

# 02. Context Analysis

*A distinctive aspect of the Western Harbour Tunnel and Warringah Freeway Upgrade, setting it apart from the rest of the motorway network, is its unique relationship to the geography of Sydney.*

-Western Harbour Tunnel and Warringah Freeway Upgrade UDLCVIA



Figure 8: View from St Leonard's Park towards Sydney CBD

## 2.0 Context analysis

To gain insight into the historical, present, and future aspects of the Project corridor, and to develop a more profound understanding of the opportunities and challenges it presents, a comprehensive urban design analysis was undertaken. This analysis delved into the various natural, built, and community aspects, including:

- Land use
- Connectivity
- Topography and geology
- Open spaces and amenities
- Soil landscapes
- Non-Aboriginal heritage
- Aboriginal heritage

The analysis covers the entire alignment of the Project but gives particular emphasis to the northern side of the harbour, close to Cammeray and North Sydney, due to the absence of direct ground interaction elsewhere along the alignment. To facilitate the design of Cammeray facilities, tunnel portals, and the Ernest Street Bridge, dedicated zoomed-in maps have been prepared.



## 2.1 Aboriginal history and heritage

The history of Aboriginal people of the Sydney Harbour region stretches back through the millennia. As the first site of British settlement, the lands of the Eora Nation hold an important place in the history of modern Australia. The territory of the Eora nation spread from Botany Bay and the Georges River in the south, to the Pittwater and the Hawkesbury River in the north and to Parramatta in the west. The Aboriginal people of the Sydney Harbour area had, and continue to have, a deep and enduring connection to their land and waterways.

### Eora Nation

The term “Eora” means “here” or “from this place” in the language dialect of the Gadigal people. Known collectively today as the Eora Nation, this language family group comprised of many inter-related clan groups, including the Cammeraygal, Wangal, and the Cadigal. The alignment of the WHT project traverses through the lands of the Cammeraygal and Wangal peoples of Eora Nation. Each clan of the Eora Nation had its own specific territory and dialect but were interconnected through a complex social and kinship system. They lived as one with the land, with the abundant resources of this coastal region enabling the production of tools, resources, food and medicines for everyday life. Their mythology and creation stories are intertwined with the land.



Figure 9: Sydney from Bell Mount, 1813 painted by Stephen Taylor. Source: State Library of NSW

### Cammeraygal

The territory of the Cammeraygal clan encompassed the north shore of Sydney Harbour, including the suburbs known today as North Sydney and Waverton. Their interconnected social system with Eora Nation clans to the south, including the Cadigal and Wongal clans, was facilitated by travel by nawi (canoe).

Sydney Harbour was central in lives of the Cammeraygal people, and evidence of its importance in their way of life can still be seen today in shell middens demonstrating thousands of years of sourcing and consuming shellfish in the same location., such as on Berry Island. Ancient rock engravings depicting marine life, made by the Cammeraygal clan, are also still visible today.

Barangaroo, who was married to Bennelong, is a recognised member of the Cammeraygal clan.

### Wangal or Wongal

The Wangal clan of the Eora Nation are custodians of the lands and waters of what is now the Inner West of Sydney. Their country, Wangal, was to the west of the Cadigal clan and extended from Darling Harbour, around the Balmain Peninsula (including Goat Island, or Me-mel) to Parramatta in the west.

Bennelong is a notable member of the Wangal clan, after which Bennelong Point was named. He was laid to rest at Kissing Point, at the western end of Wangal land.

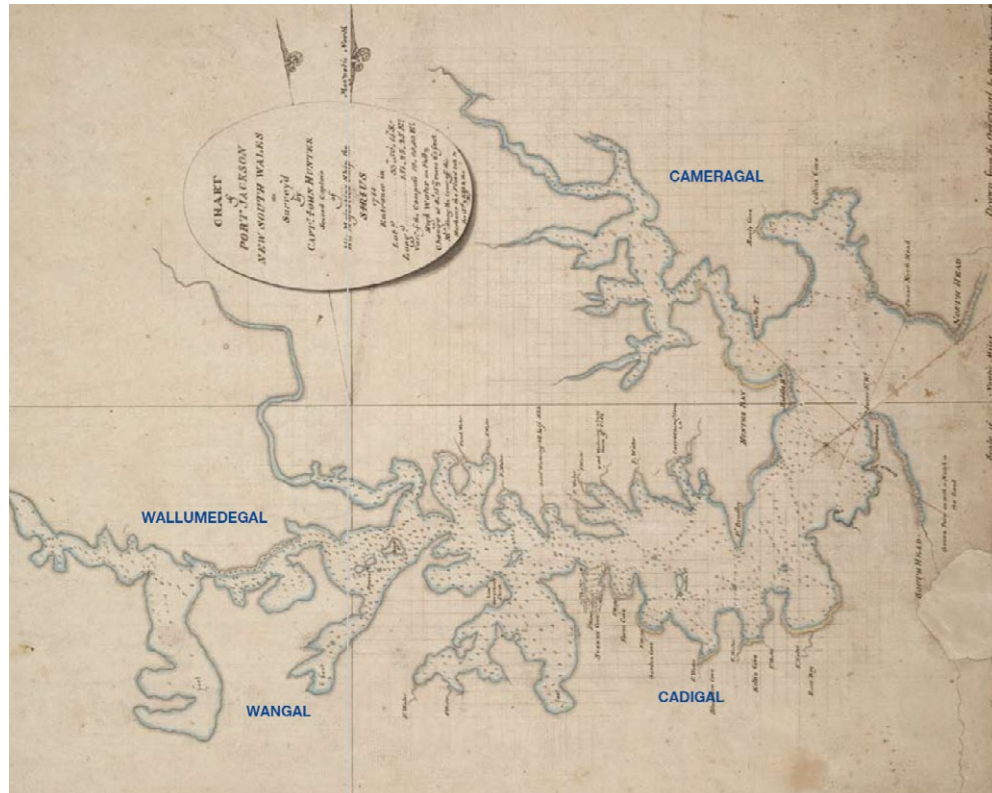


Figure 10: Eora Mapping Aboriginal Sydney 1770–1850.  
Source: State Library of New South Wales

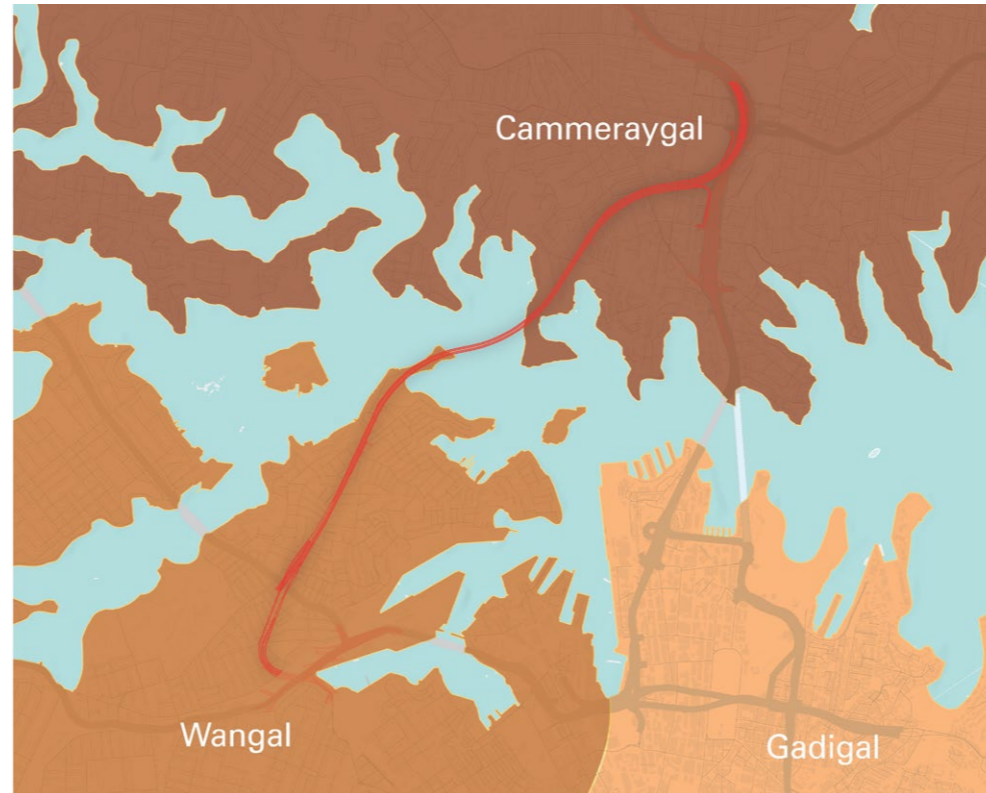


Figure 11: Aboriginal language Groups around the Harbour.  
Source: DesignInc



Figure 12: Aboriginal engraving of whale at Balls Head  
Image courtesy: Stanton Library Historical Services

**Nawi: Tied bark canoes**

Nawi canoes served as the initial means of connecting the two sides of the harbour. Nawi is the Gadigal and Dharug word for the tied bark canoe and this type was made along a large stretch of the eastern coastline from the Sunshine coast in Queensland down to the Gippsland region in Victoria. Bark canoes were used by Aboriginal people for general transport, fishing and collecting birds' eggs from reed beds. When fishing in such canoes, women sat and used hooks and lines; men stood to throw spears. A small fire was kept alight in the canoe on a bed of wet clay or seaweed. This kept people warm in winter and also allowed them to cook the fish they had caught.

