



# Technical Paper 1

Traffic and transport impact assessment





Transport for New South Wales

# Lindfield Substation Traffic and Transport Assessment

16 July 2014



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# Glossary

CBD	central business district
CEMP	Construction Environmental Management Plan
CSR	Combined Services Route
EPA	(NSW) Environmental Protection Agency
km/h	kilometres per hour
kv	kilovolt
LGA	local government area
m	metres
OHW	overhead wiring
RAV	Restricted Access Vehicle
REF	Review of Environmental Factors
Roads and Maritime	(NSW) Roads and Maritime Services
TfNSW	Transport for NSW
vpd	Vehicles per day



# Executive Summary

## The proposal

In future, Sydney Trains intends to operate increasing train services on the North Shore Line. A new traction power substation is required to allow for an increase in the capacity along the North Shore Line for additional train services to be run and will support the delivery of the North West Rail Link. Therefore, a new substation is proposed to be constructed at Lindfield to supply the North Shore Line. The proposal also includes ancillary electrical works generally between Killara Station and the Clanville Road overbridge in Lindfield.

The substation site (where the substation would be constructed) is located on Lindfield Avenue at the intersection with Strickland Avenue in Lindfield, approximately 300 metres to the south of Lindfield Station. The site is within the existing rail corridor between the North Shore Line up-track (i.e. travelling towards Sydney central business district (CBD)) and Lindfield Avenue. In addition, the works comprise ancillary electrical works, including the installation of aerial earth wires to existing power poles generally between Killara Station and Russell Avenue, Lindfield and the realignment of existing overhead wiring generally between Russell Avenue and the Clanville Road overbridge.

## Vehicle restrictions

Vehicle restrictions currently apply on routes connecting with the proposed substation site access and the cable and service relocation gated accesses (existing rail corridor accesses). Careful planning of construction traffic routes by the contractor is required due to load limit, height restrictions and banned vehicle movements.

## Construction traffic impact assessment

### *Construction traffic generation*

It is anticipated that up to 20 vehicles in total would arrive to the substation site prior to the weekday AM peak hour and up to 10 vehicles in total would leave the substation site in the PM peak hour.

It is anticipated that up to 10 vehicles in total would arrive to the cable and services relocation sites prior to the weekday AM peak hour and up to 5 vehicles in total would leave the substation site in the PM peak hour.

### *Intersection performance*

Given the anticipated low construction traffic generated during peak periods, the impacts to intersection performance on the surrounding road network would be considered negligible.

### *Pedestrian impacts*

There would be minor impacts to pedestrians due to temporary closures of the footpath on the western side of Lindfield Avenue adjacent to the proposal site.

### *Parking impacts*

There would be a temporary loss of up to six car parking spaces on Lindfield Avenue during construction to allow for access to the substation site via the driveway entry for both light and heavy vehicles.

### *Road closure impacts*

Short term temporary road closures would be required on Lindfield Avenue to accommodate construction vehicle access to the substation site and ancillary electrical works. No long term road closures of Lindfield Avenue are proposed or required as part of this proposal. No road closures would be required for the cable and service relocation sites.

## Operational traffic impact assessment

### *Operational traffic generation*

Once construction is completed, the Lindfield substation would undergo testing and would be commissioned for service. Once operational, the maintenance requirements of the substation are anticipated to be small, in the form of one site visit per month by one person for maintenance and attendance for switching operations during power isolations.

Once construction is completed, maintenance requirements of the cables and relocated services is anticipated to be small and have only negligible traffic impacts on the surrounding road network and local intersections.

### *Intersection performance*

Given the anticipated low operational traffic generated during peak periods, the impacts to intersection performance on the surrounding road network would be considered negligible.

### *Parking impacts*

It is anticipated that approximately two on-street parking spaces would be removed on Lindfield Avenue to allow for driveway access to the substation.

