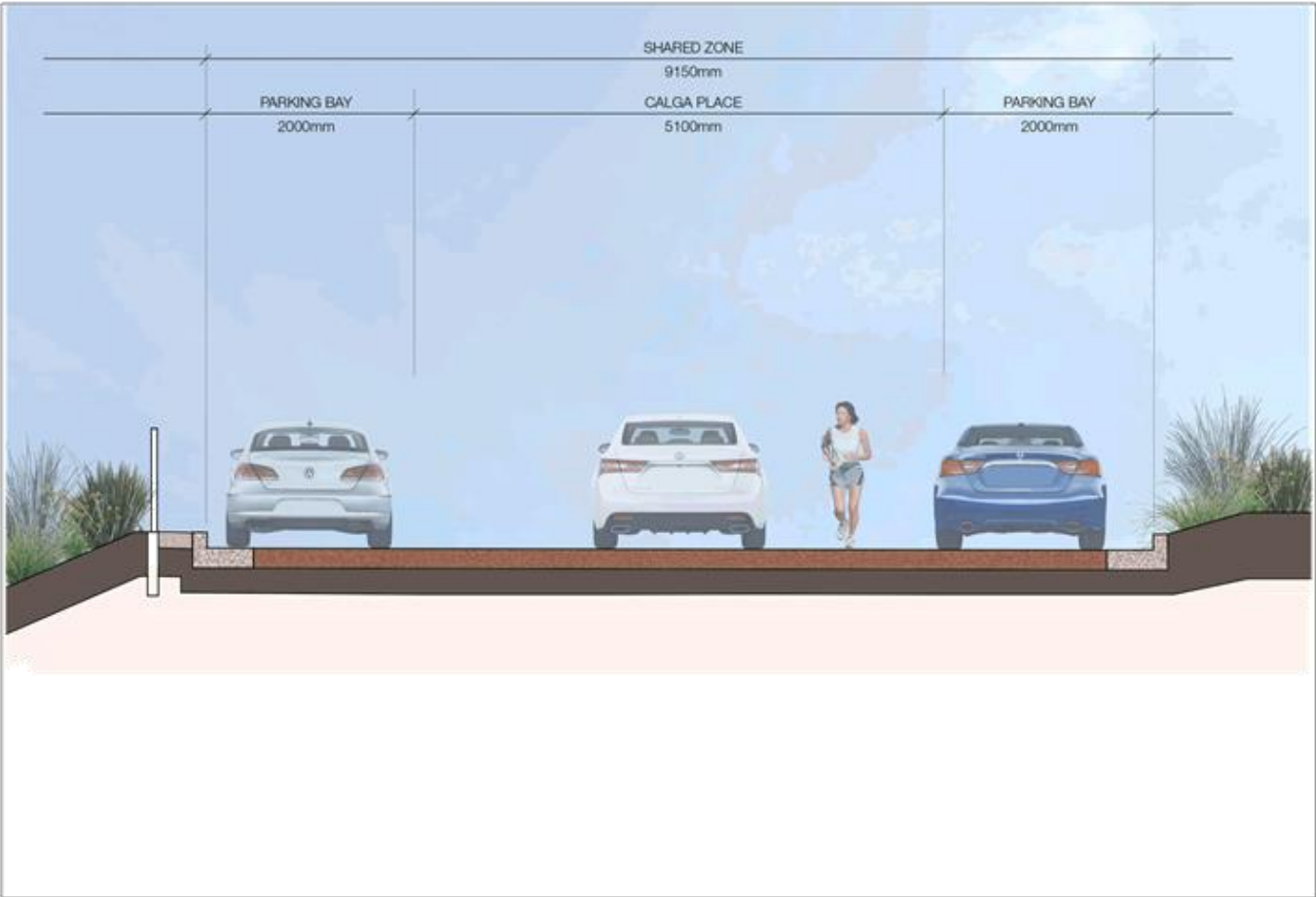
Plot Date: 10 July 2020 - 9:55 AM

Plotted by: Rachel Venter

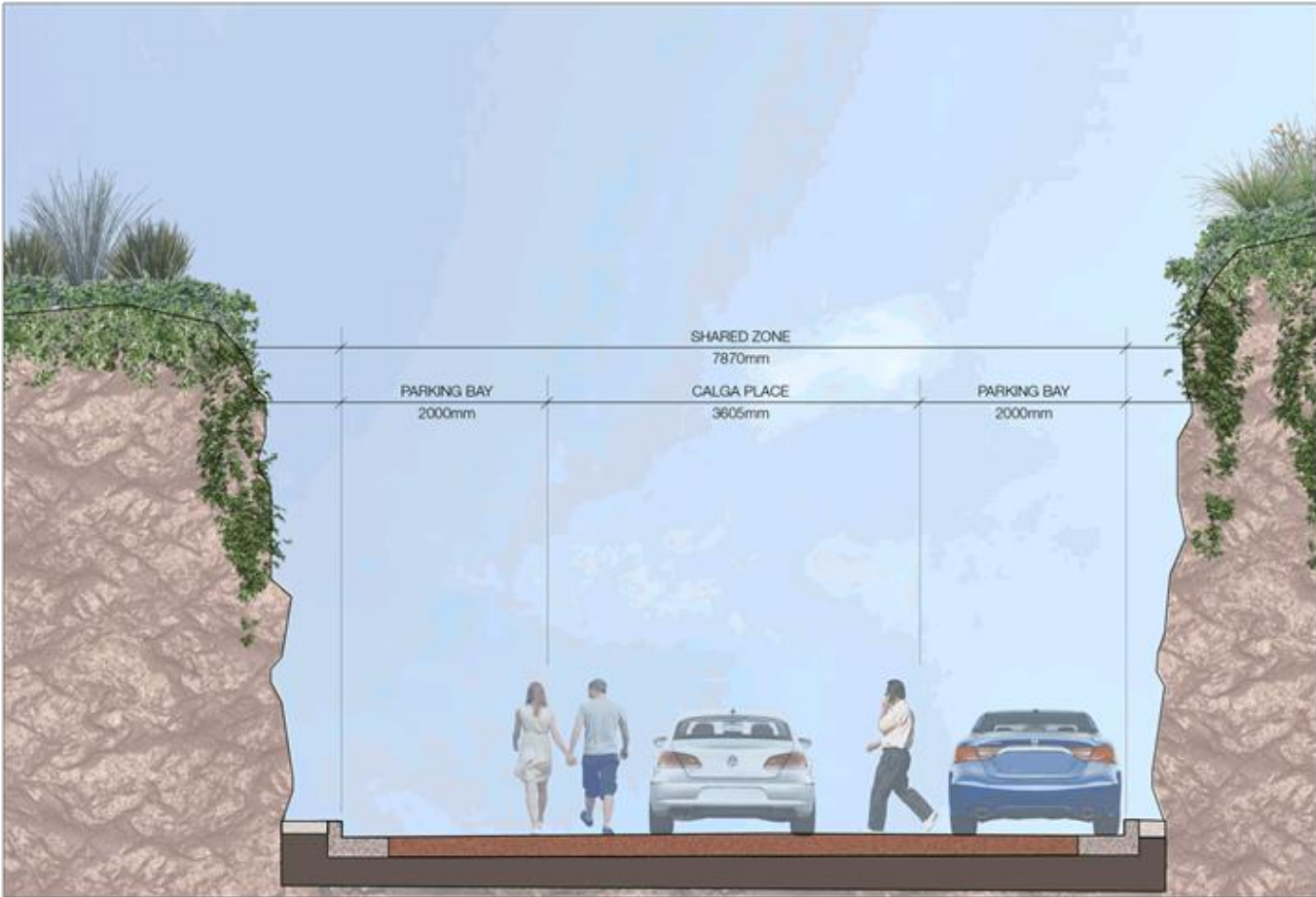
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WAVERLEY COUNCIL BRONTE CUTTING SAFETY UPGRADE 12526408



OPTION 2- SECTION A- SHARED ZONE



OPTION 2- SECTION B- SHARED ZONE

PRELIMINARY

								DO NOT SCALE		Drawn N. ALCARAZ	Designer G. de SWART	Client WAVERLEY COUNCIL				
						Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydney@ghd.com W www.ghd.com		Conditions of Use: This document may only be used by GHD's client (and any other person who GHD has agreed can use this document) for the purpose for which it was prepared and must not be used by any other person or for any other purpose.		Drafting Check D. XIE	Design Check A. RAHMAN	Project BRONTE CUTTING SAFETY UPGRADE				
								Approved (Project Director) M. PRESSWELL		Date 01.07.2020		Title OPTION 2- SHARED ZONE				
								Scale NTS		This Drawing must not be used for Construction unless signed as Approved		Original Size A1				
										Drawing No: 12526408-LS-004		Rev: A				
A				OPTION ASSESSMENT		NA	GdS	MP	10.07.20							
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing		Drawn	JOB Manager	Project Director	Date									
Plot Date: 10 July 2020 - 9:56 AM				Plotted by: Rachel Venter		Cad File No: N:\AU\Sydney\Projects\2112526408\CADD\Drawings\12526408 LANDSCAPE.dwg										

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Bronte Cutting - Options Assessment Report.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft A	Guillaume de Swardt	M Presswell		M Presswell		10/07/2020

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