**Design considerations:**

- By active collaboration with the Aboriginal communities and incorporating Aboriginal design elements along the corridor, this Project presents a great opportunity to tell the story of Aboriginal people. Through the sharing of their culture and stories with road users, the project could foster a meaningful connection and understanding of Aboriginal heritage by the broader community.
- Potentially identify significant locations for interpretation and creating an integrated art strategy that represents the Aboriginal heritage and cultural identity along the alignment
- WHT acts as a connection between two Aboriginal countries. This is celebrated through design
- The restoration of historical, pre-European landscape communities in the region, including incorporation of native plants
- Consider usage of Indigenous names for project elements.

The consultation approach, strategies and interpretation opportunities are outlined in [Section 3.4](#).



Figure 13: Benelong Point from Dawes Point showing Aboriginal Nawis and European ships, watercolour by John Ayre, 1804. Source: State Library of NSW



Figure 14: A watercolour illustration of Aboriginal people fishing dated c1790s. Source: State Library of NSW



Figure 15: Three people on a bark canoe. Source: Federation University Historical Collection

## 2.2 Non-Aboriginal history and heritage

The non-Indigenous history of Sydney Harbour begins with the arrival of European settlers in the late 18th century. In 1788, Captain Arthur Phillip led the First Fleet, consisting of British convicts, soldiers, and officials, to establish a penal colony in what is now known as Sydney.<sup>1</sup>

The early years of European settlement were challenging, with the settlers facing difficulties in adapting to the unfamiliar environment. However, Sydney Harbour quickly became a vital hub for the growing colony. The natural deep-water harbour provided a sheltered port for ships, allowing for the transportation of goods, supplies, and people.

As the colony developed, the population increased, and Sydney Harbour played a crucial role in facilitating trade and commerce. The harbour became a centre for maritime activities, including shipping, shipbuilding, and whaling. Industries such as wool and wheat farming in the surrounding regions relied on the harbour for exporting their products to other parts of Australia and the world.

The construction of infrastructure around the harbour transformed its landscape. In addition to the iconic Sydney Harbour Bridge, numerous wharves, docks, and industrial facilities were built along the shoreline. These developments enhanced the harbour's capacity to handle growing maritime activities and further solidified its importance to the city's economy.

Over time, Sydney Harbour also became a popular destination for recreational activities. The picturesque coastline, pristine beaches, and islands dotted throughout the harbour attracted locals and tourists alike. Sailing, boating, fishing, and swimming became popular pastimes, and the harbour's natural beauty contributed to the city's reputation as a desirable place to live and visit.

Today, Sydney Harbour remains a vibrant and bustling waterway. It continues to serve as a major transportation hub, accommodating ferries, cruise ships, and recreational vessels. The harbour's shores are lined with vibrant neighbourhoods, parks, and cultural institutions, further enhancing its appeal to residents and visitors.

The history of Sydney Harbour reflects the growth, development, and transformation of the city over the centuries. It showcases the significant role the harbour has played in shaping Sydney's identity, economy, and cultural heritage.



Figure 16: Sydney Harbour, ca.1870. Source: State Library of New South Wales



Figure 17: Sydney Harbour, 1939. Source: State Library of Victoria



Figure 18: Bird's-eye view of Sydney Harbour, 1890. Source: National library of Australia

<sup>1</sup> [Port Authority of New South Wales](https://www.portauthority.nsw.gov.au/)



Figure 19: Sydney Harbour Bridge. Photo by Frank Hurley ca.1960. Source National Library of Australia

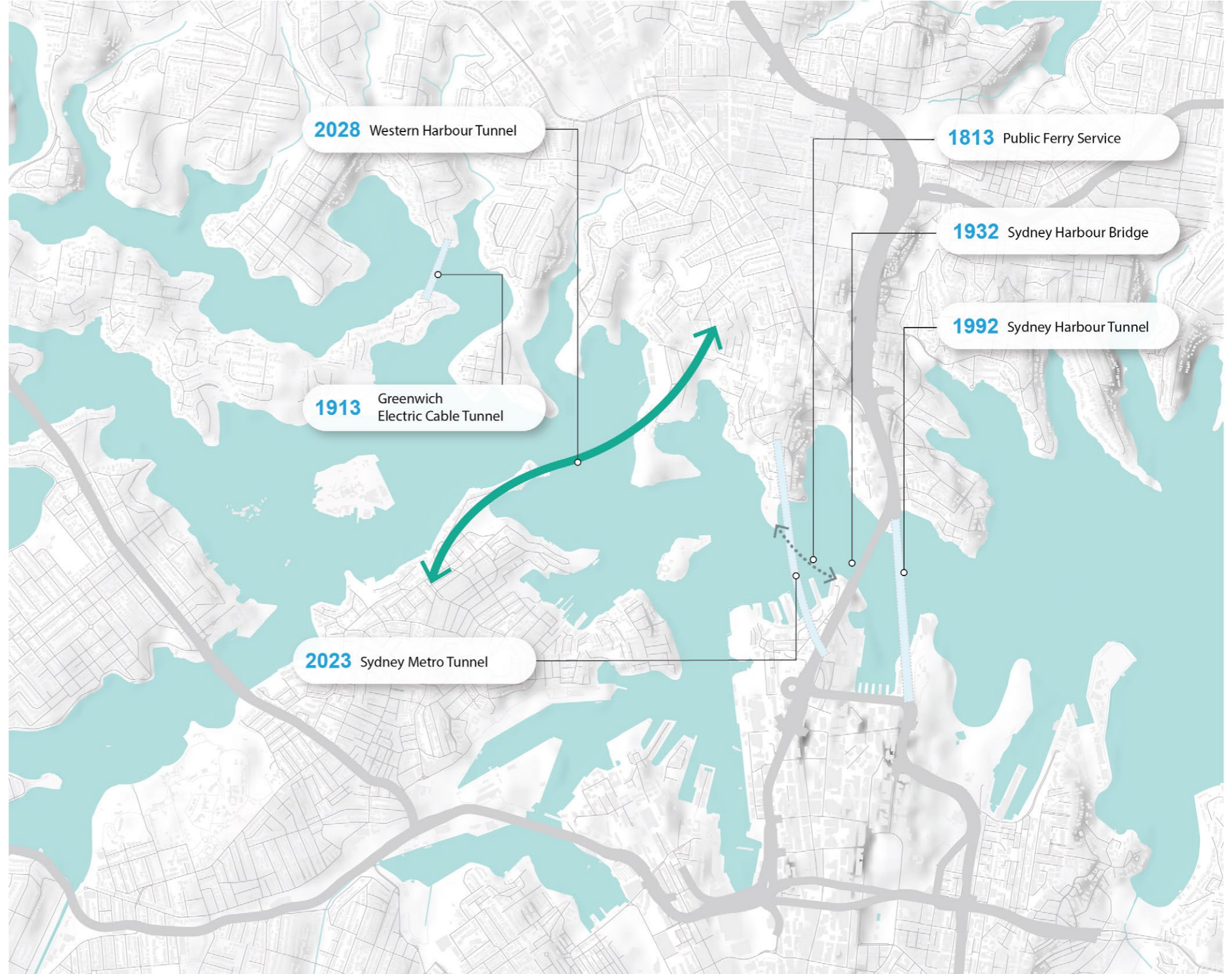


Figure 20: Connections across Sydney Harbour



# Crossing The Harbour



European arrival

1788

1813

In the late 1800s, Sydney experienced rapid urbanization and population growth, resulting in increased congestion and limited transport options across the Sydney Harbour. Various proposals were put forward to address this issue, including tunnels, more ferries, and even a bridge. However, it was not until the early 20th century that serious discussions about building a bridge gained momentum.

