

6. Description of the Project

6.1 Overview

This Chapter provides a description of the Project, including:

- built form — new stations, station upgrades, track work and other infrastructure
- construction — including staging, methodology and workforce
- operation — addressing issues such as rail and station operations and maintenance.

An overview of the Project is provided in Figure 6-1. Some elements of the Project would be subject to further development during the detailed design phase. Any design development as a result of matters arising during the exhibition of this Environmental Assessment would be reported in a submissions report, or if substantial, a preferred project report. Any design development undertaken following Project approval would be required to be consistent with the Project approval and associated conditions.

It is intended that the Project be constructed in two stages – Stage 1 being for the construction of all components of the Project between Quakers Hill and the new Schofields Station (including removal of the existing Schofields Station and construction of a Schofields pedestrian footbridge), and Stage 2 comprising the remainder of works north of the new Schofields Station as far as Vineyard and including the new Vineyard Station. At the time of lodgement of this Environmental Assessment it was proposed that Stage 1 construction would commence in 2009 and take approximately 24 months to complete, with delivery of Stage 2 deferred until a date to be determined. The staging and its implications for project design, construction and operation are described below. Importantly this Environmental Assessment seeks approval for both stages of the Project.

6.2 Built form of the Project

6.2.1 Stations

Quakers Hill Station

No construction works are planned at Quakers Hill Station as part of the Project. However, the existing pedestrian level crossing, located approximately 200 metres north of Quakers Hill Station, would be removed and replaced with a footbridge with ramps. These works are discussed in Section 6.2.2.

Schofields Station

As part of the Project, Schofields Station would be relocated approximately 800 metres to the south-east of its existing location. The need to relocate the station is discussed in Section 5.5.1. The key components of the new Schofields Station are shown in figures 6-2 and 6-3. The new station would comprise an island platform, ticket office, station manager's office, meal room, toilet, locker room, switch room, communications room and family-accessible toilet. The new Schofields Station would comply with the *Disability Discrimination Act 1992* and conform to easy access standards. A footbridge would be built for access between Railway Terrace, the platform and western side of the rail line. The footbridge would be accessible via stairs and three lift shafts. Full weather protection would be provided for the footbridge, while the platform would be partially provided with weather protection.

A new bus interchange facility with canopy, including kiss-and-ride and taxi zones, would be provided on the western side of Railway Terrace. The bus zone would be located on the southern side of the pedestrian crossing and would accommodate up to three standard size buses at a time. The kiss-and-ride and taxi zone would also be located on the southern side of the pedestrian crossing, and would have sufficient space for up to six waiting kiss-and-ride vehicles or taxis at any one time.

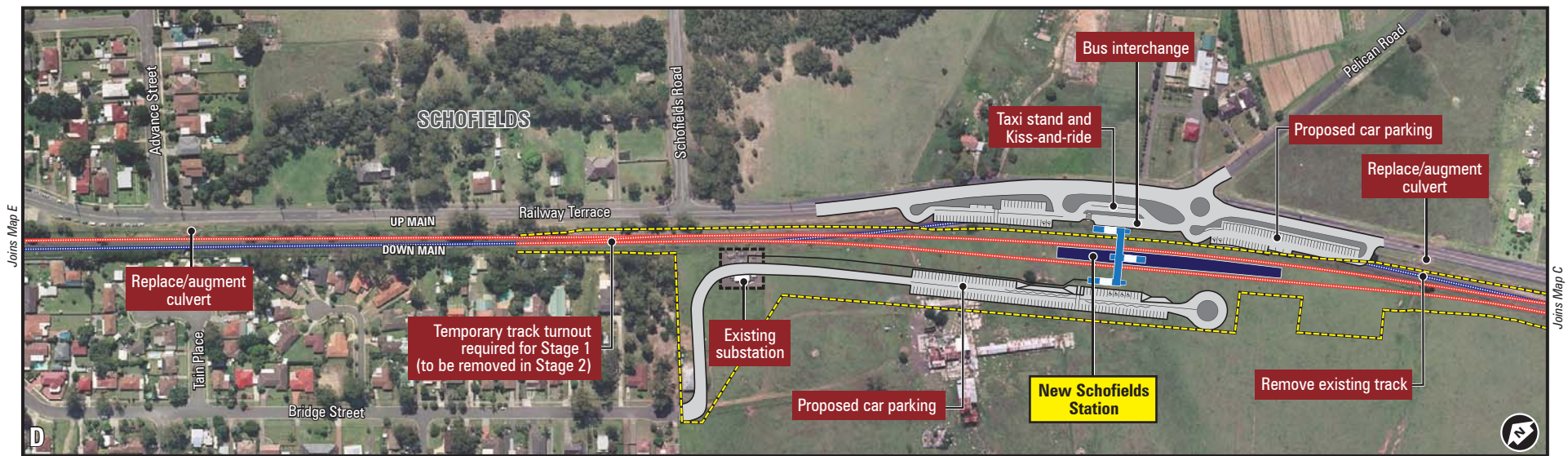
Parking for approximately 230 vehicles would be provided collectively on both the western side of Railway Terrace (eastern side of the rail corridor) and on the western side of the rail corridor, replacing the existing spaces used by commuters at the current Schofields Station location. Parking provisions would include off-street parking areas with disabled access parking. As demand for future car parking increases, there is the potential for future parking requirements to be accommodated in plans developed for the area by the Growth Centres Commission (GCC). This would be further investigated by RailCorp in conjunction with the GCC.

The current concept design locates part of the total proposed parking capacity on the western side of the rail line providing approximately 120 car spaces, a kiss-and-ride zone and a raised pedestrian crossing. This design, as further discussed in Section 8.2, resolves previous limitations for pedestrian access on the western side of the rail corridor.

The existing Schofields Station would be demolished, and the existing pedestrian level crossing would be removed and replaced with a footbridge with ramps (refer Section 6.2.2). Rehabilitation of the existing Schofields Station site is addressed in Section 6.2.5.



Figure 6-1a Main features of the Project
 Note: Project detail shown is indicative only, subject to detailed design.



0 100
metres

Existing railway line Proposed railway line Proposed project footprint Utility corridor

Figure 6-1b Main features of the Project
 Note: Project detail shown is indicative only,
 subject to detailed design.



Figure 6-1c Main features of the Project
 Note: Project detail shown is indicative only, subject to detailed design.

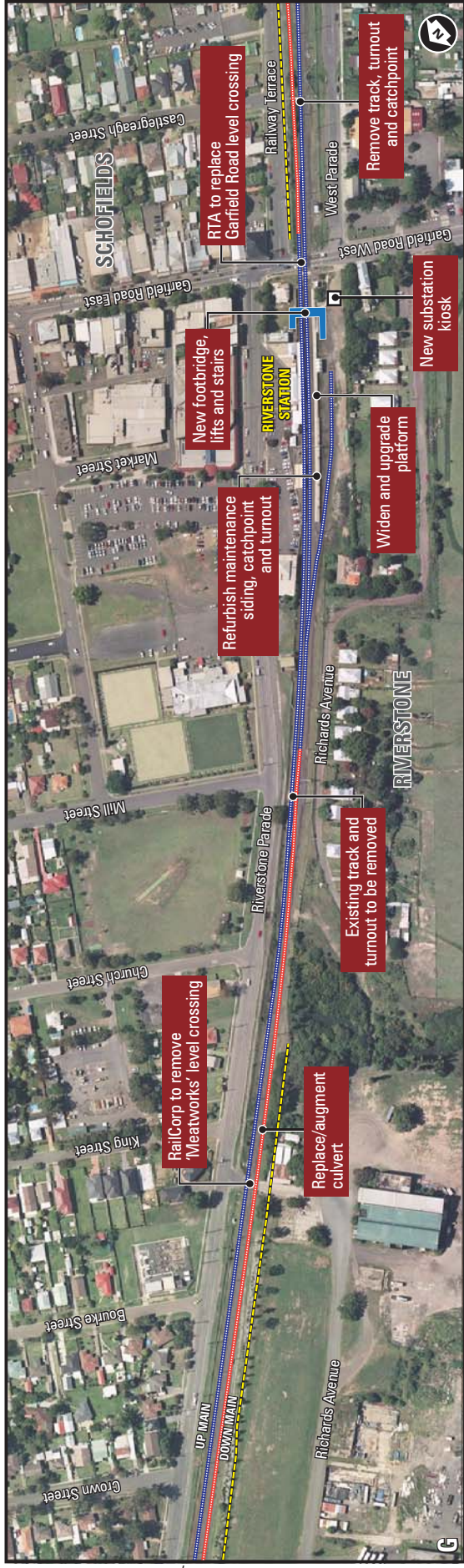


Figure 6-1d Main features of the Project
 Note: Project detail shown is indicative only, subject to detailed design.

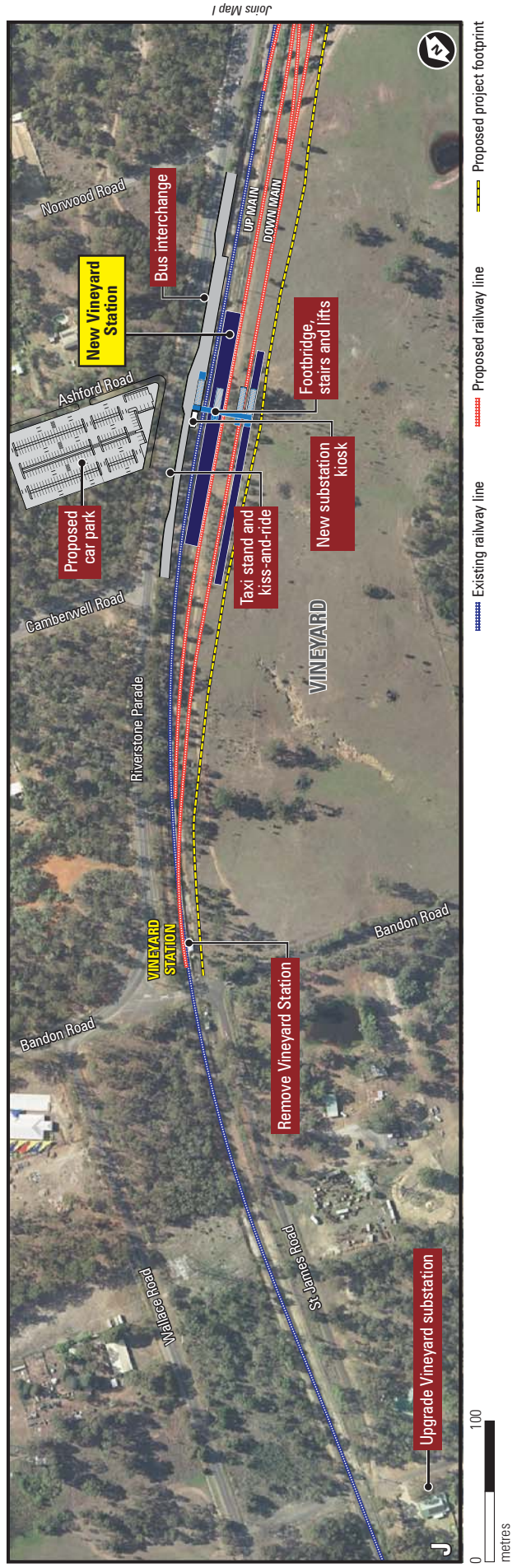
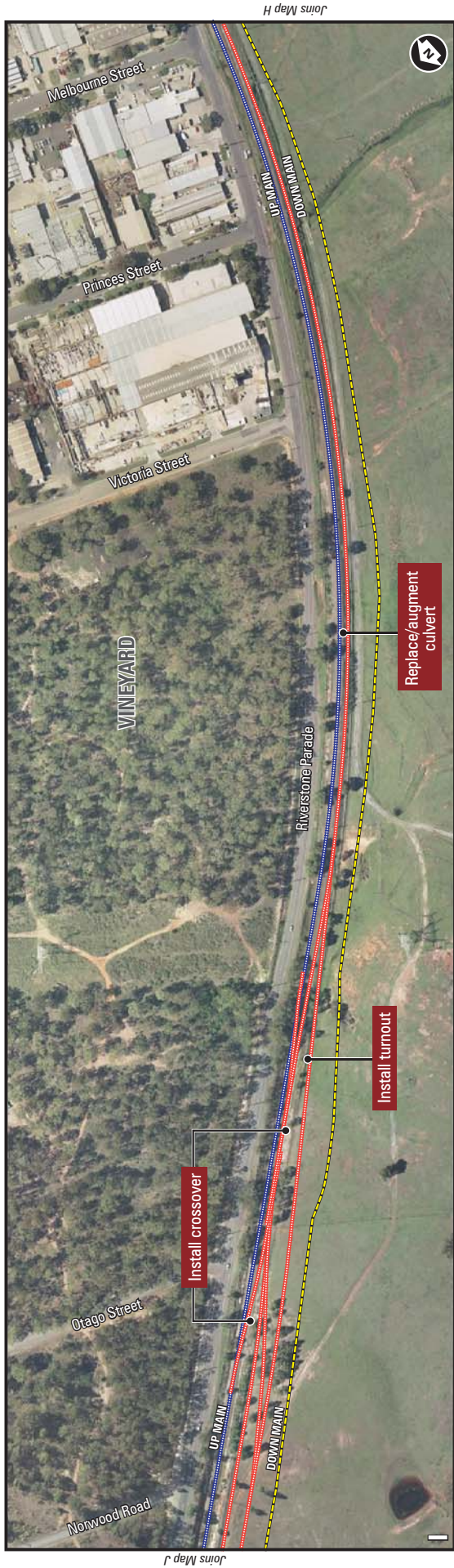
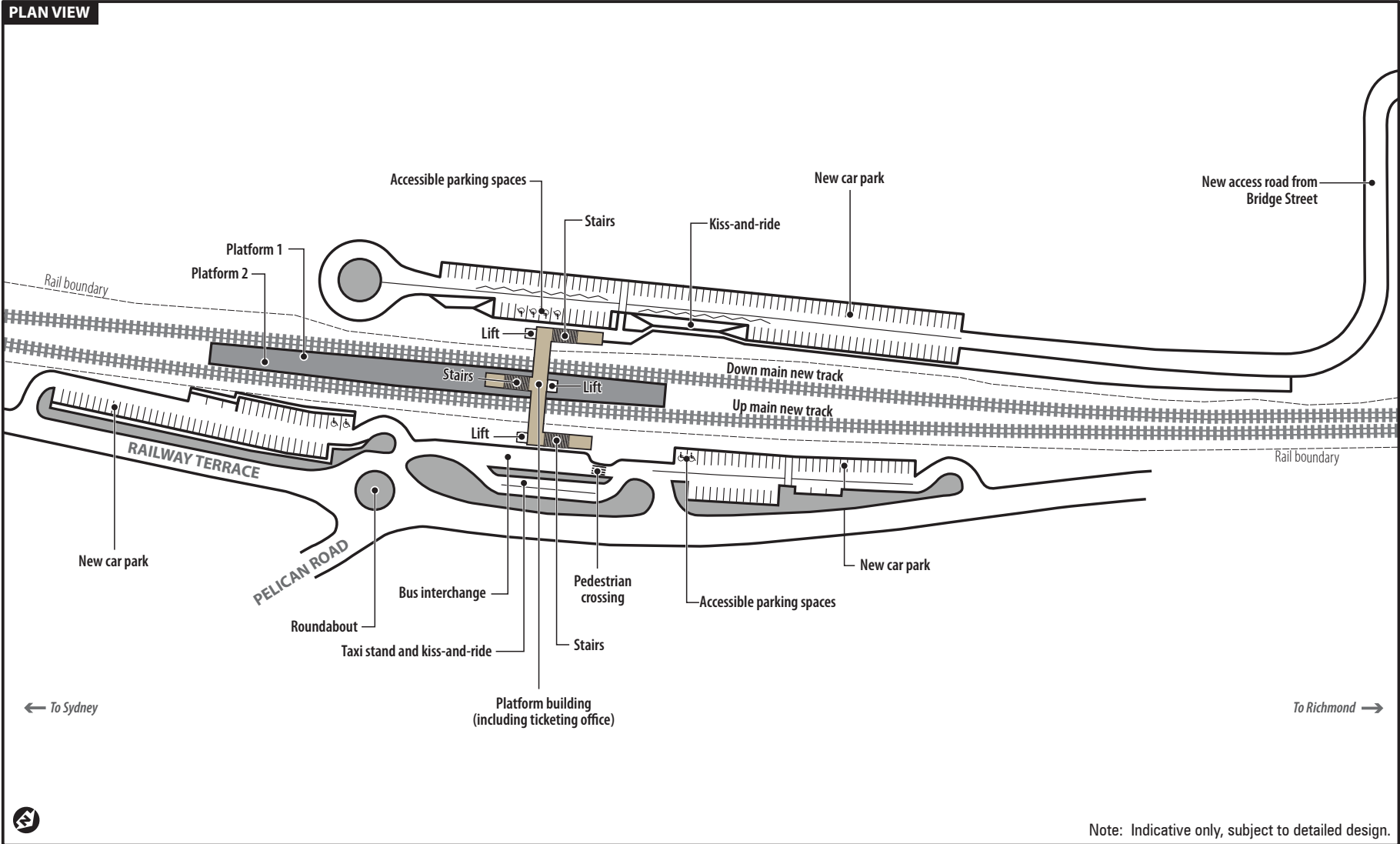


