

ALBION PARK RAIL BYPASS -
M1 PRINCES HIGHWAY

URBAN DESIGN CONCEPT,
LANDSCAPE CHARACTER AND
VISUAL IMPACT ASSESSMENT
REPORT

OCTOBER 2015



CONTENTS

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I. EXECTUTIVE SUMMARY

INTRODUCTION

In the mid 1990s, the then Roads and Traffic Authority undertook a study which identified a preferred route for the bypass of the Albion Park Rail township. To reserve land for this bypass route, a road corridor was included in the Wollongong and Shellharbour City Council local environmental plans. This road corridor protects the route from development and reserves land for the road.

In 2013 Roads and Maritime Services (Roads and Maritime) reviewed the reserved bypass corridor to assess if it was still a suitable location for the Albion Park Rail bypass. The review confirmed the reserved corridor is suitable. It highlighted that when designed to current road standards the bypass would largely fit within the existing road corridor except for a section around the Croom Regional Sporting Complex.

An intensive options identification, and assessment process has been undertaken to determine the preferred option. This involved significant road design option development, hydraulic assessment, traffic modelling and stakeholder consultation and environmental assessment. Following a Value Management Workshop in August 2014, a shortlist of options was subject to further investigation and development to select a preferred option. This option was put on public display for review and comment on 29 October 2014.

This preferred option has been further refined, based on input received from local councils, government agencies, stakeholders and the public to create the concept design that is presented and assessed in this Urban Design Concept, Landscape Character and Visual Impact Assessment Report (Urban Design Report).

I.I EXECUTIVE SUMMARY

THE PROPOSAL

The proposed Albion Park Rail bypass would reduce travel times for through and local traffic, improve the reliability of journeys through greater flood immunity and provide more consistent driving conditions. It would also divert a substantial proportion of through traffic onto the motorway, reducing traffic volumes on the Princes Highway through Albion Park Rail.

This would improve local amenity and access, and reduce other traffic related impacts such as noise for nearby residents.

The majority of the works associated with the project would be located in greenfield areas, away from the existing Princes Highway. The concept design includes a 9.8 km section of new grade separated dual carriageway to full motorway standard.

The project objectives for the Albion Park Rail bypass are as follows:

- Provide a motorway standard bypass of Albion Park Rail - motorway standard refers to a dual carriageway and a design speed of at least 100 km/h
- Provide a minimum of one in 20 year flood immunity - the project is to ensure that the highway can remain open in a flood event with an average recurrence level of at least one in 20 years
- Provide access for A-double vehicles - A-double vehicles incorporate two trailers that can each carry a full length shipping container. While these vehicles are not currently used, it is intended that the project be designed to accommodate such vehicles to provide maximum flexibility into the future
- Provide east-west connectivity for current and future land use - it is important that efficient motor vehicle, pedestrian and cyclist movements are catered for across the project.

URBAN DESIGN STRATEGY

The over-arching aim of the urban design strategy is to ensure that the proposal is physically and visually integrated with its surrounding environment, reduces visual impact and where possible, maximises engagement of the road user in a local context to provide a more enjoyable and interesting driving experience. The proposal would demonstrate consistency with other nearby Princes Highway sections and minimise impacts on the natural and cultural environment.

The urban design strategy also considers local resident requirements such as maintaining the semi-rural character of the place and mitigating visual impacts. Bridges, retaining walls, noise walls, cut and fill, drainage and water quality structures and fencing are all considered as part of the strategy.

Refer Section 3 for key urban design strategies and Section 6 for a detailed assessment of visual impacts.

LANDSCAPE DESIGN STRATEGY

The landscape design strategy outlines landscape methodologies for incorporating vegetation into the proposal. These methodologies comprise planting and seeding methodologies aimed at producing a cost-effective and rapidly establishing revegetation outcome. A combination of methods is required to accommodate the various construction zones and to work within local endemic vegetation communities.

The general approach to the landscape design is to provide a well vegetated road corridor that aims to integrate the highway with the surrounding landscape and provide motorists with a sense of place along the highway journey. In order to achieve this, the landscape revegetation must strike a balance between screening the highway from the sensitive views from surrounding areas and maintaining key views from the highway to the surrounding landscape.

The planting and revegetation design also aims to minimise the potential ecological impacts of the proposal by stabilising earthworks to prevent erosion, and reinforce existing habitats and ecological corridors through endemic species selection.

Refer Section 4 for key landscape design strategies.

LANDSCAPE CHARACTER ASSESSMENT

Following field and desktop studies, the proposal study area has been divided into twelve Landscape Character Zones (LCZ). The zones have been defined through gaining an understanding of land use, topography, heritage and vegetation in combination with other factors intrinsic to the local landscape. The twelve landscape character zones are:

- LCZ 1 - Southern Dapto
- LCZ 2 - Central Yallah
- LCZ 3 - Southern Yallah
- LCZ 4 - Southern Yallah & Haywards Bay
- LCZ 5 - Darcy Dunster Reserve
- LCZ 6 - Northern Albion Park Rail
- LCZ 7 - Western Albion Park Rail
- LCZ 8 - Albion Park
- LCZ 9 - Terry Reserve & Croom Regional Sporting Complex
- LCZ 10 - Southern Albion Park Rail
- LCZ 11 - Albion Park Rail & Oak Flats
- LCZ 12 - Croom

Overall, the proposal would have an impact on landscape character. While the works, would partially take place in an established road corridor, they would impact on all LCZs to some degree.

From the perspective of local property owners, tourists, motorists and cyclists, landscape character would be impacted, due to the magnitude of the proposal in this area.

The overall character impacts in each LCZ are summarised below.

LCZ	Sensitivity	Magnitude	Impact
LCZ 1	High	High	HIGH
LCZ 2	High	Low	MODERATE
LCZ 3	High	High	HIGH
LCZ 4	High	Low	MODERATE
LCZ 5	High	High	HIGH
LCZ 6	Low	Low	LOW
LCZ 7	High	Moderate	HIGH-MODERATE
LCZ 8	High	High	HIGH
LCZ 9	High	High	HIGH
LCZ 10	High	Low	MODERATE
LCZ 11	Moderate	Low	MODERATE-LOW
LCZ 12	High	Moderate	HIGH-MODERATE

Refer Section 5 for Landscape Character Assessment detailed analysis and results.

VISUAL IMPACT ASSESSMENT

The potential visual impact of the proposal has been assessed in relation to a number of key and potential viewpoints within a defined visual catchment area. Overall, the proposal would have an impact on views in and around the study area. Based on the magnitude of change to existing views, as well as, the sensitivity and visual importance of the view, the impact that the proposal has on the existing viewpoints can to be assessed.

The overall visual impacts in each viewpoint are summarised below.

VP	Sensitivity	Magnitude	Impact
VP 1	High	Moderate	HIGH-MODERATE
VP 2	High	Moderate	HIGH-MODERATE
VP 3	Low	High	MODERATE
VP 4	Low	Low	LOW
VP 5	Moderate	Moderate	MODERATE
VP 6	High	Low	MODERATE
VP 7	Moderate	Moderate	MODERATE
VP 8	High	Moderate	HIGH-MODERATE
VP 9	High	Moderate	HIGH-MODERATE
VP 10	High	Moderate	HIGH-MODERATE
VP 11	High	High	HIGH
VP 12	Low	Moderate	MODERATE-LOW
VP 13	Moderate	Low	MODERATE-LOW
VP 14	Moderate	Moderate	MODERATE
VP 15	Moderate	Moderate	MODERATE
VP 16	High	High	HIGH
VP 17	Moderate	High	HIGH-MODERATE
VP 18	High	High	HIGH
VP 19	Moderate	Moderate	MODERATE
VP 20	Moderate	Moderate	MODERATE
VP 21	High	High	HIGH
VP 22	High	High	HIGH
VP 23	High	High	HIGH
VP 24	High	Moderate	HIGH-MODERATE
VP 25	High	High	HIGH
VP 26	High	High	HIGH
VP 27	Moderate	High	HIGH-MODERATE

VP	Sensitivity	Magnitude	Impact
VP 28	Moderate	Moderate	MODERATE
VP 29	Moderate	High	HIGH-MODERATE
VP 30	Moderate	High	HIGH-MODERATE
VP 31	Low	Low	LOW
VP 32	Moderate	Low	MODERATE-LOW
VP 33	High	Moderate	HIGH-MODERATE
VP 34	High	Moderate	HIGH-MODERATE
VP 35	High	Moderate	HIGH-MODERATE
VP 36	High	Moderate	HIGH-MODERATE
VP 37	Moderate	Low	MODERATE-LOW
VP 38	High	Low	MODERATE
VP 39	High	Moderate	HIGH-MODERATE

Refer Section 6 for visual impact assessment detailed analysis and results.

CONCLUSION

The study area for the Albion Park Rail bypass crosses through the Macquarie Valley from Dapto in the north, to Oaks Flat in the south. The proposed 8km long motorway traverses a range of topographical features that define the different character areas of the valley. Understanding the built, natural and community character of this area, particularly the relationship between Albion Park Rail and Albion Park, is a key element of this study.

Analysing the impacts and potential mitigation opportunities, based on the urban design objectives and principles, for this new motorway has been an integral part of designing this project. An iterative, inter-disciplinary, process has been adopted to produce:

- An integrated design that best fits in with its context, complements the existing landscape, minimises the impacts and mitigates the impacts that are unavoidable
- New public domain improvements at the Croom Regional Sporting Complex which is an important and well used community amenity
- A series of new pedestrian and cycle paths and crossings to ensure that communities in the area remain connected and have easy access.

The proposed project aims to reduce travel times for through and local traffic, improve the reliability of journeys through greater flood immunity and provide more consistent driving conditions. It would also divert a substantial proportion of through traffic onto the motorway, reducing traffic volumes on the Princes Highway through Albion Park Rail. This would improve local amenity and access, and reduce other traffic related impacts such as noise for nearby residents, as described in Chapter 1 of this Report,.

The overall urban fabric of the Albion Park Rail and Albion Park are kept largely intact, however, there are high visual and landscape character impacts due to the large scale of the motorway works and that a substantial portion of the new motorway will be developed along a greenfield corridor that generally has a low ability to absorb large scale infrastructure changes.