5 million ferry passengers

## Harbour Bridge Act

In 1900, the New South Wales government established the "Harbour Bridge Act" which authorized the construction of a bridge over Sydney Harbour. The act called for a design competition to select the most suitable bridge design. The competition attracted several entries, with the renowned engineering firm Dorman Long and Co. eventually winning the contract.

1890

1900

The history of Sydney Harbour crossing refers to the development and evolution of transportation infrastructure that enables passage across Sydney Harbour. From the early stages of the settlement that eventually became Sydney, there was a growing public demand for a safe and permanent connection that would bridge the gap between the northern and southern areas of the city, spanning across its expansive natural harbor.

However, well before the arrival of European settlers, the Aboriginal people been navigating the waters of the harbor. They belonged to a canoe culture, and the expansive Port Jackson served as their primary means of transportation. They utilized carved wooden canoes known as "nawi" to navigate the waterways and even established trade routes along which they travelled.



During this initial era of colonial settlement, the options for crossing the water were limited. One could either brave the treacherous voyage by boat or opt for a lengthy detour that could consume a significant portion of the day.



In 1813, Billy Blue, a former convict, took the initiative to establish the inaugural public ferry service. Sydney Ferry Company was established in 1861 the ferries soon became an integral part of daily life and solidifying the connection between north and south parts of Sydney. The ferries moved everything—not just people, but vehicles and horsemen. By 1927, the annual passenger count had surged to 27 million, leading to overcrowding and posing an escalating risk for commuters during their journeys.





## Harbour Bridge opening

In addition to the Sydney Harbour Bridge, there are other crossings that have been developed over time to accommodate the growing transportation needs of the city, including Sydney Harbour Tunnel. The history of the tunnel dates back to the late 19th century when discussions about a harbor tunnel as an alternative to the Sydney Harbour Bridge began to emerge.



The tunnel was designed to alleviate traffic congestion on and provide an additional route for commuters traveling between the northern and southern parts of Sydney. After several years of construction, the Sydney Harbour Tunnel was opened to the public in August 1992. Since then, it has served as an essential transportation link, providing a convenient and efficient route for motorists and improving connectivity within the city.

## Sydney Harbour Tunnel opening



1923

1932

1987

1992

2028

## Harbour Bridge construction commencement

Construction of the Sydney Harbour Bridge began in 1923 and involved thousands of workers over a span of eight years. After eight years, the bridge was completed in 1932, overcoming challenges such as financial difficulties. This iconic steel arch bridge spans the harbor, connecting the Sydney CBD with the North Shore. Today, it is not only an essential transportation artery but also an iconic landmark that represents Sydney and symbolise greater connectivity.



In the 1920s, the idea of a tunnel gained traction due to concerns about increasing congestion on the bridge. However, it wasn't until the 1960s that serious plans for a tunnel were considered. In 1982, the idea of constructing a second bridge crossing was put forward. However, it was declined in favor of a tunnel due to the absence of available corridors for building a new north-south freeway. In 1987, construction on the Sydney Harbour Tunnel officially commenced.

## Western Harbour Tunnel opening

The ongoing development and improvement of Sydney Harbour crossing infrastructure continue to be a priority for the government and transport authorities. Future projects, the proposed Western Harbour Tunnel aim to provide additional connections and alleviate congestion by creating alternative routes across the harbour.

(Information extracted from ["The Bridge"](#) a five episode podcast series by NSW State Library)

### 2.2.1 Non-Aboriginal heritage

There are many local and state heritage items located near the project alignment. The alignment also passes along vast conservation areas, primary residential areas such as Birchgrove, North Sydney, and Cammeray. However, as the project is primarily underground the impact of the WHT Project on heritage items will be minimal: the only state heritage item that will be directly affected by the construction works is St. Leonards Park. Additionally, the local heritage site, Cammeray Park, is expected to experience substantial impacts as a result of the construction.

Refer to WHT EIS Chapter 14: Non-Aboriginal Heritage for more details.

