CHAPTER 6

PROJECT DESCRIPTION – OPERATION

6 PROJECT DESCRIPTION – OPERATION

6.1 Introduction

This chapter provides details regarding the station designs, railway operating systems and operations for the NWRL alignment, including:

- Station fit-out, platforms, buildings and other architectural aspects.
- Skytrain design and architectural aspects.
- Rail infrastructure such as railway tracks, signaling systems, ventilation systems, overhead power supply and substations.
- Transport interchanges, bicycle facilities, bus stops, taxi ranks, kiss and ride, and park and ride facilities.
- Access roads and landscaping.

The chapter is divided into six sections as follows:

a. Context
b. Overview of Project
c. Station detail
d. Rail infrastructure and systems
e. Operations
f. End state

6.2 Director-General's Requirements, Conditions of Approval and Statement of Commitments

The Director-General's Requirements do not contain specific requirements for the project description. sets outs the Conditions of Approval (CoA) and the Statement of Commitments (SoCs) as they relate to the project description and where these have been addressed within this chapter. Unless otherwise stated, references are to chapters of EIS2.

Table 6.1 Director General's Requirements, Conditions of Approval and Statement of Commitments

	Description	Addressed
Concept Plan Approval Requirements		
2.4	The Proponent shall ensure that station precincts across the project provide a high degree of accessibility to all modes-of-access, consistent with the objectives of *Integrated Land Use and Transport* (DUAP 2001 or as updated).	Modes of access and the objectives of *Integrated Land Use and Transport* (DUAP 2001) are discussed in Section 6.7.1 and Chapter 9.
3.1	a. a detailed project description including: i. confirmation of the alignment, station locations (including feasibility of any additional stations) and stabling arrangements; and ii. the design and location of ancillary infrastructure.	Project description of rail systems and stations in Chapter 6. Project description of major civil construction works, including alignment, station locations, stabling facility and ancillary infrastructure in Chapter 7 of EIS1. Project development history is presented in Chapter 1 of EIS 2.
3.3	The Proponent shall review mode-of-access demand and peak traffic predictions at Epping Station taking into account the impact of ECRL operations on patronage distribution; and identify any required changes to mode-of-access arrangements at Epping.	Mode of access changes at Epping are discussed in Section 6.6.1.
4	A construction strategy would be developed confirming detailed construction activities and methodologies at each construction site for the construction of the tunnel.	Construction strategy for rail systems and stations in Chapter 7. Construction strategy relating to major civil construction works in Section 7.9 of EIS1.
5	Detailed construction methodologies at each construction site would be developed, including spoil management, with the aim of minimising environmental impacts and informing future impact assessment.	Construction strategy for rail systems and stations in Chapter 7. Construction strategy relating to major civil construction works in Section 7.9 and 7.10.1 of EIS1.
Statement of Commitments		
19	Maintenance access points would be identified and planned in consultation with RailCorp and Councils.	Maintenance access points are addressed in Chapter 9 and Chapter 6 (Table 6.2 – 6.9).

PART A - CONTEXT

6.3 Project Vision

This section provides a description of the vision of the NWRL project.

6.3.1 The NWRL, the first part of Sydney's Rapid Transit Rail Network

In June 2012 TfNSW announced a new rail plan for Sydney, *Sydney's Rail Future*.

Sydney's Rail Future is a long term plan to increase the capacity of Sydney's rail network through investment in new services and upgrading of existing infrastructure. It is a plan to improve the customer's experience. A central aim of the plan is to transform and modernise Sydney's rail network so that it can grow with the population and meet the needs of customers now and into the future.

Sydney's Rail Future is an integral part of the *NSW Government Long Term Transport Master Plan*.

The NWRL would be a key component of the introduction of a rapid transit sector as part of *Sydney's Rail Future*, a customer focused public transport plan to modernise Sydney's rail network and trains. The NWRL would be the first part of a new, modern high frequency rail network providing a train every five minutes during peak times. **Figure 6.1** illustrates the proposed *Sydney's Rail Future* network, the Rapid Transit Network shown in blue.

Subject to a value for money analysis, the NWRL would be operated by the private sector, with train frequency and fares to be set by the NSW Government in line with the rest of the Sydney rail network. The NWRL forms part of the first stage of the future rapid transit sector. As part of future stages, the NWRL would be extended to the CBD via a second harbour crossing and ultimately convert the Bankstown and Illawarra lines (to Hurstville) to rapid transit operations.

As part of the first stage of operations of the rapid transit sector between Cudgegong Road and Chatswood, customers from the NWRL would be able to simply cross the platform at Chatswood to board a train on the existing rail network going into the city. To facilitate this, rapid transit trains would continue through the Epping to Chatswood Rail Link (ECRL).

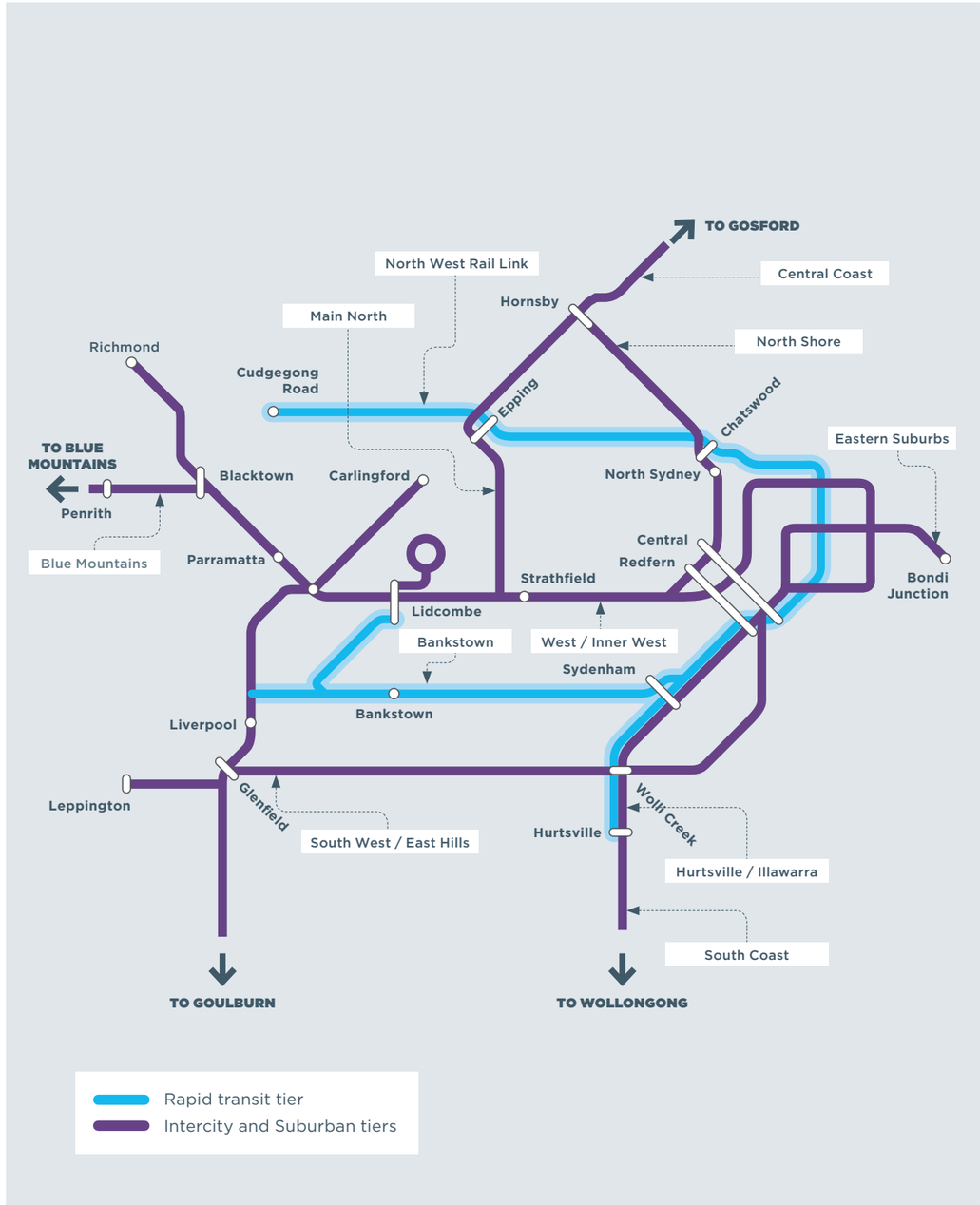
The eight new rail stations (Cherrybrook, Castle Hill, Showground, Norwest, Bella Vista, Kellyville, Rouse Hill, and Cudgegong Road) would form the focus of an enhanced bus, pedestrian and cycle network to provide seamless journeys from all areas of the North West, linking with the rest of Sydney, as well as with destinations within the North West.

As part of a wider transport network for Sydney, the NWRL would be integrated with other forms of transport as well as current and future urban land uses. Stations and their precincts would encourage walking, cycling and bus travel by creating good access for all customers. This would facilitate customer journeys that are seamless and intuitive from origin to destination.

The NWRL would be designed to provide architecture with appropriate civic presence, to promote the role of NWRL stations as community focal points.

The stations' influence can extend beyond the immediate precinct allowing the potential for connection to walking and cycle paths from the stations to local schools, community centres and places of interest. The influence of the NWRL would also extend beyond the rail corridor with the potential to provide a link to universities, cultural and community facilities, employment and retail areas and other facilities around Sydney.

Figure 6.1 Network Plan - Sydney's Rail Future



6.4 The Customer Experience

Recognising the importance of the customer experience, TfNSW's mission statement is:

"The customer is at the centre of everything we do in transport".

Customer experience is a fundamental driver for the NWRL. The stations, the new rapid transit trains and the complete travel experience as well as the integration of the project into the community are all central to the customer experience. A high quality 'door to door' transport product is critical to attracting and retaining customers and also to meeting broader transport and land use goals.

The NWRL provides a customer focus by addressing customer needs at all stages of the journey as summarised in **Figure 6.2** below.

Figure 6.2 Customer Focus

6.5 Design of the NWRL

6.5.1 Concept design

This EIS is based on a concept design for the NWRL. The concept design has been developed by transport planners, urban planners, architects and engineers with input from stakeholders (refer to Chapter 5) to provide the level of information necessary to allow:

- Identification of property acquisition necessary to enable the project to be implemented.
- An understanding of the nature and extent of likely impacts and impact mitigation measures.
- A level of flexibility to enable detailed design development while having regard to reasonable and feasible mitigation measures to minimise impact on the receiving environment.
- Feedback from the community and key stakeholders including councils and industry has influenced the design process.
- Refine the NWRL footprint for safety, engineering and functional reasons, taking into account environmentally sensitive areas and constraints.
- Address any unresolved issues associated with the development of the design as described in this EIS and any subsequent submissions report.
- Meet any conditions of approval arising from the approval process.

The concept design detailed in this chapter and construction methods detailed in Chapter 7 are proposed as a functional solution to NWRL objectives and constraints. They may be refined by TfNSW and its construction contractors and operator within the limits of any conditions imposed by the planning approval and the design constraints, principles and standards used throughout the design development process.

6.5.2 Detailed design phase

The detailed design phase of the NWRL would involve further survey, geotechnical and other investigations. The tunnel alignment within the proposed NWRL corridor may also be refined during further design activities.

Development of the design would continue during the planning approval process and would take into account matters raised in submissions, any adjustments to the design as required by conditions of approval and the results of any further investigations. In addition, the design may incorporate alternative approaches derived from the greater knowledge of detailed design, safety refinements, innovation, new standards and technologies or the passage of time.

The ongoing development of the NWRL would consider opportunities to:

6.5.3 Design principles for stations and service facilities

The built form of stations, associated service buildings and facilities would be an important design element in the visual environment and must therefore meet high quality design principles. These principles would guide future detailed design, which would be reviewed by a Design Review Panel.

Overall, the project aims to support place making by providing urban areas and public spaces that:

- Create memorable, vibrant new focal points for the community, places where customers feel safe, are protected from the weather and places that offer an enjoyable and uplifting experience.
- Offer opportunity for customers to easily transfer between different modes of transport or readily access local facilities and services.
- Are informed by local character including natural systems and the surrounding built environment.
- Provide a positive and lasting legacy for future generations.

Design principles for stations, associated service buildings and service facilities include:

i. The built elements of the project must contribute to creating good public spaces by providing a high quality experience for customers, including direct, equitable, safe and convenient connections between transport modes and integration with adjacent land uses.
ii. The architecture and urban design of the built elements of the project must balance a contextually responsive approach with a consistent project wide design that ensures value for money.
iii. Intrusive, above ground structures must be minimised as far as practicable; where required, visually prominent structures must be well considered when viewed visually at human scale.
iv. All of the rail infrastructure elements of the station and service facilities (such as power and fresh air ventilation) must be integrated into the design holistically, while being able to be easily maintained.
v. Urban design elements of the project must respond to, or facilitate active uses such as local retailing and services around stations, active and passive public spaces, good quality landscaping and sustainable car parking.
vi. Material selection and design should provide for robust and easily maintained finishes that consider protection from graffiti, the effects of dust and rain and high usage.
vii. The built elements of the project must incorporate feasible and reasonable noise mitigation.
viii. The built elements of the project must incorporate sustainability initiatives (such as water sensitive urban design and energy harvesting), use resources and materials efficiently and have a low carbon footprint, and support the ability of current and future generations to create healthy and liveable communities.
ix. The urban design elements of the project must consider and respond to 'safer by design' principles.