The urban design and landscape objectives and principles developed take into account urban design and visual character not only for the study area itself, but also reflect its relationship with the surrounding Illawarra Escarpment, valley and urban areas. The urban design and landscape concept has been developed to achieve an integrated outcome that helps fit the project as

sensitively as possible into its context and to minimise the impacts of the project on the future character of the area, through the incorporation of a number of mitigation measures.

The urban design will:

- Ensure attractive views into the broader landscape are maintained by planting in appropriate locations
- Incorporate materials and finishes for new road elements that are site appropriate
- Minimise impacts on Croom Regional Sporting Complex and ensure that the functionality of the Complex and that connections are maintained across the area.
- Include a planting design intended to reduce the scale of the proposed road infrastructure by the provision of appropriate tree species the urban and open space environments.
- Provide distinctive entry points
- Provide screening, through the use of native plant species, of the road infrastructure to residential areas
- Provide new pedestrian and cyclist connections for the community.

Development of the project during a future detail design phase should consider the further key mitigation strategies outlined in this report to further integrate this project into the Albion Park Rail and Albion Park area of the Macquarie Valley.

I.2 PROJECT AREA

The project area for this Urban Design Report is along the 10.6 kilometre (km) length of Princes Motorway between Yallah and Oak Flats to bypass Albion Park Rail (Figure 1-1). The Albion Park Rail bypass runs through the Local Government Areas (LGA's) of Wollongong City Council and Shellharbour City Council.

The motorway will complete the ‘missing link’ for a high standard road between Sydney and Bomaderry. It would provide easy access to Dapto, Albion Park and Oak Flats, have two lanes in each direction with median separation and have capacity for additional lanes.

I.3 PURPOSE OF THIS REPORT

This Urban Design Report has been prepared as part of the Environmental Impact Statement (EIS) for the proposed Albion Park Rail bypass (the project) in the Wollongong and Shellharbour Local Government Areas. This document serves as a Technical Paper that supports the EIS Report.

This Urban Design Report documents the landscape character and visual impact of the project and has been prepared as part of the planning approval process. It aims to facilitate an integrated urban design and engineering design outcome for the project, through the utilisation of visual impact assessment to identify and summarise the visual and landscape character opportunities and issues within the study area. This, in turn, has guided the development of the Albion Park Rail bypass concept design process by avoiding or mitigating potential impact wherever possible.

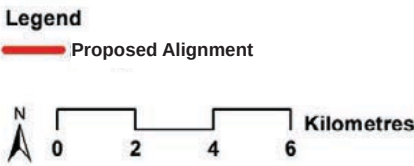


Figure 1-1: Project location map

I.4 PROJECT DESCRIPTION

The proposed Albion Park Rail bypass would reduce travel times for through and local traffic, improve the reliability of journeys through greater flood immunity and provide more consistent driving conditions. It would also divert a substantial proportion of through traffic onto the motorway, reducing traffic volumes on the Princes Highway through Albion Park Rail. This would improve local amenity and access, and reduce other traffic related impacts such as noise for nearby residents.

The majority of the works associated with the project would be located in greenfield areas, away from the existing Princes Highway. The concept design includes a 9.8 km section of new grade separated dual carriageway to full motorway standard.

The project objectives for the Albion Park Rail bypass are as follows:

- **Provide a motorway standard bypass of Albion Park Rail** - motorway standard refers to a dual carriageway and a design speed of at least 100 km/h
- **Provide a minimum of one in 20 year flood immunity** - the project is to ensure that the highway can remain open in a flood event with an average recurrence level of at least one in 20 years
- **Provide access for A-double vehicles** - A-double vehicles incorporate two trailers that can each carry a full-length shipping container. While these vehicles are not currently used, it is intended that the project be designed to accommodate such vehicles to provide maximum flexibility into the future
- **Provide east-west connectivity for current and future land use** - it is important that efficient motor vehicle, pedestrian and cyclist movements are catered for across the project.

The key features of this concept design include:

- **Alignment** – There would be a motorway with two lanes in each direction divided by a median (with capacity to upgrade to three lanes in each direction in future)
- **Route** - The route is shown in Figure 1-1
- **Interchanges** - Three interchanges provided at Yallah, Albion Park and Oak Flats would connect the local road network with the motorway

- **Bridges** - The following bridges would be provided:
 - Bridges to carry the motorway over Duck Creek, Macquarie Rivulet and Frazers Creek
 - Bridges to carry the motorway over the Princes Highway and Tongarra Road
 - A bridge to carry the motorway over the South Coast Railway Line
 - Bridges to carry local roads, and ramps over the motorway
 - Bridges to provide floodwater conveyance and flood relief
- **Local road changes or upgrades** - An upgrade to Yallah Road, between Larkins Lane and the Princes Highway at Yallah, would be undertaken as part of this project

Other changes and upgrades to the local road network would include minor realignments and creation of cul-de-sacs

- **Pedestrian and cyclist connections** - Improved pedestrian and cycle connections are proposed as part of the project. Shared use path crossings are proposed in all locations where the motorway and local roads cross. Cyclists would be able to use the motorway shoulders in both directions, accessible via the motorway ramps

The motorway would have controlled access fencing to prevent pedestrians from accessing the road corridor

- **Drainage** - The following drainage elements would be provided:
 - Network of gutters, channels, pipes and pits to collect and convey stormwater by gravity to the point of discharge into receiving waters
 - Scuppers and carrier pipes to convey stormwater from bridged sections to the bridge supports
 - Detention basins, vegetated swales, sediment traps, oil interceptors etc where required
- **Emergency access and management facilities** - Emergency stopping bays would be provided along the mainline at a spacing of one to two kilometres. Maintenance access would be provided to bridge abutments, basins, utilities and cut benches. Access tracks would generally originate from emergency stopping bays

- **Detention Basins** - Adjustments to the Green Meadows Detention Basin would ensure an appropriate level of flood storage would be maintained. An additional detention basin is proposed adjacent to Croome Road to mitigate flooding impact in low level flood events
- **Noise barriers** - Noise barriers between the motorway and sensitive receivers would be required in some locations to reduce noise impact

- **Lighting** - Lighting would be provided as required for safety reasons. Typically this would be limited to busy entry and exit ramps and the local road network
- **Landscape and urban design** - Landscape and urban design treatments would integrate the project with the surrounding environment
- **Croom Regional Sporting Complex (CRSC)** - Directly impacted sporting facilities at the Croom Regional Sporting Complex would be replaced, including sporting fields and associated amenities. Changes would be made to the southern access of the sporting complex. There would be new and reconfigured internal roads, pedestrian/cycle paths and parking provided
- **Construction activities and temporary ancillary facilities** - The key construction activities would include:
 - Mobilisation and site establishment
 - Clearing, grubbing and topsoil stripping, including clearing all areas within the site boundary (except within the nominated environmental protection areas), temporary work areas and local work areas
 - Demolition of existing roads and buildings
 - Bulk earthwork and haulage of materials
 - Construction of the road pavement
 - Construction of drainage structures
 - Construction of bridges (this would likely include heavy vehicle deliveries of over-size loads)
 - Relocation and construction of sporting facilities
 - Changes to property access
 - Signposting
 - Installation of lighting and roadside furniture
 - Landscaping, waste disposal and rehabilitation of disturbed areas with no future useTemporary ancillary facilities would be provided to enable the above construction activities for the project. A total of 13 temporary ancillary facility sites have been identified for the project.

I.5 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The Environmental Impact Statement (EIS) must be prepared in accordance with, and meet the minimum requirements of, Part 3 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000, including:

1. The information required under clause 6 of Schedule 2 of the Regulation.
2. The content listed in clause 7 of Schedule 2 of the Regulation, including but not limited to:
 - A statement of the objectives of the project, including a description of the strategic need, justification, objectives and outcomes for the project, taking into account existing and proposed transport infrastructure and services within the adjoining subregions, and as relevant the outcomes and objectives of relevant strategic planning and transport policies, including, but not limited to, NSW 2021, NSW Government State Infrastructure Strategy, NSW Long Term Transport Master Plan (December 2012), Your Future Illawarra: Draft Regional Growth and Infrastructure Plan (October 2014) and any other relevant plans
 - An analysis of feasible alternatives to the carrying out of the project and project justification, including:
 - ▢ An analysis of alternatives/options considered having regard to the project objectives (including an assessment of the environmental costs and benefits of the project relative to alternatives and the consequences of not carrying out the project), and the provision of a clear discussion of the route development and selection process, the suitability of the chosen alignment taking into account environmental impacts, and consideration of whether or not the project is in the public interest, and
 - ▢ Justification A or the preferred project taking into consideration the objects of the Environmental Planning and Assessment Act 1979
 - A detailed description of the project, including:
 - ▢ The proposed route
 - ▢ Design of the alignment (vertical and horizontal), associated structures, interchanges, and road user, pedestrian and cyclist facilities (including street furniture and lighting)
 - ▢ Land use changes, including resumption of residential, commercial, industrial and recreational lands, and impacts to Crown land

- ▢ Croom Regional Sporting Complex works and ancillary development
- ▢ Interactions with key utilities and services
- ▢ Location and operational requirements of construction ancillary facilities and access tracks, and
- ▢ Relationship and/or interaction with existing public and freight transport services (including air, rail, and bus services)
- An analysis of the project including an assessment, with a particular focus on the requirements of the listed key issues, in accordance with clause 7(1)(d) of Schedule 2 of the Regulation (where relevant), including an identification of how relevant planning, land use and development matters (including relevant strategic and statutory matters) have been considered in the impact assessment (direct, indirect and cumulative impacts) and/or in developing management/ mitigation measures
- Detail how the principles of ecologically sustainable development will be incorporated in the design, construction and ongoing operation phases of the project, and
- Provide an assessment of the cumulative impacts of the project, taking into consideration other projects on the Princes Highway and the Princes Motorway.

Notwithstanding the key issues specified below, the EIS must include an environmental risk analysis to identify the potential environmental impacts associated with the project.

Where relevant, the assessment of the key issues below, and any other significant issues identified in the risk assessment, must include:

- Adequate baseline data
- Consideration of potential cumulative impacts due to other development in the vicinity; and
- Measures to avoid, minimise and if necessary, offset the predicted impacts, including detailed contingency plans for managing any significant risks to the environment.