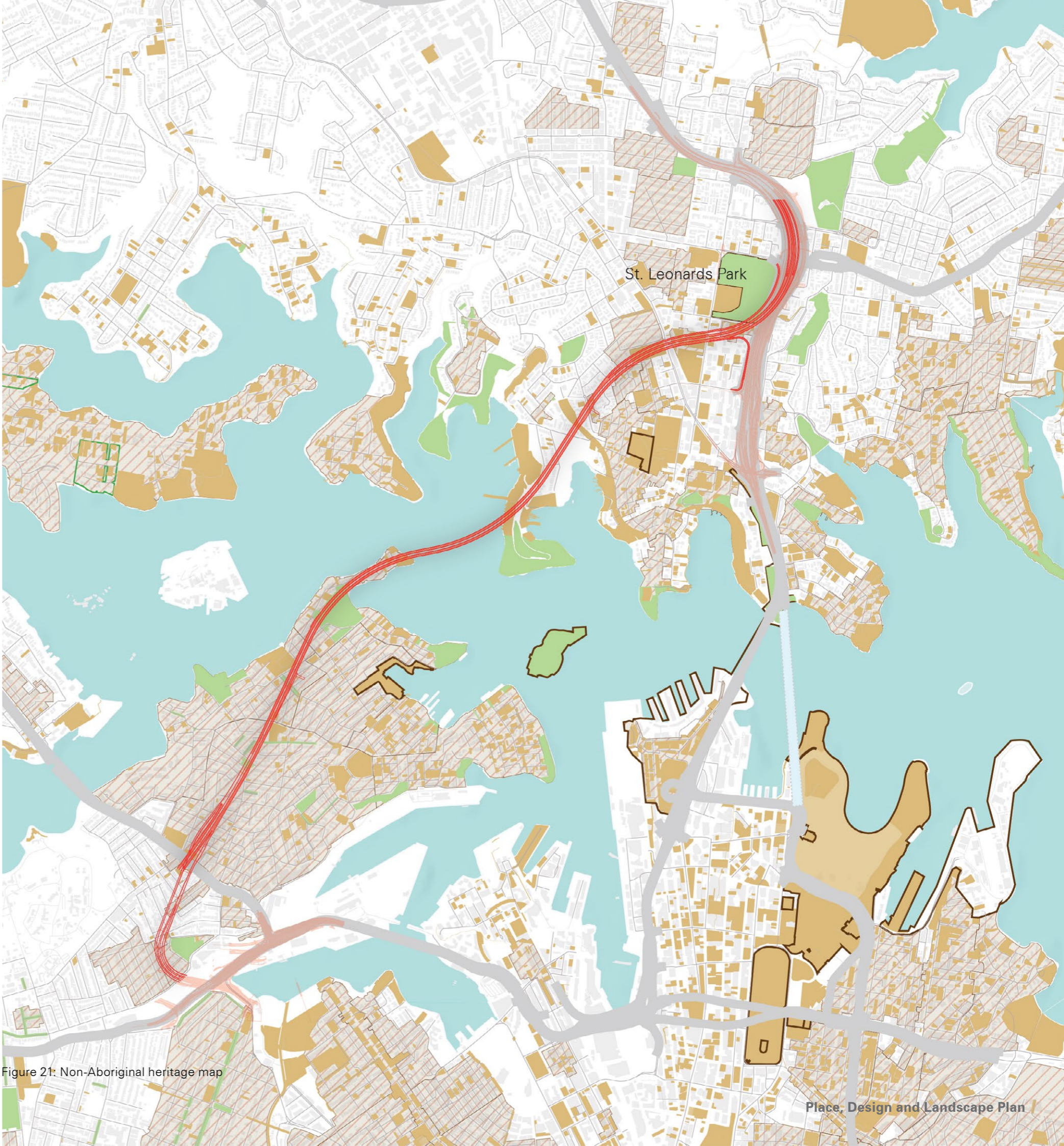


Figure 21: Non-Aboriginal heritage map

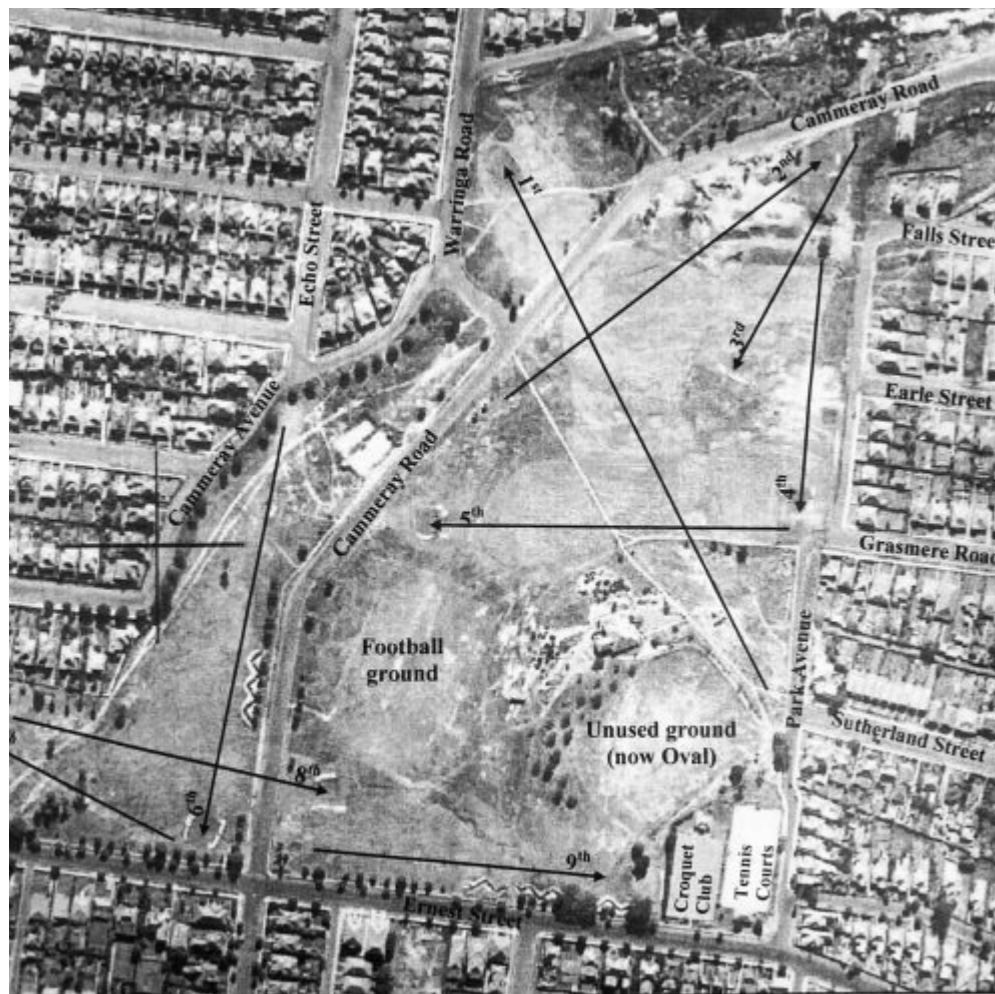


Figure 22: Cammeray golf course map circa 1940. Source: Cammeraygolf.com

### Cammeray Park

Established on December 7, 1886. The land was reserved from earlier, possibly when the town plan was created, and it was labelled as “Reserved for Access to Water” in 1859. A map from 1868 designates the area as the “St Leonards Rifle Range”. In the early 1900s, Cammeray Park was a wild expanse of bushes and rocks, overlooking Middle Harbour.

The golf course was introduced to the park during the mid-20th century. The western section was reduced in size due to the construction of the Warringah Expressway in the 1960s.



Figure 23: Trooping the Colour The North Sydney Regiment at St. Leonards Park, 1938. Source: Australian War Memorial. Research Centre

### St Leonards Park

St Leonards Park is of state heritage significance for its historical importance as one of the earliest established public parks in New South Wales. It was designated as a recreation reserve as far back as 1838, making it a testament to the state’s early commitment to public parkland. It is also significant as a surviving and relatively intact example of a Victorian public park in the gardenesque style. Additionally, the park is home to one of Australia’s oldest continuously used cricket grounds, established in 1867, and a bowling club that dates back to 1887<sup>1</sup>. Refer to Section 2.7 for the details on the present condition of the park.

#### Design considerations:

- Falcon Street exit ramp design should consider and respond sensitively to the heritage value of St Leonards Park
- Take into account the historical significance and cultural heritage of the land while designing tunnel elements

<sup>1</sup> [NSW Government - State Heritage Inventory](#)

## 2.3 Topography

The Sydney Harbour area, features diverse topography that combines flat sections, ridges, and a picturesque harbour.

The topography of the south side of harbour is relatively flat, with gently undulating terrain. As the route moves towards the north, the alignments' surface topography is marked by a general increase in elevation. This results in higher visibility of the Cammeray facilities from the surroundings. North Sydney and the surrounding harbour area are characterised by a combination of hilly terrain, water bodies, and man-made structures. The area is known for its stunning views of the city skyline, iconic landmarks, and the natural beauty of Sydney Harbour.

Proximity to the water is a major feature of the project alignment, however the scope of the project does not encompass any direct surface connections or views to these water features.

### Design considerations:

- Recognise the potential visual impacts of the built elements and identify positive view opportunities based on the surrounding topography
- Respond to the flood risks
- Recognise the location and nature of lateral connections
- Consider design inspirations from the varying surface topography of the Harbour

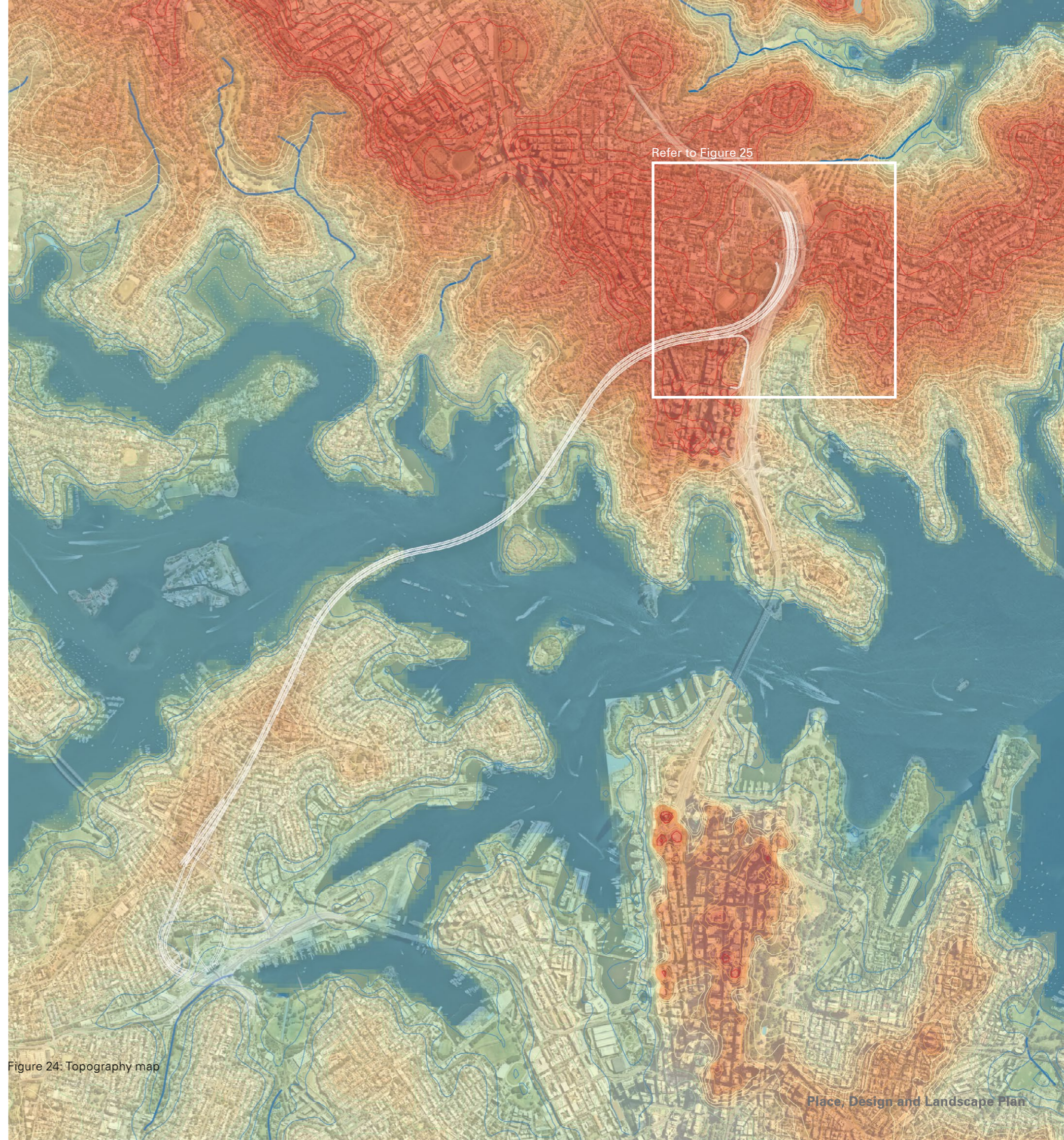
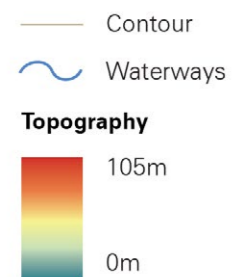