6.5.4 Public art

The stations, interchanges and precincts are social places and the NWRL would incorporate public art as a way to link communities to new public places. Public art would connect the stations with the communities they serve and contribute to the success of the NWRL through promoting station identity, amenity, safety, security, community values and the public domain, as depicted in **Figure 6.3**.

The provision for public art aims to keep stations and interchanges alive and create interesting public spaces. It is envisaged that public art works would evolve over time through ongoing community arts activities during the operational phase to sustain a community sense of ownership of the public domain.

The key themes for ongoing public art works are:

- Enhance the customer experience
- Integrated art, architecture, urban design and engineering
- Innovative, contemporary and fresh approach
- Exceptional quality Australian art
- Diverse types of artwork
- Socially and culturally sustainable
- Environmentally sustainable
- Cost effective and value adding to all design areas
- Strong cultural concepts

Figure 6.3 Public Art Principles

6.5.5 Design Review Panel

A Design Review Panel has been established for the NWRL to provide independent design review and to evaluate the design of stations, the transport product and associated precinct works. This panel comprising independent experts is chaired by the NSW Government Architect and considers and provides advice on a range of designrelated issues, including:

- Master planning.
- Public domain design.
- Architecture.
- Design of structures such as the viaduct and bridges.
- Internal station design.
- Sustainability.

The Design Review Panel would be engaged for the duration of the project including the assessment of tender proposals to ensure a high quality product.

6.5.6 Deliver high quality design

To ensure a high quality design outcome for the NWRL project, all procurement requirements would encourage the engagement of world class, award winning architects, engineers, urban designers and landscape architects to deliver the optimum outcome.

PART B - OVERVIEW OF PROJECT

6.6 Overview description

The NWRL comprises an electrified railway with services operating between Chatswood and Tallawong Road, Rouse Hill, refer **Figure 6.4**. This EIS is in relation to a project application for the component of the NWRL between Epping and Tallawong Road, Rouse Hill. It would include the construction of a two track alignment from Epping to Rouse Hill, 23km in length with eight new stations and associated services.

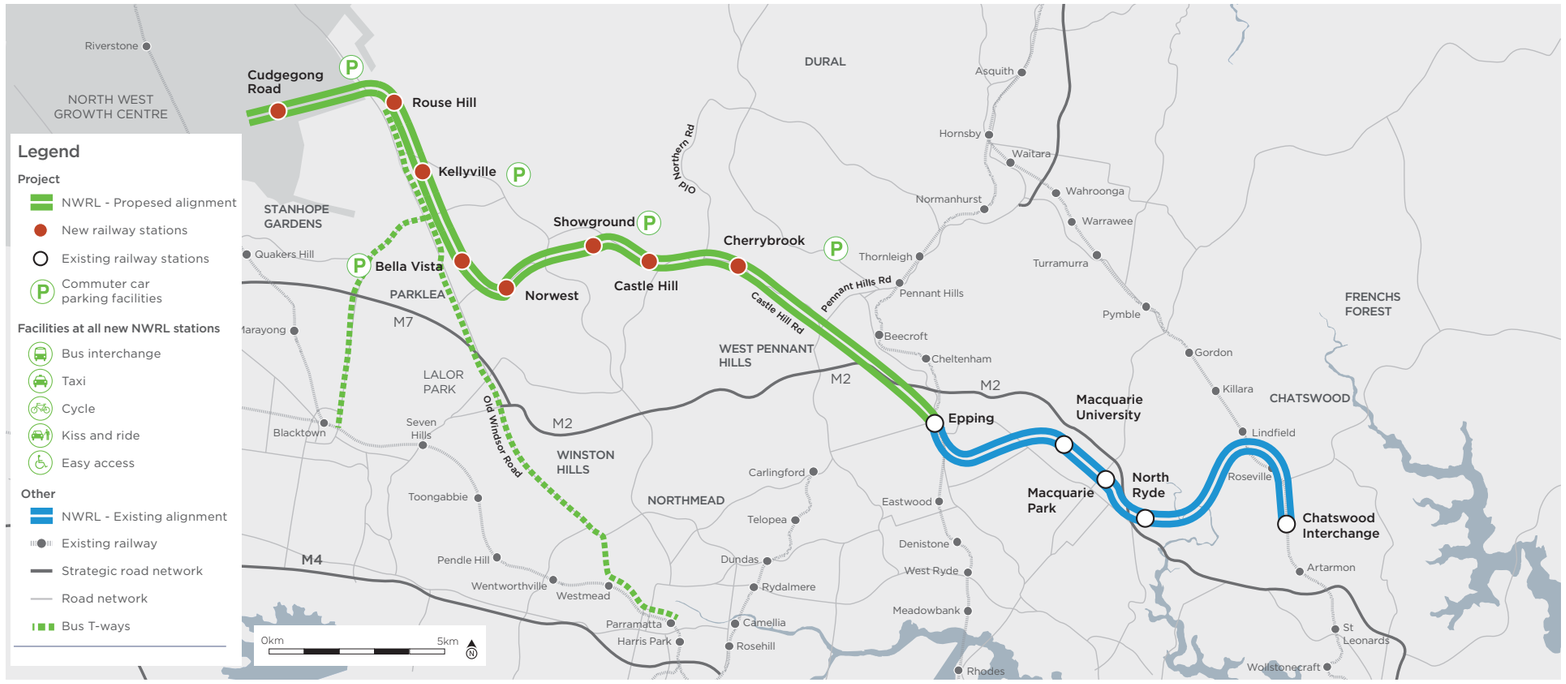
The NWRL, between Epping and Tallawong Road, comprises the following main components:

- Eight new stations located at Cherrybrook, Castle Hill, Showground, Norwest, Bella Vista, Kellyville, Rouse Hill and Cudgegong Road.
- A direct underground connection into the existing ECRL at Epping, with trains operating between the north west and Chatswood.
- An underground section of alignment comprising of 15.5 km of two track railway in a twin tunnel configuration with cross passages at regular intervals between Epping and Bella Vista.
- A 7.5 km above ground section of alignment from Bella Vista to Tallawong Stabling Facility, Rouse Hill, which would be a combination of viaduct, embankment, at grade and cutting.
- A Stabling Facility at Tallawong Road.
- An intermediate service facility between Epping and Cherrybrook.
- A service facility at Epping.

The following overview description of the NWRL is based on a direction of travel from east to west.

The proposed NWRL alignment is described below. The components between Epping and Tallawong Road are shown in detail in **Figure 6.5** A-J.

Figure 6.4 Map of NWRL stations



6.6.1 From Chatswood Station to Epping Station

NWRL trains would use the existing ECRL to provide services between Chatswood and Cudgegong Road, Rouse Hill.

The NWRL would continue from the existing underground tunnel stubs located immediately north of the underground ECRL Epping Station platform. The rail line between Epping and Chatswood would be converted to rapid transit operations before the NWRL project opens to customers. This Epping and Chatswood rail line conversion is not part of the current design or approvals of the NWRL project. Conversion works for the ECRL to facilitate the rapid transit operations would be considered and assessed separately.

Customers using the NWRL services would be able to interchange at Epping onto the existing heavy rail system and vice versa. Other mode of access arrangements at Epping would be maintained.

Epping Town Centre has excellent access to Sydney's heavy rail and bus networks. The Epping Town Centre Study notes that it is unlikely that an enhanced role of Epping Railway Station as a key interchange will place any significant demand on the local infrastructure within Epping (including bus services and commuter parking) as most passengers using Epping as interchange would do so within the confines of the station.

No changes to mode-of-access arrangements at Epping are required to accommodate the NWRL. As part of the ECRL (and in accordance with the ECRL Condition of Approval No. 121), implementation of the existing Station Access Management Plan adequately addresses mode-of-access arrangements. This Plan was prepared in consultation with RMS, DP&I and relevant Councils and to the satisfaction of the Director-General.

Significant improvements to pedestrian, bus and vehicular access/integration have been completed at Epping as part of the Epping Station Upgrade.

In addition, it is noted that ECRL Condition of Approval No. 220 provides for any additional operation stage measures resulting from station area transport management investigations to promote improved public transport, pedestrian and cyclist improvements and/or any other measures required by the Director-General. Funding has been made available to Parramatta City Council and Hornsby Shire Council for pedestrian and cycle improvements.

The NWRL project does not propose any commuter parking at Epping, which is a major destination and employment location. This is supported by the Epping Town Centre Study that recommends a review of parking rates in the short term (i.e. next 5 years) with the aim of reducing parking provision across the Epping area. The Study also recommends the introduction of a car share program.

6.6.2 Epping Station to Bella Vista Station

The first 15.5 km of the rail line between Epping and Bella Vista is proposed to be in twin underground rail tunnels. This underground tunnel section of the project would include an open cut station at Cherrybrook and underground stations at Castle Hill, Showground and Norwest. Refer to **Figure 6.5** A-J.

From the Epping connection the twin tunnels would turn north west onto a long straight section and descend to pass beneath Devlins Creek and the M2 Motorway before rising on a long and comparatively steep grade beneath Pennant Hills Road and towards Cherrybrook Station.

This section of the alignment would also include:

- The site of the Epping Services Facility at Beecroft Road, approximately 350 m from the ECRL connection.
- An alignment that would allow for any future Parramatta to Epping Rail Link to join the tunnels approximately 800 m north of Epping.
- The site of the Cheltenham Services Facility near Cheltenham Oval, approximately 1.8 km from the ECRL connection.
- Provision for a cross over cavern in the vicinity of the Epping Services Facility. Provision for a crossover cavern in the vicinity of Castle Hill Station.

Continuing under Pennant Hills Road, the alignment would rise towards Cherrybrook Station. Beyond Cherrybrook the alignment would run to the west beneath Castle Hill Road descending on a long moderate grade before turning south west at the location of Castle Hill Station beneath Arthur Whitling Park. A cross over cavern would be provided on the city side of Castle Hill Station.

West of Castle Hill Station the alignment would descend and curve north westerly onto a straight section of route located below Showground Road before turning due west on the approaches to Showground Station which would be located south of the showground and adjacent to Carrington Road.

Leaving the station and moving west, the alignment would pass below Cattai Creek before traversing to the south and falling gradually as it passes under the Castle Hill trading estate precinct on a long straight section in a south westerly direction. Just beyond Windsor Road the alignment would curve to bring the corridor directly below the southern edge of Norwest Boulevard. Norwest Station would be located here, immediately to the south east of Norwest Boulevard.

Leaving Norwest Station the alignment would continue to follow Norwest Boulevard in a south westerly direction up to the intersection with Solent Circuit. Past this point of the alignment it would begin to diverge from Norwest Boulevard taking a more westerly route on a long curved section which would eventually turn the alignment around to the north west and parallel to Old Windsor Road. The alignment would continue in a tunnel to a portal located immediately north of Celebration Drive and surface in a cutting on to Bella Vista Station further to the north.

6.6.3 Bella Vista Station to Rouse Hill Station

From Bella Vista Station, the alignment would continue to follow a route located roughly parallel to the eastern side of Old Windsor Road and would begin to climb to become elevated north of Balmoral Road. This elevated section of alignment (the skytrain) would be located on an earthwork embankment and would transition to an elevated rail viaduct as the route passes over Memorial Avenue and an area of local floodplain in the vicinity of Samantha Riley Drive with Kellyville Station located immediately to the south of this road. A cross over would be provided between Bella Vista and Kellyville Stations.

The skytrain would continue to the north west, crossing and then following the eastern side of Windsor Road. Rouse Hill Station would be located on a straight section of elevated track between Rouse Hill Town Centre and Windsor Road, above the existing North West T-way interchange. Refer to **Figure 6.5**.

6.6.4 Rouse Hill Station to Tallawong Road

From Rouse Hill Station the alignment would curve westwards to pass over Windsor Road and then to the south west, parallel and to the north of Schofields Road. The alignment would cross Second Ponds Creek and pass beneath Cudgegong Road which would be located on a new bridge. The terminus station, Cudgegong Road, would be sited just beyond in a shallow cutting. On the far side of the platforms, beyond a new bridge carrying Tallawong Road, the alignment would broaden into the stabling facility at Tallawong Road. Provision would be made for a possible future extension of the line further to the west. Refer to **Figure 6.5**.

