The closure of the Garfield Road level crossing and the 'Meatworks' level crossing at Riverstone are not a part of this Project, but are discussed further in Section 8.2. The Garfield Road crossing would be constructed by the RTA and alternative pedestrian access would be provided by the Project over Riverstone Station. The closure of the 'Meatworks' level crossing by RailCorp does not form part of this Project.

Land sterilisation could occur in locations where structures are proposed outside of the existing rail corridor, in particular areas within the proposed widened rail corridor, the new Schofields and Vineyard stations and associated car parks and bus interchange facilities. The development of the Project would require the acquisition of privately-owned land (refer Table 8-1). Acquisition of this land is not expected to result in land sterilisation as the acquired land would eventually be redeveloped for residential and other uses as part of plans for the NWGC.

8.1.5 Management measures

To minimise land use and property impacts associated with the Project, Transport Infrastructure Development Corporation would liaise with agencies responsible for future precinct planning in the NWGC to ensure the detailed design of the Project makes allowance for:

- any required measures to improve connectivity across the corridor to manage severance impacts, including opportunities for pedestrian bridges and other access
- potential co-location of utilities or other beneficial land uses of the rail corridor.

Acquisition of land would be by agreement or compulsory process in accordance with the requirements of the *Land Acquisition (*Just *Terms Compensation) Act 1991*.

Measures to manage impacts on adjacent land uses are discussed further in sections 8.2, 8.3, 8.4, 9.1 and 9.5.

8.2 Traffic and transport

The existing traffic and transport conditions in the Project area have been described in Section 3-2. This section summarises the potential traffic and transport impacts during construction and operation of the Project and identifies mitigation measures for such impacts. The complete assessment is provided in Technical Paper 1 – Traffic and transport in Volume 2 of this report.

A construction and operation impact analysis was undertaken to examine:

- the proposed construction methodologies and preliminary station concept designs to determine the potential impacts of construction on existing traffic and transport conditions
- the adequacy of the proposed interchange facilities to meet demand for opening and future operations (2031 scenario).

It is important to note that traffic management issues will be addressed as part of the construction environment management plan (CEMP) prior to the commencement of construction to avoid, manage, mitigate, offset, and/or monitor the impacts.

8.2.1 Construction impacts

Construction methodology

Section 6.3 provides information on the proposed construction methodology, working hours and construction equipment for the Project.

It is anticipated that the bulk of construction works would occur during the civil construction work phase. This phase would present the greatest peak in vehicle demand, due mostly to spoil removal. A total of 180 staff could be on the various work sites at any one time during Stage 1. This would increase to 190 staff in Stage 2. The total truck movements for all sites could be up to eight vehicles per hour in Stage 1. This would increase to 12 vehicles per hour in Stage 2.

Potential site compounds, including stockpile sites and set-down areas, have been identified in 11 different locations: Quakers Hill Footbridge (East), Quakers Hill Footbridge (West), Quakers Hill Parkway (Oddy Reserve East), Quakers Hill Parkway (West), Seldon Street South, Richmond Line Alliance (RLA) Project Office (off Bridge Street), Existing Schofields Station, Westminster Bridge, Riverstone Station, Roadmaster property 'Meatworks' site in Riverstone and Bandon Road in Vineyard. These are shown in Figure 8-2 and discussed further in Chapter 10.

It is proposed that all staff and construction vehicles would access the rail corridor via the compounds outlined above or other access locations along the corridor. Additional construction zones, external to the rail corridor, would be required for construction of facilities at each of the stations and at Westminster Street overbridge. Riverstone Parade and Railway Terrace would be used to access these sites.

General construction traffic would use designated construction routes. Construction vehicles would not use weight-restricted local roads, as far as possible. The exception to this is the use of a short section of Grange Avenue between Carnarvon Road and Argowan Road, which is unavoidable. The use of other local roads would be limited to access to compounds and construction sites. Any oversize/overweight deliveries (larger than a standard B-Double load) would require NSW Roads and Traffic Authority (RTA) approval prior to movement.

Rail possessions scheduled by RailCorp would be used for the Project. Whilst proposed possessions are subject to confirmation, there are approximately 30 scheduled RailCorp weekend possessions and two, two-week long possessions during the Project construction timeframe. It is possible that the number and scheduling of possessions could change. Any changes to the possessions would be arranged by RailCorp. During rail possessions, rail replacement buses would operate as per standard RailCorp rail replacement bus arrangements. Limited train operations are proposed during one of the two-week long rail possessions.