Figure 24: Topography map

## 2.4 Soil landscape and geology

### Hawkesbury sandstone

The Harbour consists mainly of Hawkesbury sandstone, a very hard rock that tends to break away in large blocks, creating the distinctive boulders and vertical cliffs that define the Sydney coastline<sup>1</sup>. It is a distinctive geological formation known for its durability, attractive appearance, and historical significance in Australian architecture and construction. The exposed sandstone cuttings of Warringah Freeway are a significant visual element during the journey through North Sydney.

<sup>1</sup> <https://australian.museum/learn/animals/wildlife-sydney/geology-of-sydney-harbour/>



Figure 26: Hawkesbury stone. Source: Dictionary of Sydney

#### Design considerations:

- Consider design inspirations from the geology of the Harbour
- Use appropriate landscape types to suit the soil and climatic conditions

#### Soil names

- Blacktown
- Disturbed terrain
- Gymea
- Gymea/lambert
- Hawkesbury

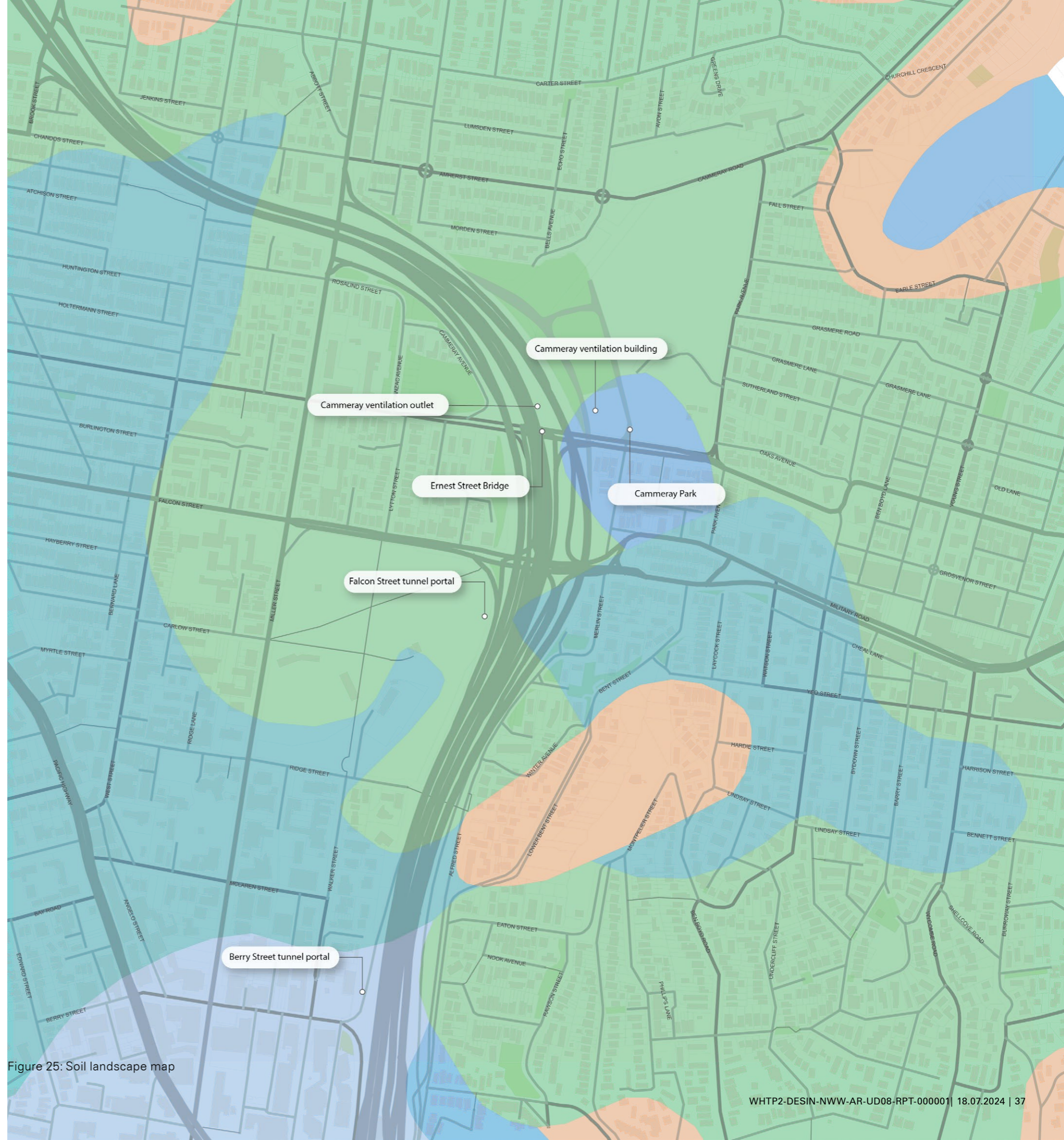


Figure 25: Soil landscape map

## 2.5 Transport and connectivity

Currently, there are several transportation options for crossing Sydney Harbour. The Sydney Harbour Bridge and the Harbour Tunnel serve as the primary road links across the harbour, but often experience severe congestion during peak hours. The rail network connects the CBD to North Sydney and St. Leonards via the Sydney Harbour Bridge. The closest train station to the alignment is North Sydney which provides access to the CBD and other suburbs. Ferry wharfs are also located on the northern and southern sides of Sydney Harbour, serving the city and its surrounding suburbs.

The Western Harbour Tunnel and the upgraded Warringah Freeway will complement the new B-line bus services connecting the Northern Beaches, North Sydney, the CBD, and the Northwest. This will also improve access to North Sydney, making it easier to connect with existing rail and future metro services. As a result, it presents the opportunity to reduce the number of buses going to the CBD and make bus trips across the Harbour more reliable.

### Active transport

There is a well-developed cycle network around project's surface interface, particularly within the parks. Currently there are dedicated pedestrian connections across the Warringah freeway at two points - Ridge Street/Alfred Street and Military Road/Falcon Street. These pedestrian bridges will be upgraded as part of WFU project to accommodate future projected increases in usage.

The Ernest Street Bridge plays a vital role as a key link connecting residential and recreational areas on either side of the road corridor. As part of the WFU, a separated cycle path is proposed for the bridge, further enhancing connectivity in the area.

**Design considerations:**

- Ensure the current networks for pedestrians, cyclists, vehicles, and public transport are maintained
- Explore the opportunities for new pedestrian and cyclist connections
- The design makes sure the smooth integration of the project with the works provided by others and future connections