KEY ISSUE - URBAN DESIGN AND VISUAL AMENITY

Key issues related to urban design and visual amenity including, but are not limited to:

- Consideration of the urban design and visual amenity implications of the project, including supporting infrastructure, during construction and operation. The assessment must identify:
 - ▢ Urban design and landscaping objectives to enhance the design of the alignment and associated structures (including batters, cuttings, bridge and viaduct structures), interchanges, road infrastructure facilities, and Croom Regional Sporting Complex works
 - ▢ Consider uses for resulting surplus or residual land, and
 - ▢ Demonstrate how the proposed hard and soft urban design elements of the project would be consistent with the existing and desired future character of the area
- Identification and evaluation of the visual impacts and urban design aspects of the project (and its components) on surrounding areas
- A consideration of impacts on views and vistas, streetscapes, key sites and buildings
- Measures to manage lighting impacts both during construction and operation, and
- Artists' impressions and perspective drawings of the project from a variety of locations along and next to the route.

I.6 URBAN DESIGN GUIDANCE

Roads and Maritime have produced a comprehensive list of design guideline documents aimed at achieving good urban design outcomes. This report has been undertaken with reference to the following published documents:

- EIA N04 Practice Note: Guidelines for Landscape Character and Visual Impact Assessment V2.0 (Roads and Maritime, 2013)
- Beyond the Pavement (Roads and Maritime, 2014)
- Bridge Aesthetics Design Guidelines (Roads and Maritime, 2012)
- Noise Wall Guidelines (Roads and Maritime, 2006)
- Landscape Guideline (RTA, 2008)
- Shotcrete Design Guidelines (Roads and Maritime, 2005).



2. PROJECT CONTEXT ANALYSIS

This chapter provides a discussion of the study area’s key urban, environmental and cultural factors that would affect the design of the Albion Park Rail bypass. The purpose of this contextual information is to understand the individual aspects that make up the landscape character in the project area and to identify broad scale urban design opportunities that may be applied to the project. This discussion provides a basis and understanding of how the Objectives & Principles and Urban Design and Landscape Strategy were developed for the proposed project, which are described in the following chapter. The key aspects of the proposed motorway that are likely to influence the urban and landscape design of the project and help define the landscape character include:

- Local Setting
- Landform
- Hydrology
- History and Heritage
- Ecology
- Transport Network
- Pedestrian and cyclist facilities
- Land Uses
 - Urban Form
 - Urban Commercial Centres
 - Residential Neighbourhoods
 - Airport and Industrial
 - Open Space & Recreation
 - Rural Hinterland
- Croom Regional Sporting Complex.

Additional details about some of these topics, such as heritage, ecology and hydrology, can be found in the relevant specialist consultant reports in the appendices of the EIS.

2.1 LOCAL SETTING

Albion Park Rail and Albion Park are suburbs situated in the Macquarie Valley located in the Shellharbour City Council Local Area Government (LGA). The Illawarra escarpment is to the west; Dapto is to the north; Jamberoo is to the south; and Shellharbour is to the east of these suburbs (Figure 2-1).

These suburbs that make up part of the greater Wollongong Metropolitan Area and are about 21 km from central Wollongong. The Illawarra Regional Airport, the South Coast Railway Line stations and shoreline along Lake Illawarra, near Koonah Bay are key features define the Albion Park Rail suburb. Albion Park is surrounded by a 'green belt' of farms and open space with dynamic views of the Macquarie Valley.

The project would build a 9.8 kilometre extension of the Princes Motorway between Yallah and Oak Flats to bypass the suburb of Albion Park Rail. This would pass through the central part of Yallah suburb and continue along the western and southern edge of Albion Park Rail suburb.

Key project considerations related to the local setting include the following:

- Minimising severance within suburbs
- Maintaining connections between communities.

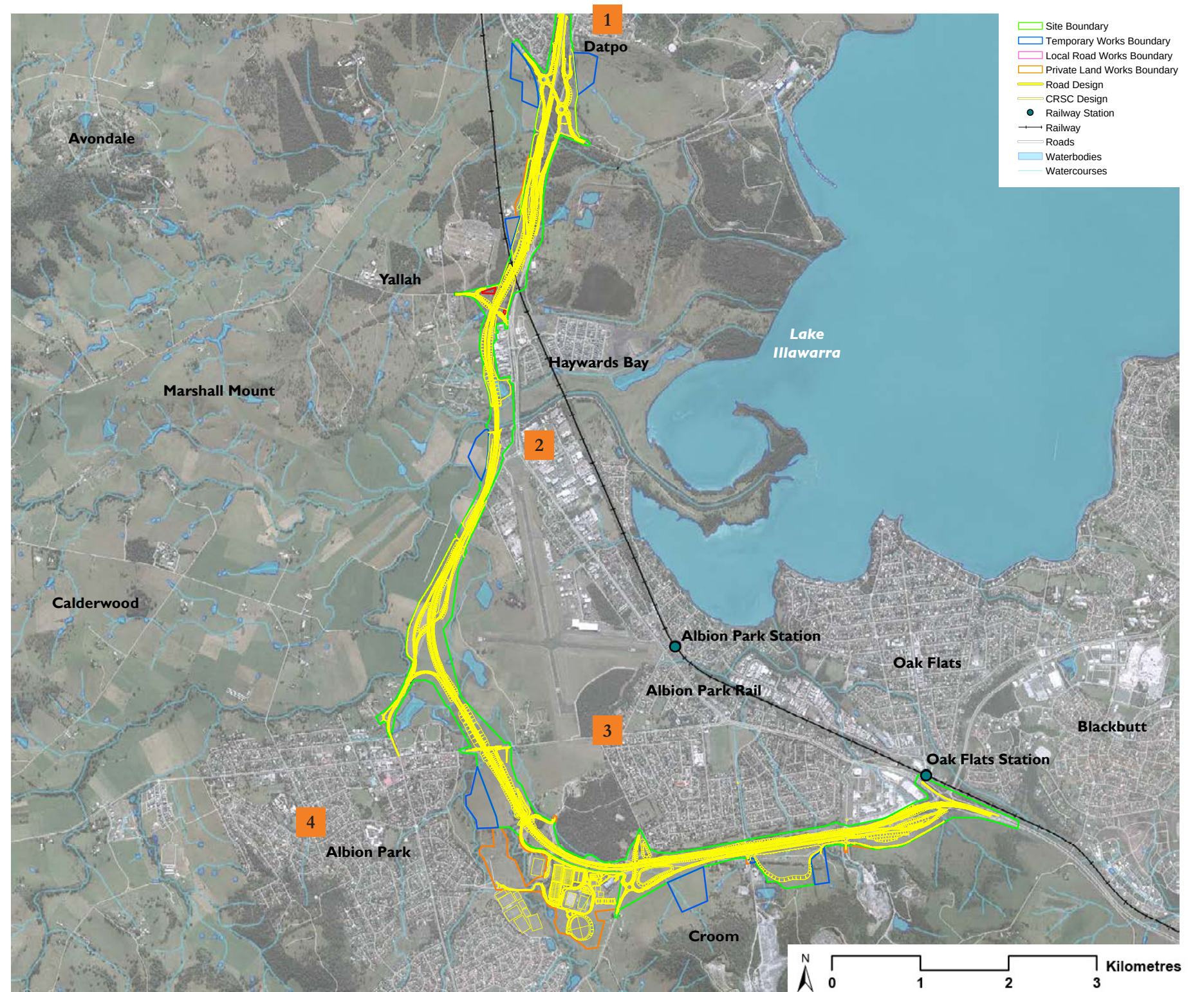


Figure 2-1: Local setting



Plate 2-1: View from the Dapto hills looking south



Plate 2-2: View from the Darcy Dunster Reserve looking north



Plate 2-3: View along Tongarra Road heading towards Albion Park Rail



Plate 2-4: View from the hillside residential area in Albion Park looking towards Lake Illawarra

2.2 LANDFORM

The Illawarra Escarpment is the dominant landform in the area and is the backdrop against which the Macquarie Valley is formed. The landform in this area has two distinctive characters. The first is the flat open country on the floodplain in the areas of Calderwood (east), Albion Park (north) and Albion Park Rail, which is visually exposed and connected to the Macquarie Rivulet. The second is the visually impressive rolling hills that rise up to the Illawarra Escarpment to the west, which also have long-range views of Lake Illawarra and along the South Coast. These areas include Dapto, Yallah, Marshall Mount, Calderwood (west), Albion Park (south) and Croome.

The key project considerations related to the landform are:

- Design the project to facilitate views from the alignment to the dominant visual backdrop of the rolling hills and escarpment
- Design the project to maintain the high visual quality of the area
- Design the project to fit sensitively into the changing topography of the area.