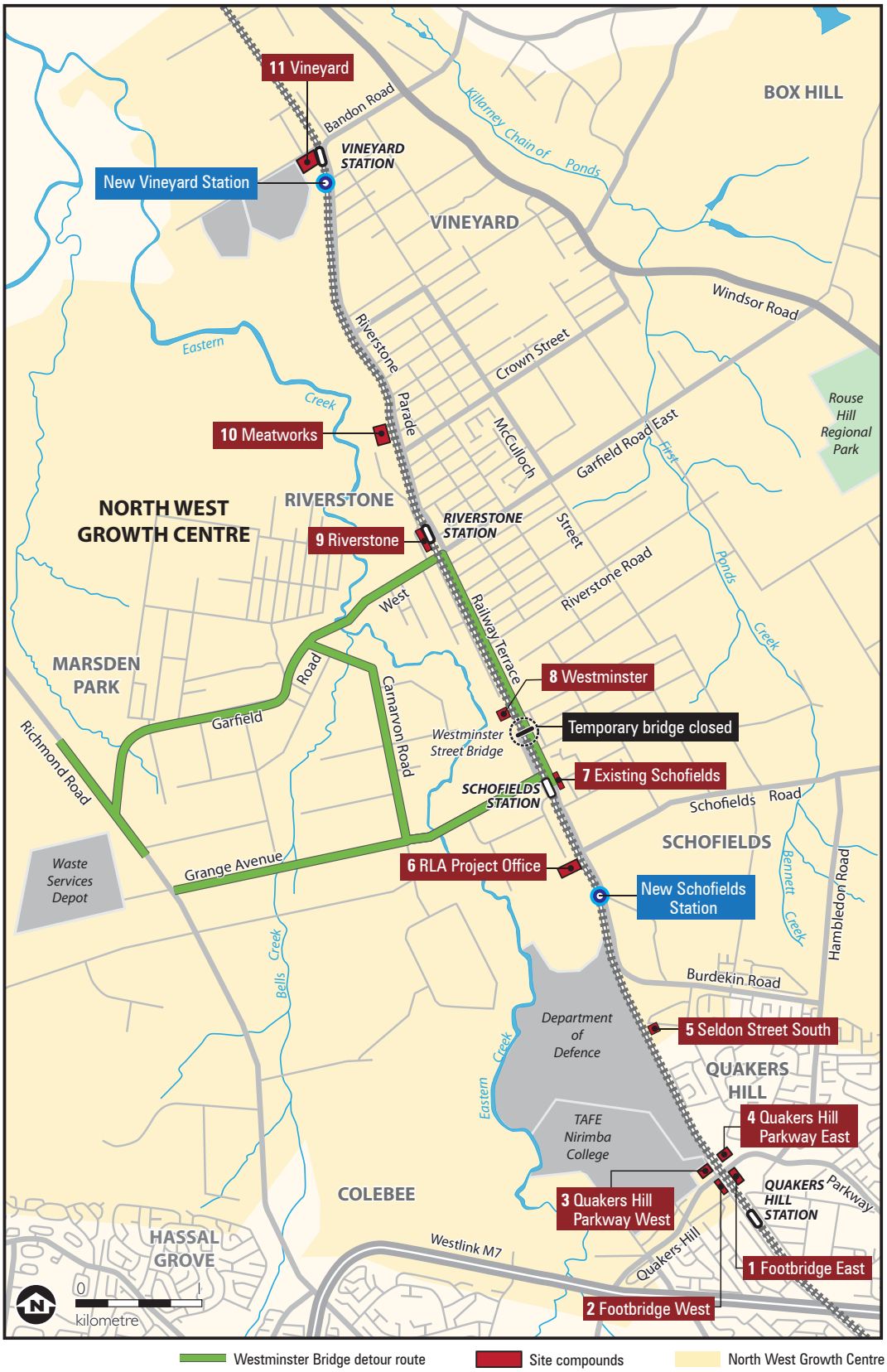

Figure 8-2 Proposed construction site compounds and detours during closure of Westminster Street overbridge

Construction impacts — station precincts

All of the stations would remain open to rail operations during construction except during the rail possessions, as discussed above (although a portion of the rail possessions described would occur irrespective of the Project). Construction work for the new line would proceed while the existing line remains operational. A barrier or fence would be provided to segregate works from the 'live' rail operations. Barriers would also be provided, where required, to restrict access to authorised construction personnel only.

The existing Schofields and Vineyard stations would remain operational during construction of the new stations. This would allow for minimal disruption to passengers using the existing stations. Rail operations would shift to the new stations on their completion.

Impacts on buses

None of the proposed site compounds or construction sites would impact the location of bus stops or bus services during construction. However, as construction planning progresses it may be required to temporarily relocate bus stops at stations undergoing reconstruction. In the event that this would be required, both bus companies and passengers would be notified.

Impacts on station access

Quakers Hill Station (Stage 1)

Quakers Hill Station is excluded from the works associated with the duplication. The only construction activities would be associated with the new pedestrian footbridge north of Quakers Hill Station, which is proposed to replace the existing pedestrian level crossing north of Quakers Hill Station. The level crossing would remain operational during construction of the footbridge and would be closed once the new footbridge is opened.

It is expected that between 12 and 20 car parking spaces would be temporarily removed from the western side of the rail line during construction of the pedestrian footbridge. The pedestrian footbridge would require the permanent removal of one parking space from the western side of the rail line.

Schofields Station (Stage 1)

Construction activities associated with Schofields Station would include:

- relocation of the existing station approximately 800 metres to the south
- replacement of the existing pedestrian level crossing at the existing station with a pedestrian footbridge
- development of a kiss-and-ride facility, bus zone and taxi rank at the new Schofields Station
- development of a new at-grade car park of approximately 140 spaces between Railway Terrace and the new Schofields Station concourse
- development of a new approximately 90 space at-grade car park adjacent the new Schofields Station on the western side of the rail line. (A new road and shared pedestrian/cycle path would provide access to the western side of the new station from Bridge Street.)

The decommissioning, demolition and removal of the existing station would be completed following the transfer of service to the new Schofields Station.

Construction of the new Schofields Station would occur off-line and to the west of the existing rail line. Partial road closures may be required on Railway Terrace to construct the kiss-and-ride/car parking facilities, bus zone and taxi rank.