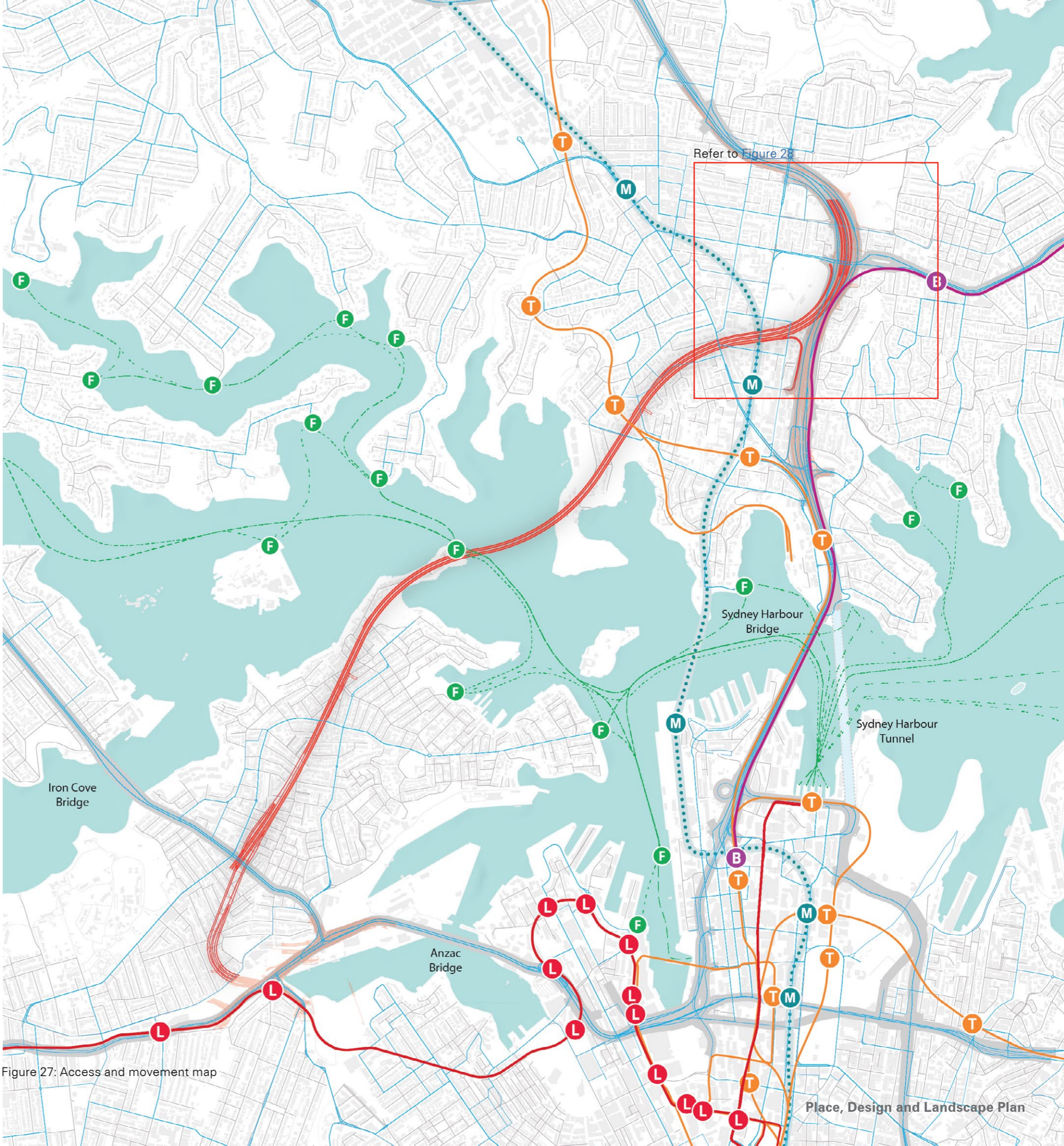


Figure 27: Access and movement map

- Separated cycle path
- Shared user path
- On-road cycle route
- ⋯ Potential future bicycle route\*
- Primary road
- Secondary road
- Local roads
- - - - - Pedestrian bridge

\*North Sydney cycling guide and map

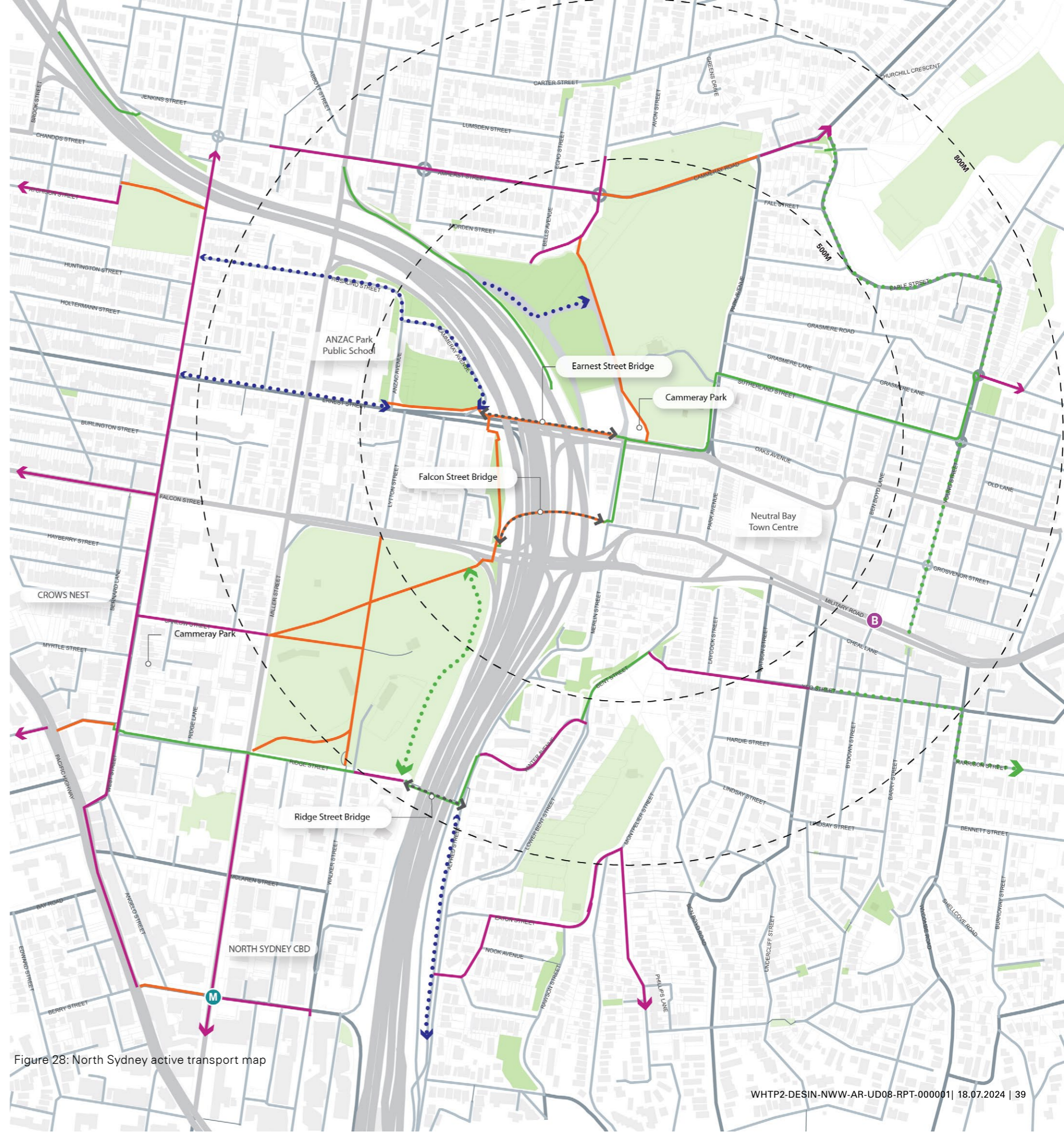


Figure 28: North Sydney active transport map



## 2.6 Land use

The alignment passes underneath a wide variety of land use types.

Low density residential areas are the primary feature in southern side of the alignment. The suburbs are known for their charming streets lined with a mix of detached houses, terrace houses, and some apartment complexes. They often feature a blend of historic and modern architecture, creating a unique and appealing atmosphere.

The land use character of Northern side is primarily residential and commercial, with a few pockets of industrial activity and public recreation. The residential areas of North Sydney are predominantly low to medium density, with a mix of apartment blocks, terrace houses, and detached houses. There are several high-end residential areas, particularly in the suburbs of Kirribilli and Lavender Bay, which offer spectacular views of the Sydney Harbour Bridge and Opera House.

The surface interactions of the Project occur mainly adjacent to sensitive public open spaces and residential zones, especially the Cammeray facilities and tunnel portals. Berry Street portal connects the tunnel to the North Sydney CBD, which is characterised by high-rise office buildings, shopping centres, restaurants, and cafes. This area is home to a significant number of businesses, especially in the finance, technology, and creative sectors, and is an important employment hub for the city.