Figure 6-1e Main features of the Project
 Note: Project detail shown is indicative only, subject to detailed design.

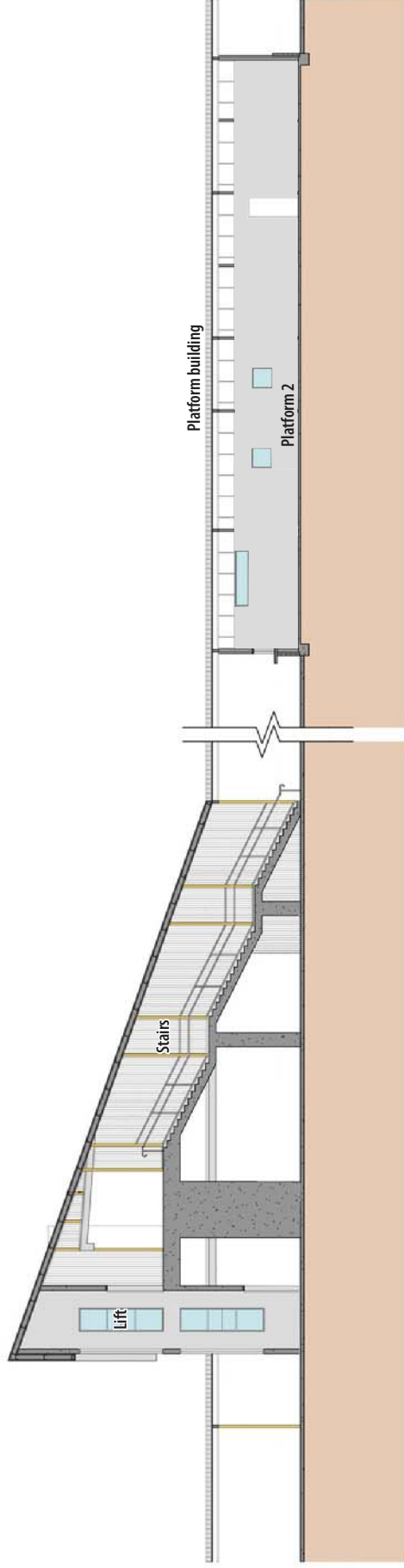
PLAN VIEW



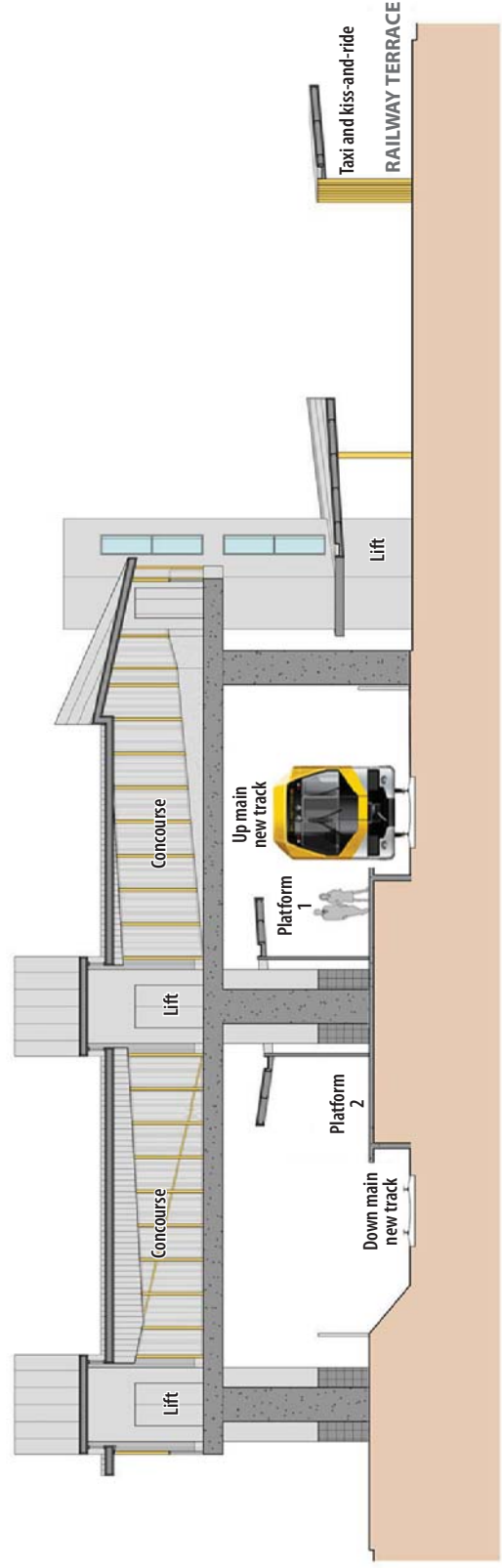
Note: Indicative only, subject to detailed design.

Figure 6-2 New Schofields Station - plan view

FACING EAST TOWARDS PLATFORM 2



FACING NORTH



Note: Indicative only, subject to detailed design.

Figure 6-3 New Schofields Station – elevations

Riverstone Station

The key components of the Riverstone Station upgrade are shown in Figures 6-4 and 6-5. The whole of the Riverstone Station precinct, including platforms 1 and 2, would be upgraded to comply with the *Disability Discrimination Act 1992* and easy access standards. The surface of platforms 1 and 2 would be regraded to provide level access, and the existing Platform 2 would be widened to approximately 3.5 metres.

The existing pedestrian level crossing at Garfield Road would be replaced by a new covered footbridge at the southern end of the station (refer Section 6.5.4 and Figure 6-5). The footbridge would be accessible by stairs and two lift shafts. The height of the footbridge (to roof level) would be approximately 9 metres; the lift shafts would be approximately 12 metres high.

The existing footpath would be regraded for the widened Platform 2 to provide for lift and stair access on Garfield Road West. A new walkway and path would be provided to access the existing platform, lift and stairs on Garfield Road East.

The Riverstone Station precinct (comprising a number of station and service buildings) is listed on the State Heritage Register (refer Section 3.5.3). The upgrade of the station has, therefore, been designed to minimise visual and heritage impacts to the station. To maintain the heritage significance of the precinct, the new footbridge would be located to the rear of the Stationmaster's Cottage, where development works during the 1970s and 1980s created a separation of the cottage from the main group of heritage buildings. The addition of a forecourt at the main entrance to the footbridge on Riverstone Parade is planned to reduce the apparent bulk and over-shadowing associated with the new footbridge, stairs and lifts.

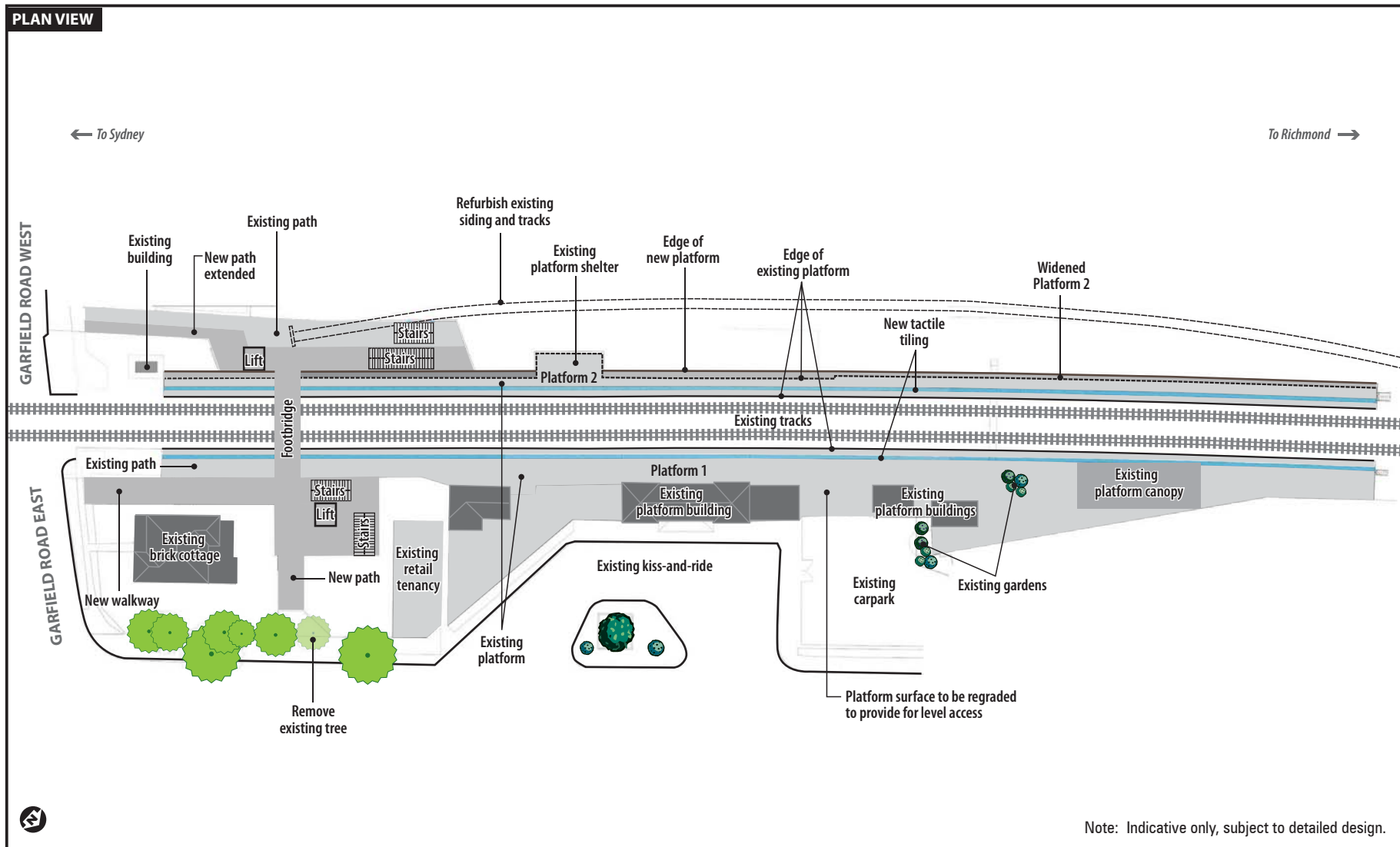
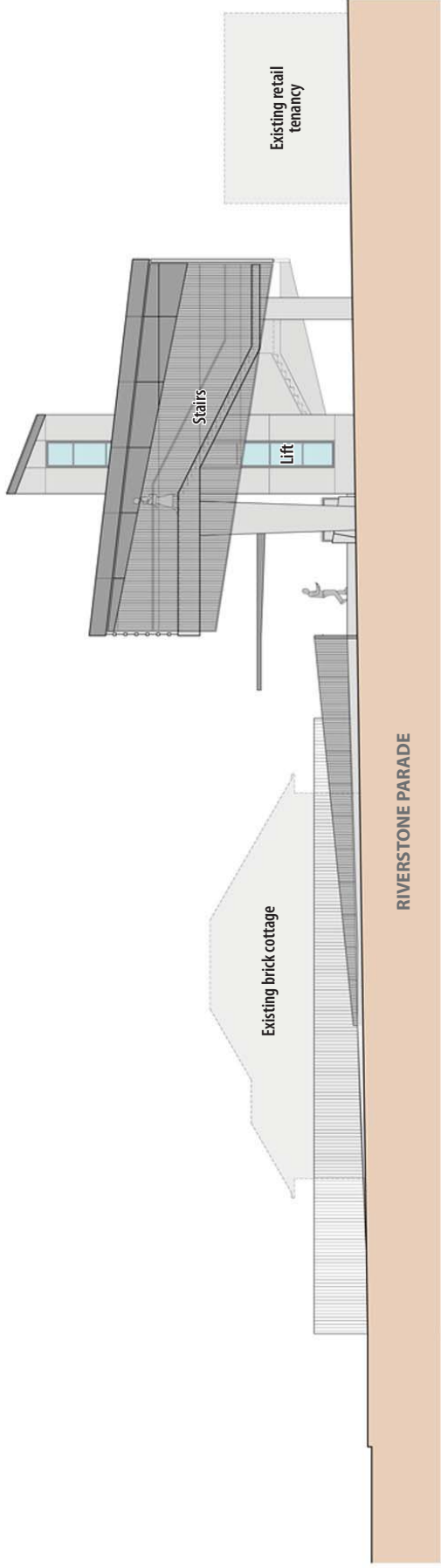
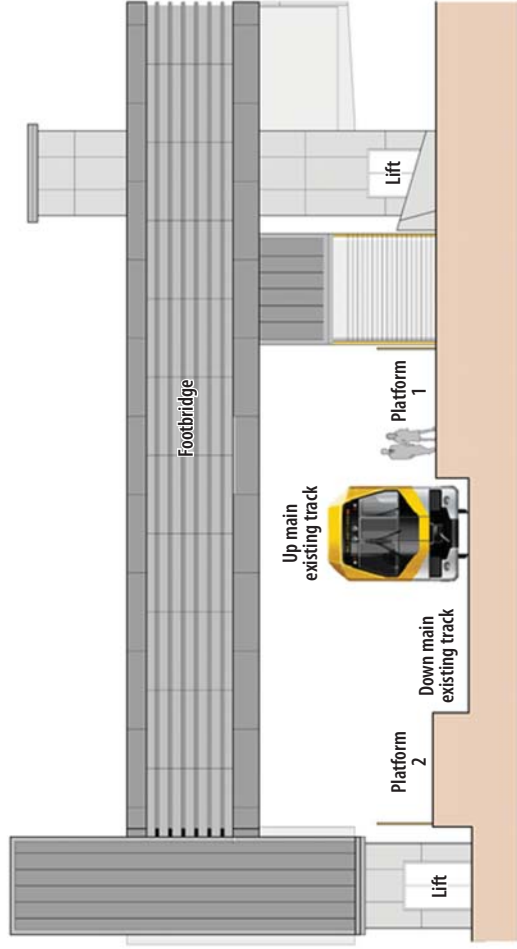