Figure 6.5 A-J Long Section Long Plan 1-10

Figure 6.5A Plan and Long Section

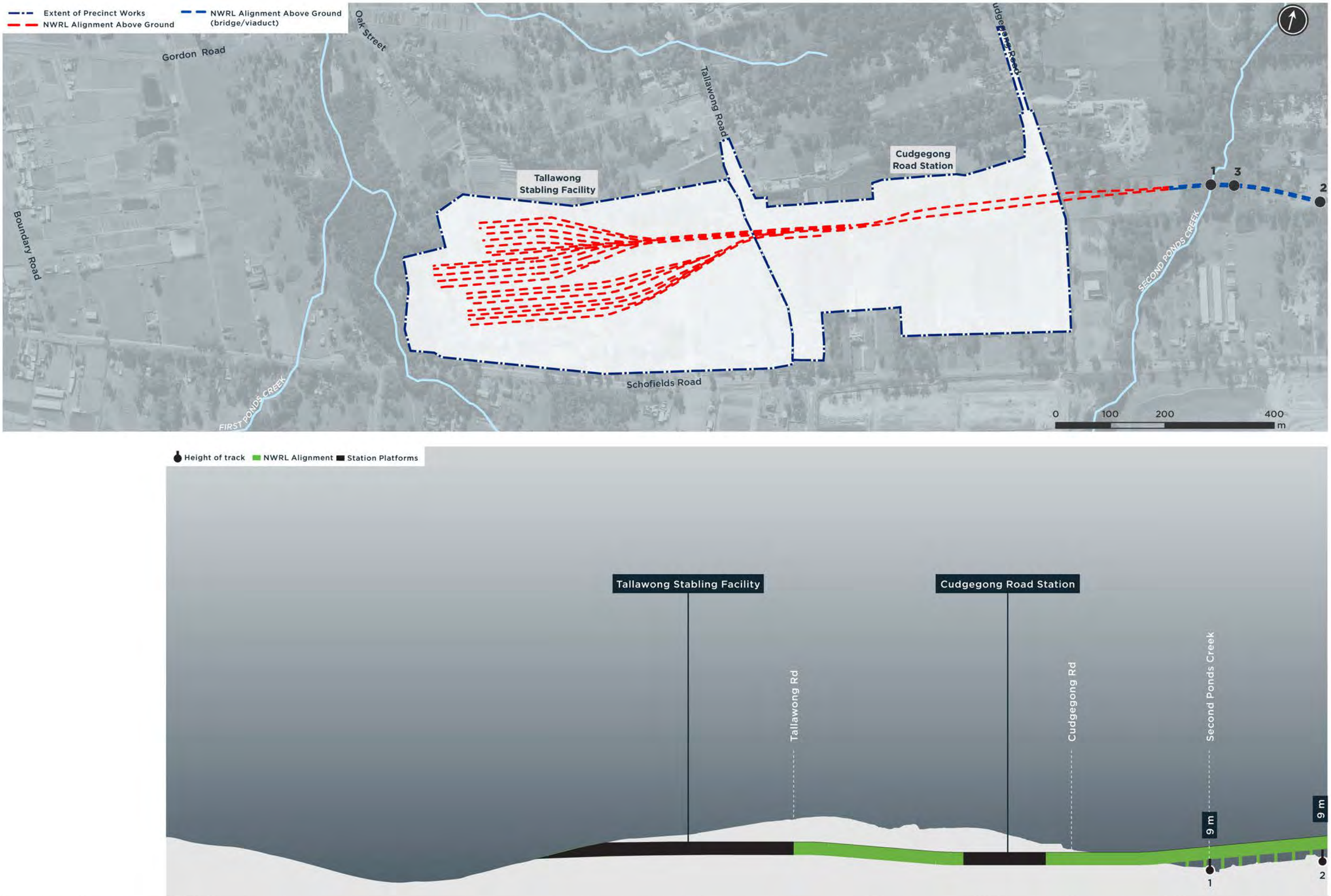


Figure 6.5B Plan and Long Section

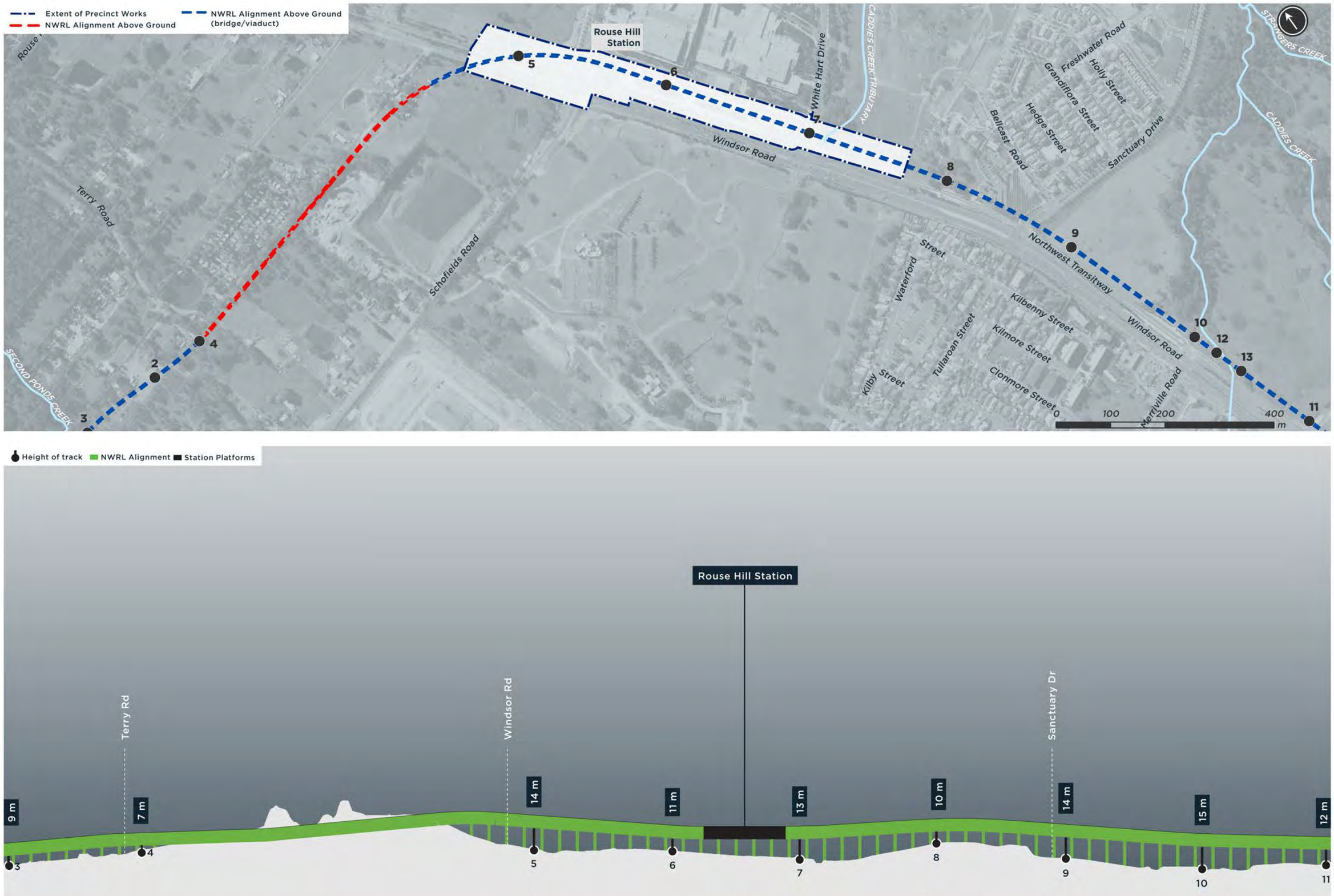


Figure 6.5C Plan and Long Section

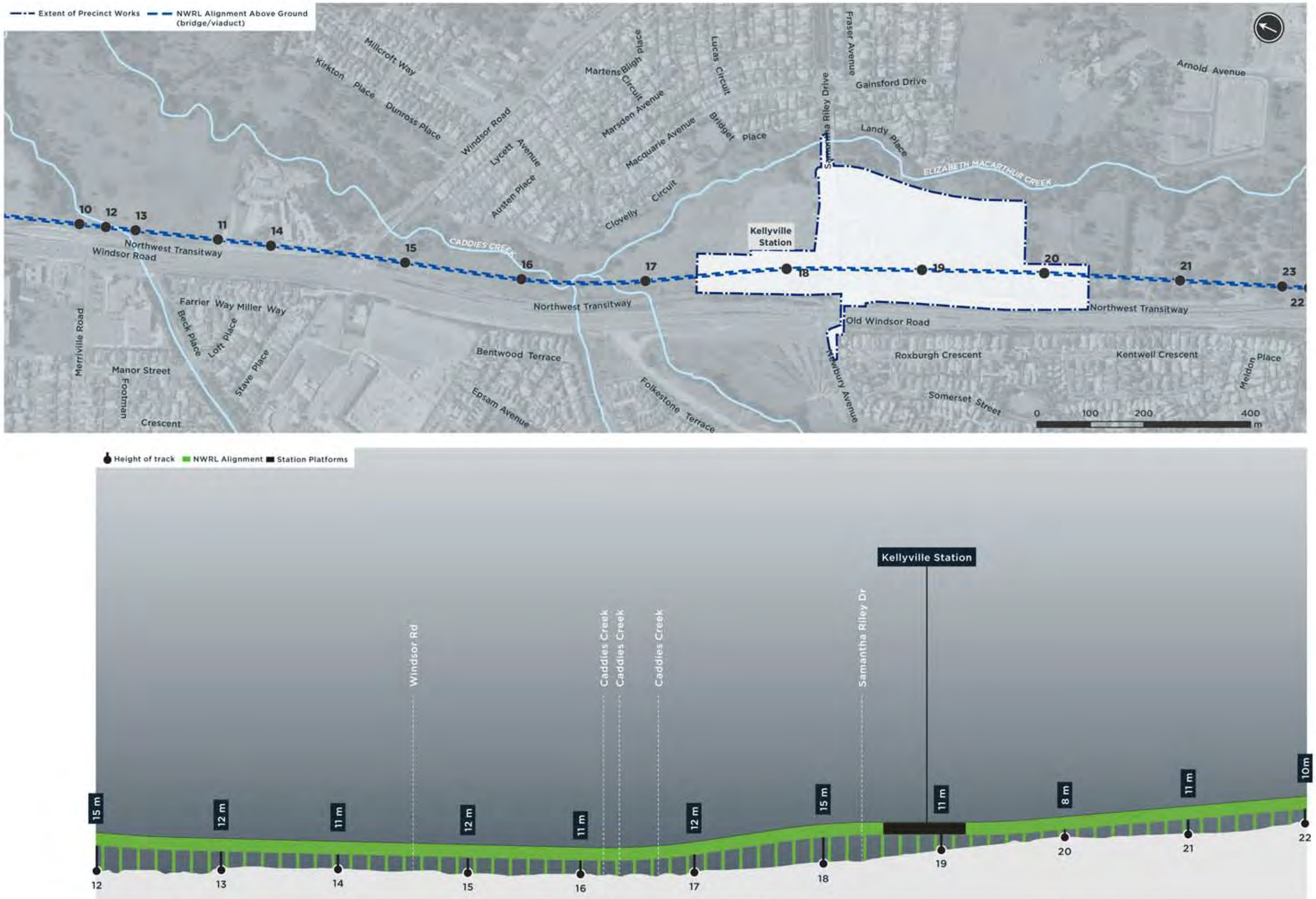


Figure 6.5D Plan and Long Section

Figure 6.5E Plan and Long Section

Figure 6.5F Plan and Long Section

Figure 6.5G Plan and Long Section

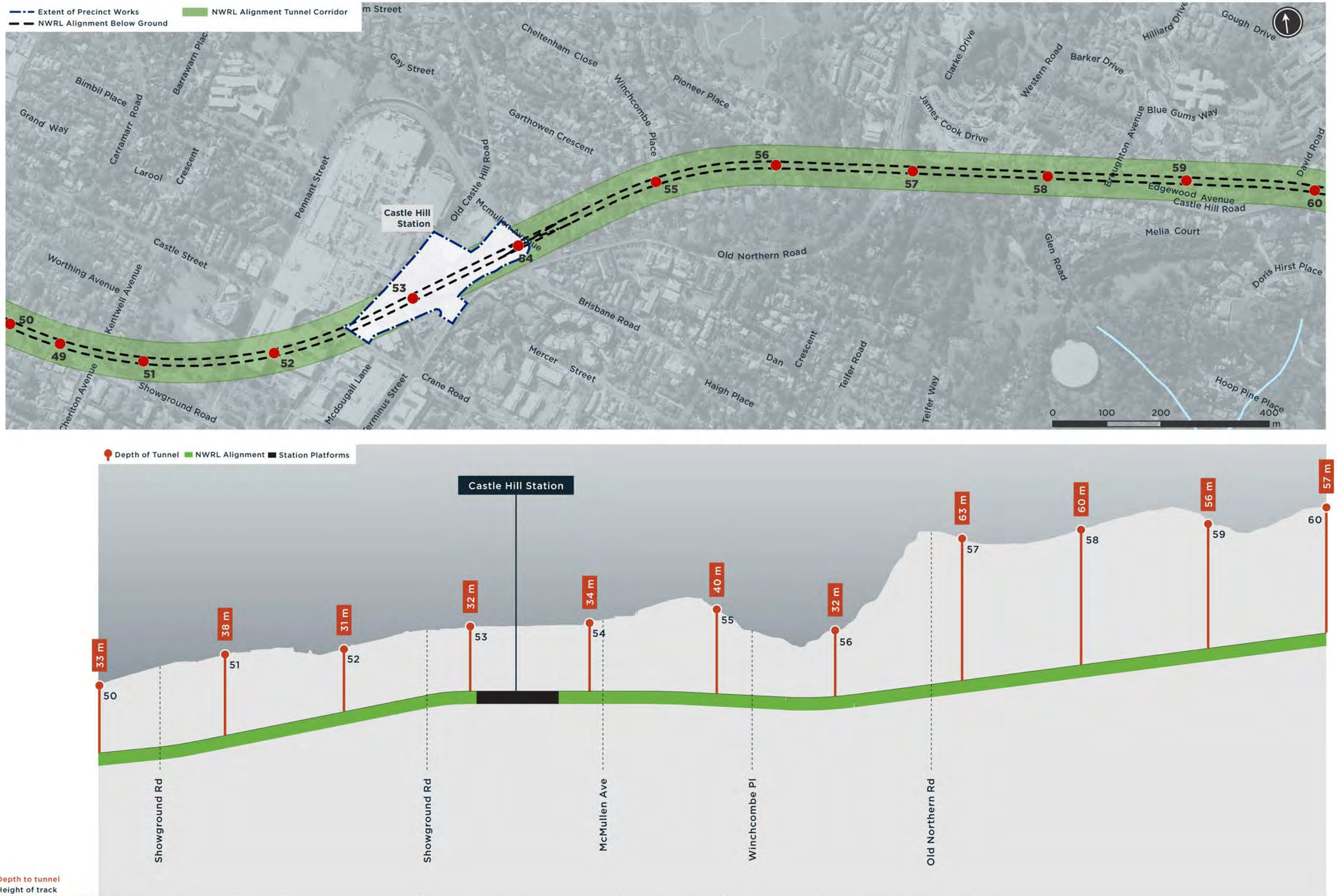


Figure 6.5H Plan and Long Section

Figure 6.5l Plan and Long Section

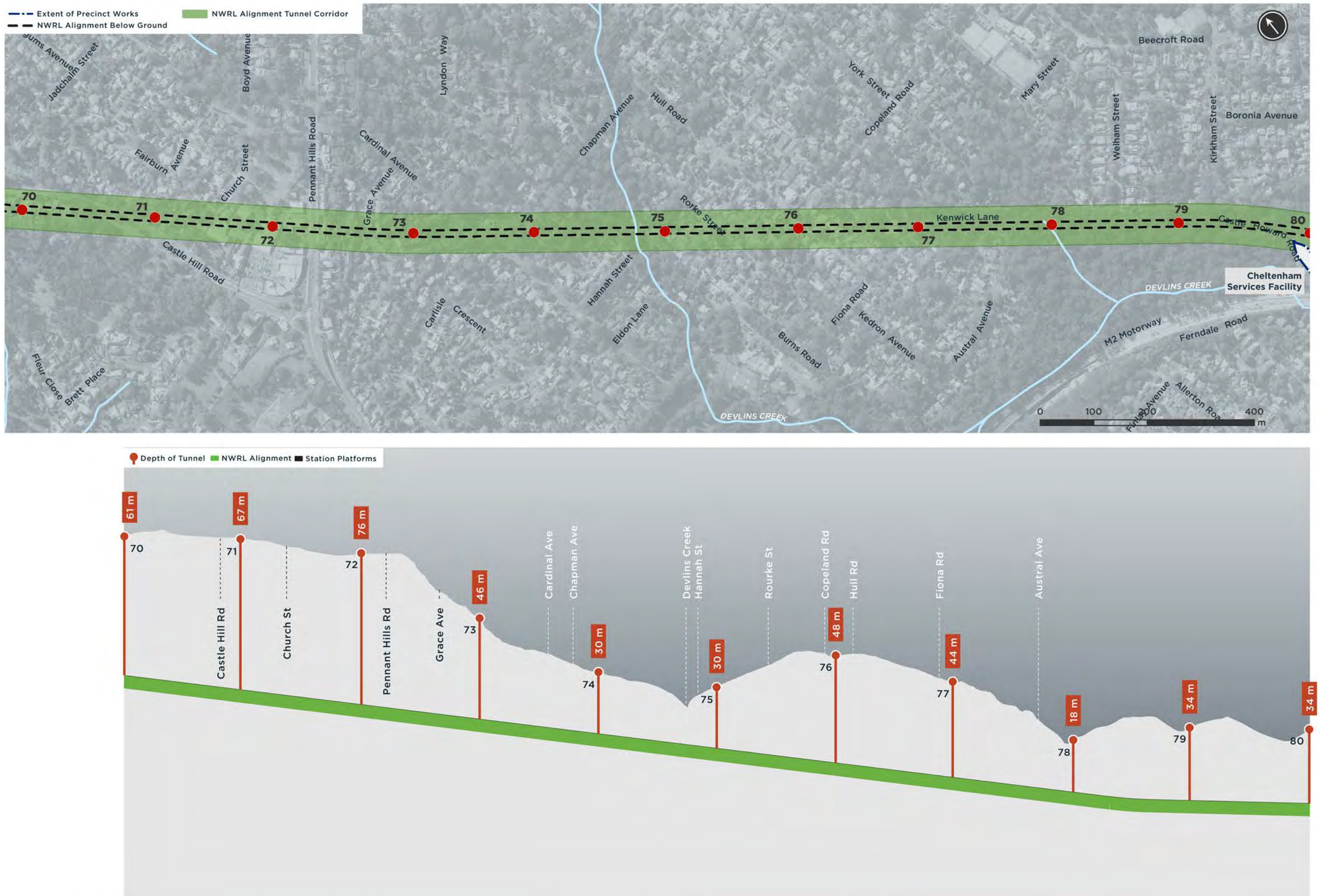


Figure 6.5J Plan and Long Section

6.7 Overview of Stations and Interchanges

The following provides an overview description of the NWRL stations and transport interchanges.

6.7.1 Station Design

The eight NWRL stations would be designed to enable a swift and enjoyable travel experience for all customers. The stations would be safe, comfortable, visually appealing and user-friendly.

The stations would be designed to provide:

- Ease of access for all customers, including those with specific accessibility needs (e.g. wheelchair users, those with restricted mobility, reduced vision and hearing and customers with strollers).
- A safe environment.
- Emergency access and egress.
- A comfortable environment (e.g. weather protection, ventilation/cooling, daylighting).
- Customer facilities (e.g. toilets, seating, ticket facilities, coverage for modern telecommunications and bicycle storage).
- Public areas (i.e. unpaid concourse, paid concourse and platforms).
- Activation opportunities such as retail space.
- Staff facilities.
- Station systems - electrical and mechanical services.

NWRL stations would be designed to create spaces that are cohesive with a welcoming and attractive feel that reinforce existing community areas. Stations would be located near major streets so that they are highly visible and accessible. Station design takes into account the likely patronage use, number of station entrances and the station facilities as well as other key considerations including site constraints, local geography and the landscape character of the local precinct.

Design principles include creating a positive customer experience, achieving integrated design, connecting transport modes, fitting in with the built and natural environment, contributing to future land uses and urban form, respecting heritage contexts and connecting communities.