## Mitigation measures and strategies

Several general mitigation measures and strategies have been suggested to ameliorate the proposal related impacts including:

- traffic controllers positioned at access gates adjacent to residential areas and access driveways to assist with vehicle ingress and egress, to stop traffic if required and to assist pedestrian crossing movements
- road occupancy licences for temporary closure of roads would be obtained, where required
- heavy vehicles would be restricted to the routes specified and route markers installed for heavy vehicles along designated routes
- restricting construction traffic movements to and from the sites outside of peak periods
- signs would be provided at each access point to assist in deliveries to each work site
- signs would be provided at each access point for pedestrian and cyclist guidance
- signs would be installed to advise pedestrians of temporary footpath closures and signs advising of the alternative pedestrian detour route installed
- local bus operators would be consulted to ensure that they are aware of proposed operation changes and that impacts to bus services are minimised
- an emergency response plan would be developed for construction traffic incidents
- a pre and post construction assessment of road pavement assets would be conducted in areas likely to be used by construction traffic

- public communications would be conducted to warn the community and local residents of vehicle movements and anticipated effects on the local road network relating to the site works
- access to all private properties adjacent to the works would be maintained during construction
- during project inductions all heavy vehicle drivers would be provided with the emergency response plan for construction traffic incidents
- undertake road safety audits where required or deemed necessary
- coordination of project staging, vehicle movement and scheduling, equipment and resourcing.

## Conclusion

Construction and operational traffic impacts would be negligible given that the majority of construction traffic and maintenance related vehicle trips would occur outside of peak road network periods. Several mitigation measures have been recommended to remove or ameliorate any proposal related impacts to road users.



# 1. Introduction

## 1.1 The proposal

In future, Sydney Trains intends to operate increasing train services on the North Shore Line. A new traction power substation is required to allow for an increase in the capacity along the North Shore Line for additional train services to be run and will support the delivery of the North West Rail Link. Therefore, a new substation is proposed to be constructed at Lindfield to supply the North Shore Line. The proposal also includes ancillary electrical works generally between Killara Station and the Clanville Road overbridge in Lindfield.

The substation site (where the substation would be constructed) is located on Lindfield Avenue at the intersection with Strickland Avenue in Lindfield, approximately 300 metres to the south of Lindfield Station. The site is within the existing rail corridor between the North Shore Line up-track (i.e. travelling towards Sydney central business district (CBD)) and Lindfield Avenue. In addition, the works comprise ancillary electrical works, including the installation of aerial earth wires to existing power poles generally between Killara Station and Russell Avenue, Lindfield and the realignment of existing overhead wiring generally between Russell Avenue and the Clanville Road overbridge.

The key features of the proposal are:

- construction and operation of a new traction power substation at Lindfield in order to continue to power the Sydney Trains network (in particular the North Shore Line). Components of the substation would generally include:
  - ▶ construction of two new rectifier transformers
  - ▶ installation of switchgear room containing switchgear and switchboards, batteries and changers, voice and data communications equipment
  - ▶ installation of the rectifier and reactor unit(s)
  - ▶ office and associated facilities
  - ▶ earthworks and construction of a retaining wall on the western side of the substation site, adjacent to the rail line
- realignment of the existing 33 kilovolt (kV) and 11 kV overhead wiring (OHV), to a new combined services route (CSR), generally between power pole P57 (to the south of Lindfield Station near the intersection with Russell Avenue, Lindfield and power pole P49 (to the north of the Clanville Road overbridge)
- relocation and installation of signalling cable and communication cable to the substation to connect with existing cables along the North Shore Line
- security and permanent maintenance lighting within and external to the building
- construction of a new driveway access to the substation site from Lindfield Avenue and a paved surface area to provide car parking for approximately four vehicles within the proposed substation compound
- landscaping and vegetation surrounding the proposed substation building, generally to the east and south of the site
- installation of feeder and return cabling to the OHV system on the North Shore Line
- installation of an aerial earth wire to the top of the existing (Sydney Trains) power poles, generally between Killara Station and Russell Avenue, Lindfield

- relocation of street lighting and power routes to provide access to the substation for construction and maintenance (including future replacement of substation equipment).

Minor enabling works are expected to be undertaken in late 2014. Service relocation will commence in mid 2015 with construction of the substation expected to commence in early 2016 (subject to Transport for NSW's determination of this Review of Environmental Factors (REF)) with testing and commissioning anticipated in August 2017. The substation site is expected to be handed over to Sydney Trains in late 2017.