Figure 6-4 Riverstone Station upgrade – plan view

FACING WEST



FACING NORTH



Note: Indicative only, subject to detailed design.

Figure 6-5 Riverstone Station upgrade pedestrian overbridge (elevations)

Vineyard Station

The existing Vineyard Station would be relocated to a new location approximately 250 metres south-east of the existing location. The station would be relocated to allow for the provision of a turnback facility, pedestrian footbridge, bus interchange facility, and kiss-and-ride and taxi zone. The key components of the new station are shown in figures 6-6 and 6-7. The new station would be built with straight platforms, and would comply with the *Disability Discrimination Act 1992* and easy access standards.

The new station would consist of an island platform and a side platform on the western side of the rail line. The station building would be constructed on the island platform and would include a ticket office, staff and operations facilities, and family-accessible toilet.

A footbridge would be built to allow access between Riverstone Parade and the platforms. The footbridge would be accessible via stairs and three lifts. The footbridge would be covered along its full length. The middle sections of the island and side platforms would also be covered. The height of the footbridge would be approximately 6 metres from the level of the footpath to the level of the footbridge floor. The height to the top of the lift shafts would be approximately 14 metres.

A new bus interchange facility with canopy, including kiss-and-ride and taxi zone, would be provided on the western side of Riverstone Parade. The bus zone would be located on the southern side of the pedestrian crossing and would accommodate up to five standard-sized buses at a time. The kiss-and-ride and taxi zone would be located on the northern side of the pedestrian crossing; it would have sufficient space for up to 11 waiting kiss-and-ride vehicles and taxis at any one time.

A car park would be provided on the eastern side of Riverstone Parade, with access off Ashford Road. This car park is proposed to be constructed in two phases to meet commuter demand over time. The first phase (phase 1) would be constructed along Riverstone Parade, providing approximately 70 parking spaces. The second phase (phase 2) would be constructed as an extension to the phase 1 car park on its northern side along Ashford Road. This would increase the total parking spaces to approximately 220. Phase 2 car park is proposed to be constructed adjacent to the phase 1 car park along Ashford Road. The exact location of this car park would be determined following more detailed site investigations and consideration of alternative locations (such as the western side of the station) in consultation with the GCC.

As addressed in the Draft Statement of Commitments (refer Chapter 12), further assessment of environmental impacts of the phase 2 car park would be undertaken following confirmation of the proposed Stage 2 works, prior to construction of this phase.

As the car park would be located on the opposite side of the street to the station, significant pedestrian traffic movement could be expected across Riverstone Parade.

The existing Vineyard Station would be demolished following the commission of the new station.

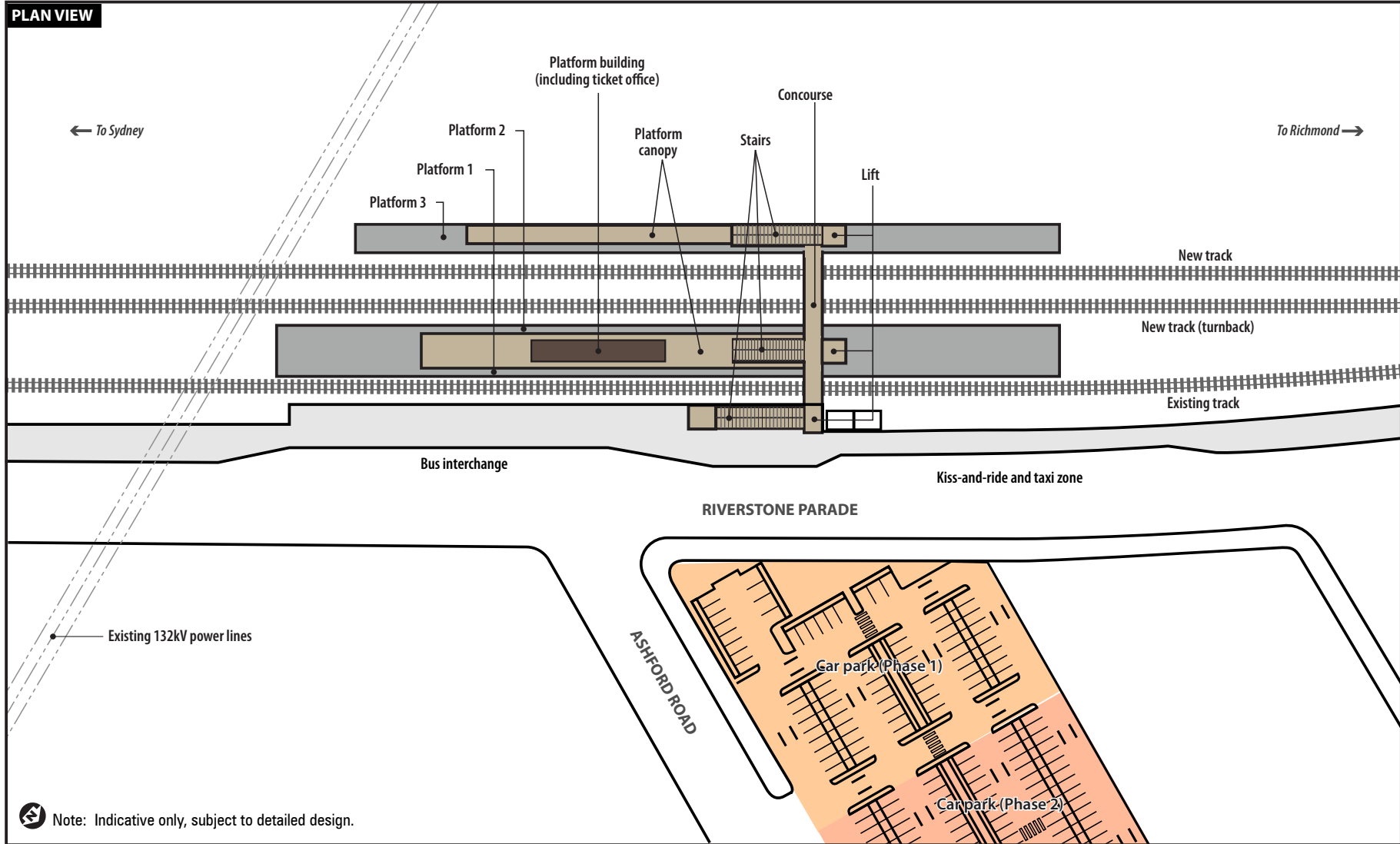
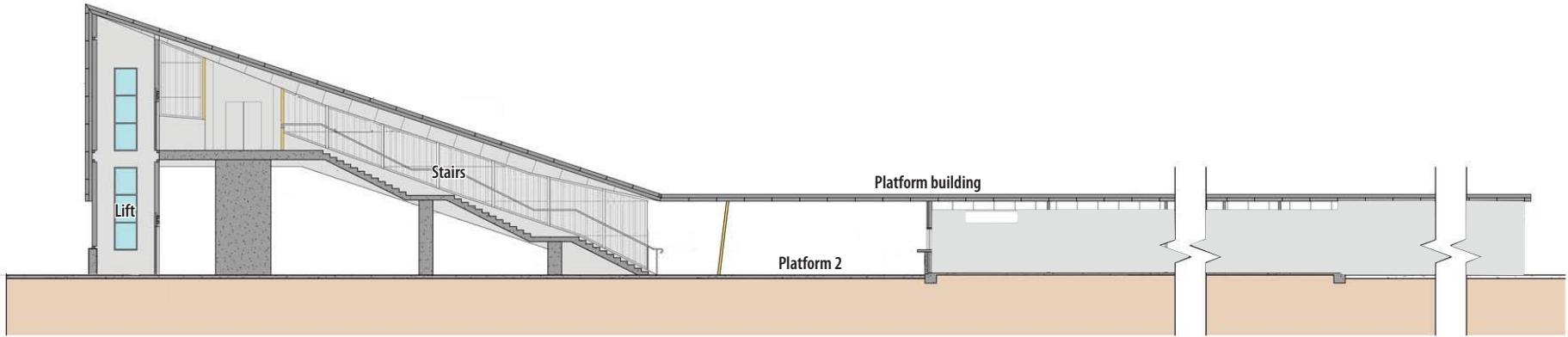
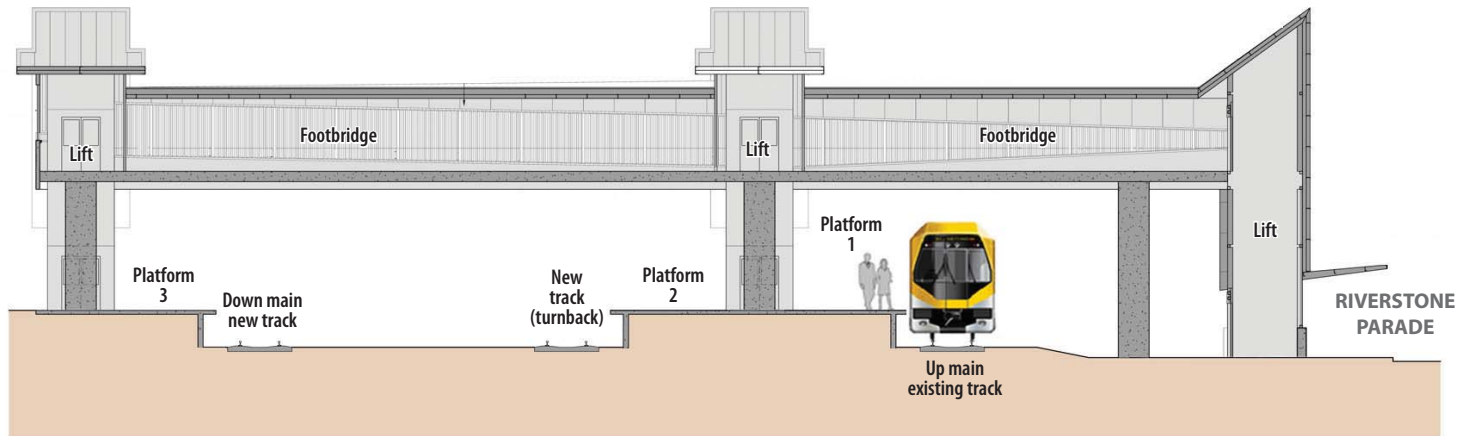


Figure 6-6 New Vineyard Station – plan view

FACING EAST TOWARD PLATFORM 2 FROM PLATFORM 3



FACING NORTH



Note: Indicative only, subject to detailed design.

Figure 6-7 New Vineyard Station – elevations

6.2.2 Pedestrian and vehicular rail crossings

Quakers Hill pedestrian level crossing

The existing pedestrian level crossing, located approximately 200 metres north of the Quakers Hill Station building, would be removed and replaced with a footbridge with ramps. This component of the Project is proposed to improve pedestrian safety following increases in train service frequencies once the new rail timetable is introduced. The height of the footbridge would be approximately 7 metres from ground level to the footbridge floor. The preliminary concept design of the footbridge is shown in Figure 6-8.

The architectural style and finish of the structure would be consistent with that of the other structural components of the Project. The proposed preliminary design is contemporary steel and concrete structures incorporating mesh balustrades, which are easily maintained and resistant to vandalism. The design would incorporate easy access considerations, such as way-finding tactile stud indicators and ramp access.