Construction of the new footbridge would require the use of approximately five commuter parking spaces on Railway Terrace during construction. This impact is expected to be negligible if station operations have already been transferred to the new Schofields Station. If the footbridge is constructed prior to the transfer of service, then any existing commuter car parking spaces lost prior to the commissioning of the new Schofields Station would be offset at a ratio of 1:1 to ensure that the net number of parking spaces at the existing Schofields Station is maintained. Construction of the footbridge would have minimal impact on access to, and use of, the station platform. The level crossing would remain operational during construction of the footbridge.

Riverstone Station (Stage 2)

Construction activities associated with Riverstone Station would include:

- the widening of Platform 2
- upgrading the station to comply with easy access and *Disability Discrimination Act 1992* (DDA) standards
- constructing a new pedestrian footbridge, including stairs and two passenger lifts to replace the existing pedestrian level crossing.

Pedestrian access across the railway would be maintained during construction of the new pedestrian footbridge.

It is expected that during construction, part of the existing commuter car park at Riverstone Station would be closed to allow enabling works and the upgrade of the station. It is likely that less than 10 spaces would be required for the construction period at Riverstone Station. Therefore, approximately 10 commuter vehicles would be dispersed throughout the area during construction at Riverstone Station. Currently an informal car park across Riverstone Parade from the station also fills with commuter vehicles; therefore, it is likely that the 10 vehicles would be required to park in the surrounding streets of Riverstone Parade, Railway Terrace, Mill Street and Pitt Street. An indication of this impact is that 10 vehicles would consume an additional 60 metres of kerb space from adjacent streets (assuming 6 metres per vehicle). It is possible that some users would travel to other stations along the rail line that provide commuter car parking, such as Schofields Station. Additional parking at Schofields Station constructed in Stage 1 would be available. Following completion of the construction works, the existing commuter car park would be reinstated to its original state.

The partial closure of the commuter car park at Riverstone would not impact pedestrians or cyclists. No other traffic impacts are expected for access to Riverstone Station.

Vineyard Station (Stage 2)

Vineyard Station is proposed to be relocated approximately 250 metres to the south of its current location. Construction would be sequenced to complete the new station prior to decommissioning the existing station. As such, normal station operations would be maintained throughout construction.

During construction of the new Vineyard Station, partial road closures may be required on Riverstone Parade to construct the kiss-and-ride facilities, bus zone and taxi rank and car park.

Traffic management measures would be developed to address construction traffic and transport management. The objectives of the traffic management plan (TMP) would be to identify any additional issues (that arise during the detailed construction planning phase) relating to construction stage traffic and transport impacts and to set out the monitoring and mitigation measures to reduce the impacts to acceptable levels.

Construction impacts — road network

General traffic detours

Planned partial or full road closures would be required in some locations during construction works that impinge on the road network. The speed limit on these road sections may need to be reduced due to their proximity to the work zone area. The potential impacts would be delays to general traffic and an increase in journey travel time.

The only expected full road closure would be that of the Westminster Street overbridge in Stage 2. The proposed traffic detour during this time (shown in Figure 8-3) would be via Carnarvon Road, Garfield Road West and Railway Terrace. Opportunities to provide additional detour routes for east–west traffic movement are limited by the availability of suitable railway crossing points (refer Section 3.2.4).

A substantial portion of construction activities for the replacement of the Westminster Street overbridge would occur during track possessions. The bridge would be completely closed to traffic and pedestrians for approximately three days and partially closed (single lane operation) for approximately 30 days.

The overall impact on intersection performance is expected to be minimal. The partial closure of the bridge would result in the adjacent Westminster Street/Railway Terrace and Westminster Street/Bridge Road intersections operating at level of service (LoS) C during peak periods, and queue lengths could reach approximately 14–15 vehicles on Railway Terrace and Bridge Road.

Construction of the Westminster Street overbridge may involve the transport of beams and other materials by rail or oversized vehicles. This is yet to be determined. The load limit on Grange Avenue (5 tonne limit) would limit the transport of beams to the east side of the site, via Railway Terrace.

The closure of the bridge would affect pedestrians, who would be diverted to the existing pedestrian level crossing at Schofields Station (approximately 400 metres away) to cross the rail line. However, the arrangement of the road network suggests that many pedestrians would walk to/from the south adjacent Schofields Station and cross the pedestrian level crossing. Therefore, the diversion would only add additional time for pedestrians attempting to access the properties on the section of Bridge Street to the north of Schofields Station from areas adjacent to Westminster Street (on the eastern side).

Railway Terrace and Riverstone Parade would be minimally affected during construction of station interchange facilities at Schofields and Vineyard stations. These impacts would likely be limited to partial short-term lane closures; two-way flows would still be maintained.

Riverstone Parade and Railway Terrace would be the main north–south roads used for hauling materials, and for construction vehicle and staff access. This would be considered during the planning of any lane closures on these roads.

Construction would result in additional traffic impacts on Garfield Road East in the Riverstone town centre as construction equipment, materials, and spoil vehicles would need to cross Garfield Road in order to access Riverstone Parade and Railway Terrace, which are the primary north–south routes for access in the project area.

The Riverstone town centre area is currently congested and is a high activity area that has unsignalised pedestrian crossings across Riverstone Parade and Garfield Road. Construction vehicle trips are expected to add up to approximately 20 vehicles per hour to existing flows at this intersection, increasing traffic flows on Railway Terrace and Riverstone Parade by approximately 6% and 4% respectively. Considering the industrial nature of Riverstone Parade and the low traffic volumes on Railway Terrace, this additional vehicle movement is not expected to present a large impact. The management of Garfield Road East at these two intersections would be addressed in the TMP.