Figure 2-2: Illawarra Escarpment in relationship to the project

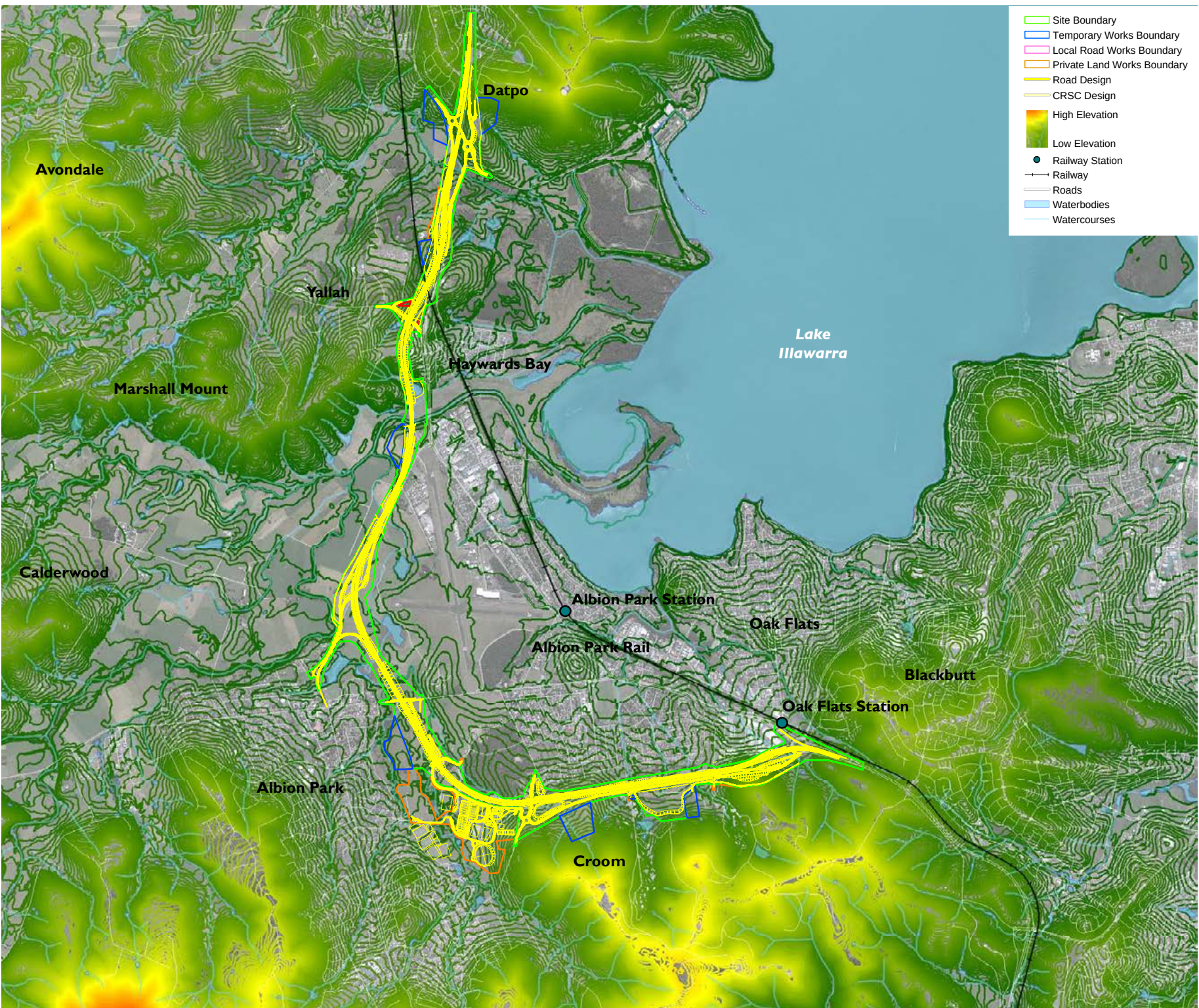


Figure 2-3: Topography of the study area

2.3 HYDROLOGY

The main river catchment in project area is the Macquarie Rivulet, which is centrally located between Yallah and Albion Park. This catchment represents a complex system of rural environment riverine flooding, urban catchment flooding, large event cross catchment flooding and tidal interactions.

The Macquarie Rivulet catchment incorporates a number of creeks including, Albion Creek, Frazers Creek and Marshall Mount Creek. The catchment drains an area of 110 km² and includes the suburbs of Albion Park, Calderwood, Tongarra and Yellow Rock. The catchment contains major infrastructure such as the Illawarra Highway, Princes Highway, Illawarra Regional Airport, South Coast railway line.

Large parts of the catchment remain rural, with urban development concentrated around Albion Park. The catchment elevations vary with the rolling topography of the area and ultimately discharging into Lake Illawarra. There have been several recorded instances of substantial flooding in the catchment including November 1961, June 1975, February 1984, June 1991 and March 2011. Duck Creek is a smaller catchment system located at the northern extent of the project area.

Key project considerations related to the hydrology in the urban design are:

- Balancing opportunities for landscaping and revegetation that does not compromise the flood conveyance or storage capacity need to maintain the appropriate ARI flood immunity
- Selection of appropriate species of plants for hydrological conditions across the project.

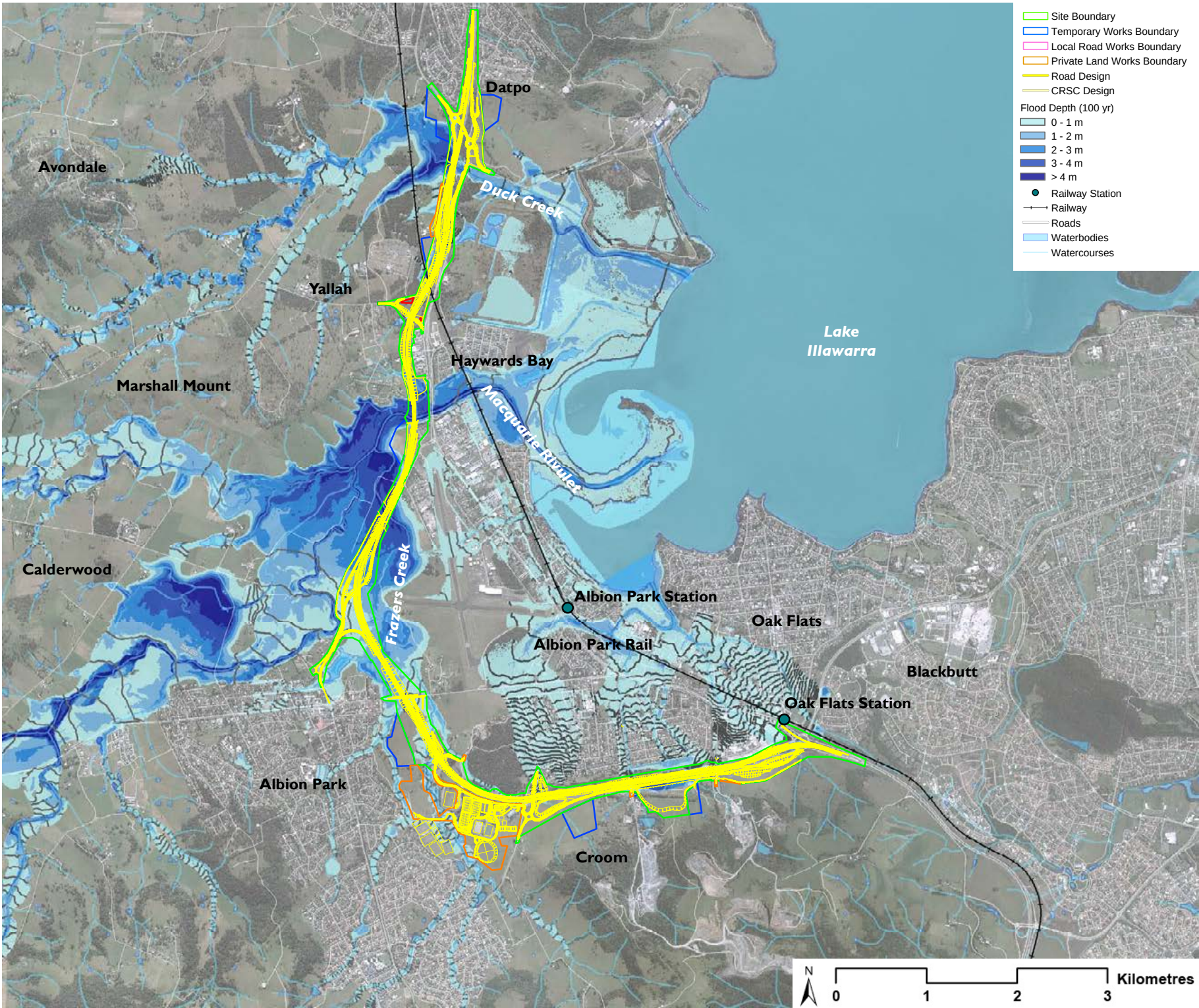


Figure 2-4: Hydrology of the study area

2.4 HISTORY AND HERITAGE

The Albion Park Rail railway station was originally established to serve the southern Wollongong suburbs. The station opened on 9 November 1887, just a few kilometres away from Albion Park. It was originally named Oak Flats, but was renamed as Albion Park Rail in 1888. Over time, houses were built around the railway station, and Albion Park Rail developed into a town in its own right, and with its own name.

The assessment has identified six locally significant historical items located within the study area. This included impacts to the Boles Meadows residence and associated outbuildings, Stapleton Bridge, Duck Creek Bridge, Ravensthorpe Guesthouse, Albion Park Showground and the Swansea Farmhouse and Dairy site.

Additionally, there are three items of archaeological potential located within the area of proposed works. These include the potential remains of the Terry's Estate Homestead, the remains of the Tongarra Road Homestead, and the potential remains of the former Yallah Platform.

Key project considerations related to the history and heritage:

- Minimise visual impacts and provide visual screening towards significant heritage areas
- Provide screening along both the project boundary and impacted property boundaries, if not directly nearby
- Tree species should also be sympathetic to the existing cultural landscape associated with the property.