The materials and architecture of the stations and interchanges would be appropriately selected and scaled to suit the local character and environment.

The design of all stations and interchanges would include landscaping and high quality public domain to ensure that they enhance the overall quality and nature of the neighbourhood.

Design guidelines would be established for each station, precinct and other structures such as the viaduct, retaining walls and bridges and be reviewed by the Design Review Panel.

The station precinct design principles are described below.

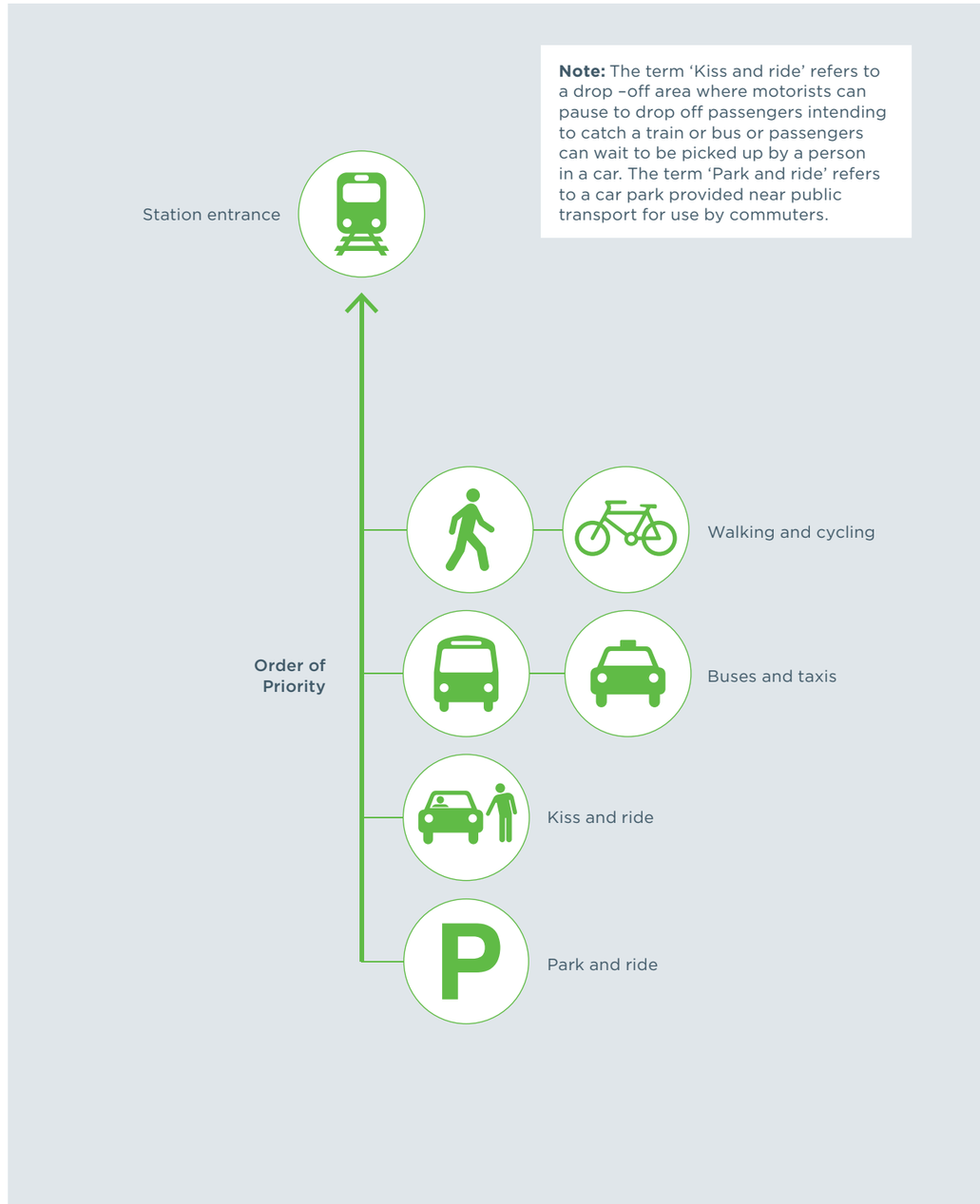
Accessing the station

The station design would be guided by an 'access for all' philosophy to ensure all customers can move through the 'door to door' travel experience in an environment that is safe, intuitive and comfortable. This philosophy is consistent with the objectives of the *Integrated Land Use and Transport Guidelines* (DUAP, 2001).

To access the train customers may choose to walk, cycle, travel via bus or taxi, be dropped off by family or friends, or where parking is provided, drive to the station and park. This experience must be as seamless as possible.

As shown in **Figure 6.6**, the stations would be designed on the principle of "priority of access" considering pedestrians and cyclists first, followed by buses, taxis, people dropping off and picking up customers. These kiss and ride facilities would be provided at all stations and car parking would be provided at five of the stations.

Figure 6.6 Access hierarchy



When getting off a train, passengers would be able to transfer quickly and easily between the platform and different types of transport with station concourses being as close to street level as possible. A station interchange concept has been developed for each station, based on the functionality of the station and how it can be accessed from the surrounding area. Station interchange is described further in Section 6.8.

A safe environment

From the outset of the design process, safety has been considered for passengers, neighbouring areas and staff. The stations would be designed in accordance with Crime Prevention Through Environmental Design (CPTED) principles. In particular, access and safety for customers getting off or joining trains and using car parks and interchanges at night has been carefully considered during the design process.