Schofields Station pedestrian level crossing

The pedestrian level crossing at the existing Schofields Station would be removed and replaced with a footbridge with ramps. The footbridge would be located just north of the existing level crossing, and would be accessible from Bridge Street and Railway Terrace via the new access ramps. The height of the footbridge would be approximately 8 metres from ground level to the footbridge floor. The preliminary concept design of the footbridge is shown in Figure 6-9.

The style and finish of the structure would be similar to that proposed for the Quakers Hill pedestrian footbridge (refer above).

Westminster Street overbridge

The existing Westminster Street overbridge (road over the rail line) accommodates two lanes of traffic and a pedestrian pathway. The structure is a three-span concrete superstructure supported by concrete piers and abutments. The bridge has a 5-tonne load restriction on the mass of vehicle that can utilise the bridge. In addition, the bridge does not comply with RailCorp requirements for vertical and horizontal clearances to the bridge structure.

To accommodate the proposed new Up Main track, including the required clearances and loading requirements, the existing bridge would need to either be reconstructed or upgraded. The solution would be developed in consultation with RailCorp, the Roads and Traffic Authority of NSW (RTA) and others during the detailed design stage of the Project, including consideration of upgrading the existing bridge, which potentially would reduce the impact on road users.

If a new bridge was built it would likely comprise a single span approximately 27 metres in length, which would accommodate two traffic lanes and two pedestrian footways. The design would include anti-throw screens and anti-climb protection. The proposed vertical and horizontal clearance beneath the bridge is 5.3 and 4.3 metres respectively. The pavement levels on the new overbridge would be up to approximately 300 millimetres higher than the existing levels. Some road works would, therefore, be required to tie the bridge into the new levels. The preliminary concept design of the new Westminster Street overbridge is shown in Figure 6-10. Exact design of the bridge would be developed during the detailed design phase.

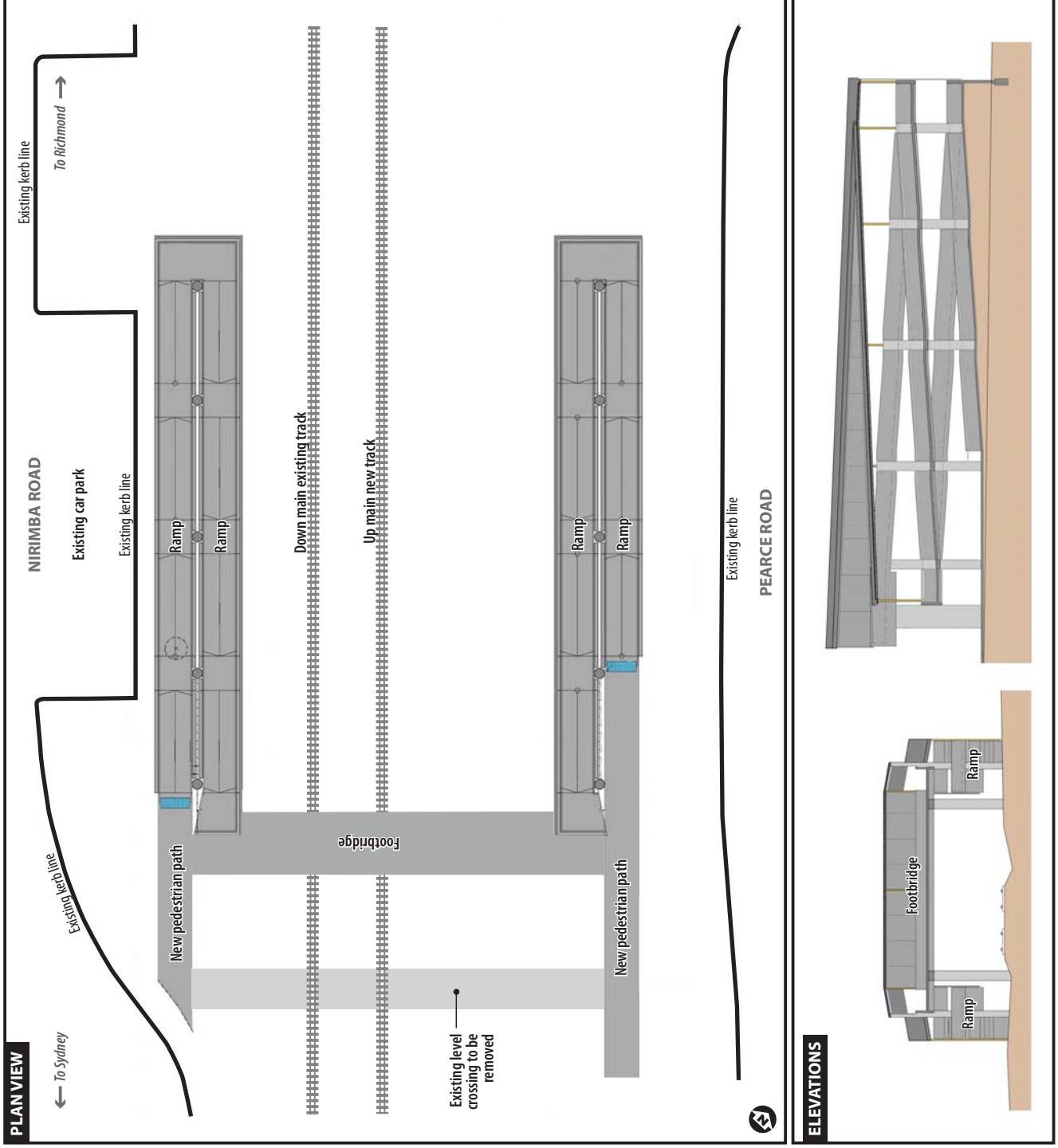


Figure 6-8 Quakers Hill Station pedestrian overbridge (plan view and elevations)

Note: Indicative only, subject to detailed design.

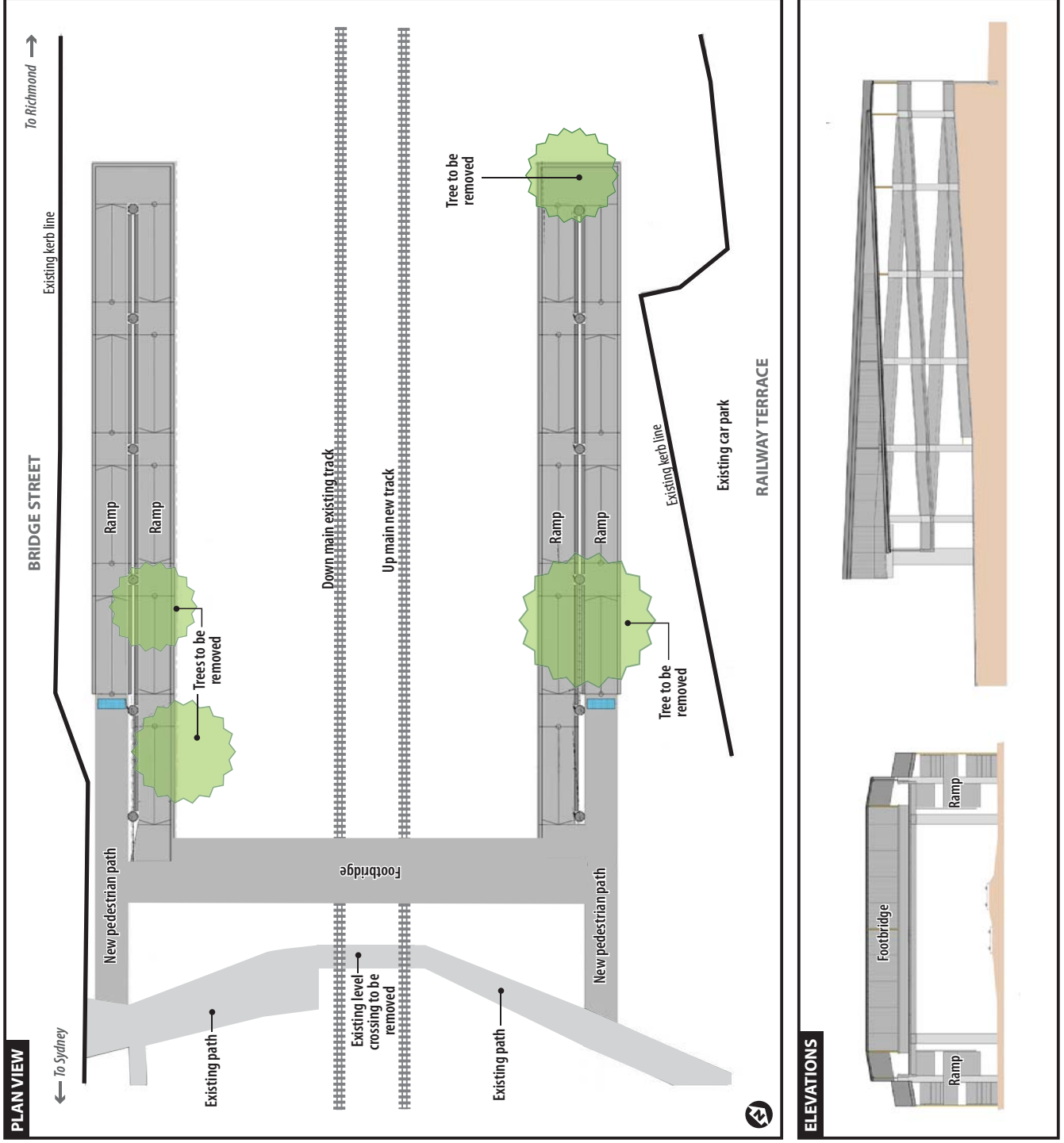


Figure 6-9 Schofields Station pedestrian overbridge (plan view and elevations)

Note: Indicative only, subject to detailed design.

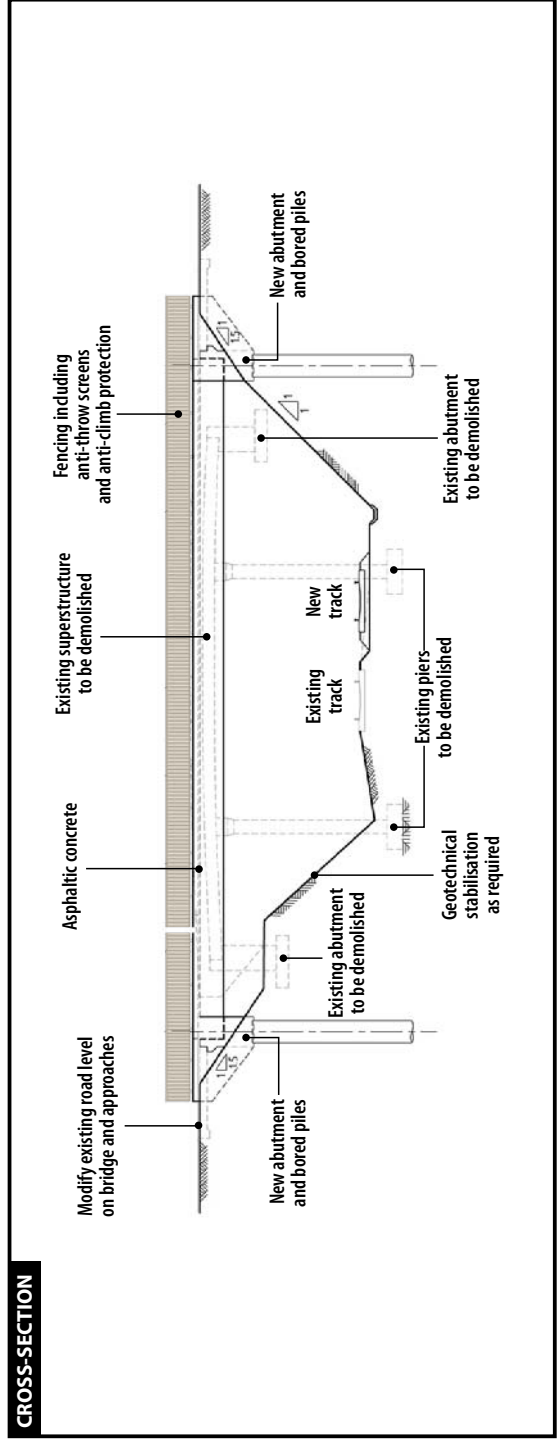
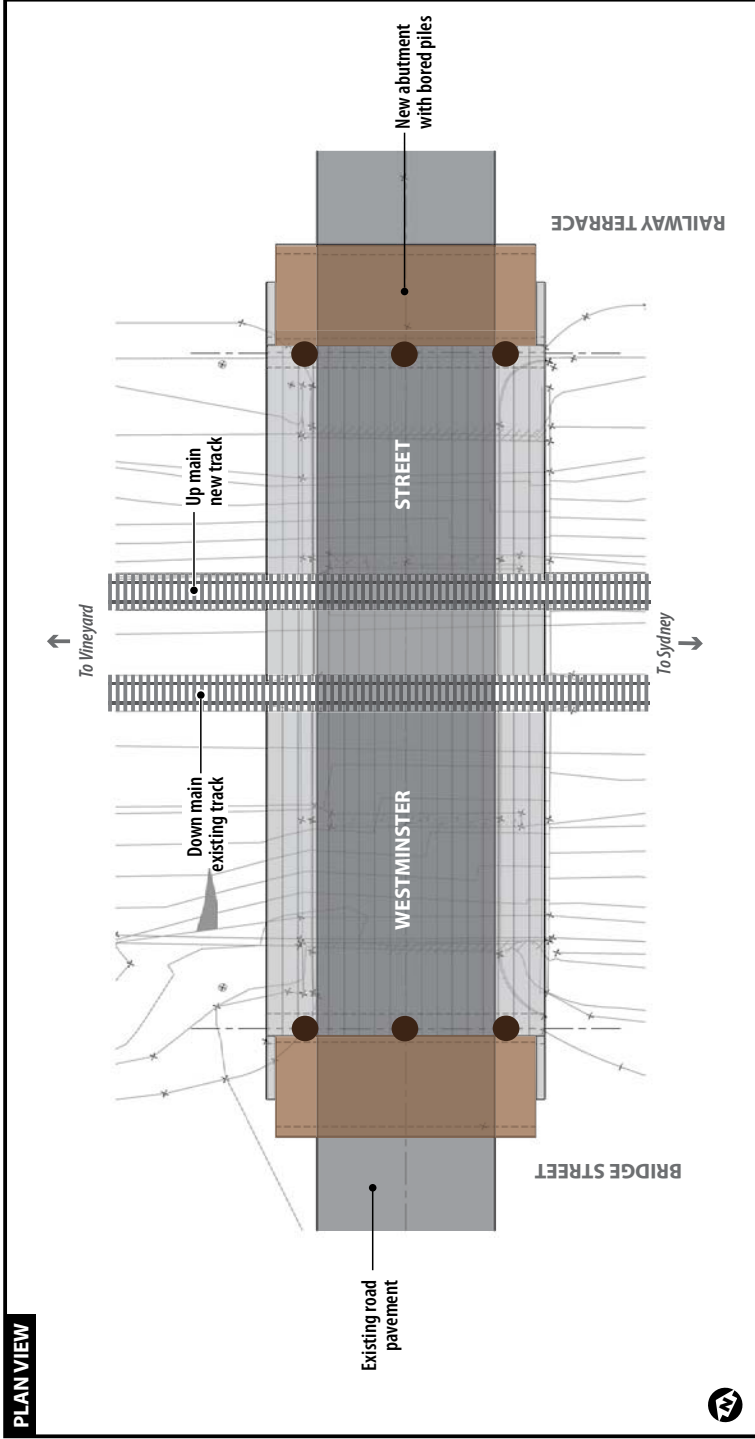


Figure 6-10 Plan view and cross-section of new Westminster Bridge overbridge
 Note: Indicative only, subject to detailed design.