It is anticipated that the main construction activities associated with the Lindfield substation would be carried out in the following sequence:

- establishment works
- excavation
- civil and building works including:
  - ▶ piling works and deflection/retaining wall
  - ▶ drainage works
  - ▶ cable sub-floor chamber
  - ▶ ground beams
  - ▶ floor slab
  - ▶ super structure
  - ▶ electrical fit out
- commissioning.

Figure 1.1 and Figure 1.2 on the following pages show the indicative substation layout and the proposed access and parking arrangements for vehicles to the substation respectively.



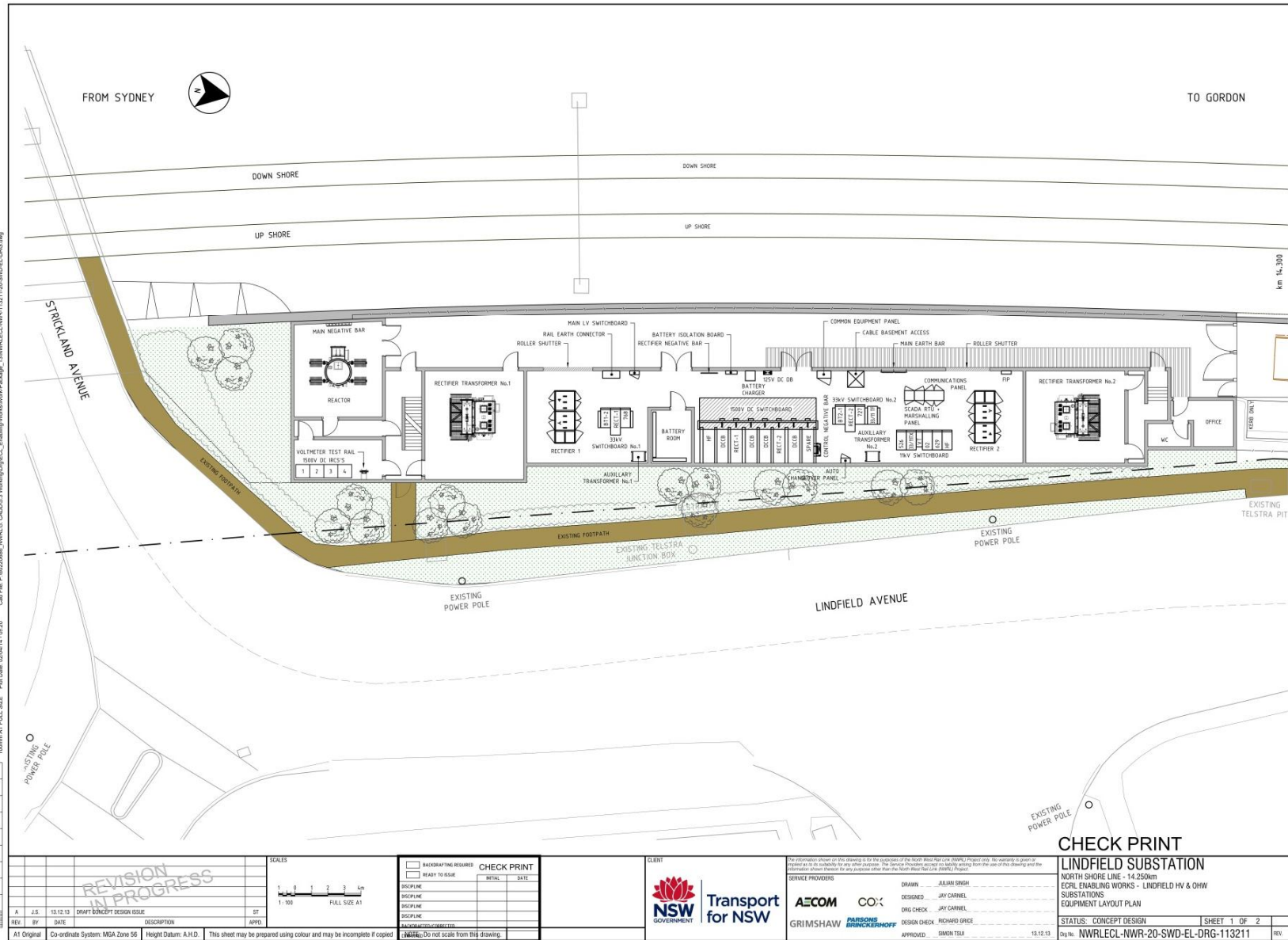


Figure 1.1 Indicative layout of the proposed Lindfield South substation