A safe environment would be encouraged through well-designed and efficiently controlled lighting systems, visible CCTV surveillance and appropriate staffing during operational hours. Passive means to promote safety, such as enabling clear visibility lines and using natural daylight have also been integrated into station design. Public spaces in the stations would be designed to minimise obstructions, providing clear routes for passengers and eliminating blind spots. Emergency help points would also be provided within the station.

The design includes pedestrian areas leading to the station which are wide enough to create calm, safe and accessible spaces, with clear visibility lines and an adequate path width.

Emergency exit and access

The stations would provide emergency exit and access facilities (i.e. lifts, stairs, escalators and separate fire stairs at the end of station platforms) to allow for passenger evacuation and emergency services access to and from the station and tunnels. A room with fire control services equipment would also be provided at each station.

A comfortable environment

Customers need to be able to easily navigate their way through stations and interchanges. There would be visibility between levels wherever possible to provide intuitive connections between the concourse, rail services and the interchange. The escalators, stairs, platforms, passageways and concourses would be designed to accommodate maximum passenger flows and avoid and manage overcrowding and queuing during peak periods.

The station cladding materials would be selected to suit the local character. The stations and public access areas would be designed to be aesthetically pleasing and include public art and landscaping. The design would also maximise the use of natural daylight.

To provide shade and ensure people are protected from rain and wind, weather protection would be included in the design of the stations and interchange areas (e.g. covered access paths, waiting shelters). Effective climate control measures (e.g. natural ventilation) would also be provided at stations.

To minimise noise from the trains, acoustic treatments may be integrated under the platform edge and/or along trackside walls, where required.

Ventilation

Ventilation shafts would be provided within underground stations to allow for effective natural ventilation and supplementary mechanical ventilation. A number of service buildings would be required within each station precinct.. Air vent shafts would typically be incorporated into the station or precinct design and there would also be ventilation fans at each station in the tunnel section. The proposed locations of these ventilation shafts are shown on station figures in Sections **6.8** to 6.17. These facilities would supply fresh air to stations and tunnels and discharge air from the tunnels and station environment. The project would be an electrified passenger only rail line and therefore tunnel emissions would not affect air quality.

The ventilation systems would be designed to meet the criteria for normal, congested and emergency operating scenarios. The systems would also provide ventilation in the event of fire to ensure suitable conditions in the tunnel for safe egress of passengers and safe access for the emergency service personnel. In the event of fire, smoke-laden air would be discharged to the atmosphere.

Retail

Retail space would be provided to meet customers' needs for example, buying a coffee in the morning, picking up newspapers or dropping off and picking up dry cleaning. These retail spaces mean that customers do not need to make additional trips for shopping for everyday needs (which in turn reduces travel demands on local roads as customers' needs can be met in one place).

Shops and service facilities in or near stations and interchanges can also ensure there is further activity at stations and interchanges which provides passive surveillance of public areas.

Sustainability

Sustainability would be integral to decision making throughout the design process.

Key sustainability measures to be incorporated into the station design include:

- Skylights above platform concourse areas.
- Solar panels on building roofs.
- Collection, treatment and storage of rainwater. This water would be reused for irrigation and/or toilet flushing.
- Passive ventilation and shading.
- Use of durable and low maintenance materials.
- Energy efficient lighting, including demand controlled lighting in plant and staff areas.
- Landscaping to combat urban heat islands.
- Optimal use of land.

Figure 6.7 to **Figure 6.9** illustrate some of the sustainability measures which have been integrated into the station design.

6.7.2 Station Types and Configuration

There would be three types of NWRL stations as illustrated in **Figure 6.7** to **Figure 6.9**:

- Underground.
  - Castle Hill, Showground and Norwest Stations would be underground stations.
- Open Cut
  - Cherrybrook, Bella Vista and Cudgegong Road Stations would be open cut stations.
- Elevated.
  - Kellyville and Rouse Hill Stations would be elevated and located on a viaduct structure.

The layout of stations is discussed below.

Entry

Entrances to the stations would be provided at street level. At some locations the entry would comprise a lobby area with ticket vending machines (referred to as an unpaid concourse). At underground stations the entrance would provide escalators, stair and lift access to the concourse or mezzanine levels, where ticket vending machines would be located.

At some stations retail space would also be provided adjacent to the entry. Some services and plant structures would also be accommodated at street level. These would include emergency exit points, tunnel ventilation, inlet and outlet structures and traction power substations.

Concourse

The concourse level would include ticket barriers and may also include ticketing facilities. Access would be provided to and from the platform via escalators, stairs and lifts. At some station locations the concourse may also provide secondary subsurface pedestrian links and retail space.

Platform

Each station would include a platform (either an island platform or side platforms), about 168 metres long. For the two elevated stations (Kellyville and Rouse Hill), the side platforms would be at a height of approximately 12 to 13 metres above ground level.

Figure 6.7 A generic underground station (indicative only)

Figure 6.8 A generic open cut station (indicative only)

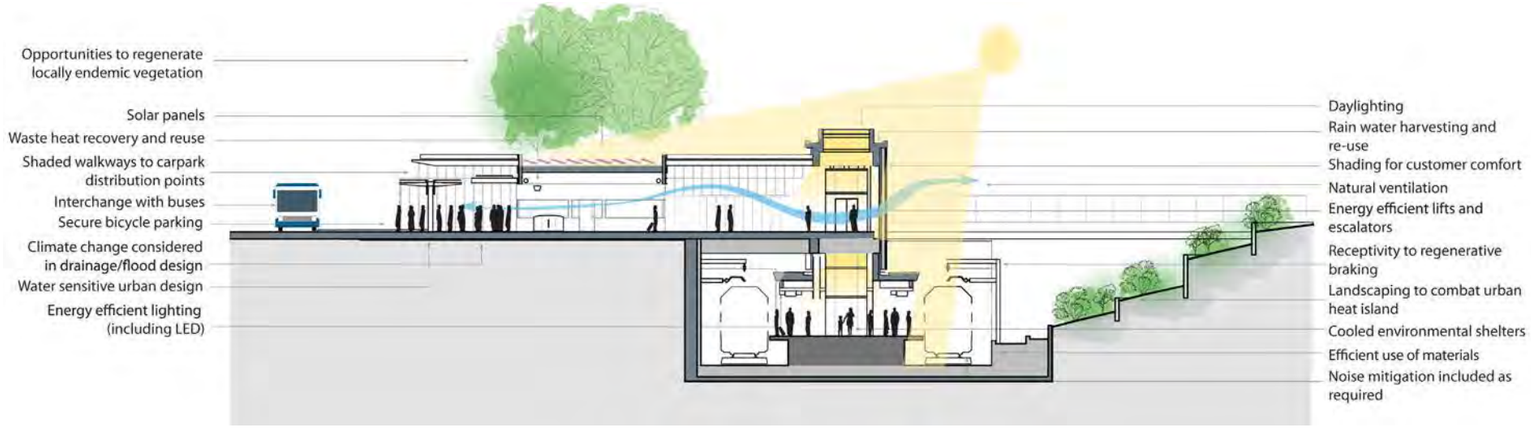
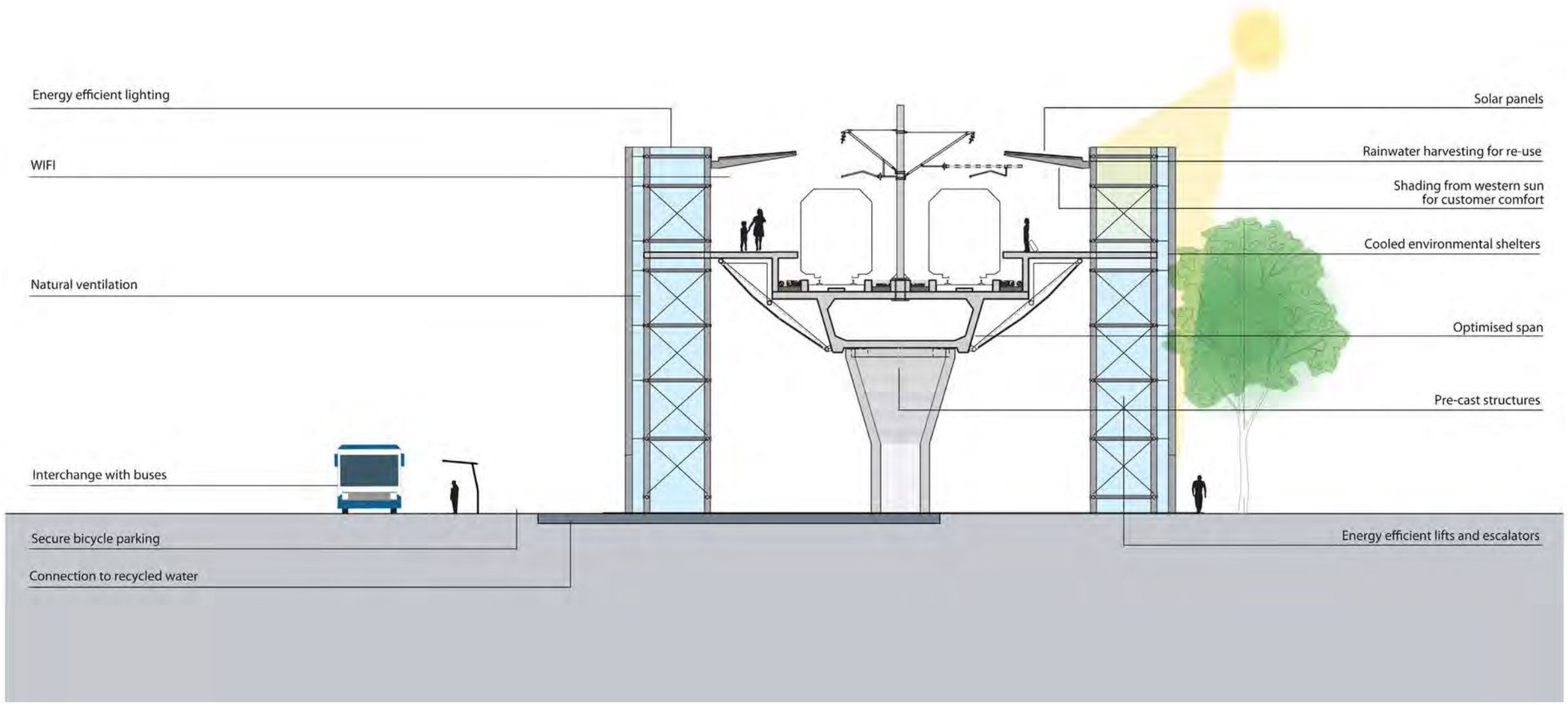


Figure 6.9 A generic elevated station (indicative only)



6.7.3 Transport Integration and Interchange

Key objectives of the NWRL, with regards to transport integration and interchange, are convenient access, integration and interchange with other transport modes as part of the broader strategy to provide an integrated transport network for Sydney.

The NWRL would interface with Sydney's existing public transport network, including trains (direct interchange at existing stations at Epping and Chatswood), buses at all stations, and T-way services at Rouse Hill, Kellyville and Bella Vista stations.

Each precinct would be designed to allow easy access for pedestrians with efficient interchange to rail, bus, footpaths and / or cycleways as appropriate, and with adequate bicycle storage for cyclists. Stations would be designed to provide full access for customers with specific accessibility needs.