The RTA propose to replace the existing Garfield Road at-grade vehicular crossing with an overbridge in the future. The construction works for this project would be coordinated in consultation with the RTA in the event that the proposed Garfield Road overbridge is under construction at the same time as the Project.

Construction impacts — proposed vehicle routes

When determining construction vehicle routes it is important to distinguish between general construction traffic and oversized/overweight vehicles. In this case, general construction traffic would include vehicle sizes up to a standard semi-trailer. B-Doubles are not expected to be used to supply materials to the Project sites. This section describes routes for general construction traffic only.

Oversized/overweight vehicles may be required to transport large structural components, such as bridge beams, to the site. Movements of oversized and overweight vehicles would be subject to applicable approvals by the RTA following detailed construction planning.

The following principles were adopted, where possible, in determining general construction vehicle routes to the Project site:

- travel the most direct route
- use currently identified B-double routes
- avoid routes that may affect schools, childcare centres or shopping precincts
- avoid the use of local roads
- avoid the use of roads with road weight restrictions and/or bridge height clearance limits
- use roads in accordance with the road hierarchy: state roads (RTA-controlled), regional roads (council-controlled) then local roads (council-controlled).

Access to the rail corridor would be via the site compounds shown in Figure 8-3 and the existing RailCorp access gates. The rail corridor would provide the main north–south movement for internal construction trips. In limited circumstances, Riverstone Parade and Railway Terrace would be required to provide for north–south trips between the different work areas. Quakers Hill Parkway, Garfield Road and Bandon Road would provide for east–west travel movements across the railway line. All level crossings of the rail line are

restricted by 4.4 metre height limits. Therefore, vehicles greater than 4.4 metres height would be required to access the sites from the western side of the corridor. It is expected that vehicles higher than 4.4 metres arriving at the sites would be a rare occurrence.

Figure 8-3 shows the possible heavy vehicle routes to access the work compound areas and construction sites.

Proposed site compound access routes

Indicative locations for site compounds, including stockpile sites and set-down areas, have been identified in 11 different locations (refer Figure 8-2 and Chapter 10). Generally, site compounds would be accessed via arterial and collector roads; however, some sites would unavoidably require trips on local roads as summarised in Table 8-2.

Table 8-2 Proposed site compound access routes

Compound	Proposed access	Alternative access
Footbridge East	Pearce Road, Lalor Road, Quakers Hill Parkway, Douglas Road, Nirimba Drive	-
Footbridge West	Nirimba Drive/Railway Road, Douglas Road, Eastern Road, Quakers Hill Parkway	-
Quakers Hill Parkway East	Pearce Road, Lalor Road, Hambledon Road, Quakers Hill Parkway	Access Road through Oddy Park, Manorhouse Boulevard
Quakers Hill Parkway West	Nirimba Drive/Railway Road, Douglas Road, Eastern Road, Quakers Hill Parkway	-
Seldon Street South	Railcorp Access Road, Reycroft Avenue, Walker Street	-
RLA Project Office	New access track extending west to Vemon Road, Argowan Road, Grange Avenue, Carnarvon Avenue	Bridge Street, Argowan Road, Grange Avenue, Carnarvon Avenue
Existing Schofields	Railway Terrace, Schofields Road	Railway Terrace, Burdekin Road
Westminster	Bridge Street, Grange Avenue, Carnarvon Avenue	-
Riverstone	Garfield Road, Richmond Road	-
Roadmaster Property 'Meatworks'	Level crossing, Riverstone Parade, Garfield Road	-
Vineyard	Bandon Road	-