Plate 2-5: Ravensthorpe Guesthouse

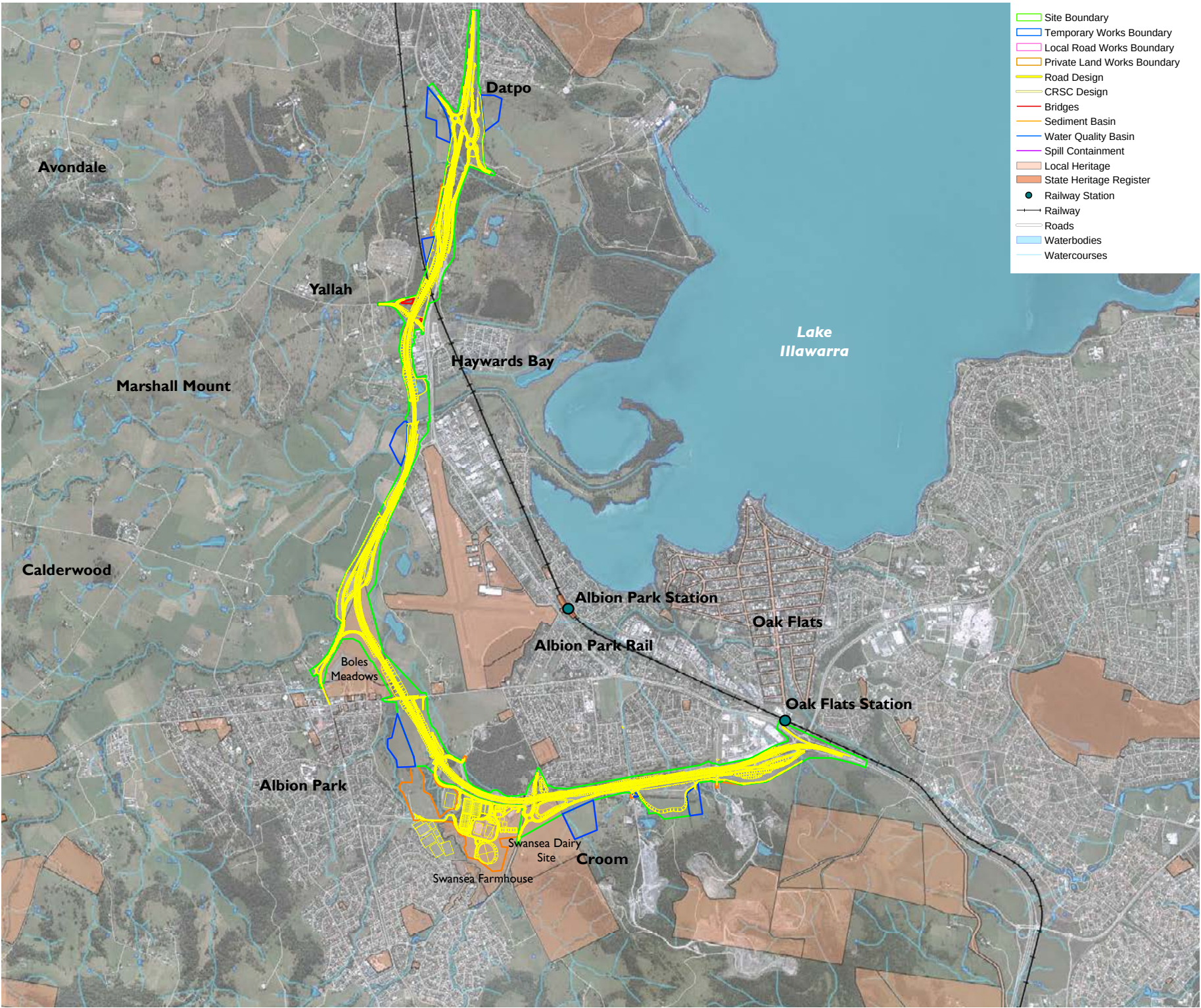


Figure 2-5: Heritage of the study area

2.5 ECOLOGY

There are five distinct vegetation types located along the study area and include the following:

- Illawarra lowlands grassy woodland
- Freshwater wetlands on coastal floodplains
- Disturbed riparian vegetation
- Planted/regrowth vegetation
- Non-indigenous vegetation.

The Illawarra Lowlands Grassy Woodland are generally considered to be in moderate to good condition and occur in the northern road corridor, the TransGrid site near Yallah, and the Croom Reserve. This endangered community is important because it provides good quality habitat for threatened flora species, including the Eastern Flame Pea and the Illawarra Greenhood Orchid. A total of 347 individual Eastern Flame Peas were located in the study area. There is some potential for Curved Rice-flower to be found in high quality patches of this community, and the species has been found in Croom Reserve and the Illawarra Light Rail Museum Society land to the north of Croom Reserve.

The Freshwater Wetlands on Coastal Floodplains are generally located near water bodies on the floodplain in the study area. They fall under the definition of the endangered ecological community (EEC) and are classified as SEPP 14 wetlands. This vegetation type is associated with areas located on private property in the southern half of the project which are considered to be in moderate to good condition. There are also more degraded wetland areas to the north of the Macquarie Rivulet.

The Illawarra Lowlands Grassy Woodland and the Freshwater Wetlands on Coastal Floodplains are the two key vegetation community types that will be carefully considered for protection, restoration and expansion as part of the urban design for the project.

Key project considerations related to ecology include the following:

- Protecting existing ecological resources
- Re-establishing EEC species and related community species
- Establishing additional areas of vegetation to complement the surrounding ecology.

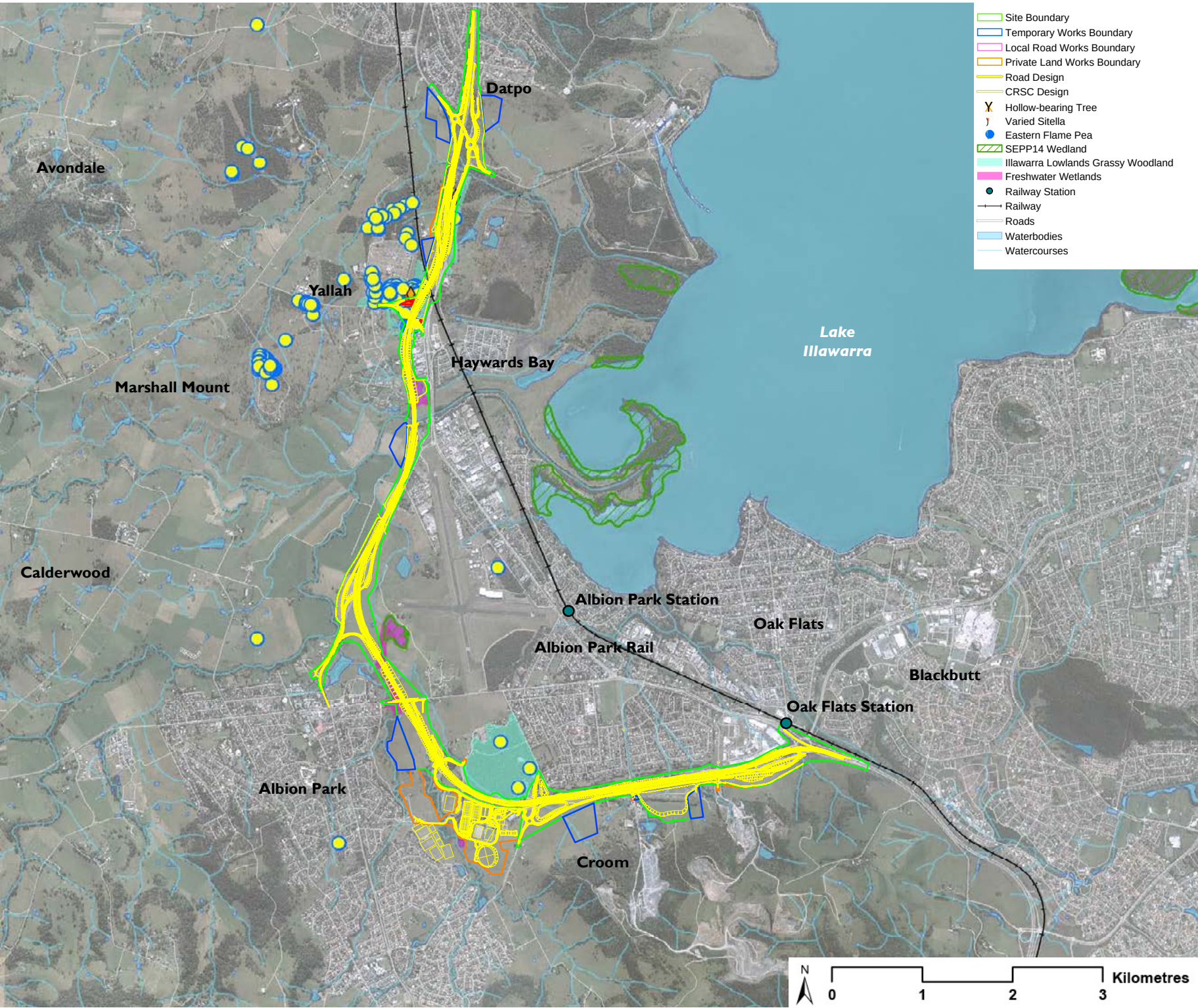


Figure 2-6: Ecology sensitive flora & fauna

2.6 TRANSPORT NETWORK

Albion Park Rail and the surrounding suburbs are well served by a variety of transport infrastructure. The road network around Albion Park Rail and Albion Park consists primarily of the Princes Highway, Illawarra Highway and Tongarra Road with a series of distributor and local roads branching off these main arterials.

The Princes Motorway begins at southern end of the Sydney metropolitan area at Waterfall and continues south, through Wollongong and ends at Yallah, just north of Albion Park Rail. From the southern end of the Princes Motorway at Yallah, the Princes Highway is the main National Highway route that continues south to the NSW/VIC boarder. The 3 km section of the Princes Highway between the Illawarra Highway and Tongarra Road serves as the main retail and commercial area through Albion Park Rail.

The Illawarra Highway is a State Highway that provides an east-west connection between the Wollongong metropolitan area and the Southern Highlands. It is also the most southern link between the Princes Highway and Hume Highway. The main towns en route are Albion Park in the Shellharbour area and Robertson and Moss Vale on the Southern Highlands.

Tongarra Road is the main east-west connection between Albion Park Rail and Albion Park. It is an important link between the two communities. Tongarra Road is the main retail and commercial area through Albion Park before returning to the Illawarra Highway at the western part of town.

Albion Park Rail is located on the South Coast Line Railway Line, which serves the coastal regions between the southern suburbs of the Sydney metropolitan area, the Illawarra region and Wollongong, and the South Coast region extending as far as Nowra in Shoalhaven.

The Illawarra Regional Airport operates for private aircraft use and is located centrally within Albion Park Rail. Airport operations require the maintenance of an Obstacle Limitation Surface (OLS) around the airport which ensures the safe operation of aeroplanes using the facility.

Key project considerations related to the transport network operations include the following:

- Maintaining a strong and complete road network for the improved movement of private vehicles, goods and services
- Ensuring new infrastructure does not impact the operations of the Illawarra Regional Airport.