Station and interchange design addresses:

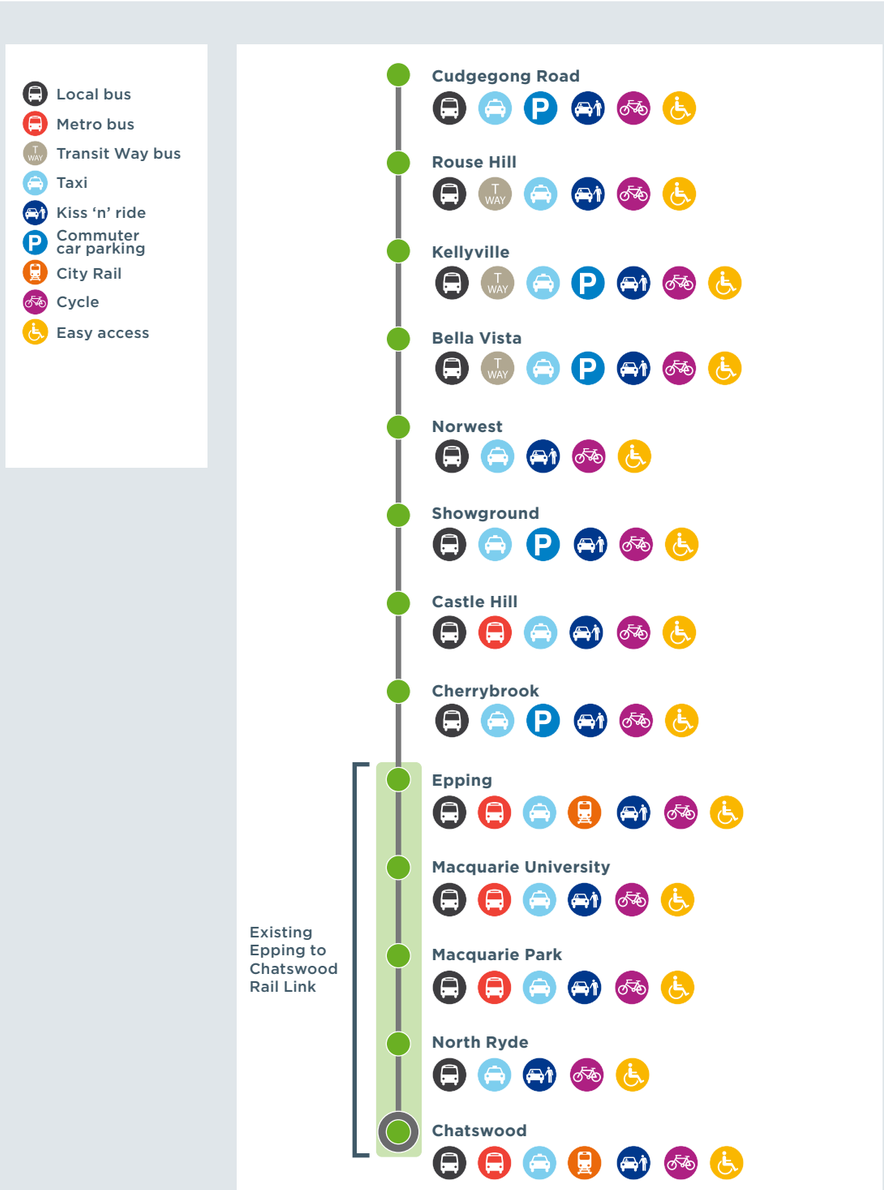
- The ability of people to easily locate and access the station, and provision of readily available information regarding services and amenities at the station.
- Signage and wayfinding that is clear and easy to read and caters for all modes of arrival at the station.
- Easy access for customers with reduced mobility – lifts and ramps.
- Visual aids including tactile paving for visually impaired.

Interchanges between NWRL and other public transport services across the network are illustrated in **Figure 6.10**.

The Metrobus connections include:

- M61 Castle Hill to Baulkham Hills and City.
- M60 Parramatta to Hornsby (via Castle Hill).
- M54 Parramatta to Macquarie (via Epping).
- M40 Chatswood to Bondi Junction.
- M41 Macquarie to Hurstville.

Figure 6.10 Transport network interchanges



Pedestrians

The overall needs of pedestrians, including those with specific accessibility needs, would be given the highest priority over other modes within each station precinct. All stations would be designed to comply with the Commonwealth *Disability Discrimination Act 1992*.

Within each station precinct and surrounding walking catchment, pedestrian infrastructure, including footpaths, pedestrian refuges, pedestrian crossings and access ways would be safe, pleasant and direct to provide a high quality walking environment.

Cycling

Safe, secure and weather protected bicycle facilities would be provided at all stations in close proximity to the station entrance to encourage people to combine cycling with rail travel. Bicycle friendly design has been integrated into station and interchange design.

Cycling routes to the NWRL stations improves the catchments of stations. In consultation with key stakeholders, linkages would be provided to existing and new bicycle routes.

Rail

Rapid transit trains would operate on the NWRL from Cudgegong Road through to Chatswood. Customers from the NWRL would be able to simply cross the platform at Chatswood to board a train on the existing rail network to the city. During peak periods a train would arrive every three minutes from Chatswood to the city. Train timetables and services would be organised to ensure passengers only need to wait a few minutes to switch from a NWRL train to another train into the city.

Customer interchanging at Epping will need to use the lifts/escalators to change between NWRL and Northern Line services due to the configuration of the station. Frequent services will be provided to the city via Strathfield in peak periods.

Buses

All stations would provide space and weather protected waiting areas for buses. Bus services to and from stations would operate for the full span of rail service hours.

The existing bus network in the region is largely focussed either on the Sydney CBD (via the M2), Parramatta (via the T-way or Windsor Road) or interchange points on the rail network such as Pennant Hills and Blacktown. Because of the number and spread of destinations, and the length of many routes, many of these services are infrequent outside peak periods and on weekends.

The NWRL presents an opportunity to reconfigure and refocus the bus network to provide shorter but much more frequent cross regional services across the day, night and weekends to railway stations and key centres such as Castle Hill, Rouse Hill, Blacktown, Parramatta and Hornsby.

Bus service timetables need to align with arriving and departing trains so that passengers can travel efficiently, minimise waiting times and have certainty on connecting services.

Bus stops would be upgraded and, in some cases, relocated closer to NWRL station entrances to improve passenger interchange. These measures would ensure timely connectivity to outlying destinations not served by the NWRL network. This interface would require development and agreement of service plans between TfNSW and other transport operators to ensure full integration of services.

Taxis

All stations would provide weather protected waiting areas for taxis. Taxis offer a flexible and convenient door to-door service. For example for visitors to an area, when an immediate and quick trip is required, when people are carrying large or heavy items or when injury/age/disability makes use of other modes difficult.

Kiss and Ride

All stations would include designated weather protected waiting areas for passenger drop off and pick up, also known as 'kiss and ride', to attract car based commuters.

Park and Ride

The park and ride facilities, whether at surface or multi-deck, would be designed to integrate with the public domain and street pattern and be safe and easy to access.

Car travel offers flexibility for many public transport customers and can significantly extend the catchment of a station.

By providing parking, people who may otherwise use their cars to travel long distances or who live in areas with no available public transport, can drive to their nearest park and ride station and then use rail for part of their journey. Diverting some car trips to public transport, helps to alleviate road congestion and can reduce vehicle kilometres travelled.

To enable passengers to park their cars, motorcycles and scooters and then travel on the rail network, car parking areas would be constructed adjacent to the following stations:

- Cherrybrook Station (approximately 400 spaces).
- Showground Station (approximately 600 spaces).
- Bella Vista Station (approximately 800 spaces).
- Kellyville Station (approximately 1,200 spaces).
- Cudgegong Road Station (approximately 1,000 spaces).

This equates to 4,000 park and ride spaces that would be provided as part of the NWRL project.

PART C - STATION DETAIL

6.8 Introduction

The following sections provide a description of the eight proposed NWRL stations and a stabling facility at Tallawong Road.

6.9 Cherrybrook Station

Cherrybrook Station would be located adjacent to Castle Hill Road between Franklin and Robert Roads. The station is a shallow open cut arrangement with a mid platform entry and concourse. The station has been designed as a suburban park and ride station that integrates with the surrounding natural and built environment. The station precinct has been designed to respond to the area's character.

The station would provide rail access and a public transport interchange to the residents of Cherrybrook, West Pennant Hills and Dural. The station would serve existing residents within walking and cycling distance, local schools and create a focus for the local area.

The station would be in a cutting, sitting at the top of a ridge. The angled cutting of the site has enabled the station designers to maximise the use of daylighting and natural ventilation throughout the station. The open side of the rail corridor opposite the station platform would be a landscaped embankment with retaining walls which allows visual connectivity to Castle Hill Road.

The station cladding materials and finishes would be in response to the local environment and conditions.

The station island platform would be located approximately seven metres below street level. A proportion of the platform area would be covered by a canopy to provide shading and protection for passengers.

As an established arterial road, Castle Hill Road provides good existing links to the east and west. The station would have high visibility from Castle Hill Road and the layout and access arrangements present an opportunity to improve the existing pedestrian environment and vehicular safety along and across Castle Hill Road to West Pennant Hills.

A new precinct access road would be constructed to provide access to the station entry plaza and park and ride facility. This new road would be parallel to Castle Hill Road and run between Robert Road and Franklin Road. The bus and taxi stops/waiting areas, and kiss and ride, would also be located along this new road.

To facilitate access to the station, sections of surrounding roads and footpaths would be modified and upgraded as needed. The intersection of Castle Hill Road and Glenhope Road would be signalised and provide pedestrian access across Castle Hill Road.

Pedestrian access to the station from Castle Hill Road would need to be provided currently shown as a bridge across the station void to the station entry to the north.

The intersection of Castle Hill Road and Robert Road would also be signalised and provide pedestrian access across these roads. Robert Road between Castle Hill Road and the new station access road would also be widened to facilitate access to the new station. The footpath would be upgraded as needed. In addition, a right turn bay would be provided on Castle Hill Road to enable a right turn, westbound, into Robert Road and the station precinct.

Franklin Road between Kayla Way and Castle Hill Road would be widened to provide one lane in either direction and to safely accommodate buses and other vehicles. The footpath would be upgraded as needed.

A two - three storey stepped park and ride facility would be located to the east of the station entry plaza and provide approximately 340 car parking spaces. An on grade park and ride facility for approximately another 60 cars would be located north of the proposed access road and adjacent and beneath the existing power lines.

To manage local traffic, no on-street parking would be allowed along Franklin Road and Robert Road, between Castle Hill Road and John Street.

Two service buildings would be located either side of the station entry and would include a traction and station substation.

A stormwater detention pond would be located north of the proposed access road, to collect and enable reuse of rainwater. The treated water would be reused for irrigation and other non-potable uses (e.g. toilet flushing).

The station is described in **Table 6.2** and illustrated in **Figure 6.11** to **Figure 6.14**.

Table 6.2 Description of Cherrybrook Station

Feature	Description
Centre type	Future neighbourhood centre
Station type	Suburban village
Customers	Predominantly residential
Location	▪ Cherrybrook is a predominantly residential neighbourhood located 23.5 km north west of the Sydney CBD ▪ The proposed station is located in Hornsby Shire, north of Castle Hill Road between Franklin Road and Robert Road ▪ It has steep topography, views to the west and existing forest canopy ▪ The proposed station is located close to the ridge and near Castle Hill Road servicing existing residential areas and schools
Platform depth	Approximately 7 m entrance to platform
Concourse location	Street level
Station Access and entry	Station entry plaza located adjacent to the new precinct access road
Day 1 elements	▪ Way-finding signage and transport information ▪ Station utilities /services facilities ▪ Public space/plaza areas adjacent to station entry points ▪ Retail space ▪ Local bus interchange located on the new precinct access road (six bus stands) ▪ 14 Kiss-and-ride spaces and four taxi spaces located on the new precinct access road ▪ Bicycle parking and storage facility for 40 bicycles ▪ New pedestrian and bicycle link ▪ Park and ride facility with capacity for approximately 400 cars ▪ Access to the station entrances for emergency, delivery and maintenance vehicles ▪ New east-west precinct access road on the northern side of the station precinct (between Robert Road and Franklin Road) ▪ Two service access points located adjacent to the two service buildings, accessed via the new precinct access road ▪ Two service buildings located either side of the station entry ▪ New signalised intersections at: - Glenhope Road and Castle Hill Road - Robert Road and Castle Hill Road ▪ Intersection upgrade of Franklin Road and Castle Hill Road to provide for left in left out movements ▪ Widening of: - Castle Hill Road on northern side to accommodate right turn bay at Robert Road - Franklin Road between Kayla Way and Castle Hill Road - Robert Road between Castle Hill Road and new station access road ▪ Footpath upgrades as needed along Castle Hill Road, Robert Road and Franklin Road ▪ New intersection at Robert Road and the new precinct access road ▪ Pedestrian access across Castle Hill Road at the intersections with Glenhope Road and Robert Road ▪ Onsite stormwater detention ▪ Fencing, landscaping and public domain ▪ Future development sites