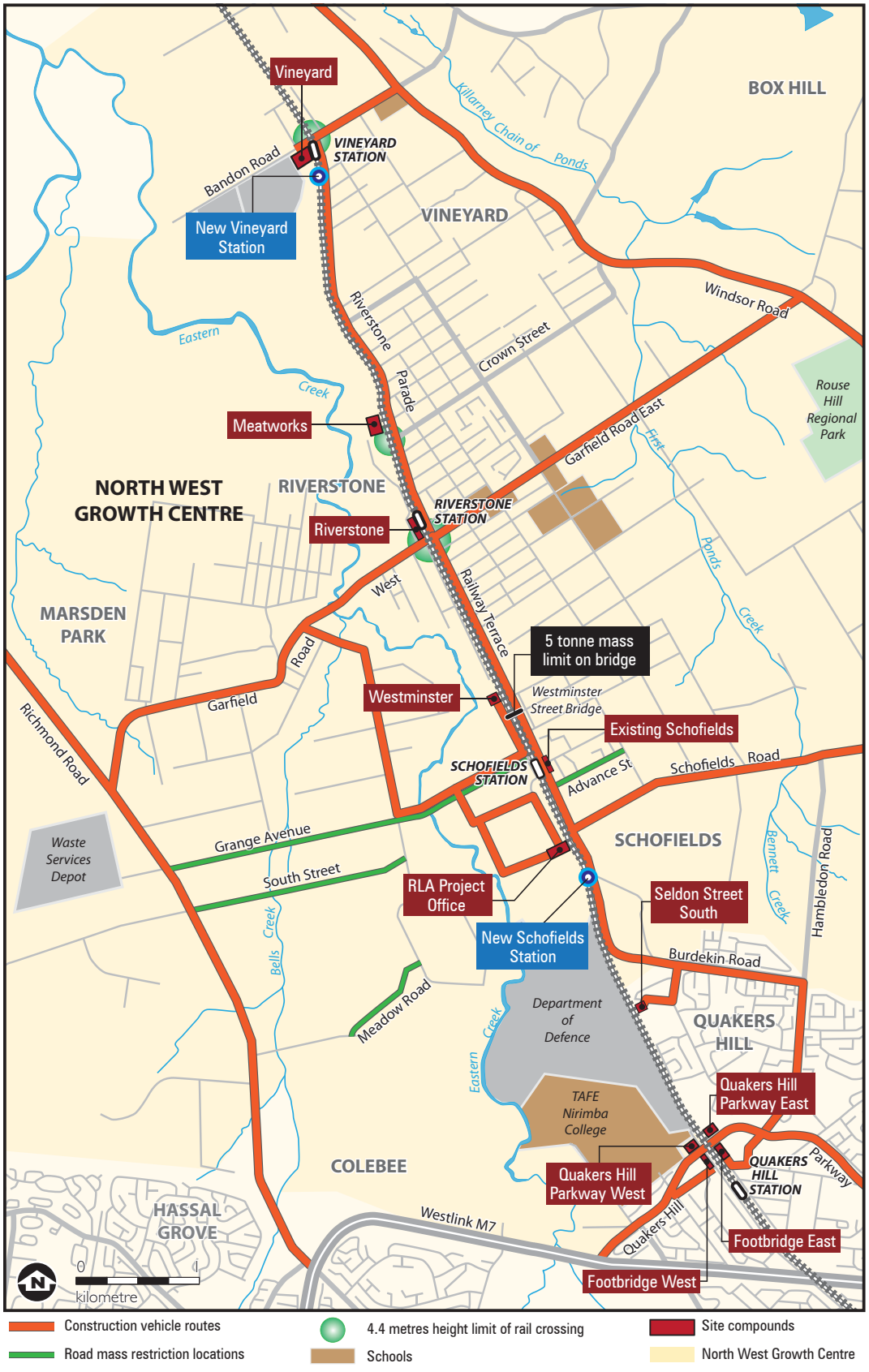

Figure 8-3 Proposed construction vehicle travel routes

Spoil removal

It is estimated that in the worst-case scenario up to 77,000 cubic metres of excavated material would require disposal (i.e. offsite disposal of all excavated material). For the best case scenario, all excavated material would be reused on site, and an additional 13,300 cubic metres of material would require offsite re-use or disposal. The destination of the spoil is unknown at this stage and would depend on its composition and classification. However, the reuse of fill within the Project is preferred to reuse on other construction projects in the area or disposal. A maximum of 20 truck trips per hour would be expected to move this amount of spoil (or a maximum of three to four trucks per hour at an individual compound site). This traffic would be additional to existing traffic volumes during both peak periods at the peak of construction. The proposed routes for spoil removal would follow the proposed heavy vehicle routes in Figure 8-3.

Workforce access

The expected maximum staff numbers at each site are shown in Table 10-1. Smaller compounds would have up to 20 staff whilst larger compounds would cater for up to 100 staff.

It is proposed to provide parking for all employees within the site compounds to reduce the impact of staff parking on surrounding areas, wherever possible. It is proposed that staff would park in the main compound areas and travel to external work sites together by van (or other vehicle). Smaller compounds at stations would only provide minimal on-site parking; however, many of the staff would leave their cars at the main compounds and travel to site together. These vehicles may, at times, displace commuter cars parked in the station surrounds. The impact of this would be minimal considering the small number of vehicles potentially affected.

Emergency services access

Emergency services would be alerted to the closure of Westminster Bridge to allow advance warning of diversion routes. Emergency services would also need to be alerted to any other unforseen lane and road closures. The CEMP would address the notification procedure and diversion routes for emergency services in consultation with those services.

8.2.2 Operational impacts

This section provides a summary of the impacts of the Project and the adequacy of the proposed interchange facilities to meet mode of access requirements on opening and in 2031. A full assessment of the impacts is provided in Chapter 5 of Technical Paper 1. The expected interchange access demands are summarised in Section 3.2.11 of this report and in further detail in Chapter 4 of Technical Paper 1.

The capacity upgrade of the rail corridor would facilitate higher train frequencies. The completion of Stage 1 would allow up to six peak train services per hour through Schofields and Quakers Hill. Four of these services would start and terminate at Schofields and two at Richmond. The completion of Stage 2 would allow up to eight peak train services per hour, with six services starting/terminating at Vineyard and two at Richmond.

Quakers Hill Station

No works are proposed to be undertaken at Quakers Hill Station. However, there may be a demand for increased feeder bus services, commuter car parking and pedestrian and cyclist access at Quakers Hill Station. These potential requirements would be considered by RailCorp and the Ministry of Transport (MoT).

Schofields Station

The relocation of Schofields Station in Stage 1 would have an impact on existing residents who currently access Schofields station by walking and cycling. For residents located to the south of the existing station, travel times to the new station are likely to be the same or improved. However for residents located within the centre of Schofields and north of the existing station, the relocation would add approximately 800 metres to these existing trips. Whilst this is an acceptable distance for cyclists, it could be excessive for some pedestrians.