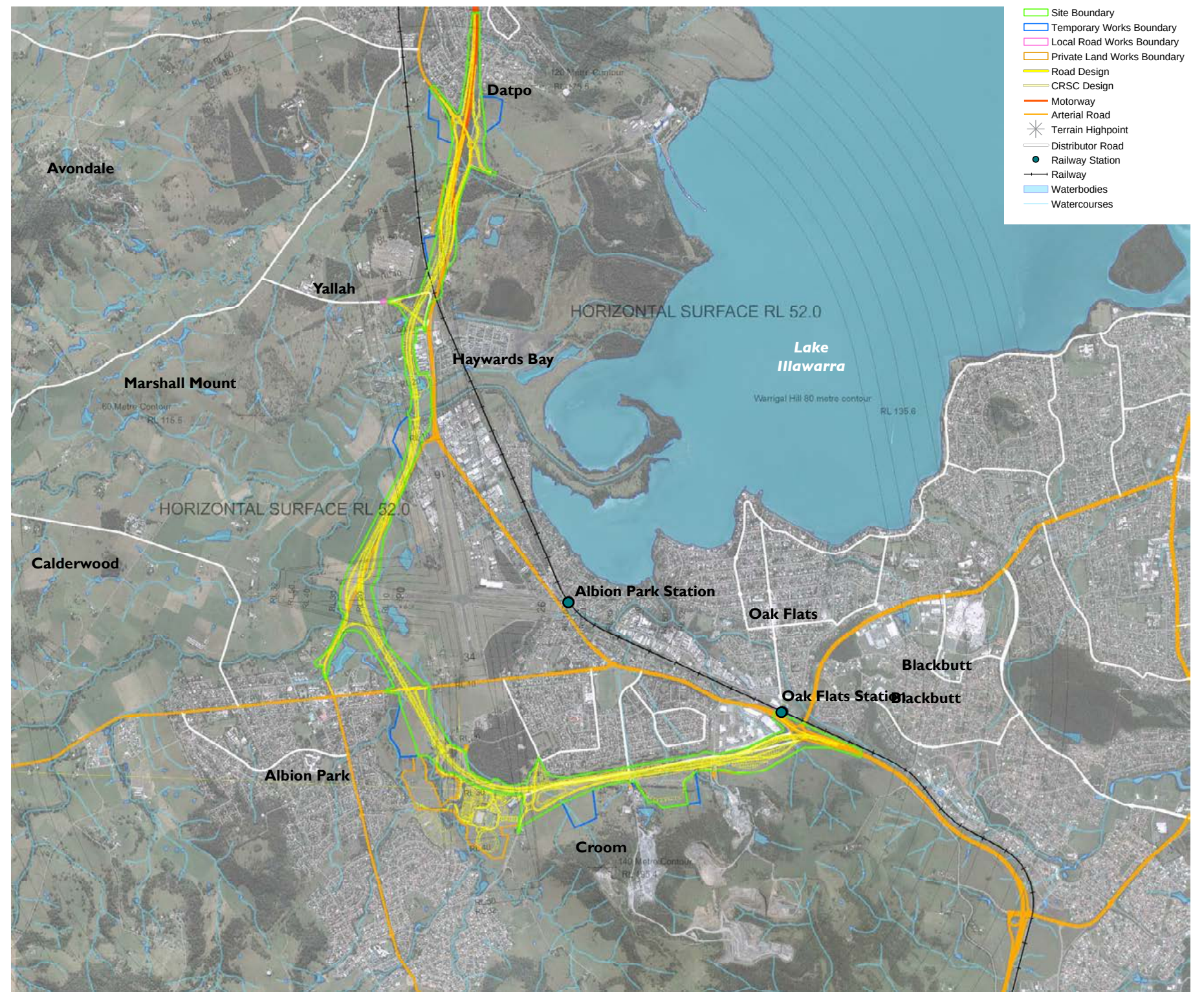


Figure 2-7: Transport network

2.7 PEDESTRIAN & CYCLIST FACILITIES

Both Wollongong City Council and Shellharbour City Council are committed to providing a range of sustainable, affordable and accessible transport options for their LGAs. This includes developing a connected network or different pedestrian and cyclist facilities in the LGAs. Wollongong City Council has recently adopted the *City of Wollongong Bike Plan 2014-2018*, while Shellharbour City Council is continuing to implement their *Shared Use Path Strategy 2010*.

There is currently a strong foundation for pedestrian and cyclist facilities in the area, particularly between Albion Park Rail and Albion Park. These facilities include on-road bike lane and road shoulders along the Princes Highway, Tongarra Road and the East West Link Road. The off-road shared path connection through the Croome Regional Sporting Complex and Terry Reserve provides direct, safe access to recreation facilities for pedestrians and cyclists in the area and is an important connection between the two communities of Albion Park Rails and Albion Park.

The proposed connections identified by both councils will help to strengthen these established routes and a larger network that can be more easily accessed by the local community. The connection along the Illawarra Highway is a key link that will help to strengthen the overall network.

Key project considerations related to the pedestrian and cyclist network include the following:

- Minimising disturbance to the existing and proposed networks
- Providing easy and safe connections across the new motorway to ensure connectivity is maintained and strengthened.

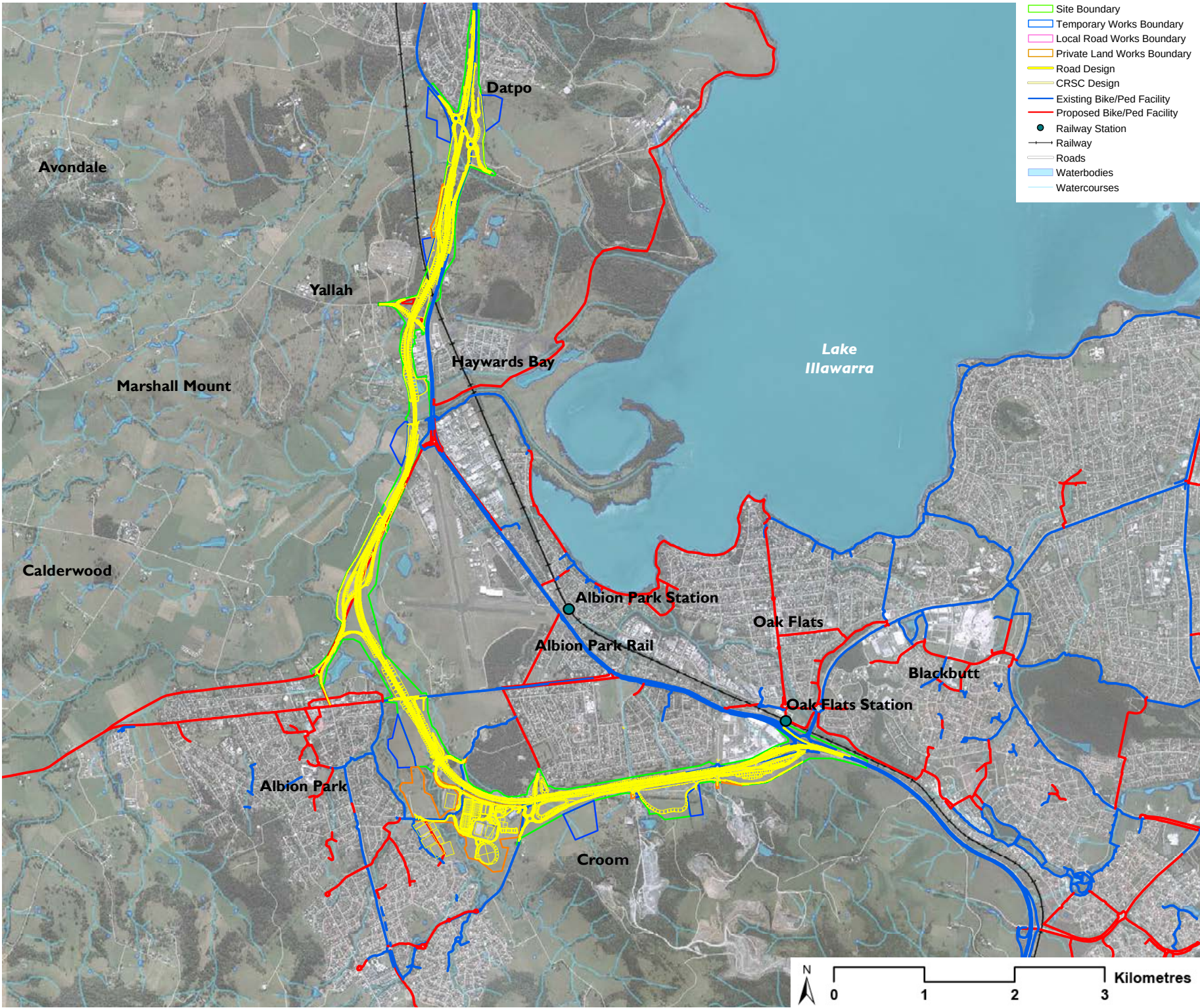


Figure 2-8: Pedestrian and cyclist facilities

2.8 LAND USES

URBAN FORM

The urban form of the project area is heavily influenced by its location in the Macquarie Valley. The undulating lowland areas are well suited for farming and dairy production, predominately in the Calderwood and Marshall Mount areas. The elevated areas with sloping hills provide district views for the residential areas of Dapto, Albion Park, Oak Flats and Blackbutt. These areas generally have post-war suburban residential development patterns with curvilinear and fragmented parallel streets. The close proximity of the Princes Highway, South Coast Railway Line and Illawarra Regional Airport has resulted in establishment of an industrial and business corridor, mixed with residential pockets in Albion Park Rail, Haywards Bay and Yallah.

As the Wollongong metropolitan area continues to grow, new urban development pressures are being introduced to the area. Currently, there are three major future developments, predominantly residential, that have already been approved by Wollongong City Councils and Shell harbour City Councils. These developments will result in a substantial increase in residential development over the coming years.

Key project considerations related to the land uses include the following:

- Identifying appropriate use of remnant land that would need to be acquired for construction but not retained for motorway operation
- Identifying strategies for consolidating fragmented lands that are impacted as a result of the project.