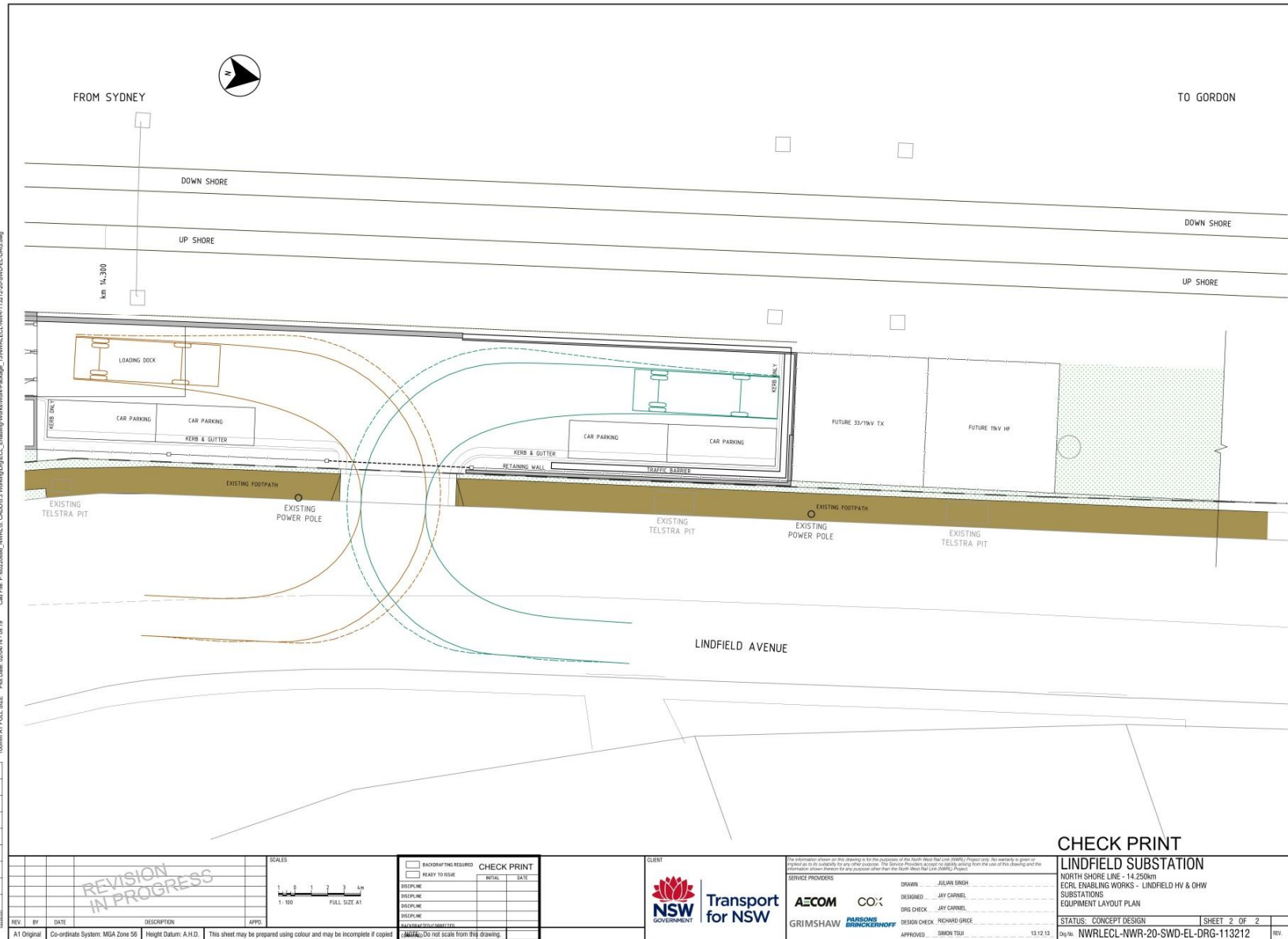


Figure 1.2 Indicative access arrangements to the proposed Lindfield South substation

## 1.2 Location of the substation

The proposal site is located on Lindfield Avenue, at the intersection with Strickland Avenue in Lindfield, approximately 300 metres to the south of Lindfield Station, as shown in Figure 1.1. The site is within the existing North Shore rail corridor between the North Shore Line up-track (i.e. travelling towards Sydney central business district (CBD)) and Lindfield Avenue. The site boundary including the substation location, overhead wiring and the relocation of cabling is shown in Figures 1.3 and 1.4. The site is located within the Ku-Ring-Gai local government area (LGA).