It is expected that if distance to Schofields Station is increased, people who currently walk to the station may choose other modes to access the station or to access their final destination. Bus services that access the new Schofields Station from the north would need to travel via the old station to ensure that current passengers have the option to access the new Schofields station by bus rather than having to walk the additional distance. These bus services would need to operate at a reasonable level of service to ensure an acceptable alternative. The MoT is currently conducting a bus network review for the area. The review will investigate introducing new and additional bus services to service new precincts, particularly those associated with Second Ponds Creek and Alex Avenue.

The MoT has indicated that there are no immediate plans to alter either of the two existing bus routes (that currently operate close to the existing Schofields Station) to link the proposed new Schofields Station location with the existing site. However, the option to modify one or both of the existing bus routes would be considered as part of the annual service review prior to the new Schofields Station reaching completion.

The longer term development of bus services is envisaged to provide transport services for new release areas in the vicinity of the Richmond Branch Line, especially with regard to the Alex Avenue, Schofields and Riverstone East precincts. These longer term bus services are envisaged to provide connections from the existing Schofields township and surrounding new development to the proposed new Schofields Station. TIDC will continue consultation with MoT, GCC, and Blacktown City Council (BCC) in the development of this bus service.

New station facilities

Facilities for persons with disabilities would be provided, including three new lifts, approximately eight disabled parking spaces and a new accessible toilet on the platform.

Bus service

The proposed bus facilities at the new station include a three bus interchange on the eastern side of the station. Assuming a minimum of four minutes to load and unload passengers this interchange could serve up to 45 buses per hour. Section 3.2.11 of this report identified a need to provide for two regional routes and two local routes on this side of the station. The capacity of the eastern interchange is adequate to meet demand up to 2031, assuming that:

- the interchange will operate as a 'head-of-rank' arrangement (where bus spaces are shared and not allocated to particular routes)
- local and regional bus arrivals will be staggered (local bus routes are likely to arrive at the station timed to connect with rail services, whereas regional bus route timetables may be governed by connections at other locations along their corridor)
- as a worst case, headways will not be less than 5 minutes for regional bus services and 7.5 minutes for local services (approximately 40 buses per hour).

No bus interchange is provided in the design on the western side of the station as there are currently no bus services operating in this location. It is not anticipated that bus stops would be required on the western side until the Schofields Precinct develops. The current design does not preclude the provision of a bus interchange and the roundabout design would be able to accept turning buses.

The GCC has identified improved road crossings of the rail line at Schofields as key east-west public transport links. Direct access to the station at these rail corridor crossing locations will be an important consideration. As planning of the precincts progresses, GCC is also considering bus access to the stations.

Pedestrian and cyclist facilities

The proposed new Schofields Station facilities include a new roundabout at the intersection with Pelican Road and Railway Terrace. This would allow for safe crossing refuges at the roundabout. A footpath 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 to prevent residents having to walk via the existing station. The station environment and associated activity may warrant the lowering of the current speed limit from 80 kilometres per hour to 60 kilometres per hour. This would be further considered in conjunction with GCC, BCC, RTA and MoT.

New bike lockers would be provided in the station entrance forecourt. Section 3.2.11 identifies a demand for cycle parking for approximately 40 bikes by 2031.

Commuter parking

A summary of parking demand and proposed supply at this station is outlined in Table 8-3.

Table 8-3 Summary of parking demand at Schofields Station

Parking demands	Number of spaces
Current observed demand (2007)	172
Estimated 2012 demand (assuming 4% growth per annum)	185
Projected 2031 demand	461
Proposed provision of formal commuter spaces	approximately 230

Based on this information, the proposed 230 spaces is sufficient to meet demand on opening. Demand is likely to exceed supply after 2012 with the supply falling short by 2031. Additional vehicle parking could be accommodated by on-street parking in the surrounding area as currently takes place at the existing Schofields Station. Whilst the availability of on-street parking supply will improve as additional roads are constructed in the area (as part of the development of the NWGC) it is still not expected that the on-street supply would meet the high level of demand predicted in 2031.

As the NWGC develops, parking demand is likely to increase. This increased demand would be considered by Railcorp, GCC and BCC. Future parking demand would be monitored over time with any additional parking provided in accordance with the RailCorp parking policies. Ongoing discussions with GCC and RailCorp would encourage the exploration of opportunities for further parking to be incorporated as part of the precinct planning.

For the safety of vehicles entering and exiting the proposed angle-in parking along Railway Terrace, the speed should be reduced to 60 kilometres per hour, in the short term, with possible speed limits of 40 kilometres per hour required for a future town centre environment, depending on the development of the precinct. These changes would be considered by RailCorp, GCC and BCC.

Kiss-and-ride and taxi facilities

It is proposed to provide four kiss-and-ride spaces on the western side and six kiss-and-ride/taxi spaces on the eastern side. Therefore, the total proposed provision for kiss-and-ride and/or taxis is 10 at any one time. Section 3.2.11 of this report identifies that at least nine spaces would be needed for kiss-and-ride vehicles in 2031. Therefore the Project is adequate to provide for demand up to 2031.

Riverstone Station

The proposed layout for Riverstone Station is provided in Figure 6-4 and would be completed in Stage 2 of the Project. None of the existing interchange or parking facilities would be affected once construction of the footbridge and other improvements are complete.

There is an existing 28 metre shared bus, kiss-and-ride and taxi kerb adjacent to the station. As demands increase consideration to separate these modes into designated areas would be required in consultation with GCC, Railcorp, MoT, BCC and RTA.

Station facilities

The proposed widening of Platform 2 at Riverstone would provide for pedestrian access from the new footbridge and lifts to the overbridge.