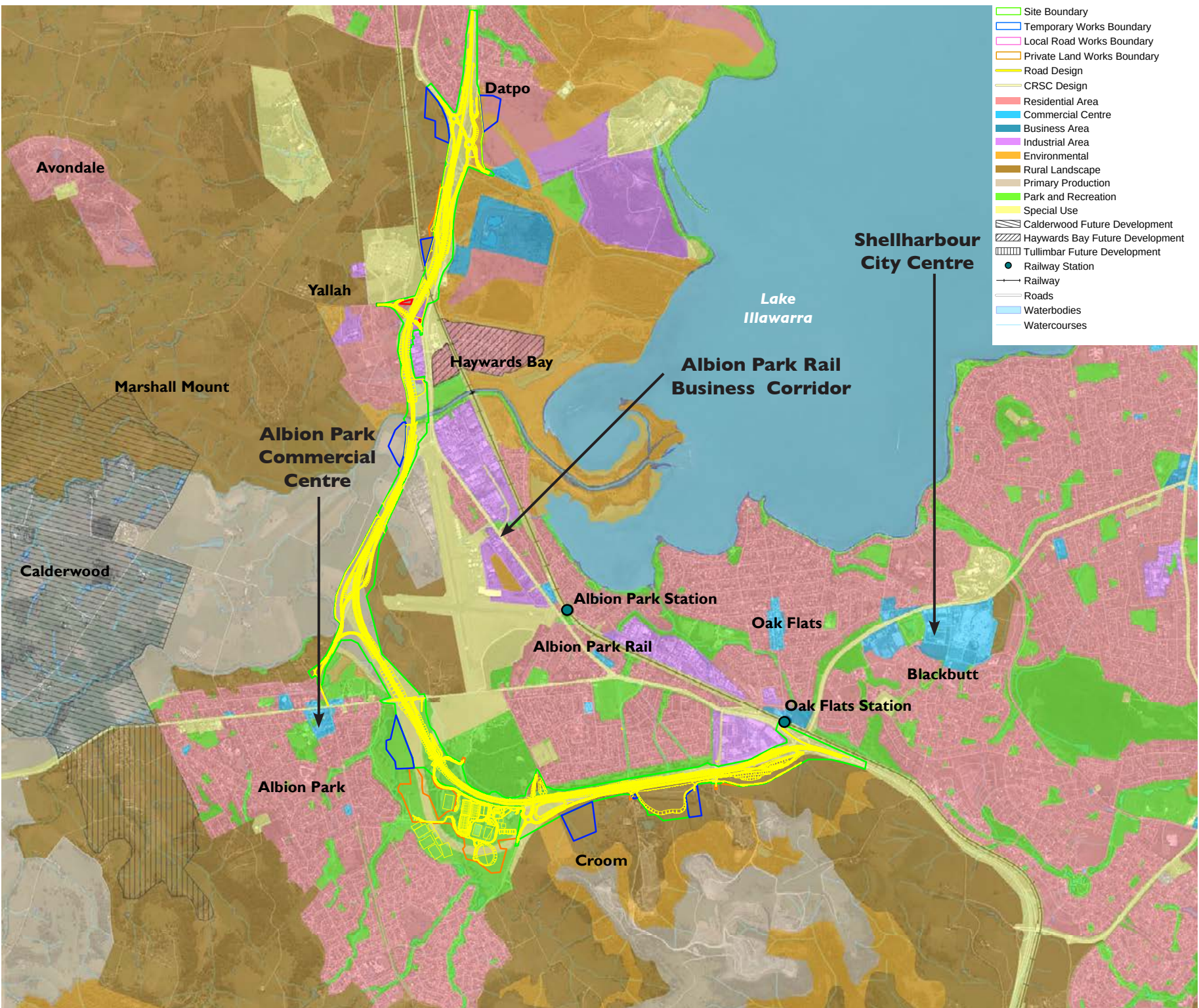


Figure 2-9: Urban Form

URBAN COMMERCIAL CENTRES

Albion Park has a clearly defined urban core with the primary commercial activities centred at Tongarra Road and Terry Street, which serves the local community and nearby communities. Tongarra Road is the traditional main street containing a variety of retail shops, services, civic, and community services. While the main urban shopping centre for the area is the Shellharbour City Centre, located east of the Princes Highway in the suburb of Blackbutt, the importance of this area is clearly demonstrated by the substantial streetscape improvements that have occurred over the past several years.

In contrast, Albion Park Rail does not have a clearly defined urban core, rather a long highway commercial and retail businesses corridor running along the Princes Highway. This provides easy access to a variety of different business and light industrial activities in the area.

The key project considerations related to the urban commercial centres includes:

- Maintaining access and easy connections to urban commercial centres for both local residence and motorway users
- Encourage streetscape improvements to Albion Park Rail to increase the variety and viability for the business through improved access and amenity.



Plate 2-6: Retail business activity in Albion Park Rail along Princes Highway looking south



Plate 2-8: Highway commercial activity in Albion Park Rail along Princes Highway looking south.



Plate 2-7: Albion Park commercial centre along Tongarra Road looking west



Plate 2-9: Albion Park commercial centre along Tongarra Road looking east

RESIDENTIAL NEIGHBOURHOODS

The established suburban residential areas in the project area are predominately in Dapto, Albion Park, Albion Park Rail, and Blackbutt and are directly connected urban centres. The urban and landscape character of these areas is defined by the pattern of the street layouts and the combination of building types, planting and road formation that make up the streetscapes.

The housing stock in the established residential areas vary in age, with the older homes generally located closest to the urban centres, and the post-war and later houses generally located further away in newer subdivisions. Most of the residential areas are characterised by contemporary landscaping, with front gardens visible to the street. The streets themselves generally have sealed roads with wide grassy verges. There are limited number of street trees along many of the residential streets.

The overriding character of this landscape type is that of an outlying residential suburb, which is in keeping with the urban character of a regional metropolitan area.

Key project considerations related to the residential neighbourhoods include the following:

- Minimising impact on views from hillside residential neighbourhoods
- Minimising impact on residential neighbourhoods that are in close proximity to the proposed project.



Plate 2-10: Residential area on Woollybutt Drive in Albion Park Rail



Plate 2-12: Rural residential landscape at Larkins Lane



Plate 2-11: Hillside residence on Church Street in Albion Park



Plate 2-13: Contemporary residential development on Ulan Place in Albion Park

AIRPORT AND INDUSTRIAL

Illawarra Regional Airport is owned and operated by Shellharbour City Council. Since 2002, Historical Aircraft Restoration Society (HARS) began relocating their collection of aircraft to Illawarra Regional Airport. There is no regular passenger service at the airport since QantasLink discontinued service to Melbourne in 2008. Today, the airport has been home to a growing light aeronautics industry cluster, the HARS, the Australian Aerial Patrol, and a range of other tourism-related operations.

The primary areas of industrial activity is in Albion Park Rail and Yallah, concentrated around the regional road and rail corridors. The character of these areas is distinguished by automotive dealerships and larger industrial buildings, often with open yards. The larger scale of these buildings, contrasts with the surrounding smaller-scaled residential and commercial areas but are not dominant features in the landscape. They tend to be visually homogeneous and somewhat anonymous.

Key project considerations related to the airport and industrial uses include the following:

- Minimising interference with airport operations
- Maintaining views of airport activities
- Maintaining access and connections to industrial activities and businesses.



Plate 2-14: Croome Lane industrial area



Plate 2-16: Illawarra Regional Airport



Plate 2-15: One of the two quarry entries at Croome



Plate 2-17: Colden Drive industrial commercial centre

RURAL HINTERLAND

The urban areas of Albion Park and Albion Park Rail are surrounded by agricultural land that characterise the Macquarie Valley rural hinterland. This landscape type has two distinctive characters. The first is the flat open country on the floodplain immediately north and east of Albion Park, which is visually exposed and connected to the Macquarie Rivulet. The second is the visually impressive rolling hills that rise up to the Illawarra Escarpment to the west, which also have long-range views over Lake Illawarra and along the South Coast.

The rural hinterland is distinguished by the geometric layout of the agricultural fields, which establishes a regular pattern across the landscape irrespective of topography. The geometry of the property boundaries is clearly visible in the landscape through the long straight roads, the fence lines and lines of trees that follow the patterns of land division.

Key project considerations related to the rural hinterland include the following:

- Maintaining rural landscape views from the motorway and adjoining areas
- Maintaining rural activities, such as farming, livestock grazing, and equestrian agistment.



Plate 2-18: Calderwood Road heading north in Calderwood



Plate 2-19: Yallah Bay Road heading east in Yallah



Plate 2-20: Horse agistment viewed from the East West Link Road at Croome



Plate 2-21: Illawarra Highway along western Albion Park Rail

OPEN SPACE & RECREATION

Both Albion Park and Albion Park Rail are well served by recreational public open spaces. In addition to their public parks, both towns connect to the Croome Regional Sporting Complex and the recreational opportunities it affords. Terry Reserve and Croom Regional Sporting Complex are located between Albion Park and Albion Park Rail and focuses on providing active recreational activities.

The Croom Regional Sporting Complex is the centrepiece for sport and outdoor recreation activity in Shellharbour City Council. This facility draws children and adults from around the region to compete in broad range of sporting endeavours and is heavily utilised throughout the year.

Mood Park and the Albion Park Showground are both located near the town urban center and are important venues for gatherings and public events. Darcy Dunster Reserve focuses on providing picnicking and passive recreation activities. It is also connected to a long foreshore trail along the Macquarie Rivulet and connects back in the residential neighbourhoods in Albion Park Rail near Lake Illawarra.

Key project considerations related to open space and recreation include the following:

- Maximising the functionality of the open space and recreation areas and protecting their core values and functions
- Minimising fragmentation and separation within open space and recreations areas
- Maximising access and connectivity between open space and recreation areas, and adjoining urban areas
- Maintaining views from open space and recreations areas to the surrounding escarpment.



Plate 2-22: Terry Reserve at Albion Park



Plate 2-24: Albion Park Showground



Plate 2-23: Darcy Dunster Reserve in Albion Park Rail



Plate 2-25: Mood Park in Albion Park

3. URBAN DESIGN AND
LANDSCAPE CHARACTER STRATEGY

This chapter identifies and describes the urban design objectives and principles that have been developed to guide both the assessment process and the concept design for the project. This will ensure that the project is physically, visually, and operationally integrated with the surrounding environment.

Urban design and landscape objectives and principles have been prepared to guide the concept design to ensure that the project is physically, visually and operationally integrated with the surrounding environment.

These objectives and principles take into account the desired future landscape and urban design character for the area as set out in the Secretary’s environmental assessment requirements and they also reference the key urban design aspects of Roads and Maritime *Beyond the Pavement* urban design policy and associated guidelines.

The three physical design objectives and nine design principles contained in *Beyond the Pavement* illustrate how the project will be shaped to achieve the published project objectives.

Physical design outcome objectives:

- Sensitive fit with the landform and built, natural, heritage and community environments
- Contribution to the accessibility and connectivity of communities and a general permeability of movement through areas
- Contribution to the overall quality of the public domain for the community.