Figure 6.11 Cherrybrook Station – Indicative layout

Figure 6.12 Cherrybrook Station – Indicative vehicle and pedestrian movements

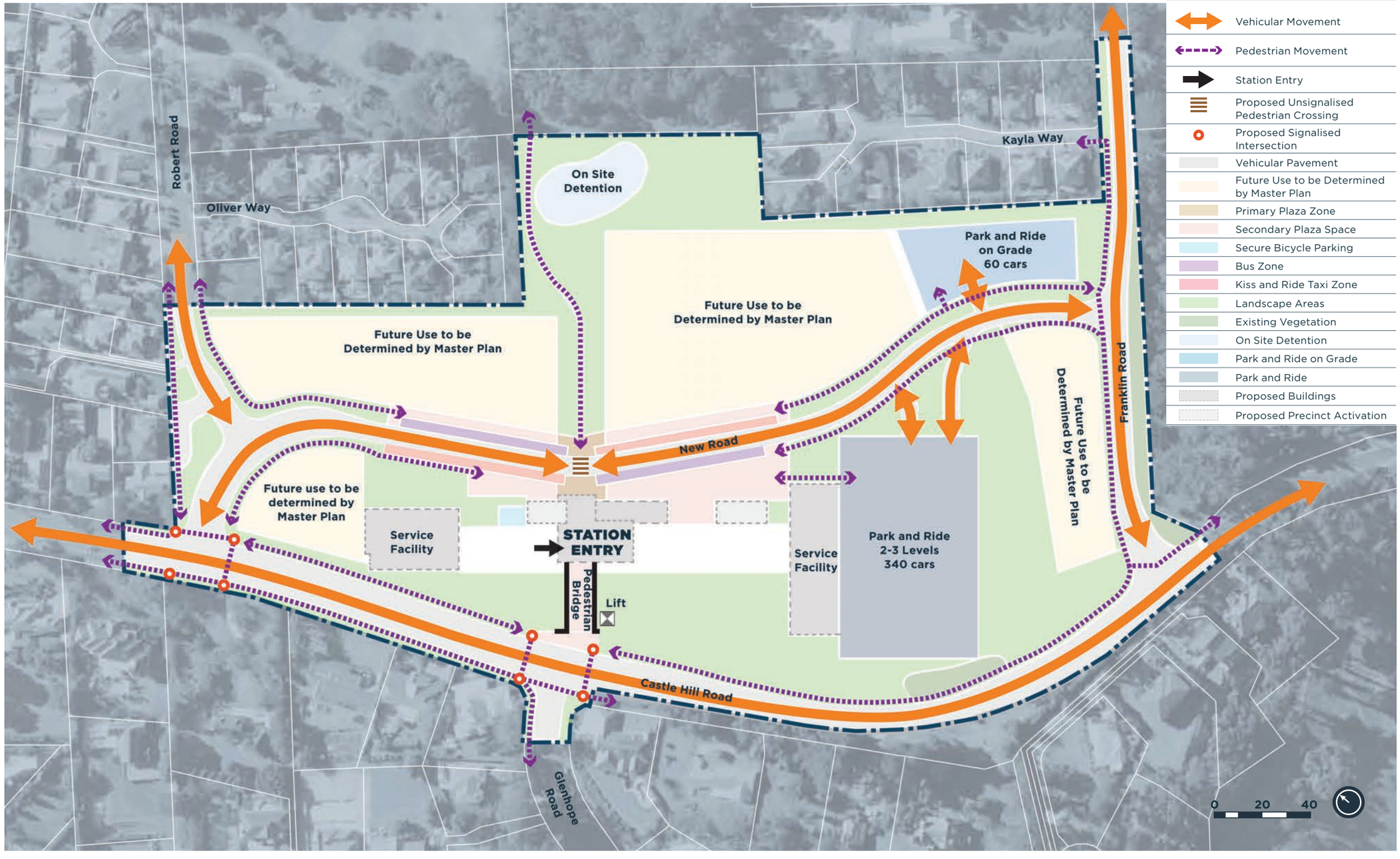
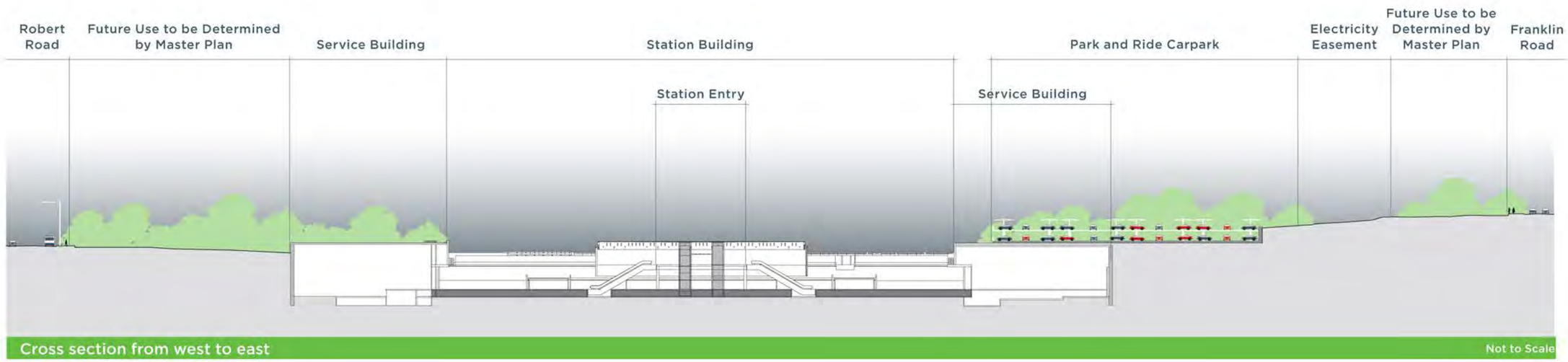


Figure 6.13 Indicative cross section of Cherrybrook Station at Day 1 operations



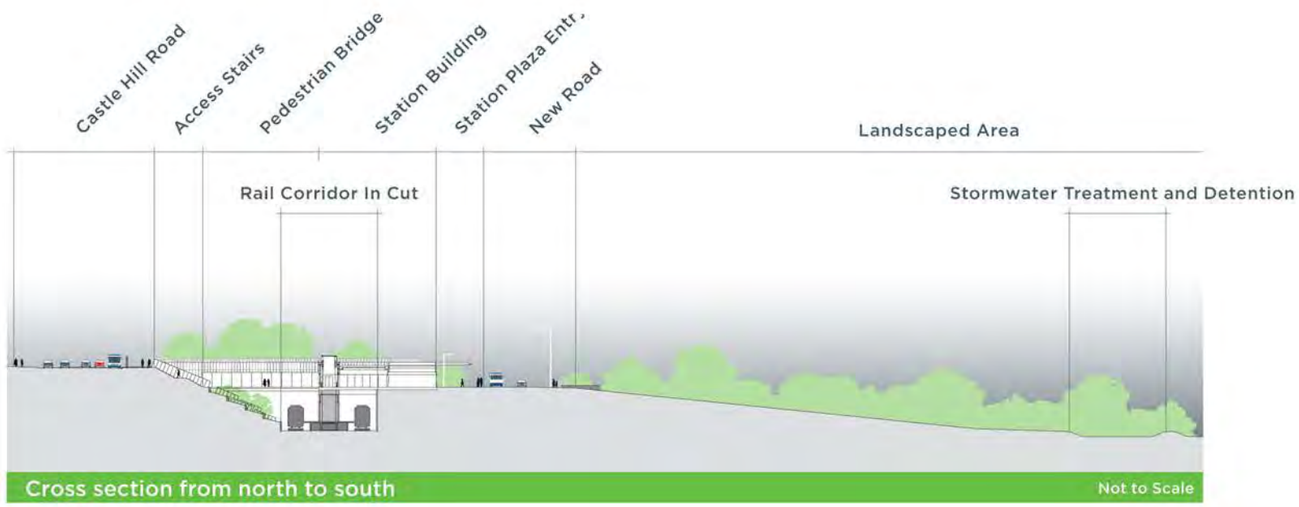


Figure 6.14 Artist's Impression of Cherrybrook Station at Day 1 of operations, looking south towards the station entrance onto the new access road

6.10 Castle Hill Station

Castle Hill Station would be a major public transport interchange that contributes to the growth and operation of Castle Hill as an accessible and vibrant major centre.

The station would provide rail access and a public transport interchange to residents and people working at Castle Hill. It has the potential to serve existing walk up catchment (residential) and walk out (employment) catchment. Castle Hill is targeted to provide 13,000 jobs by 2036 (NSW Government, 2010, Metropolitan Plan for Sydney). The station would provide an opportunity to become a focal point for future regeneration of the town centre.

There is no park and ride facility provided at this station precinct. The urban arrangement is focused on addressing the town centre structure and character and providing priority to pedestrian and bus connectivity.

As shown in **Figure 6.15** to **Figure 6.18**, the underground station would be located adjacent to the town centre, integrated within Arthur Whitling Park. The park would be redesigned and incorporate interpretation of historic items within the park, in consultation with stakeholders. The remodelled park would be high quality public open space within Castle Hill town centre.

The station entry plaza would be located in the prominent western end of Arthur Whitling Park, at the intersection of Old Northern Road and Old Castle Hill Road with good access and visual links in all directions providing an opportunity for high visibility.

To maximise passenger experience in the station and provide a safe night environment the station design includes a large area of skylights, which would be integrated within Arthur Whitling Park and become a feature of the park providing natural light to the concourse and platform level. The bus interchange would be located along Old Northern Road, at the southern end of the park, between Terminus Street and Crane Road in close proximity to the station. The taxi and kiss and ride stops/waiting areas would be located along Old Castle Hill Road.

Pedestrian access to the station would be provided at street level, however the potential for subterranean pedestrian links underneath Old Castle Hill Road to connect into Castle Towers and Old Northern Road to connect with future development to the east, would also be safeguarded within the design.

The station is described in **Table 6.3** and illustrated in **Figure 6.15** to **Figure 6.18**.

Table 6.3 Description of Castle Hill Station

Feature	Description
Centre type	Major centre
Station type	Mixed use centre
Customers	Employment and residential
Location	▪ Castle Hill is a town centre surrounded predominantly by residential uses and located 26 km north west of the Sydney CBD ▪ The proposed station is located within The Hills Shire, in Arthur Whitling Park between Old Northern Road and Old Castle Hill Road ▪ The proposed station is located at the top of a ridge at the intersection of key local roads, which service the town centre
Platform depth	Approximately 25 m below street level
Concourse depth	Approximately six metres below street level
Station entrances	Located in prominent western end of park creating public forecourt
Day 1 Elements	▪ Way-finding signage and transport information ▪ Station utilities /services facilities ▪ Public space/plaza areas adjacent to station entry points ▪ Retail space ▪ Indented bus bays on Old Northern Road Up to 10 buses can be accommodated at any one time ▪ Taxi interchange with nine taxi spaces located off Old Castle Hill Road ▪ 17 kiss-and-ride spaces located on Old Castle Hill Road ▪ Bicycle parking and storage facility for 20 bicycles ▪ Access to the station entrances for emergency, delivery and maintenance vehicles ▪ Service access road off Old Castle Hill Road ▪ Two service access points located between McMullen Avenue and the service building ▪ New signalised intersections at Old Northern Road and Terminus Street ▪ Modification to the existing five-way intersection at Crane Road, Old Northern Road, Castle Hill Road and Castle Street ▪ Footpath upgrades as needed along Old Castle Hill Road and Old Northern Road. ▪ Pedestrian crossings on Old Castle Hill Road and Old Northern Road ▪ Onsite stormwater detention ▪ Reinterpretation of all historic elements located within the park ▪ Service building integrated into park landscape ▪ Station skylights integrated within a remodelled park landscape ▪ Station concourse located to provide accessibility and connectivity town centre catchment ▪ Safeguard the provision for a subterranean pedestrian link underneath Old Castle Hill Road to connect into Castle Hill Towers, and under Old Northern Road for potential future construction ▪ Provision of a quality landscaped park with appropriate public art

Figure 6.15 Castle Hill Station - Indicative layout

Figure 6.16 Castle Hill Station – Indicative vehicle and pedestrian movements

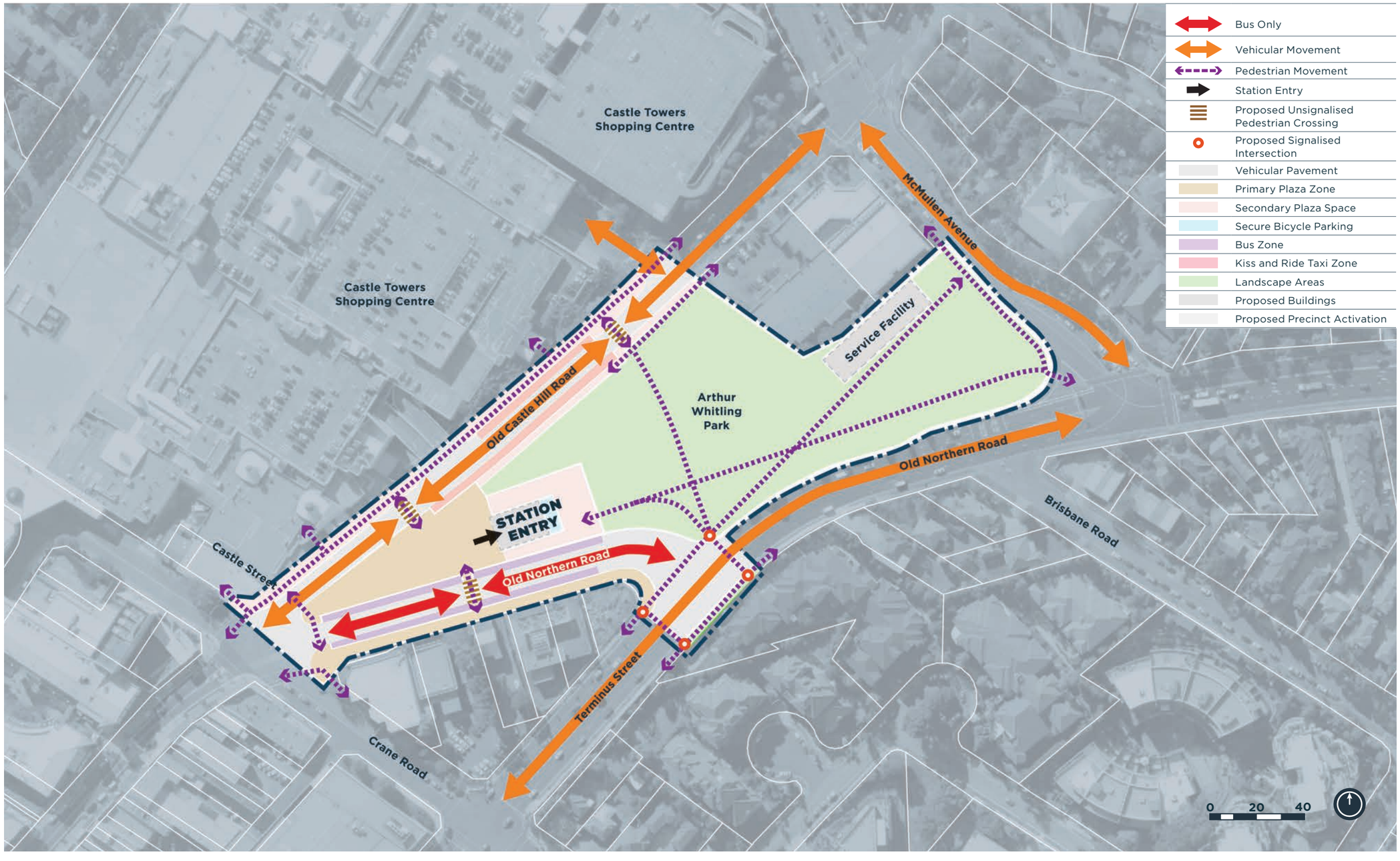


Figure 6.17 Indicative cross section of Castle Hill Station at Day 1 of operations