Bus service

The existing capacity for buses at the Riverstone Station interchange provides for four buses at any one time (arriving, departing, or laying over) or 60 buses per hour (30 in each direction).

Section 3.2.11 of this report identifies that demand for up to five bus spaces may be needed in 2031. The four bus spaces are considered adequate on opening of the Project. Additional bus spaces are not precluded by the current design of the Riverstone upgrade and could be considered by Railcorp, MoT, BCC and GCC as precinct planning progresses.

Pedestrian and cyclist facilities

A new pedestrian footbridge with stairs and lifts is proposed to replace the existing Garfield Road pedestrian level crossing with an unpaid concourse over the Riverstone Station platforms.

Bike racks and eight cycle lockers are already provided at Riverstone Station and are considered sufficient to provide for demand on opening, but not for 2031 demand. Section 3.2.11 identifies a need to provide cycle parking for approximately 50 bikes by 2031. Any additional bikes could be locked to fencing and railings around the area. Future planning for station upgrades should include designs to provide for these additional bikes.

Commuter car parking

A summary of parking demand and proposed supply at this station is outlined in Table 8-4.

Table 8-4 Summary of parking demand at Riverstone Station

Parking demands	Number of spaces
Current observed demand (2007)	158
Estimated 2012 demand (assuming 4% growth per annum)	208
Projected 2031 demand	581
Proposed Provision of formal commuter spaces	As per existing

Existing parking demand exceeds the number of formal commuter parking spots at Riverstone Station. Therefore, future parking demand would not be met through the existing provision of formal commuter parking. Some of the shortfall can be accommodated through parking in the adjacent streets (on-street parking). However, this may present a problem as the area becomes a higher density town centre and parking restrictions are introduced. Future provision of more parking would be investigated by GCC, BCC and RailCorp as precinct planning continues.

Kiss-and-ride and taxi facilities

The existing 28 metre shared bus, kiss-and-ride and taxi kerb is not proposed to change as a part of this Project. The kerb currently facilitates up to five vehicles at one time. It is estimated that by 2031 there would be demand for 11 designated kiss-and-ride spaces (refer Section 4.4 Technical Paper 1). Considering the existing facility is shared and is not proposed to be upgraded it may not provide adequate space for 2031 operations. However, upon opening the extra demand for kiss-and-ride could be met by use of the existing short-term parking areas in Riverstone Parade.

Vineyard Station

Vineyard Station would be relocated approximately 250 metres to the south as part of Stage 2 of the Project. This new station is proposed with easy access and with interchange facilities for bus, taxi, kiss-and-ride and a 70 vehicle car park (phase 1), expanding to a total capacity for 220 vehicles at a later date (phase 2). The proposed station layout at Vineyard is shown in Figure 6-6.

Station facilities

Facilities for persons with disabilities would be improved, including three new lifts to connect Platform 3, and Platforms 1 and 2.

Bus service

The proposed bus zone at the new Vineyard Station is approximately 69 metres long, providing sufficient space for five buses. As the existing station currently has no formal bus zone, this zone would cater for future bus mode-of-access associated with the new release areas. Based on a dwell time of four minutes to load and unload passengers this facility could accommodate up to 75 buses per hour. Section 3.2.11 of this report identified demand for only two bus spaces at this station. Therefore, the Project more than adequately addresses the demand up to and beyond 2031.

Pedestrian/cycling facilities

A new pedestrian at-grade crossing across Riverstone Parade to the car park is proposed. Changes to the sign-posted speeds on this road would need to be considered by Railcorp, GCC and BCC to reduce pedestrian risk in this area.

Section 3.2.11 identifies demand for approximately five cycle parking spaces by 2031. New bike lockers are proposed behind the southern end of the taxi stand/kiss-and-ride zone to be able to accommodate demand at opening.

Commuter parking

A summary of parking demand and proposed supply at this station is outlined in Table 8-5.

Table 8-5 Summary of parking demand at Vineyard Station

Parking demands	Number of spaces
Current observed demand (2007)	0
Estimated 2012 demand	6
Projected 2031 demand	55
Proposed provision of formal commuter spaces	220 (70 in short-term)

Development adjacent to Vineyard Station is not expected to commence prior to 2012, therefore, the parking demand is expected to remain low on opening. However, with the provision of a formal parking facility it is possible some commuters may relocate from Riverstone due to the congested parking conditions at this station. It is also possible that commuters travelling from further north than Vineyard (for example from Mulgrave Station) may travel to the new Vineyard Station to access more frequent services following the commissioning of Stage 2.

Section 3.2.11 identifies a demand for approximately 55 parking spaces by 2031. Further assessment would be needed to determine the need and location for a phase 2 car park (currently proposed to be up to an additional 170 commuter vehicles). The phase 2 car park is proposed to be constructed adjacent to the phase 1 car park along Ashford Road. Whilst the phase 2 car park is a part of this Project, development of the car park would be subject to further investigations and consideration of alternative locations in conjunction with GCC and RailCorp precinct planning.

Based on the existing demand and commuter car parking supply at adjacent stations along the Richmond Line and the low level of development in the area surrounding Vineyard, it is likely that the Phase 1, 70 space car park would be sufficient to meet short to medium-term demand. However further consultation with GCC, RailCorp and BCC would be required to determine how to provide for the 2031 demands. Once the Project has commenced further consultation would be undertaken to confirm future parking forecasts.