6.2.3 Drainage culverts

The culverts beneath the existing rail line comprise mainly brick arch and reinforced concrete structures. A number of these structures would require replacement, or upgrade to strengthen them, as they are not considered capable of withstanding the load of the duplicated track. The *Culvert Flood Assessment Report* (Maunsell 2007c) identified 14 major culverts that would require replacement or upgrade. The locations of the culverts to be replaced are identified in Figure 6-1. No new culverts or modifications to creek alignments/water bodies are proposed, with exception to those that would be directly affected by the augmentation of the culverts. At the local scale, the changes to culvert crossings will have the largest impact to the local surface water system.

6.2.4 Track configurations

The Project would require approximately 10.1 kilometres of new track between Quakers Hill (approximately Chainage 40.150 kilometres) and Vineyard (approximately Chainage 49.320 kilometres). As described in Section 6.3.1, the Project would be constructed in two stages. The track configuration for each stage of the Project is described below. A cross-section of a typical rail corridor is shown in Figure 6-11.

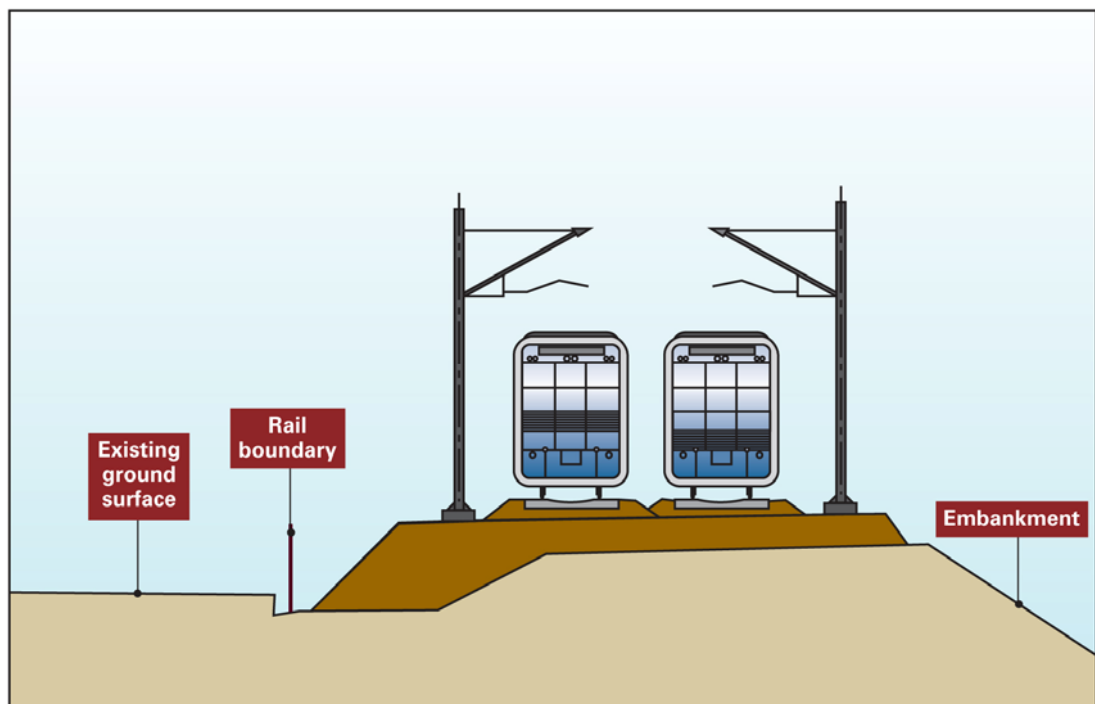


Figure 6-11 Typical rail corridor cross-section

The track base would comprise a formation bed of suitable fill material with in-built track drainage. The finished track structure would consist of parallel, continuously welded steel rails tied together by reinforced concrete sleepers, supported and retained by a bed of stone ballast. Foundations for the overhead traction wiring structures would be installed at regular intervals (nominally every 40 metres) and would consist of *in situ* cast reinforced concrete footing or piles.

Stage 1 track configuration

As outlined in Section 6.1, the Project would be constructed in two stages – Stage 1 and Stage 2. Stage 1 track work would involve the construction of new sections of track between Quakers Hill Station and the new Schofields Station. The new track would be constructed mainly on the western side of the existing track, with a small section of track constructed on the eastern side just north of Quakers Hill Station (refer Figure 6-1). This will result in the widening of the existing rail corridor by a nominal width (rail corridor width increases towards the new stations). The new track would become the Down Main track (i.e. the track on which trains travel away from Sydney).

The existing turnout (the intersection and mechanisms for the meeting of two tracks) immediately north of Quakers Hill Station would be removed, and crossovers (the connection between two tracks allowing trains to cross tracks) would be constructed just south of the new Schofields Station.

A temporary turnout would be constructed north of the new Schofields Station, approximately 100 metres north of Schofields Road, during the Stage 1 construction phase; it would be removed during Stage 2 of the Project, once the new track to new Vineyard Station becomes operational.

Construction of the car park and station entrance at the new Schofields Station would require construction of new track for both the Up Main and Down Main, and removal of the existing track. The proposed car park on the eastern side of new Schofields Station is located where the existing track is currently. The new track and station would be constructed offline adjacent to the existing track prior to the construction of the car park.

Stage 2 track configuration

Stage 2 track work would involve the construction of new sections of track between the new Schofields and Vineyard stations. Between the new Schofields Station and Riverstone Station, the new track would be constructed on the eastern side of the existing track (refer Figure 6-1). This would become the new Up Main track (i.e. the track on which trains travel towards Sydney). Between Riverstone Station and the new Vineyard Station, the new track would be constructed on the western side of the existing track (refer Figure 6-1). This would become the Down Main track. The track is already duplicated at Riverstone Station and both of the existing tracks would remain.

The existing turnouts just south of Riverstone Station and just south of the Meatworks level crossing would both be removed by RTA and RailCorp respectively and do not form part of this Project. The turnout and maintenance siding just north of Riverstone Station would be refurbished.

The temporary turnout constructed north of the new Schofields Station during Stage 1 would be removed during Stage 2 of the Project once the new track to new Vineyard Station becomes operational.

Crossovers would be constructed just south of the new Vineyard Station. A terminating shunting neck (a 'dead-end' section of track) capable of storing a train would be provided immediately north of Vineyard Station. A new turnout would be constructed just south of Bandon Road.

6.2.5 Other rail infrastructure

Signalling

The Project would require the relocation of existing signalling infrastructure, including signalling supplies and signal huts, and new signalling and modifications to the existing signalling system. Signalling would be arranged so as to:

- provide for trains to operate at 3-minute headways (the time between two trains passing the same point and travelling in the same direction on the same track)
- provide sufficient signal overlap on the country end of Vineyard Station to allow a Down train to enter Platform 2 without speed restriction while an Up train enters Platform 1 without speed restriction
- provide for a simple bi-directional running system for both tracks for Stage 1 of the Project using the signals required for the base uni-directional infrastructure. This will facilitate train movements and provide additional flexibility, in terms of rail reliability, to the rail network in this area
- bi-directional running for Stage 2 will be considered as part of the detailed design development process
- bi-directional functionality would not require any additional signals in the opposite running direction beyond those associated with the Vineyard Terminus (Stage 2) and existing Quakers Hill interlockings (Stage 1)
- retain the current bi-directional signalling south of Quakers Hill and north of Vineyard.

Power supply

The Project will require the relocation of overhead poles, underground cables, and associated equipment.

A new 11,000 volt feeder to supply the signalling and station will also be provided as part of the new Schofields substation and the upgrade to Vineyard Substation. This 11,000 volt feeder cable would be installed from the upgraded Vineyard Substation to the new Quakers Hill pedestrian footbridge.

The existing Schofields traction substation (located approximately opposite Schofields Road; refer Figure 6-1b) will be replaced with a new traction substation. The new substation would be located near the corner of Burdekin Road and Railway Parade, adjacent to the eastern boundary of the rail corridor, south of the new Schofields Station (refer Figure 6-1). An existing substation on the western side of the rail corridor, north of the new Schofields Station will be removed to accommodate the new road alignment as shown in Figure 6-1b. If the existing substation is not removed during Stage 1 of the Project, the alignment of the access road will be modified accordingly (this will be determined during the detailed design stage). The capacity of the existing traction substation at Vineyard will also be increased (refer Figure 6-1e).

Overhead wiring

New overhead wiring would be required from Quakers Hill Station to Vineyard Station. Where possible, the existing overhead wiring structures would be retained for the existing track. Existing structures would be replaced with new structures where they:

- infringe on the proposed new track gauge
- are deemed redundant due to track realignment
- are structurally or functionally non-compliant.

The Project would also comprise sectioning huts for the new and, where possible, existing track. New structures would be spaced as far apart as possible to minimise the aesthetic changes to the surrounding area.

6.2.6 Other components

Cuttings, embankments and retaining walls

Widening of the rail corridor is planned predominantly on the western side of the existing track. In a number of locations, the Project would be elevated above natural ground level (on fill) or below natural ground level (in cut). For these areas, the extent of additional land required for the Project would be minimised by the use of retaining walls where appropriate (particularly in environmentally sensitive areas). In areas where there are less space restrictions or environmental constraints, battered embankments would be constructed to marry the level of the rail line with existing ground levels adjacent to the rail corridor. The retaining walls would be within existing cuttings at some locations, and on embankments in other areas. Retaining walls may also be required in areas where the extent of embankment widening is to be limited to maintain or reconstruct drainage channels within the rail corridor.

The types of retaining walls required in the widened formation would vary along the route depending on ground conditions, height of cut/fill, and proximity to the rail boundary. The types of retaining wall considered would include:

- shotcrete faced and nailed slopes, which are the typical form of construction proposed to widen cuttings where rock is at a shallow depth
- post and panel walls, which are typically used where there is insufficient space for a cutting slope
- pile walls, which are typically used where there is insufficient space for a cutting slope and the easement for rock nails is to be avoided
- reinforced soil walls, which are typically used when widening an embankment.

A 160 metre long retaining wall would be required for Stage 1 of the Project. This retaining wall will have a maximum height of 1.8 metres and would be located on the eastern boundary of the rail corridor, between track chainages 43.125 km and 43.285 km (approximately between 80 metres south of Schofields Road and 70 metres north of Schofields Road).

The height of the embankments is generally expected to be between approximately 1 metre and 1.2 metres for Stage 1 of the Project (with exception to a retaining wall around new Schofields Station (approximate chainage 43.100 km) which is expected to have an average height of 1 metre and a maximum height of 1.8 metres). The height of the embankments for Stage 2 of the Project is expected to be as follows:

- 1.8 metre embankment near the existing Schofields Station (chainage 44,000 km)
- 2.0 metre embankment between Schofields and Riverstone (chainage 45,000 km)
- 3.5 metre embankment at the Roadmaster Property 'Meatworks' site.

Stage 2 of the Project would also require a 1.8 metre deep cutting at Vineyard Station (chainage 48,800 km).

Noise mitigation

A noise assessment was undertaken for the Project (refer Technical Paper 2 — *Noise and vibration* (Volume 2)) in accordance with the *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (IGANRIP) (DECC 2007e). This indicated that noise trigger levels are likely to be exceeded at a number of locations along the rail corridor as a result of the Project. It was concluded that further assessment of noise impacts (including consideration of reasonable and feasible mitigation measures) at these locations would need to be considered. The full results of the noise impact assessment undertaken for the Project are discussed in Section 8.4.

Three options for noise mitigation are proposed for further consideration: at-source measures (i.e. rail dampers), at-corridor measures (i.e. noise barriers) and at-receiver measures (i.e. architectural treatment of buildings) (refer Section 8.4.6). A general hierarchy of at-source, at-corridor then at-receiver measures would be used during the development of the detailed Project design, where practicable. This approach is supported by the Department of Environment and Climate Change (DECC) in the IGANRIP. The most appropriate mitigation measures would be selected during the detailed design phase of the Project.

Stormwater drainage

Extensive drainage treatments would be required for the new stations at Schofields and Vineyard. The key drainage components of the Project would comprise:

- surface, subsoil, inter-track and underground track drainage along the route
- water quality treatment devices connecting into Council drainage systems as required during detailed design
- replacing, adjusting and extending of culverts along the route
- car park and road drainage at the new Schofields and Vineyard stations
- roof and platform drainage for the new Schofields and Vineyard stations, and Riverstone Station
- installing a rainwater tank beneath the island platform at the new Vineyard and Schofields stations for reuse of collected water.