**Design considerations:**

- Determine the requirements for lateral connections
- Recognise potentials for public open spaces like parks and public amenities
- Shape the aesthetic aspects of urban and landscape design approaches
- Understand the current and future character of the area, and identify the potential users and receptors
- Influence the locations and form of the built elements above ground including ventilation tunnels, maintenance facilities and tunnel portals

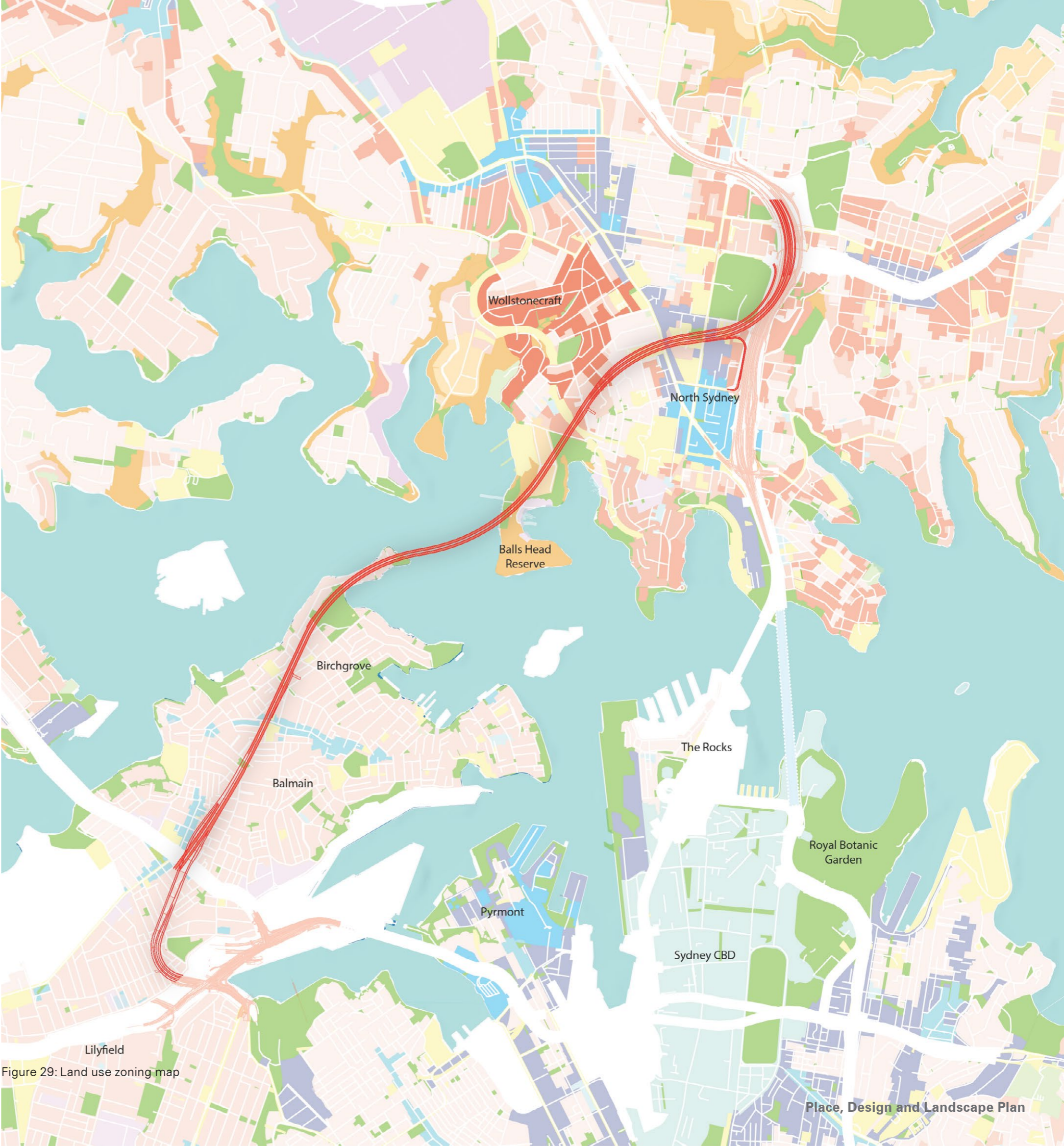


Figure 29: Land use zoning map

## 2.7 Open space network

The open spaces around Sydney Harbour provide a welcome escape from the urban environment, allowing residents and visitors to connect with nature, engage in recreational activities, and appreciate the iconic beauty of Sydney Harbour. There is a significant amount of urban development expected adjacent to the corridor in the following years. Therefore, open spaces are becoming more valuable.

A variety of green spaces can be found throughout the surrounding area of the project alignment, including sports facilities, reserves, and parklands. Given that the majority of the project is located underground, it has minimal impact on most of these open spaces. Prominent public open spaces that surface interface with the Project are St. Leonards Parkland and Cammeray Park. These areas are highly valued for their recreational opportunities, such as dog walking, cycling, walking, and sports activities. Additionally parks and reserves contribute significantly to the natural landscape of the surrounding area.

### St. Leonards Park

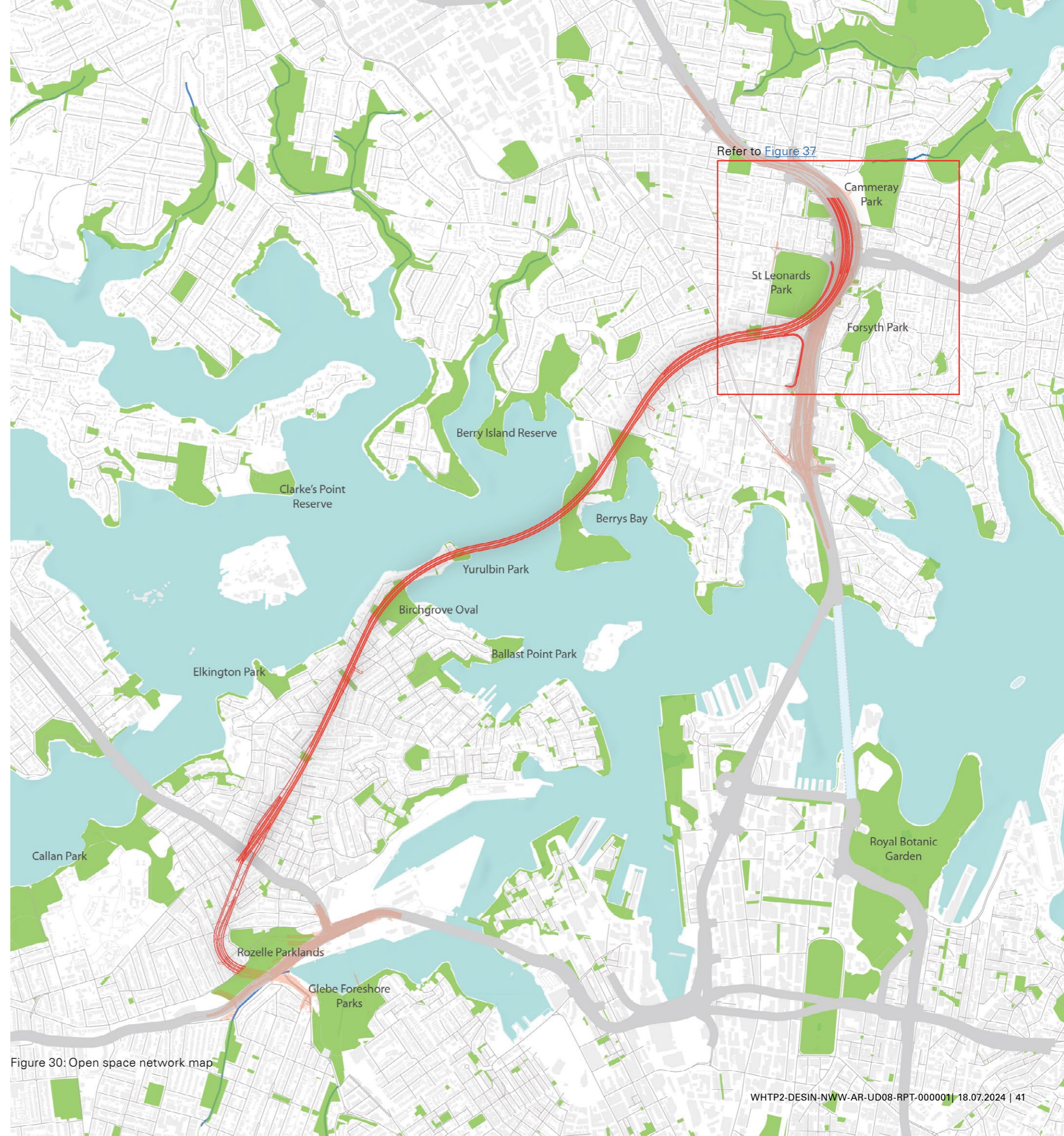
It is a nineteenth century area of parkland that covers approximately 15 hectares, making it one of the largest open spaces in North Sydney. The park's most prominent features, apart from its open green spaces, include the North Sydney Oval complex, which comprises a playing field, grandstands, and commercial areas. The park also houses a Parks depot and a childcare centre. The park is surrounded by well-established vegetation, featuring a distinct line of palm trees located at the intersection of Falcon and Miller Street in the northwest corner. The topography of the park generally slopes southward from Ridge Street, with steep descents to the east from Walker Street leading to the Warringah Freeway.