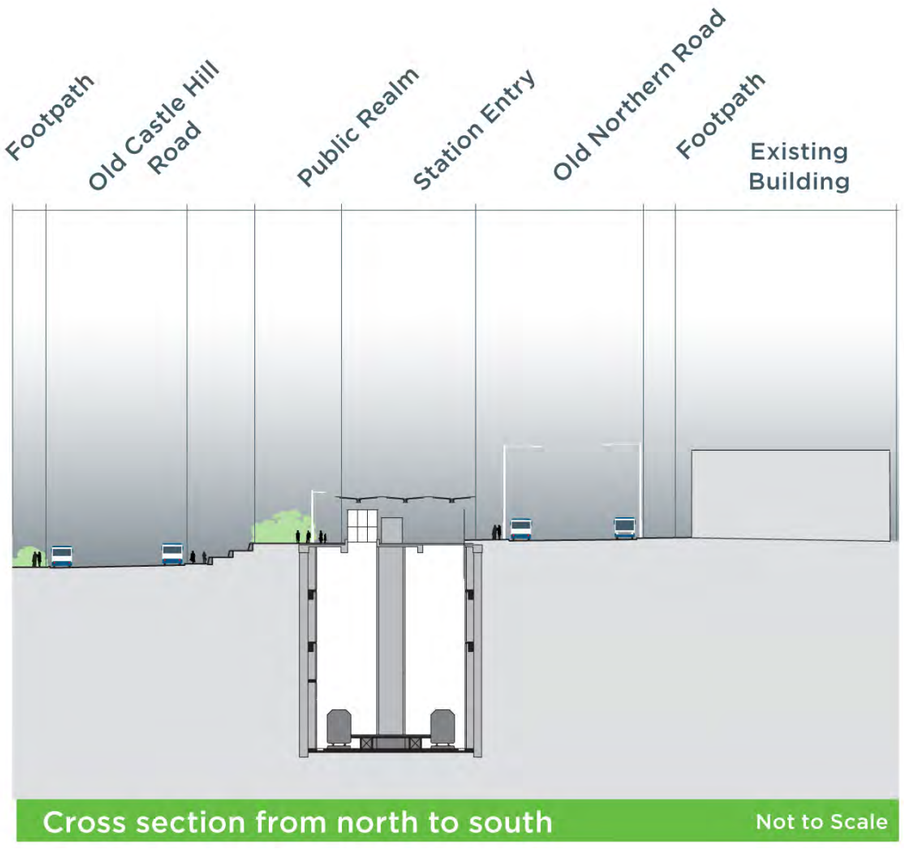


Figure 6.18 Artist's Impression of Castle Hill Station at Day 1 of operations, looking north towards the station entrance from Old Northern Road

6.11 Showground Station

Showground Station would be located to the east of the junction of Carrington Road and Middleton Avenue, and in close proximity to the Castle Hill Showground. The proposed station would reinforce one of the few remaining functioning showgrounds in Sydney. The station would also provide direct rail access to existing residential areas and employment facilities.

The new Showground station would be the catalyst for the evolution of the showground precinct into a village centre. The precinct design proposal is for a cut and cover station, located between Cattai Creek and Carrington Road.

Pedestrian access would be provided primarily from Carrington Road, but a range of local connections would be accommodated. A significant proportion of station users would arrive by private car and park in a 600 space three level car parking structure adjacent to Doran Drive. In addition, Doran Drive would provide the primary street address for kiss and ride users.

As shown in **Figure 6.19** to **Figure 6.22**, the underground station would be accessed from the station entry plaza off Carrington Road.

The station may include skylights to provide daylight to the concourse and platform areas.

Service buildings would be located at both ends of the station box. The western service building would incorporate traction substation facilities and be integrated into the proposed car parking structure. To provide access to the carparks and precinct new precinct access roads would be constructed, including:

- A precinct access road parallel to Carrington Road providing access between Carrington Road and Showground Road inclusive of a new roundabout at the junction with Doran Drive, and the other would be between Doran Drive and Middleton Avenue.
- A new access road off Carrington Road to the west of the Ashford Avenue intersection. This road would provide access to the commuter parking proposed to the west of Doran Drive. This road would have one entry and exit lane at Carrington Road.
- A new road linking Doran Drive and Showground Road. The intersection on Showground Road would be between the existing signalised intersections of Gilbert and Carrington Roads and signalised (subject to RMS approval). All movements would be allowed, except for right turns from the new road to Showground Road which would be restricted to buses only.

In addition, Middleton Avenue would also be extended to provide additional access.

Doran Drive would be upgraded to provide weather-protected bus stands, kiss-and-ride spaces and taxi ranks close to the station entrance. Doran Drive would also provide access to the Showground area. In conjunction with the above, the intersection or Doran Drive with Carrington Road would be signalised (subject to RMS approval).

The station is described in **Table 6.4** and illustrated in **Figure 6.19** to **Figure 6.22**.

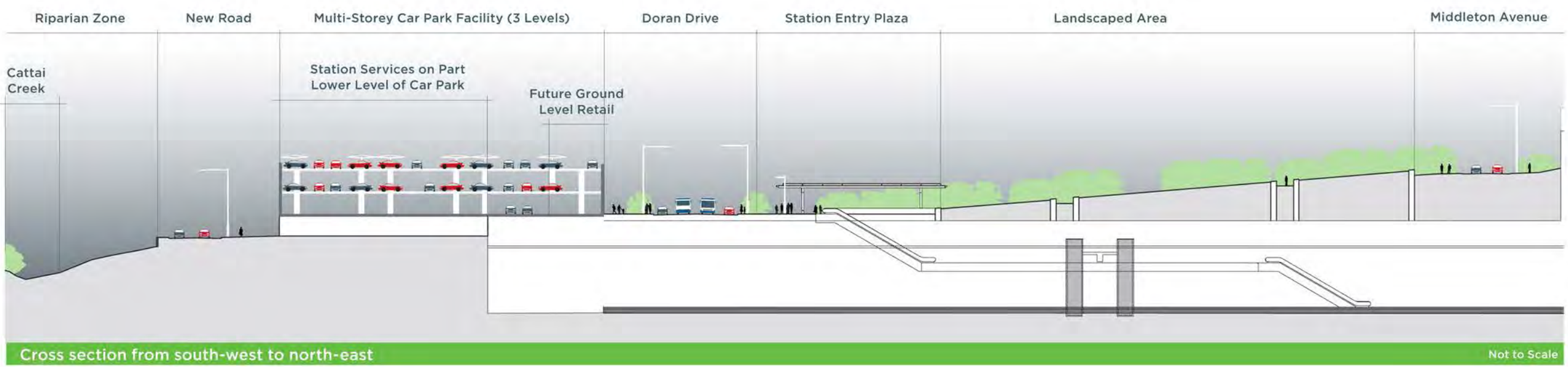
Table 6.4 Description of Showground Station

Feature	Description
Centre type	Small Village
Station type	Suburban village
Customers	Employment and residential
Location	▪ The proposed station is located within The Hills Shire in close proximity to the Castle Hill Showground with residential development to the north and east and employment to the south and west. The station is 28.5 km north west of the Sydney CBD ▪ The proposed station is at the corner of Carrington Road and Doran Drive
Platform depth	Approximately 20-25 m below street level
Concourse depth	Approximately 8-13 m below street level
Station entrances	Located in prominent eastern end of the precinct, creating a public forecourt
Day 1 Elements	▪ Way-finding signage and transport information ▪ Station utilities /services facilities ▪ Public space/plaza areas adjacent to station entry points ▪ Retail space ▪ Local bus interchange located on Doran Drive ▪ Two bus stops on Doran Drive ▪ 15 kiss-and-ride spaces and four taxi spaces located on Doran Drive and the access road between Doran Drive and Middleton Avenue. ▪ Bicycle parking and storage facility for 40 bicycles ▪ Three level park and ride facility with capacity for approximately 600 cars ▪ New precinct access road between Carrington Road and Showground Road inclusive of a new roundabout at the junction with Doran Drive Signalisation of the intersection of this new access road and Showground Road ▪ New precinct access road between Doran Drive and Middleton Avenue ▪ Upgrade and widening of Doran Drive, to allow for two lanes of traffic ▪ Extension of Middleton Avenue and reconfiguration of existing roundabout at the intersection with Carrington Road ▪ New signals at the intersection of Carrington Road and Doran Drive ▪ Access to the station entrances for emergency, delivery and maintenance vehicles ▪ Footpath upgrades as needed along Carrington Road (including towards Castle Hill Industrial Estate) and Doran Drive ▪ New footpath from carpark to new northern access road ▪ Provision of pedestrian crossings on Middleton Avenue, Doran Drive and the new access road ▪ Service buildings would be located at both ends of the station box ▪ Three service access points located directly adjacent to the service buildings, accessed via the new precinct access road and Middleton Avenue ▪ Future development sites

Figure 6.19 Showground Station - Indicative layout

Figure 6.20 Showground Station - Indicative vehicle and pedestrian movements

Figure 6.21 Indicative cross section of Showground Station at Day 1 of operations



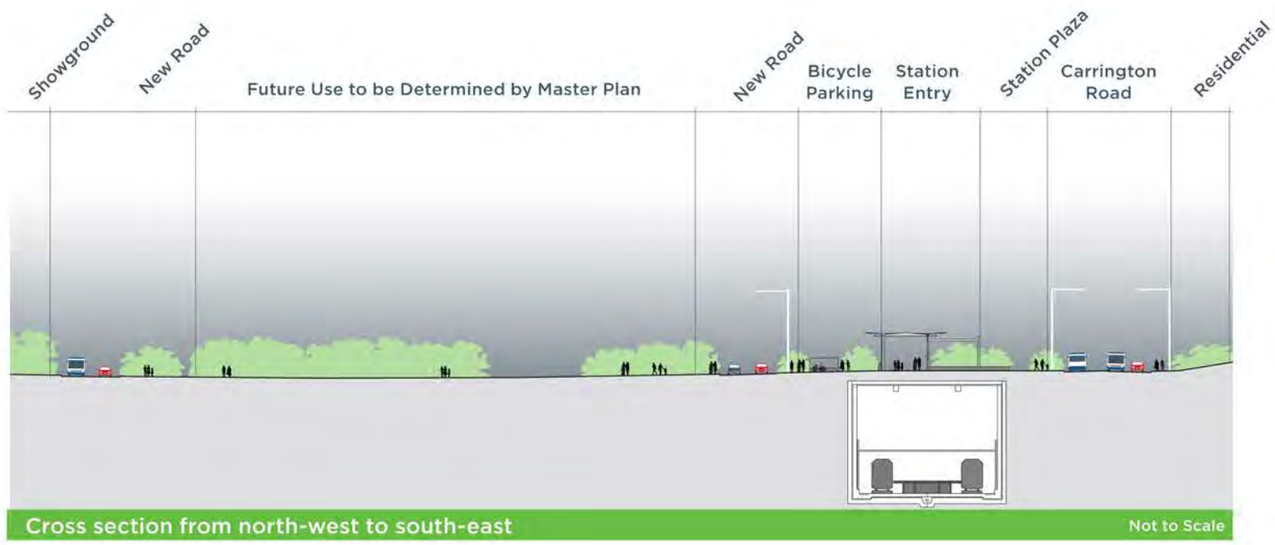


Figure 6.22 Artist's Impression of Showground Station at Day 1 of operations, looking north east at the station entrance from the intersection of Carrington Road and Doran Drive