The proposed adjustments to the track near the new Schofields Station would cut off an existing 375 millimetre diameter cross-drainage pipe at chainage 42.670 kilometres. A new culvert and trunk drainage extension would be required on the Eastern Creek side of the rail line so that the upstream, eastern catchments can drain. This would be investigated in detail during the detailed design phase of the Project.

The outlet drainage route from the new Vineyard Station car park along Ashford Road would require further investigation during the detailed design phase of the Project as there is no existing underground drainage infrastructure to connect into along Ashford Road. Options for drainage in this area, including the use of bioswales and a surcharge system would be investigated during detailed design and in conjunction with the Growth Centres Commission (GCC) and Council's plans for future road drainage system for the North West Growth Centre (NWGC).

Rail drainage would be designed to meet RailCorp standards, the Institution of Engineers Australia's *Australia Rainfall and Runoff*, 1999 (Volume 1 and Volume 2) and sized for the 50-year average recurrence interval storm event. The drainage system for the new works would consist of half-pipe or trapezoidal shaped surface drains, grassed swales, pits and subsoil drains connecting into the existing Council systems, as required. Both the GCC and Council would be consulted regarding plans for future drainage for the NWGC.

Stormwater drainage is discussed further in Section 8.7.

Rehabilitation of disused station sites

The existing stations at Schofields and Vineyard would be removed. The rehabilitation of these sites would be undertaken in consultation with the GCC and with consideration of the existing and future uses of the surrounding areas.

The GCC is currently preparing plans for the revitalisation of the Schofields town centre. This could include plans for the rehabilitation of the station itself and areas adjacent to the station site.

Shared user path

A shared user path would be provided along Railway Terrace to connect the existing Schofields Station with the new Schofields Station. Pedestrian access to the new Schofields Station from the existing station would also be provided from the western side of the rail corridor. The details of this access would be included in the new car parking arrangements on the western side of the rail corridor which are currently being determined as part of the design development.

The detailed design of the shared user path and pedestrian access from the western side of the rail corridor would be developed in consultation with affected land owners and the GCC. Cycleway facilities within the rail corridor are considered unviable for safety reasons however the development of additional cycleway infrastructure alongside the rail corridor could be provided by developers in the future as development of the NWGC continues. Paths located within road reserves would be constructed by developers and dedicated to Council through conditions of development consent (GCC 2008c). Paths within land zoned for open space will be funded through Section 94 Contributions (GCC 2008c)

Utility corridor

To facilitate the construction of the Project, a 3 metre wide utility corridor would be established on the western side of the rail corridor between Quakers Hill Parkway and the new Schofields Station. A 3 metre wide utility corridor would also be established on the eastern side of the rail corridor between Lalor Road (Quakers Hill) and Manorhouse Boulevard. The location of these utility corridors is shown in Figure 6-1.

Services and utilities that conflict with the proposed Project works would be co-located within the utility corridors, which would be located outside of the rail corridor boundary. The utility corridors would require the establishment of an easement in consultation with the utility asset owners, including approximately 5,500 square metres of Department of Defence Land, as well as 1,925 square metres of land owned by Blacktown City Council. The utility corridor would be controlled by the utility owners and would not be owned by RailCorp.

A referral to the Minister for the Environment, Water, Heritage and the Arts was submitted in early 2009 to seek confirmation as to whether the Project constitutes a *Controlled Action* under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). It is anticipated that the Minister will advise TIDC that the Project is not a Controlled Action, and will not require approval under the EPBC Act. This is discussed in further detail in Section 2.4.2.

6.2.7 Works undertaken by other agencies

The construction of the Project would increase the need for certain other works by other agencies to occur. While these do not require assessment or approval as part of this Environmental Assessment, they are indirectly related to the Project, and are therefore, described to provide an understanding of the wider context within which the Project is being constructed.

Closure of Garfield Road vehicle and pedestrian level crossing

In February 2007, the then Minister for Roads announced a Riverstone Railway overpass would be constructed to improve safety of vehicles and trains at the Garfield Road level crossing. The RTA has investigated and assessed a number of route options for the Riverstone Railway Overpass. A grade separated crossing of the rail line would be needed to achieve the optimal benefit from Stage 2 of the Quakers Hill to Vineyard Project. The construction of Stage 2 of the proposed Quakers Hill to Vineyard Duplication would be coordinated with RailCorp, RTA, TIDC and the GCC.

The replacement of the crossing by the RTA would be subject to a separate approval process to this Project. Further details regarding the impact of the level crossing closure is provided in Section 8.2.

The Roadmaster Property 'Meatworks' level crossing

RailCorp has proposed the closure of the existing vehicle level crossing at Riverstone, (the 'Meatworks' level crossing), which is located approximately 800 metres north of the town centre (refer Figure 6-1). The closure of this crossing is not associated with this Project and would be assessed separately by RailCorp. The crossing is not planned to be replaced.

The Riverstone West Precinct Planning Report (GCC 2009a) has proposed future improvements to the road network to provide primary regional access connections to and from the Riverstone West precinct. The Indicative Layout Plan (refer Figure 3-4) proposes a

new north-south heavy vehicle route running through Riverstone West precinct, between Garfield Road and Bandon Road. This new route is anticipated to be adequate to accommodate predicted future traffic flows.

6.2.8 Urban design principles

Due to the changing nature of the Project area with the evolving plans for the NWGC, the application of good urban design principles will be essential in ensuring that the design of the Project is sympathetic to both the existing and future environment along the rail corridor. A landscape and urban design plan would be prepared during the detailed design phase. TIDC would continue to liaise with the GCC, the Department of Planning (DoP), local councils and other stakeholders involved in precinct planning to ensure the integration of urban design principles of the stations and surrounds.

The principles that would apply to key elements of the Project are discussed below.

New stations and cross-railway line connections

Street furniture at the new and existing stations would be relocated or modified to suit the revised layouts. Street furniture includes street lights, barriers, seats, telephones, paving, kerbs, bicycle racks/lockers and rubbish bins.

Access across the rail corridor would be designed to maintain or improve the existing cross-railway line connections, and links to the surrounding areas and activities. Where a connection between adjacent areas is desirable, pedestrian bridges or underpasses would be considered.

At Schofields and Vineyard, the architectural style and finish of the new station platform buildings, canopies, footbridges, stairs and lift structures would be consistent with the architectural style currently proposed as part of the Project. The proposed design comprises contemporary steel and concrete structures incorporating mesh screens and metal roofing to produce a 'clean' aesthetic, which is easily maintained, and resistant to vandalism. The design also incorporates easy access considerations, such as way-finding tactile stud indicators, accessible toilets on the platform and lift access.

The layout is designed to limit blind corners and recesses to comply with Crime Prevention through Environmental Design principles. In addition, the following urban design principles, in conjunction with further consultation with the GCC, the DoP, local councils and other stakeholders, are proposed to guide ongoing design work for the future town centres and wider precinct planning:

- Reinforce the role of the local area and urban centre as a principal transport, commercial and community centre within the locality.
- Reinforce the desired scale, character and image of the area, and enhance the presentation of the area to visitors and travellers.
- Recognise the importance of pedestrian and vehicular access across the rail corridor.
- Maintain or improve the pedestrian cross-rail line connections or links to surrounding areas and activities, particularly as stations would be one of the limited locations where such access is afforded.
- Respect the scale, form and economy of existing uses and development, and provide appropriate transition to surrounding areas.

- Maintain visibility, and protect and enhance built or natural features, establish landmarks and memorable gateways for visitors to the area, and contribute to generating image and character.
- Create a civic presence for the stations as befits their role as a focus of human activity.
- Improve existing, or establish new, comfortable and inviting pedestrian environments, including disability access within the station.
- Give priority access to public transport and other non-private vehicle-based transport users.

Riverstone Station

The complex of buildings comprising the Riverstone Station precinct is listed on the State Heritage Register. The addition of the footbridge, stairs and lifts to the station would be designed and implemented with due consideration of the heritage value of the station precinct so as to minimise any visual and heritage impacts on the existing station buildings. The remodelling of the southern edge of the Riverstone Station precinct with stairs, lifts and the footbridge would allow the creation of a southern gateway to the town centre. This gateway treatment would allow for improvements to the existing south eastern approach to the station, allowing for a proper landscaped treatment, as well as formalising the entrance to the station from the west (Maunsell 2008).

Rail corridor

Wherever possible, existing vegetation along the rail corridor would be maintained. As the rail corridor is an existing feature, the new track would be constructed so as to match the appearance of the existing track as far as practicable. Any retaining walls required along the rail corridor would be provided, with appropriate urban design (such as vegetation screening) to be determined during the detailed design phase.

The urban design of the Project would be further developed during detailed design and would be consistent with the above principles.

6.3 Construction of the Project

6.3.1 Construction phasing and program

Construction of Stage 1 of the Project would be expected to commence in 2009. The following indicates general timing for the Project stages:

- the construction program for Stage 1 (Quakers Hill to new Schofields Station, including removal of the existing Schofields Station) is expected to commence in late 2009 pending project approval and would take approximately 24 months to complete
- Stage 2 (new Schofields Station to Vineyard) would begin after the commissioning of Stage 1, and is estimated to take 24 months (approximate) to complete. A commencement date for Stage 2 had not been determined at the time of exhibition of this Environmental Assessment.

The components that form Stages 1 and 2 of the Project are shown in Figure 6-12. A generic construction program, applicable to both stages is provided in Table 6-1 and shows the typical sequencing of tasks, comprising the following key stages:

- works associated with establishing and enabling the site(s), including site and compound area set up, isolation of construction zone from operating RailCorp tracks, and relocating and/or protecting any existing services and utilities
- constructing civil works, such as earthworks, upgrade/replace culverts, bridges, new stations and station upgrade
- constructing track, and installing signalling, overhead wiring systems and communication facilities, also including installing connections to the existing RailCorp tracks, testing and commissioning
- decommissioning and removing existing stations at Schofields and Vineyard. This stage would not occur until the Project commenced operations (i.e. the commencement of the new CityRail timetable post-signalling commissioning).

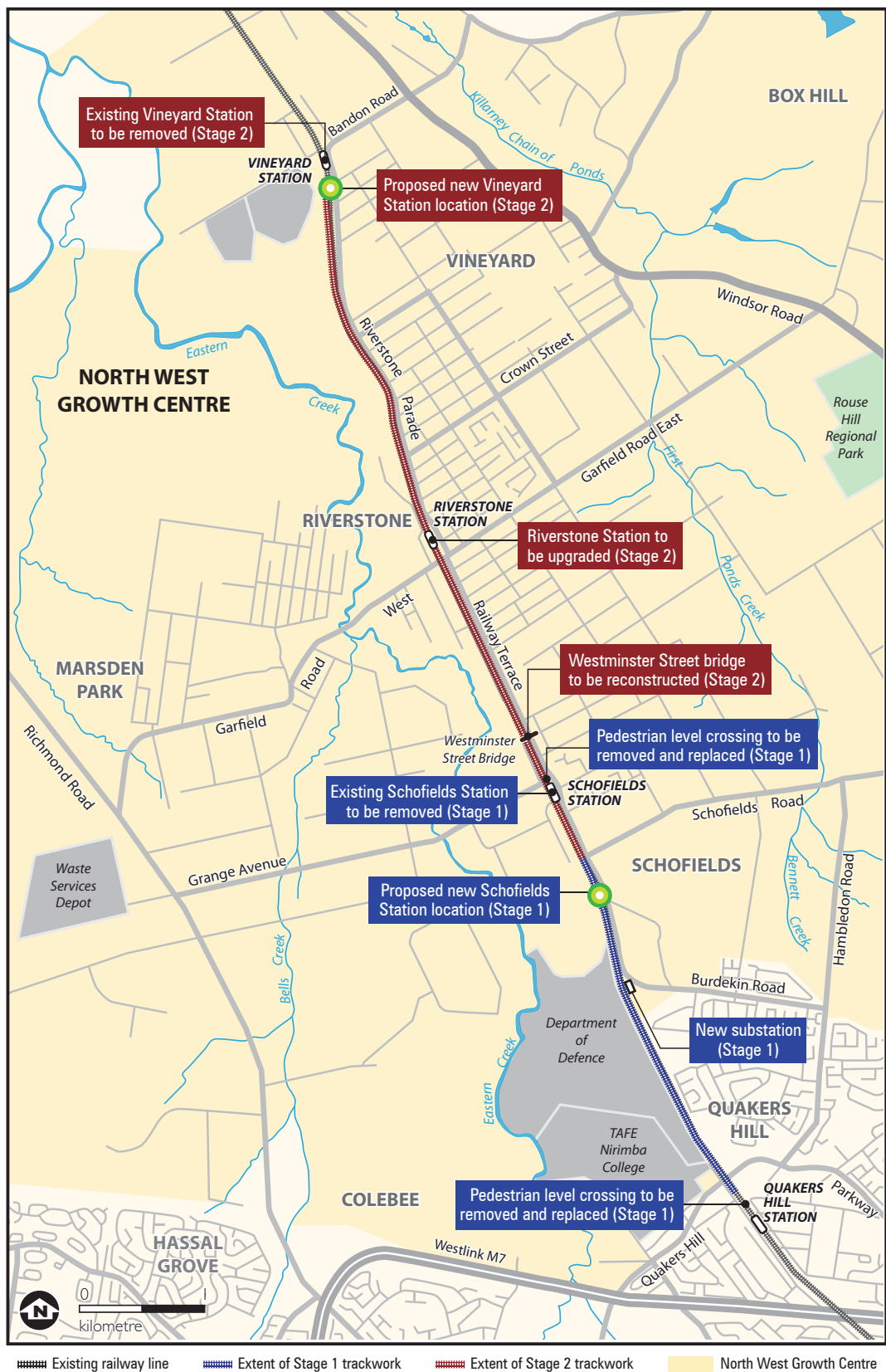


Figure 6-12 Stages of the project

6.3.2 Construction methodology

An indicative construction methodology is provided in Table 6-1 and discussed below.