## 1.3 Construction working hours

The proposed works would generally be undertaken during the standard (NSW) Environment Protection Authority (EPA) construction hours, which are as follows:

- 7.00 am to 6.00 pm Monday to Friday
- 8.00 am to 1.00 pm Saturdays
- No work on Sundays or public holidays.

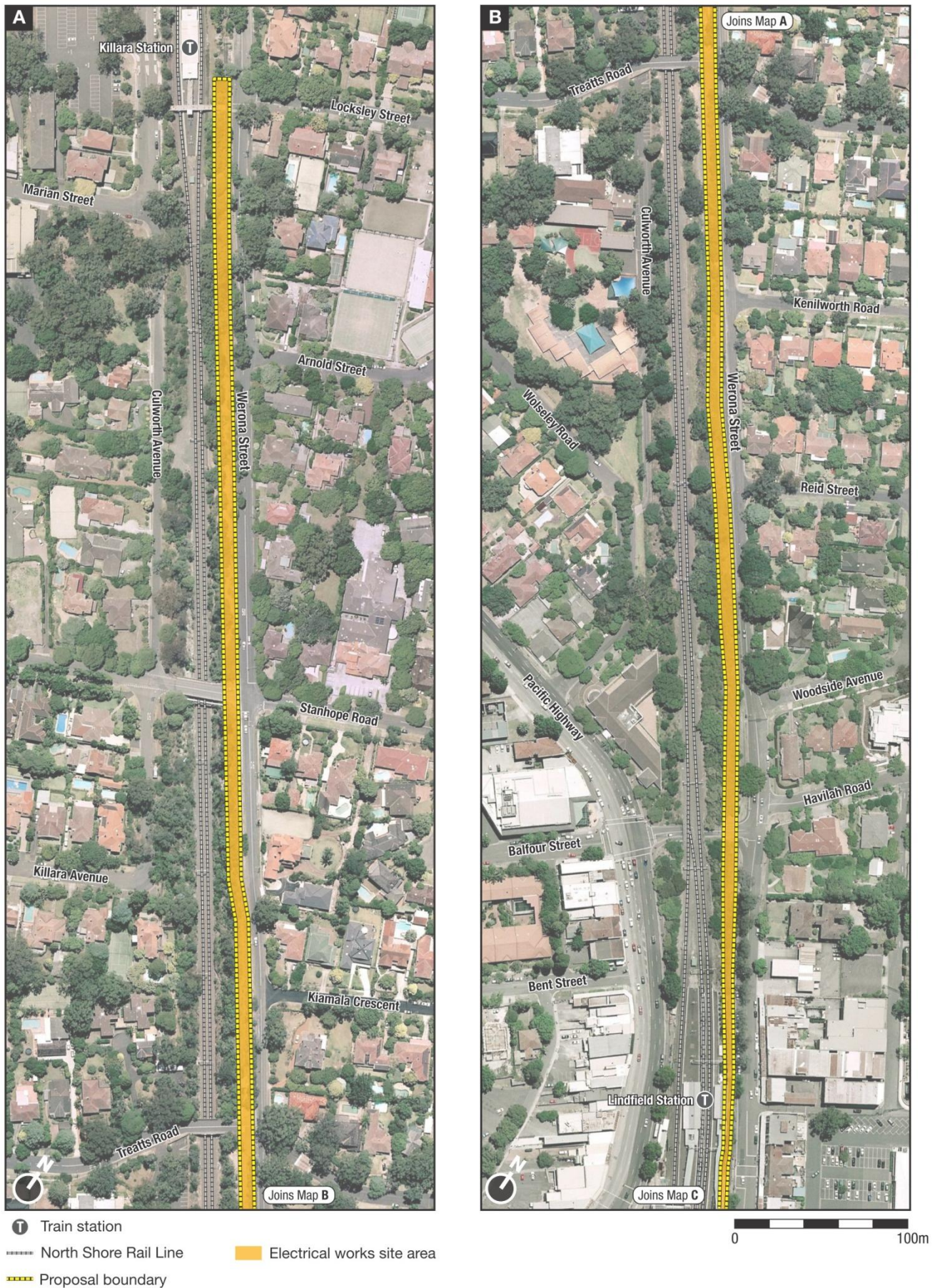
Exemptions and approval for works outside the above standard construction hours may be required in the following circumstances:

- works required by utility service providers or where impacts to services cannot be reasonably managed
- works requiring rail closedowns
- works requiring the closure of roads, bridges or stations
- oversized deliveries/unloading of machinery that can only be transported between hours specified by the police or Roads and Maritime
- where works can be undertaken so as to be inaudible at the nearest residential receivers
- as otherwise agreed with the EPA in the issuing of an environmental protection licence for licensable works.

If required, out-of-hours works would be applied for and appropriate assessments and mitigation strategies undertaken.

Work within the Lindfield substation site will be generally undertaken within the standard construction hours mentioned above. However, the realignment of the aerial high voltage feeders can only take place within normal construction outages in conjunction with the North Shore Line rail possessions. The construction of the proposed deflection/retaining wall along the western edge of the site would also require works to be undertaken during designated rail possession periods. Rail possessions are times when rail services will not be running, allowing maintenance and/or construction works to be safely undertaken. Sydney Trains are permitted a certain number of weekend rail possessions per year to allow for railway maintenance, construction and other activities that are only able to be undertaken whilst normal services are not operating.

For the North Shore Line, rail possessions occur between 12.00 am and 4.00 am for weeknight possession and 2.00 am Saturday to 4.00 am Monday for weekend possessions. Construction work affecting train operations would be performed as required 24 hours, 7 days a week during these track possessions.



**Figure 1.3 Site boundary**



- Train station
- North Shore Rail Line
- Electrical works site area
- Main substation works site
- Proposal boundary

- P49 Sydney Trains power pole number



Figure 1.4 Site boundary

## 1.4 Purpose of this report

The main purpose of this report is to:

- identify and assess the impacts of the substation and ancillary works (cable and services relocation) relating to:
  - ▶ construction and operational traffic impacts
  - ▶ road and public transport users including pedestrians and cyclists
- recommend mitigation measures and strategies to ameliorate any impacts.

## 1.5 Structure of this report

This report has the following structure:

- Section 2 discusses the report methodology
- Section 3 reviews the existing situation within the study area
- Section 4 discusses the construction traffic impacts
- Section 5 discusses the operational traffic impacts
- Section 6 discusses the mitigation measures and strategies to ameliorate the proposal impacts
- Section 7 concludes the study.

## 2. Methodology

This section discusses the methodology behind the preparation of this report including documents reviewed, data collected and site inspections undertaken.

### 2.1 Document review

The following documents were reviewed as part of this study:

- project documents and reports provided by TfNSW
- (NSW) Roads and Maritime Services (Roads and Maritime) Restricted Access Vehicle (RAV) guides
- Sydney Trains and Transport Info websites
- Bicycle Info website
- Council websites containing bicycle plans.

### 2.2 Consultation with TfNSW

A preliminary meeting was held with TfNSW on 8 November 2013 to discuss the proposed content of the traffic impact assessment. A follow up meeting was held on 11 February 2014 to further discuss the content of this traffic impact assessment.

### 2.3 Site inspection

Parsons Brinckerhoff undertook a site inspection on 14 November 2013 to assess existing railway station operations (at Lindfield) and the location of the proposed substation in Lindfield.





# 3. Existing conditions

This section describes the existing traffic and transport conditions adjacent to the proposed site within the study area.

## 3.1 Rail services

Rail services are currently provided to Lindfield railway station along the T1 North Shore Line which forms part of the existing Sydney Trains network, as shown in Figure 3.1.



Source: Sydney Trains

Figure 3.1 Rail network

### 3.2 Bus services

Bus services that currently operate in the Lindfield area are provided by Transdev and include a service along Lindfield Avenue and Middle Harbour Road (Route 558), as shown in Figure 3.2.