Kiss-and-ride and taxi facilities

A shared kiss-and-ride and taxi kerb of approximately 71 metres length is proposed. This length would be able to accommodate up to 10 vehicles. Section 3.2.11 identifies a need to provide kiss-and-ride space for approximately two cars by 2031. Therefore, the Project is considered adequate to meet the kiss-and-ride demand up to 2031.

It may be necessary to separate or appropriately sign-post this area to prioritise modes of access at this station. To prevent conflict between taxis and kiss-and-ride vehicles, particularly in the afternoon peak, appropriate signage will be necessary.

Road network

The road network in the area is expected to undergo major changes due to the development of the NWGC. Whilst the impact of additional vehicles on the road network in 2031 is very difficult to determine, the scale of the level of vehicle trips has been assumed. The Project is expected to impact the road network due to the attraction of additional vehicles to the station precincts. The expected demands are outlined in Section 3.2.11.

The greatest impact is predicted at Riverstone, where almost 476 additional vehicles (including buses) are expected to access the area surrounding the station within the AM peak hour. This is approximately equivalent to around one third of the capacity of one traffic lane. These vehicles will come from all directions, dispersing the level of impact over a number of access roads.

In the case of Schofields, a total of approximately 500 vehicles are expected to access the station in the peak hour (2031). This traffic volume will be spread over the future road network and will be divided between the eastern and western sides, distributing the impact. In the short term (2011) it is expected that up to 150 vehicles will access the western side of the station via Bridge Street in the AM peak. Whilst this will present an increase in traffic compared to the existing flows on Bridge Street, by local road standards it is a low level of traffic. As new roads are constructed to the western side of the station in future, the burden on Bridge Street will be relieved.

The vehicular demands presented by the rail stations in future need to be considered in the future road planning for the region to ensure that supply is provided to meet these demands. Planning for the future travel demands of the region would be undertaken as part of the GCC precinct planning.

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 Project would be coordinated with RailCorp, RTA, TIDC and GCC.

Currently the performance of the at-grade intersection with the rail line, as identified in Section 2.5.3, is operating at LoS A. Should the Riverstone Railway Overpass not go ahead prior to an increase in train services on the line then this would be expected to degrade the performance of this intersection dependent on the growth in future traffic volumes and the proposed increase in train volumes.

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. It is also proposed that sections of Bandon Road east of the railway line, future sections of Richmond Road, and Garfield Road West will be upgraded to a minimum four-lane traffic capacity in order to accommodate anticipated traffic volumes.

As part of these improvements to the road network, it is anticipated that once Stage 2 of the Project commences, the Meatworks level crossing will be closed by the operator (RailCorp); however the proposed access via a new north-south heavy vehicle route will accommodate existing businesses on the western side of the duplicated rail line.

8.2.3 Mitigation measures

Construction

A CEMP would be prepared for this project and would address traffic and transport management throughout construction.

The following specific mitigation measures are proposed:

- heavy vehicles will be restricted to the routes as identified in Figure 8-3 where possible
- a traffic control plan and road occupancy licence will be required for:
  - the Westminster Street overbridge reconstruction
  - lane closures on Railway Terrace and Riverstone Parade for construction of the kiss-and-ride, bus zone and taxi ranks at the new Vineyard and Schofields stations.
- closure of existing Schofields and Vineyard stations will only occur following transfer of operations to the new stations
- the proposed footbridges will be completed prior to closure of the at-grade crossings at Schofields and Quakers Hill
- in the event that temporary relocation of bus stops is required, bus operators would be consulted and bus patrons would be notified at least 2 weeks in advance.

A grade separated crossing of the rail line at Garfield Road 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 Project and the Riverstone Railway Overpass would be coordinated with RailCorp, RTA, TIDC and GCC to ensure that combined construction phase impacts are appropriately managed.

Impacts on patrons and station access would be further addressed in the CEMP as the construction planning is refined.

The provision of rail replacement bus services during track possessions would be provided by RailCorp as per RailCorp's existing rail possession timetable and rail replacement bussing operations plan.

Operation

The following recommendations are made considering the impacts investigated throughout the assessment:

- Provision for future parking demand will be determined through consultation with GCC and RailCorp. This is particularly relevant at Vineyard Station. When the phase one allocation of spaces reaches capacity, this may act as a trigger to provide the second stage of parking.

8.3 Socio-economic impacts

This Section summarises impacts of the Project on the social and economic environment affecting local businesses and residents, and outlines management measures to address any impacts. The Director-General's environmental assessment requirements (DGRs) for the assessment of social and economic impacts of the Project are listed in Table 8-6.

Table 8-6 DGRs for the assessment of social and economic impacts

DGR	Where addressed
Social and economic	
▪ Economic and social impacts on adjoining communities and businesses at a station and catchment level	Sections 8.3.2, 8.3.3
▪ The relocation of Schofields Station and the reorientation of the town centre, including an assessment of impacts to and opportunities for businesses, access, community identity and cohesion, and service relocation or business closure.	Sections 8.3.2 and 8.3.3 (generally), 8.3.4 (specifically)

The most significant impact was identified as the relocation of Schofields Station approximately 800 metres to the south. The impacts associated with this relocation are addressed specifically in Section 8.3.4.

8.3.1 Assessment approach

Social and economic impacts of the Project were assessed using both qualitative and quantitative methods.

Communities and businesses (at station and catchment levels) were assessed using qualitative methods, including desktop research into predicted impacts resulting from the Project. The location of communities, and the location and type of local businesses potentially affected by the construction and operation of the Project were recorded.