Table 6-1 Indicative construction activities

Stage	Activity	Indicative timing
Site establishment	▪ property adjustments and land acquisition	Pre-construction
	▪ installing environmental controls	
	▪ establishing temporary compound sites	
	▪ vegetation clearing	
	▪ relocating/diverting rail and non-rail services/utilities	
	▪ traffic management arrangements	
	▪ isolating work areas from the live rail corridor	
	▪ survey work	
	▪ geotechnical and contamination investigation	
	▪ bulk earthworks	
▪ constructing retaining walls and noise walls (if required)		
▪ replacement/upgrade culverts		
▪ station works: <ul style="list-style-type: none"> ▶ new Schofields Station (Stage 1) ▶ new Vineyard Station (Stage 2) ▶ Riverstone Station upgrade (Stage 2) 		
▪ bridge works: <ul style="list-style-type: none"> ▶ Westminster Street overbridge (Stage 2) ▶ Quakers Hill footbridge (Stage 1) ▶ Schofields footbridge (Stage 1) 		
▪ decommissioning of existing Schofields (Stage 1) and Vineyard stations (Stage 2)		
▪ decommissioning of existing Quakers Hill, Schofields and Riverstone pedestrian level crossings		
▪ other structures, including: <ul style="list-style-type: none"> ▶ temporary works ▶ drainage works (culverts) ▶ new substation at Schofields ▶ upgrade existing substation at Vineyard 		
▪ track work		
▪ relocating/modifying/diverting services		
▪ overhead wiring		
▪ power works		
▪ signalling works		

Stage	Activity	Indicative timing
Testing and commissioning	<ul style="list-style-type: none"> ▪ testing and commissioning of railway systems and signals 	Post-construction
Demobilising	<ul style="list-style-type: none"> ▪ removal of temporary construction facilities ▪ rehabilitating and landscaping work sites and affected areas ▪ removal of environmental controls once areas are established 	Post-construction

Site establishment

Relocating and protecting services and utilities

Where necessary, RailCorp signalling, power and communication cables, and other electrical and signalling equipment within the construction footprint of the Project would be relocated away from the construction zone. A temporary enabling route would be constructed where necessary to relocate RailCorp services. This work is necessary to ensure that the construction of the Project does not impact on utilities within the construction footprint.

Works involving the relocation of services within live rail zones would be undertaken during rail possessions.

Isolation of the construction zone from the operating rail tracks

For safety and operational reasons, the construction zone for the Project would be physically isolated from the operating railway where possible. This would minimise the need to undertake works during rail possessions (i.e. out of hours work), thereby reducing potential noise impacts to local residents, and would also reduce impacts to track operations, thus reducing impacts on commuters. The isolation of the construction zone would be achieved through a number of methods, depending on the available corridor width, including fencing and jersey kerbs.

Main civil construction works

Earthworks

A total of approximately 76,900 cubic metres of material would be excavated during construction works, as summarised in Table 6-2.

Table 6-2 Estimated volume of excavated material

From (Chainage)	To (Chainage)	Stage*	Approximate volume of material to be excavated (cubic metres)
41.010 km	43.190 km	1	43,900
43.300 km	46.000 km	2	11,320
46.000 km	47.200 km	2	1,970
47.200 km	49.310 km	2	19,650
TOTAL			76,840

* Stage is approximate for volume of excavated material

Fill material would be required for backfilling, access roads and retaining wall construction. The estimated fill requirements are summarised in Table 6-3.

Table 6-3 Estimated volume of fill required

From (Chainage)	To (Chainage)	Stage*	Approximate volume of material required for fill (cubic metres)
40.200 km	42.700 km	1	36,000
43.300 km	46.000 km	2	12,500
46.000 km	47.200 km	2	2,230
47.200 km	49.310 km	2	24,300
TOTAL			75,030

* Stage is approximate for volume of fill material required

Where feasible, the excavated material would be reworked (if necessary) and used to meet fill material needs. However, this may be impractical if the excavated material is unsuitable for the purposes of structural fill. In this case, fill would need to be imported, and excavated material exported for reuse on other sites or for treatment or disposal. It is estimated that, in the worst-case scenario, up to 77,000 cubic metres of excavated material would require disposal (i.e. off-site disposal of all excavated material). Of this, 77,000 cubic metres, approximately 44,000 cubic metres would be generated from Stage 1 works. For the best-case scenario, all excavated material would be used on site, and an additional 1,810 cubic metres of material would require off-site re-use or disposal.

Retaining walls

Retaining walls can generally be constructed outside of track possessions if the work zone is safely isolated from the operating track. As discussed in Section 6.2.6, a number of different types of retaining walls would be used, depending on the nature of the substrate, proximity to the rail boundary/adjacent structures and the height of the cut/fill. Bored piling works would be required for the construction of some of the retaining walls. Other possible retaining structures include gabion baskets, post and panel, and shotcrete with anchors.

Station works

There are existing power cables above the proposed Quakers Hill and Schofields pedestrian overbridges. These would need to be relocated prior to construction of the overbridges.

Quakers Hill Station (Stage 1)

There would be no station works at Quakers Hill Station as part of this Project.

Schofields Station (Stage 1)

The existing Schofields Station would remain operational until completion of the new Schofields Station to ensure that the construction of the new Schofields Station would not disrupt commuters. Train services at Schofields Station would only be disrupted during scheduled track possessions — at these times buses would replace trains (refer to track possessions section below). Commuter car parking at the existing Schofields Station may be impacted during the construction of the pedestrian overbridge. However, any loss of car parking spaces prior to the commissioning of the new Schofields Station will be offset at a one to one ratio to overcome impacts to commuter car parking availability.

Riverstone Station (Stage 2)

Apart from some minimal loss of platform space during the widening of the platform and construction of the footbridge, stairs and lifts, the station would remain operational during construction. The works at Riverstone Station would be isolated from the station operations by establishing a safe working zone perimeter around the construction area for the stairs, lift shafts and footbridge. Undertaking construction works in this manner would reduce service disruptions to commuters by unnecessary track closures and would also ensure faster project delivery. Train services at Riverstone Station would be disrupted during scheduled track possessions only — at these times buses would replace trains (refer to track possessions section below).

The Station Manager's Cottage and the signal box would need to be protected with temporary fencing prior to the commencement of works. The timber station sign on Platform 1 is heritage listed as an artefact on the State Heritage Register and would need to be temporarily relocated to a new position for the duration of construction at Riverstone Station.

A new path would be constructed from Riverstone Parade to Riverstone Station to provide access to the existing platform, and the new lift and stairs. The construction of the path would potentially require the removal of one or more existing trees.

Vineyard Station (Stage 2)

The existing Vineyard Station would remain operational until completion of the new Vineyard Station, hence the construction of the new Vineyard Station would not disrupt commuters except during scheduled track possessions — at these times buses would replace trains (refer to track possessions section below).

Footbridges, stairs and lifts

A large portion of work related to provision of footbridges, stairs and lifts would occur during possessions. However where possible, construction of the new stairs, lifts and ramps for the new footbridges at Quakers Hill, Schofields, Riverstone and Vineyard would occur during normal rail operations. Footings, piers and other substructure works would be undertaken outside of scheduled rail possessions through erecting safety fence(s) to define a safe working zone in accordance with RailCorp standards. Vehicle and pedestrian level crossings would remain operational during construction. Undertaking construction works in this manner would reduce service disruptions to commuters by unnecessary track closures and would also ensure faster project delivery. Possessions would be required for strategic lifting of over-rail structures (e.g. footbridge deck) during construction.

The pedestrian level crossings at Quakers Hill, Schofields and Riverstone would remain operational until completion of the replacement footbridges.

Westminster Street overbridge

The final design of Westminster Street overbridge and its construction would be developed during the detailed design phase of the Project.

The methodology for the proposed reconstruction of the overbridge was developed taking into account limited track possession periods, craneage requirements and the need to minimise road closures.

Piles and abutment beams would be constructed during possessions along with the temporary launching beams behind the existing overbridge. Temporary bridging plates would be placed over the works so that the bridge could be re-opened to traffic during the daytime. The girders would be placed on the temporary launching beams and transversely stressed during a track possession.

It would be necessary to close the bridge to road traffic and pedestrians during the major track possession, which would occur over approximately three full days. During this time traffic would be diverted. A proposed detour route is via Carnarvon Road, Garfield Road West and Railway Terrace (refer Figure 6-13). The existing superstructure and abutments would be removed and a fence would be provided around the rail tracks. The new bridge superstructure would be slid into position over the new abutments and the superstructure would be completed. Following these works, the overbridge would be reopened to traffic. The bridge would additionally be partially closed for around 30 days during which time temporary signals would be used for traffic control. The impact of the partial and full closure of the bridge is addressed in Section 8.2.

Based on the current concept design, no other road closures are expected to be required for construction of the Project. However, this would be subject to detailed design.

Construction activities would result in additional construction traffic on local roads for the duration of the construction phase. Construction traffic is addressed further in Section 8.2 and in Technical Paper 1.

Track work

Track construction would require the delivery by rail and/or road of approximately 25,000 tonnes of materials. Intermediate stockpiles of materials, such as ballast and sleepers, would be established at regular intervals along the corridor as dictated by the available trackside space and access/environmental constraints. Where possible, bulk materials (such as rail, ballast and sleepers) would be delivered by rail. Road transportation would be used to deliver non-bulk materials.

Overhead wiring

All overhead wiring structures would generally be constructed prior to the laying of the new track. The new single mast structures could be constructed outside of rail possession periods if they are located outside the existing live rail zone and if sufficient space exists. Overhead wiring for the new tracks would be assembled outside of track possessions. Due to the proximity of to the 'live' track, wiring for turnouts and crossovers to be connected to the existing wiring would be carried out during track possessions and following completion of the track work.

Signalling equipment

The Project would require the relocation of, and modifications to, the existing signalling infrastructure (including signalling supplies and signal huts), and the installation of new signalling. Works to the signalling, including the installation of new signalling equipment, would occur both during and outside of track possession periods. For areas outside 'live' rail areas, activities would include the construction of a new cable route outside of the work area to replace the existing route affected by construction, and relocating any signalling equipment likely to be affected by the earthworks. Connections to the existing equipment

would generally be undertaken progressively during track possession periods before bulk earthworks commence. The remainder of the signalling infrastructure relating to the new track work, including additional power supply, would be completed outside of track possession periods.

Testing and commissioning

The testing and commissioning of the Project would involve testing the operation of all aspects of the Project, including signalling and communication facilities, train control, the new track and the interfaces with the existing network.

Track possessions

A track possession is the temporary shut down of part of the rail network to facilitate maintenance, construction or emergency works. Track possessions are necessary to ensure the safety of construction workers and rail commuters during construction works.

Whilst final details are to be confirmed, it is currently anticipated that approximately 30 rail possessions would be utilised during the construction of the Project, which comprise both weekend possessions and two two-week long possessions in which limited and/or no train services would operate. To minimise impacts to rail commuters, track possessions generally occur across weekend periods between midnight on Friday and 4 am the following Monday. Some possessions can extend beyond weekend periods. However, these longer possessions would normally only occur at times when commuter demand are at a minimum, such as at Christmas, Easter, school holidays or long weekends. These track possessions are determined by RailCorp and would not be dictated by the Project. During the scheduled track possessions, RailCorp would arrange for buses to replace trains.

In addition to planned track possessions, night-time possessions would also be used. Night-time possessions relate to work that can be undertaken during the night-time in accordance with TIDC's (November 2007) *Construction Noise Strategy (Rail Projects)* when trains are not running. There are no scheduled dates for these works, which would occur on an as-needed basis.

The local community, including residents and businesses, would be notified in advance of any out-of-hours works that are likely to be audible at adjacent sensitive receivers, including mid-week, night-time and weekend track possessions.

Activities likely to be undertaken during track possessions include, but are not limited to:

- erecting safety barriers and fences to isolate the construction areas from the 'live' track
- adjusting utilities within the active rail zone
- clearing vegetation
- constructing elements of the Westminster Street overbridge
- constructing elements of the pedestrian overbridges at Quakers Hill, Schofields, Riverstone and Vineyard
- removing the pedestrian level crossings at Quakers Hill and Schofields
- constructing footings in proximity to the existing rail lines for the new overhead wiring structures
- removing existing overhead power lines and installing new overhead wiring structures

- installing temporary signalling cables and new signalling
- removing redundant turnouts and installing new turnouts
- refurbishing the existing turnout and siding just north of Riverstone Station.

6.3.3 Plant and equipment

Table 6-4 provides an indicative list of construction equipment that would be required for the following construction scenarios:

- A: Pedestrian footbridge construction — Quakers Hill, Schofields, Riverstone
- B: Removal of level crossing — Quakers Hill, Schofields, Riverstone
- C: Culvert replacement
- D: Retaining wall construction (piling)
- E: New station construction — Schofields and Vineyard
- F: Demolition of existing station — Schofields and Vineyard
- G: Overbridge platform construction — Riverstone Station
- H: Excavation and compaction
- I: Overhead wiring and signalling
- J: Track laying.

Table 6-4 Construction equipment required for different construction scenarios

Equipment	Construction scenario									
	A	B	C	D	E	F	G	H	I	J
Crane	✓		✓	✓	✓	✓	✓		✓	✓
Semi-trailer	✓	✓	✓	✓	✓	✓	✓			
Generator	✓	✓	✓	✓	✓	✓	✓			✓
Concrete saw	✓	✓	✓	✓	✓	✓	✓			
Jack hammer	✓	✓	✓	✓	✓	✓	✓			
Concrete truck	✓		✓	✓	✓		✓			
Concrete pump	✓		✓	✓	✓		✓		✓	
Concrete agitator				✓					✓	
Excavator	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Backhoe		✓		✓	✓	✓	✓	✓		✓
Piling bore rig	✓			✓	✓		✓	✓	✓	
Franna crane	✓			✓	✓	✓	✓		✓	✓
Grader								✓		✓
Dump truck								✓		✓
Front end loader								✓		✓
Vibratory roller	✓		✓	✓	✓		✓	✓		✓
Lighting tower	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dewatering pump			✓		✓			✓		
Water cart					✓			✓		✓

Equipment	Construction scenario									
	A	B	C	D	E	F	G	H	I	J
Rock breaker						✓		✓		
Elevated work platform	✓				✓				✓	
High rail	✓				✓				✓	✓
Work train										✓
Track laying machine										✓
Tamper										✓
Ballast regulator										✓
Rail dump cart										✓
Rail grinder										✓
Gang truck										✓
Compressor	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rock hammer	✓	✓	✓		✓	✓	✓	✓	✓	
Boring machine	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bobcat	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flash-butt welder										✓
Demolition saw	✓	✓	✓		✓	✓	✓	✓	✓	
Boring rig									✓	

6.3.4 Construction workforce

It is anticipated that between 10 and 100 staff would be working at each of the work sites in the initial stages of construction, with more staff during later stages.