Falcon Street portal will be located on the edge of St. Leonards Park, potentially affecting the existing lawn and gardens within the park. Therefore, a key focus of the design entails landscaping of the portal's cut and cover structure and restoring the surrounding vegetation.

### Cammeray Park

Located on the ridge top in Cammeray, the park comprises a sizable expanse of green public open space in the vicinity, presenting a noticeable distinction from the nearby prominent road corridor of the Warringah Freeway. The highest elevation of the park is situated in the southern corner, positioned on the Cammeray ridge top. The terrain gradually descends towards Cammeray Road in the north. Cammeray Park offers an all-year-round synthetic turf field for soccer and rugby. It is surrounded by private tennis courts, a skate park, a cricket field. The park also contains Cammeray Golf Club, which is a 9-hole public course that was recently reconfigured as part of the WFU works.

The southern side of the park has been impacted by the works undertaken by WFU, to allow WHT to build the support facilities required for the tunnel.



- Tunnel alignment
- Water
- Green space

Figure 30: Open space network map



Figure 31: Cammeray Golf Club (before being reconfigured)



Figure 32: St. Leonards park



Figure 33: Anzac Park



Figure 34: Primrose Park



Figure 35: Jeaffreson Jackson Reserve



Figure 36: Forsyth Park

**Design considerations:**

- Integrate the project with the existing open spaces and improve the amenities wherever feasible. Assess the needs based on the amenities already present around the site and Council's vision
- Provide planting where feasible to create green corridors linking the open spaces
- Preserve and enhance the environmental assets that connect with the project
- Carefully replace and restore the impacted vegetation

- Local Park
- District Park
- Regional Park
- Sportsground
- Tennis / Basketball Courts
- Playgrounds
- Skate Park
- Lawn Bowls
- Other Facilities

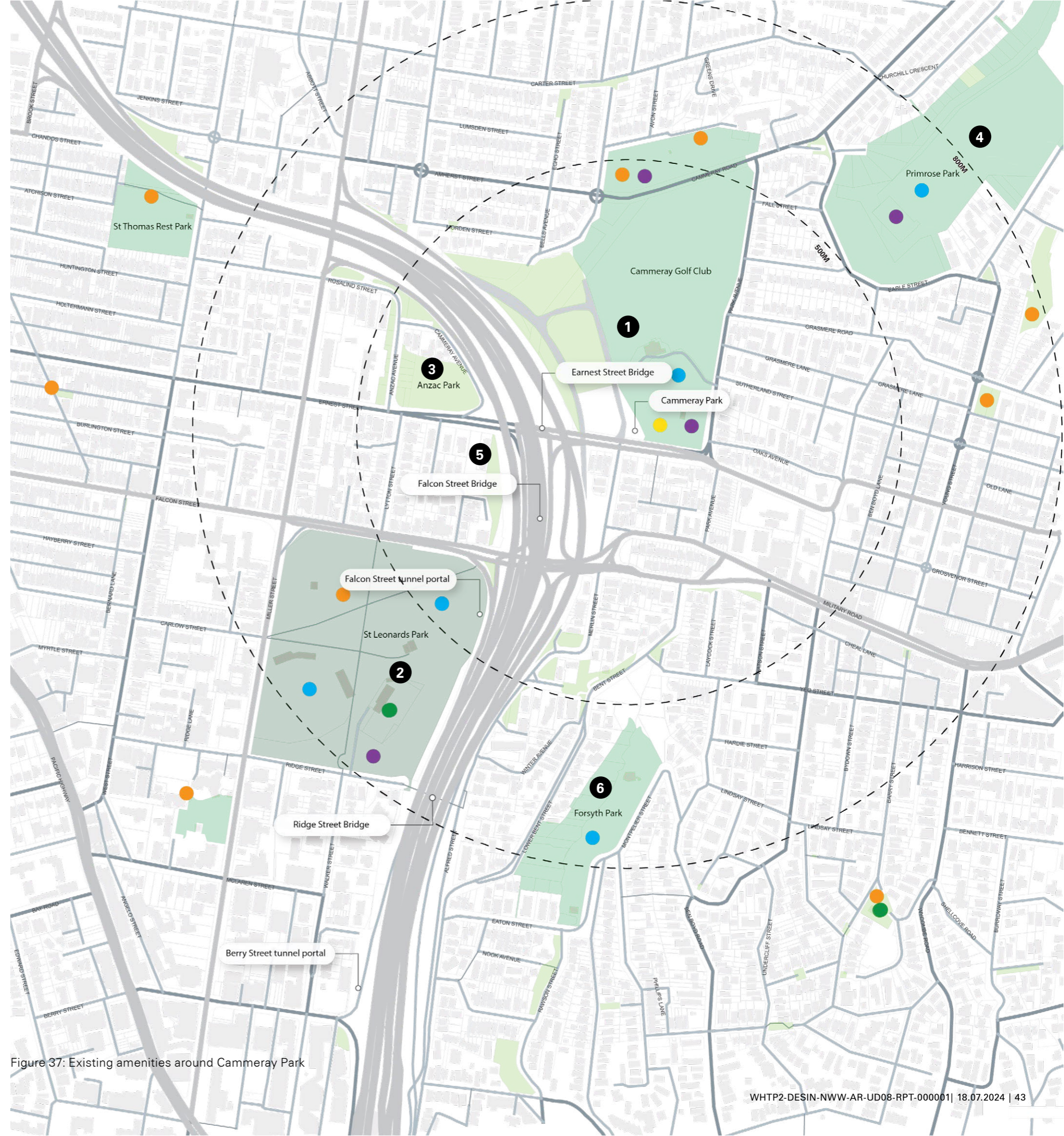


Figure 37: Existing amenities around Cammeray Park

## 2.8 Key design themes

### 2.8.1 Celebrating the Harbour crossing

Connections across the Sydney Harbour have been pivotal in shaping the development of the city. From the early days of Nawi boats to the introduction of ferries, followed by the iconic Harbour Bridge and subsequent tunnel crossings, these transportation links have significantly influenced the movement of people and the overall functionality of the city.

With the WHT, a modern infrastructure marvel, a new chapter in Sydney's transportation history is being written. This latest addition is not only a remarkable feat of engineering but also a symbol of progress, serving as a marker of time and marking a significant milestone in the city's continued evolution.

#### Interpretation

- Artworks and markers denoting the significance of project
- Travel experience through the tunnel highlighting the harbour crossing

### 2.8.2 Expression of geology and landform

Sydney Harbour boasts a distinctive landscape characterised by its unique geology and landform. The alignment passes along contrasting soil landscapes.

The presence of the Hawkesbury Sandstone, a sedimentary rock formed from ancient river deposits, gives the area its remarkable charm. The sandstone's yellow to orange hues create striking cliffs, ridges, and plateaus that add depth and character to the terrain.

The project will be showcasing a thoughtful approach to design that respects and reflects upon these natural features, creating a harmonious blend with the existing character of the place

#### Interpretation

- The form and design of the built elements draw inspirations from the geological formations along harbour
- The materials, colours and details to match the surrounding landscape



Figure 38: Photo of school children crossing the Sydney Harbour Bridge 16 March 1932, part of Fairfax archive of glass plate negatives. Source: Fairfax Library



Figure 39: Sandstone blocks at the Minister's Stockpile of stone at Sandy Point, photo credits: MJ Smith

### 2.8.3 Native flora and fauna

Sydney Harbour is one of the most biodiverse urban harbours in the world. The harbour area boasts a diverse range of flora and fauna due to its unique coastal and estuarine ecosystems. The native vegetation includes a range of coastal vegetation, mangroves and native grasses and wildflowers. The fauna consists of numerous bird species, rich marine life, reptiles and mammals.

The project aims to celebrate and honour this biodiversity through innovative and creative design approaches.

#### Interpretation

- Advocate for creating educational opportunities focused on natural systems, ecology, and the preservation of endangered flora and fauna
- Depict the native fauna in design elements



Figure 40: Silver Gull bird seen around Sydney Harbour, photo by Stuart Humphreys.  
Source: Australian Museum