Urban design principles:

- Contributing to urban structure and revitalisation
- Fitting into the built fabric
- Connecting modes and communities
- Fitting with the landform
- Responding to natural pattern
- Incorporating heritage and cultural contexts
- Designing an experience in movement
- Creating self-explaining road environments
- Achieving integrated and minimal maintenance design.

Each of these objectives and principles have been expanded to support the development of specific urban design objectives and principles for the proposed Albion Park Rail bypass.

These project specific objectives and principles are based on an understanding of the wider existing landscape and urban values of the area and the landscape and urban design issues that affect, or are affected by the project. These wider values include the understanding that the project should integrate with the immediate and surrounding context, enhancing the attractive residential community of the Albion Park and Albion Park Rail area. The neighbourhood areas should be kept liveable, walkable, cycle-able, well scaled, visually attractive and safe. The natural systems and ecological biodiversity should be protected, as far as possible, and used to contribute to unique character of the place, recreational uses, outdoor lifestyle values of the area and the overall sustainability of the project.

As a broad approach to the design and construction of the motorway, the interchanges and other ancillary works, the principles of Ecologically Sustainable Development should underpin all decisions. Amongst other factors, this would ensure that the most economical use of resources is achieved during both the construction and operation of the project. For example, project elements would be designed using robust, low maintenance materials that would also minimise the potential for vandalism.

The following urban design objectives are based on the contextual analysis of the site and the proposed project, and are accompanied by a series of principles which provide a high level urban design response to each of the objectives.

The urban design objectives related to the following:

- Landscape and Scenic Quality
- Design of the motorway, Interchanges and Bridges
- Heritage and Cultural Values
- User Connectivity
- Urban Development
- Public Domain.

3.1 OBJECTIVES & PRINCIPLES

LANDSCAPE AND SCENIC QUALITY

Objective 1: To achieve a project that fits sensitively with the existing landscape and scenic qualities and characteristics of the Albion Park Rail and Albion Park setting.

Design principles:

- Principle 1.1 Protect and integrate the rural landscape environment into the overall project design
- Principle 1.2 Utilise landscaping treatments to develop a progressive sequence of visual events and stimuli within the road corridor for all users
- Principle 1.3 Design landscaping treatments that assists in distinguishing between the different functions and speeds of roads
- Principle 1.4 Maintain important recognisable views of the rolling hillsides and escarpment
- Principle 1.5 Design the project to fit in naturally with the local topography and alluvial floodplain setting
- Principle 1.6 Design major project formations like earthworks, embankments, and mounding to fit into its setting and reduce its visual and physical obtrusiveness
- Principle 1.7 Integrate natural patterns and ecology into the design of the project, protect creeks, retain physical continuity of natural systems, and use natural characteristics in the project’s landscape design.

DESIGN OF THE MOTORWAY, INTERCHANGES AND BRIDGES

- Objective 2:** To achieve an integrated road design form and character that minimises the visual impacts on the adjoining areas.
- Design principles:**
- Objective 2.1

Minimising the footprint and scale of the motorway and interchanges
- Objective 2.2

Design the motorway and interchanges as to not be visually dominate the landscape
- Objective 2.3

Minimise the size of interchanges to better connect into the existing local road network
- Objective 2.4

Minimise the potential visual and physical barrier effect of the interchanges by maintaining cross connections for local traffic, public transport, pedestrians and cyclists.

- Objective 3:** To achieve a design that efficiently utilises road related elements which minimise visual impacts and require minimal maintenance.
- Design principles:**
- Principle 3.1

Integrate interchange elements with adjoining road elements and structures
- Principle 3.2

Minimise the height and extent of retaining walls and embankments
- Principle 3.3

Design all lighting and signage to be unobtrusive in the landscape, particularly for distant view areas where the new motorway will introduce a new visual element at night
- Principle 3.4

Minimise the intrusion of project related elements, such as signage, lighting, barriers, fencing and flood control elements to the minimum technical requirements to minimise visual clutter
- Principle 3.5

Use robust, high quality and durable materials appropriate to the urban setting and avoid opportunities for vandalism
- Principle 3.6

Design proposed bridge structures as a visually consistent and attractive set of elements that have a contemporary form and scale which complement the surrounding environment.

HERITAGE AND CULTURAL VALUES

- Objective 4:** To protect the integrity of the heritage and cultural values of the Albion Park Rail and Albion Park area.
- Design principles:**
- Principle 4.1

Minimise the impact of the proposed project on State and locally listed Aboriginal and non-Aboriginal sites, buildings and precincts and their contribution to the setting and character of the area
- Principle 4.2

Respect and incorporate places and sites of Aboriginal value in the overall project design
- Principle 4.3

Minimise impacts to heritage listed tree species and cultural plantings
- Principle 4.4

Minimise the impacts on the visual curtilage of the Raventhorpe Guesthouse through sensitive design.

USER CONNECTIVITY

- Objective 5:** To contribute to the accessibility and connectivity into and through Albion Park Rail, Albion Park and other surrounding areas.
- Design principles:**
- Principle 5.1 Retain permeability of movement through areas by maintaining the continuity of the street grid and pathway systems
 - Principle 5.2 Improve connectivity around and through the proposed project area for all modes of transport and user groups
 - Principle 5.3 Consider both transport and community needs in planning and designing road network connections
 - Objective 5.4 Design the motorway and interchanges to be self-explaining road environment that are easily legible to all road users
 - Principle 5.5 Integrate the pedestrian and cycle path of the proposed project with the local Council’s existing and future planned network systems
 - Objective 5.6 Maximise safe pedestrian and cycle crossings at intersections that are attractive, easy to use and minimise crossing distances
 - Principle 5.7 Improve connectivity to existing and potential future public recreation spaces at Darcy Dunster Reserve
 - Principle 5.8 Provide attractive, safe and accessible undercroft areas next to the abutments for pedestrians, cyclists and equestrians through the Croome Regional Sporting Complex.

URBAN DEVELOPMENT

- Objective 6:** To create a project that facilitates future urban development and revitalisation along and surrounding the proposed project area.
- Design principles:**
- Principle 6.1 Minimise the effects of fragmentation on neighbourhoods and precinct areas
 - Principle 6.2 Reduce the footprint of the motorway to minimise residual land
 - Principle 6.3 Consider the potential for new uses of residual and underutilised areas impacted by the proposed project
 - Principle 6.4 Design the proposed project and associated infrastructure so that it can support future development and revitalisation of surrounding retail, commercial, industrial, recreational and educational areas
 - Principle 6.5 Work with Council to facilitate the consolidation of residual land parcels into sufficiently useable areas that can be redeveloped appropriately, consistent with surrounding land uses
 - Principle 6.6 Provide suitable streetscape design that will facilitate new public and private related land uses.

PUBLIC DOMAIN

- Objective 7:** To enhance the quality and value of the public domain along and surrounding the proposed project area.
- Design principles:**
- Principle 7.1 Minimise negative physical impacts on public, open space, recreation and other areas next to the proposed project
 - Principle 7.2 Design the proposed project to accommodate potential new uses and improvements in existing and new public domain spaces
 - Principle 7.3 Design the proposed project to ensure that the spaces under and around the bridge and viaducts are appropriately integrated into the public domain
 - Principle 7.4 Design the proposed project to create town entry treatments that are attractive and inviting.

3.2 URBAN DESIGN AND LANDSCAPE CHARACTER STRATEGY

This section describes the interrelationship between the works and the adjoining areas in the form of an indicative urban design and landscape character strategy. This Strategy has been developed from the objectives and principles, to achieve an integrated concept design for the proposed motorway. The strategy design presented here (Figure 3-1) includes elements such as retaining walls, cuttings, fill embankments, pedestrian and cyclist connections, habitat corridors that will be integrate into the proposed motorway and assist in maintaining the existing character of the local area.

An integrated design approach has been adopted for the Albion Park Rail bypass in order to ensure that the best possible outcomes are achieved. As part the integrated design approach, an urban design strategy has been developed to provide urban design input to the overall concept design for the motorway upgrade. The purpose of the strategy is to articulate how urban design can contribute to the successful achievement of the overall project objectives. The overall project objectives for the Albion Park Rail bypass are:

- Provide a motorway standard bypass of Albion Park Rail
- Provide a minimum of one in 20 year flood immunity
- Provide access for A-double vehicles
- Provide east-west connectivity for current and future land use.

The urban design strategy has directly influenced key engineering aspects of the concept design to date, including: road alignment, bridges, retaining walls, cuttings and embankments. The intention is that the urban design strategy would influence the development of the motorway upgrade when it proceeds to detailed design and construction.

ROAD DESIGN ELEMENTS

Road elements are categorised as follows:

- Structures - including bridges, retaining walls that are necessary to achieve the road alignment within its surroundings
- Earthworks formations - including cuttings and embankments that are necessary to achieve the road alignment within its surroundings
- Drainage and water quality structures - including basins and open channels that are necessary in order to sensitively drain the works and ensure safe operation of the motorway
- Roadside elements - such as safety barriers, signs and noise attenuation walls that are necessary for the effective operation of the motorway.

Design approach

The general approach to the design of road elements is to satisfy the functional requirements for the safe and efficient operation of the motorway while also being appropriate to their location. In all cases, the design and implementation of the road elements would need to satisfy the requirements of Austroads and Roads and Maritime design guidelines and practice notes.

It is also important that, in their detailed resolution, the visual expression of the road elements is true to their function as items of contemporary motorway infrastructure. Respect for the character of the local area will not be achieved by the appropriation of stylistic cues or fashions from another era, but through sensitive consideration of the location, placement and scale of the new elements.

LANDSCAPE ELEMENTS

Landscape elements include:

- Planting and revegetation - including planting, seeding and bushland reconstruction techniques that are necessary to stabilise the works and integrate the upgrade with the surrounding environment.

Design approach

Planting and revegetation design integrates the upgrade with the surrounding landscape, thereby mitigating the potential visual and environmental impact of the upgrade.

The following revegetation methods will be utilised:

- Seeding
- Planting
- Bushland reconstruction.

The planting and revegetation design also aims to minimise the potential ecological impacts of the highway upgrade by stabilising earthworks to prevent erosion, and reinforce existing habitats and ecological corridors through revegetation of substantial areas and species selection.