6.3.5 Construction work hours

The majority of the works would be undertaken during standard construction hours, as follows:

- 7 am to 6 pm Monday to Friday
- 8 am to 1 pm Saturday
- no work on Sundays or public holidays, with exception to works undertaken during possessions.

Exemptions and approval for works outside of the standard hours may be required during the following circumstances:

- works required by utility service providers or where impacts to services cannot be reasonably managed
- works requiring track possessions
- oversize deliveries/unloading of machinery that can only travel between hours specified by the police or the RTA
- where works can be undertaken so as to be inaudible at the nearest residential receivers

- as otherwise agreed with the Department of Environment and Climate Change (DECC) in the issuing of an environmental protection licence (refer Table 2-1) for licensable works.

6.3.6 Construction worksites

The proposed locations for the site compounds, including stockpile sites and laydown areas, are indicated in Figure 6-13 and discussed in further detail in Chapter 10. The proposed construction compound locations include:

- Footbridge East — opposite Lalor Street, Quakers Hill (Stage 1)
- Footbridge West — car spaces adjacent to rail corridor between Quakers Hill Inn and Douglas Road (Stage 1)
- Quakers Hill Parkway East — within Oddy Park, Quakers Hill (Stage 1)
- Quakers Hill Parkway West — hardstand area north of Quakers Hill Inn (Stage 1)
- Seldon Street South — field south of Seldon Street, Quakers Hill (near RailCorp access road) (Stage 1)
- Richmond Line Alliance Project Office — adjacent to new Schofields Station site (Stage 1)
- existing Schofields Station — car park of the existing Schofields Station (once station operations have been relocated to the New Schofields Station) (Stage 2)
- Westminster — land on the western side of the track, adjacent to Westminster Street overbridge (Stage 2)
- Riverstone — on the western side of Riverstone Station (Stage 2)
- Roadmaster Property, referred to as “Meatworks” — within Roadmaster property, near level crossing (Stage 2)
- Vineyard — adjacent to new Vineyard Station (Stage 2).

It is noted that the number and locations of site compounds may be subject to change in response to the development of the detailed design.

These sites would typically accommodate a combination of demountable offices, meal rooms, toilets/showers, parking facilities (where possible) and construction support facilities, including equipment storage, maintenance shed and chemical/fuel stores. Additional sites would be required to store plant and equipment, and stockpiles of materials. Access to work sites would be achieved either via the existing RailCorp vehicle access gates along the rail corridor or via streets and/or reserves adjoining the rail corridor. Temporary access roads may be required to access these worksites.

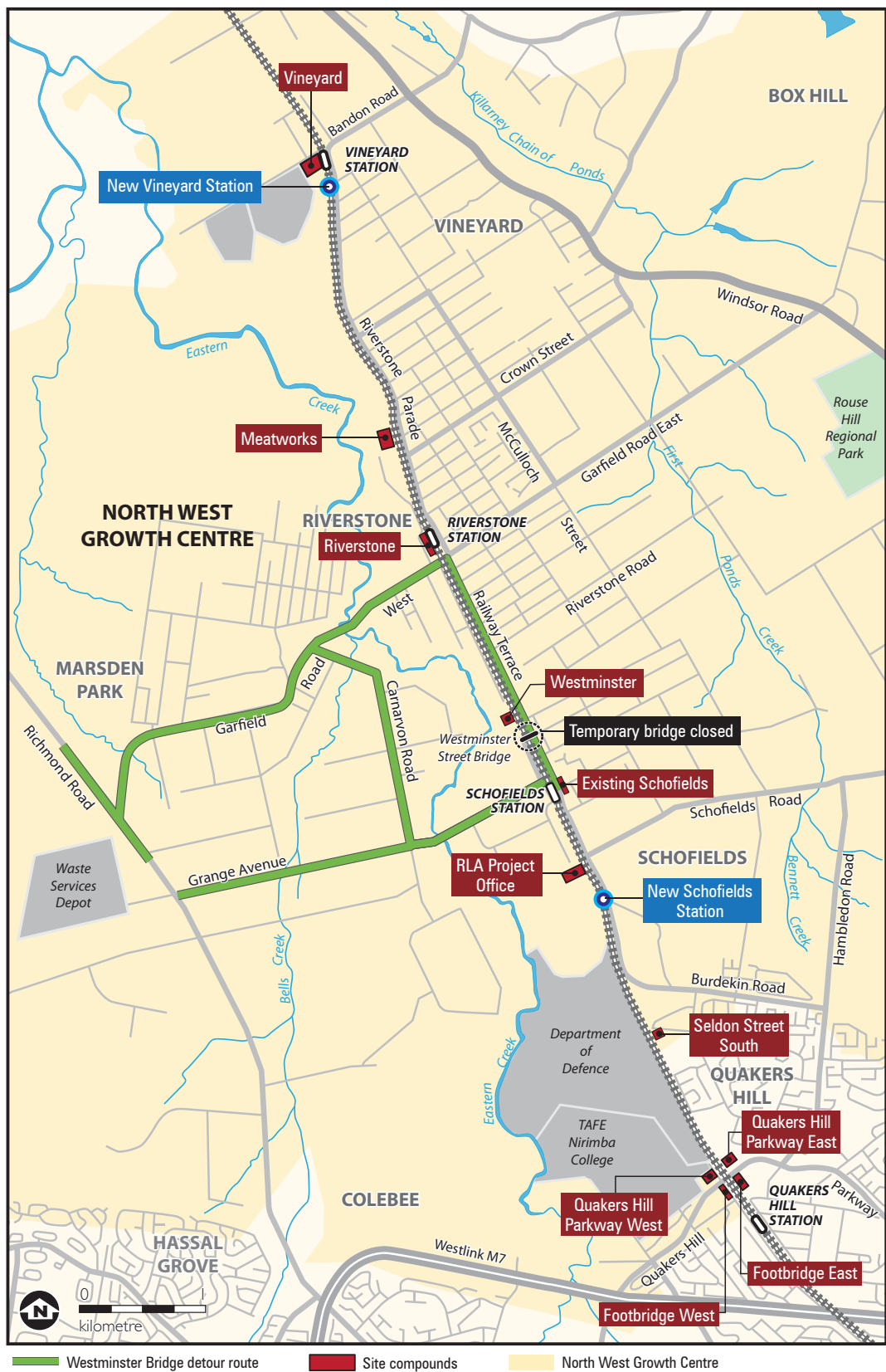


Figure 6-13 Proposed traffic detours during Westminster Street overbridge closure and construction site compounds

6.3.7 Construction traffic and access

Construction vehicle traffic would be greatest during the main earthworks and civil construction, and would comprise vehicles transporting equipment, materials and spoil, and construction workers accessing the work sites. Access to the sites would be via a number of state, regional and local roads. Further details are provided in Section 8.2 and Technical Paper 1 (refer Volume 2).

6.3.8 Utilities

As described in Section 3.13, there are numerous utilities located adjacent to and crossing the Project (refer Table 3-34). Many of these utilities will be in conflict with the proposed works and will require protection or relocation to enable the construction and operation of the Project. As discussed in Section 3.13, preliminary investigations have identified the following utilities across the rail corridor:

- telecommunications cables in 13 locations
- water mains in 11 locations
- sewer mains in 12 locations
- underground electricity cables in 13 locations
- aerial electricity cables in 10 locations
- gas main in two locations
- RailCorp communications and signalling in 21 locations (refer Table 3-34).

High voltage Integral Energy 132kV and 330kV overhead transmission lines cross the rail line between Riverstone and Vineyard stations, and pass south of the southern-most section of open platforms at the proposed new Vineyard Station. The vertical height of these cables is approximately 20 metres above natural ground level.

A 100 millimetres high pressure gas main (owned by Jemena) crosses the rail corridor within the vicinity of the existing Quakers Hill pedestrian level crossing (refer Table 3-34). Test pitting would be undertaken during the detailed design to confirm the exact location of this utility to ensure that the Project is designed around the utility.

A high pressure petroleum pipeline (Caltex's Sydney-Newcastle high pressure petroleum pipeline) has been identified as running parallel to the Project at a distance of between 700 metres -1000 metres, and is not in the vicinity of the proposed works.

Services would be protected and/or relocated where conflict with the proposed works occurs, and in any other area where existing infrastructure requires adjusting. These works would include:

- the relocation of utilities located along the western side of the rail corridor between Quakers Hill Parkway and the new Schofields Station into a 3 metre wide utility corridor (refer Section 6.2.6).
- the relocation of utilities located along the eastern side of the rail corridor between Lalor Road (Quakers Hill) and Manorhouse Boulevard into a 3 metre wide utility corridor (refer Section 6.2.6)

- the relocation of one section of Telstra cable in the vicinity of Westminster Street overbridge
- relocating and replacing street lighting and station lighting
- coordinating communications and power utilities.

Further detail on the assessment and management of utilities, hazards and risks is provided in Table 7-2, and sections 9.7 and 9.9.

6.3.9 Construction environmental management

A construction environmental management plan (CEMP) would be prepared for the construction phase of the Project. The CEMP would provide a centralised mechanism through which all potential environmental impacts relevant to the Project would be managed. It would outline a framework of procedures and controls for managing environmental impacts during construction.

The CEMP would outline how environmental mitigation measures identified in this Environmental Assessment would be incorporated into the construction stage of the Project, and would document mechanisms for demonstrating compliance with the Minister for Planning's Conditions of Approval (COA), other relevant Project approvals and the Statement of Commitments (SoCs).

The CEMP would identify the auditing and inspection frameworks. TIDC would engage an Environmental Management Representative for the Project. Regular audits by the Environmental Management Representative and TIDC would be undertaken against the CEMP, COA and SoCs.

The CEMP would also identify the framework for the management of the following issues:

- construction traffic management
- construction noise and vibration management
- water and soil management
- flora and fauna, and weed management
- non-Indigenous and Indigenous heritage management
- dust management
- landscape and rehabilitation (for worksites)
- community liaison (addressed in a Community and Stakeholder Involvement Plan)
- hazards and risk management (addressed specifically in a Hazard and Risk Management Plan, and Services and Utilities Plan)
- spoil management
- waste management.

The CEMP would identify the mitigation and monitoring measures to be implemented to minimise environmental impacts; and establish the environmental performance objectives and targets for each aspect. The plan would involve following best practice guidelines, industry standards and key recommendations, where possible, made during this Environmental Assessment as discussed in chapters 8 and 9.

The CEMP would also outline objectives and targets for environmental performance, in the form of measurable key performance indicators. In addition to the CEMP, environmental work procedures and environmental control maps, containing site-specific details, would be prepared (and implemented) during construction.

The ongoing management of environmental issues associated with the operation and maintenance of the Project would be undertaken through RailCorp's existing Environmental Management System and operating procedures.

6.4 Operation of the Project

6.4.1 Rail operations plan

The train operation objectives of the Project are to:

- increase capacity to run additional services on the Richmond Branch Line
- provide for up to eight trains per hour in the short- to medium-term with capacity for up to 12 trains per hour in the long-term
- improve service reliability by separating train services and providing infrastructure to support out-of-course train running.

Ultimately, the Project will allow further increases in train services when later required. Rail operations during each stage of the Project are described below.

Stage 1 rail operations

It is anticipated that when Stage 1 (to new Schofields Station) is operational, the Richmond Branch Line will have capacity to support up to six trains per hour through Quakers Hill, comprising four trains per hour starting from new Schofields Station, and two trains starting from Richmond.

Stage 2 rail operations

Once Stage 2 is fully operational, the Richmond Branch Line will have capacity to support up to eight trains per hour, comprising six trains starting from the new Vineyard Station and two trains starting from Richmond.

6.4.2 Track design speeds

The track would be designed for a maximum speed of 115 kilometres per hour. At some locations where the existing corridor alignment is constrained, the track speed would be limited. These areas are located between chainages 40.050 kilometres and 42.200 kilometres (i.e. between Quakers Hill Station and the intersection of Railway Terrace and Burdekin Road), and chainages 46.930 kilometres and 47.480 kilometres (i.e. between Sydney Street and Edward Street, Riverstone). In these locations, maximum track speed would be reduced to 100 kilometres per hour and 85 kilometres per hour on the Up Main, and 100 kilometres per hour and 80 kilometres per hour on the Down Main respectively. Despite this, the alignment of the new tracks would be optimised and is enhanced in comparison to the existing track geometry.

6.4.3 Station operations

The station operation objectives of the Project are to:

- provide or enhance operations at Riverstone Station, and the new Schofields and Vineyard stations to facilitate a high level of customer service, reflecting the new infrastructure and role of Vineyard and Schofields stations as interchanges
- manage safe and reliable turnback operations at new Schofields (following commissioning of Stage 1)
- manage safe and reliable turnback operations at Vineyard (following commissioning of Stage 2).

The existing stations would remain operational throughout the construction of the Project, except during the scheduled track possessions (refer Section 6.7.2). The existing Schofields and Vineyard stations would remain fully operational until the new stations are commissioned.

6.4.4 Maintenance

The provision of adequate maintenance access is an important aspect of the Project. A RailCorp maintenance track would be established parallel to the Down track (i.e. western side of the rail corridor) between Quakers Hill Parkway and the new Schofields Station. Additional maintenance access easements would be identified and included during detailed design as necessary. Existing access to the rail track is obtained via a series of gates along the rail corridor. Vehicular access is currently available via unformed tracks that do not follow the full length of the route. It is proposed that the existing vehicular maintenance access arrangements be reviewed and in most cases be provided via adjacent roadways and along access paths running parallel to the new rail. Provision of a dedicated level access, vehicular maintenance roadway along the route is not part of the Project.

A maintenance walkway on either side of extended culverts would be provided, where required, to allow for safe access and visual inspection of track.

The Project would be designed and constructed to ensure effective maintenance can be achieved safely and with minimum whole-of-life cycle costs. All planned maintenance would be conducted as per existing RailCorp operations, maintenance policies and practices.