Source: Transdev (2014)

**Figure 3.2 Existing bus services in the Lindfield area**

Bus services adjacent to the proposed substation site are shown in Table 3.1.

**Table 3.1 Bus services adjacent to the proposed substation site**

Bus route	Operated by	Description	Hours of operation (weekdays)	Frequency
558	Transdev	Daily service between Lindfield and Chatswood	From Lindfield station (from 7.17 am to 7.16 pm)	AM peak: 30 minutes Off peak/PM peak: 60 minutes
			From Chatswood station (from 7.50 am to 7.41 pm)	AM/PM peak: 30/45 minutes Off peak: 60 minutes

### 3.3 Road network and hierarchy

Roads within a network are classified according to a road hierarchy relating closely to their functional role and the volume of traffic they carry. Roads and Maritime has defined four classes for the classification of roads:

- Arterial roads - predominantly carry through traffic from one region to another forming a principal avenue for urban traffic movements. Typically traffic volumes would be in excess of 15,000 vehicles per day (vpd).

- Sub-arterial roads - connect the arterial roads to areas of development or carry traffic directly from one part of a region to another, they may also relieve traffic on arterial roads in some circumstances. Typically traffic volumes would range from 5,000 vpd to 20,000 vpd.
- Collector roads - connect the sub-arterial roads to the local road system in developed areas. Typically traffic volumes would be in the range from 2,000 vpd to 10,000 vpd, but residential amenity would begin to decline with volumes in excess of 5,000 vpd.
- Local roads - are the sub-divisional roads within a particular developed area. These are used solely to provide local access, and typically carry low volumes, usually less than 2,000 vpd.

The key roads on the surrounding road network (refer to Figure 1.3 and Figure 1.4) include:

**Pacific Highway (A1)** which is a State Road that has a six lane undivided road configuration which carries approximately 58,000 vpd (station 33.013 in 2008) through the Chatswood area. As a major arterial road, this road is designated as a B-double route and allows vehicles with a maximum vertical height clearance of 4.6 metres (m).

**Lindfield Avenue** is a two-lane, two-way collector road that provides an important link on the eastern side of the Pacific Highway and railway line connecting the Lindfield Town Centre to local residents. Lindfield Avenue has a posted speed limit of 50 kilometres per hour (km/h). Lindfield Avenue is under the care and control of Ku-Ring-Gai Council.

**Strickland Avenue** is a two-lane, two-way local road that provides an important link on the eastern side of the Pacific Highway and railway line connecting the Lindfield Town Centre to local residents, and providing a key local railway crossing (bridge). Strickland Avenue has a posted speed limit of 50 km/h. Strickland Avenue is under the care and control of Ku-Ring-Gai Council.

**Clanville Road** is a two-lane, two-way local road that provides an important link on the northern side of the Pacific Highway connecting to local residents to the Pacific Highway via a key local railway crossing (bridge). Clanville Road has a posted speed limit of 50 km/h. Clanville Road is under the care and control of Ku-Ring-Gai Council.

## 3.4 Vehicle load, length, height and turning restrictions

A review of the RAV information, as well as details obtained during the site inspection, indicate the following restrictions apply to certain vehicles in the study area:

- 3 tonne load limit on Strickland Avenue and Lindfield Avenue adjacent to the proposed Lindfield South substation location
- 4.0 m height clearance limit on Balfour Street, Lindfield (road under railway bridge)
- 3 tonne load limit on Rawhiti Street, Lindfield.

## 3.5 Lindfield Railway Station precinct

The following facilities are provided at Lindfield station.

### 3.5.1 Lindfield station details

**Table 3.2 Lindfield station facilities**

Station	Bus stop	Ferry wharf	Taxi rank	Bike racks or lockers	Kiss-and-ride	Car park
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Station	Bus stop	Ferry wharf	Taxi rank	Bike racks or lockers	Kiss-and-ride	Car park
Lindfield	Yes	No	Yes	Yes	No	No

Source: Sydney Trains and site inspection

### 3.5.2 Parking

Existing on-street parallel parking is provided on Lindfield Avenue, Strickland Avenue and Middle Harbour Road, in close proximity to the substation site.

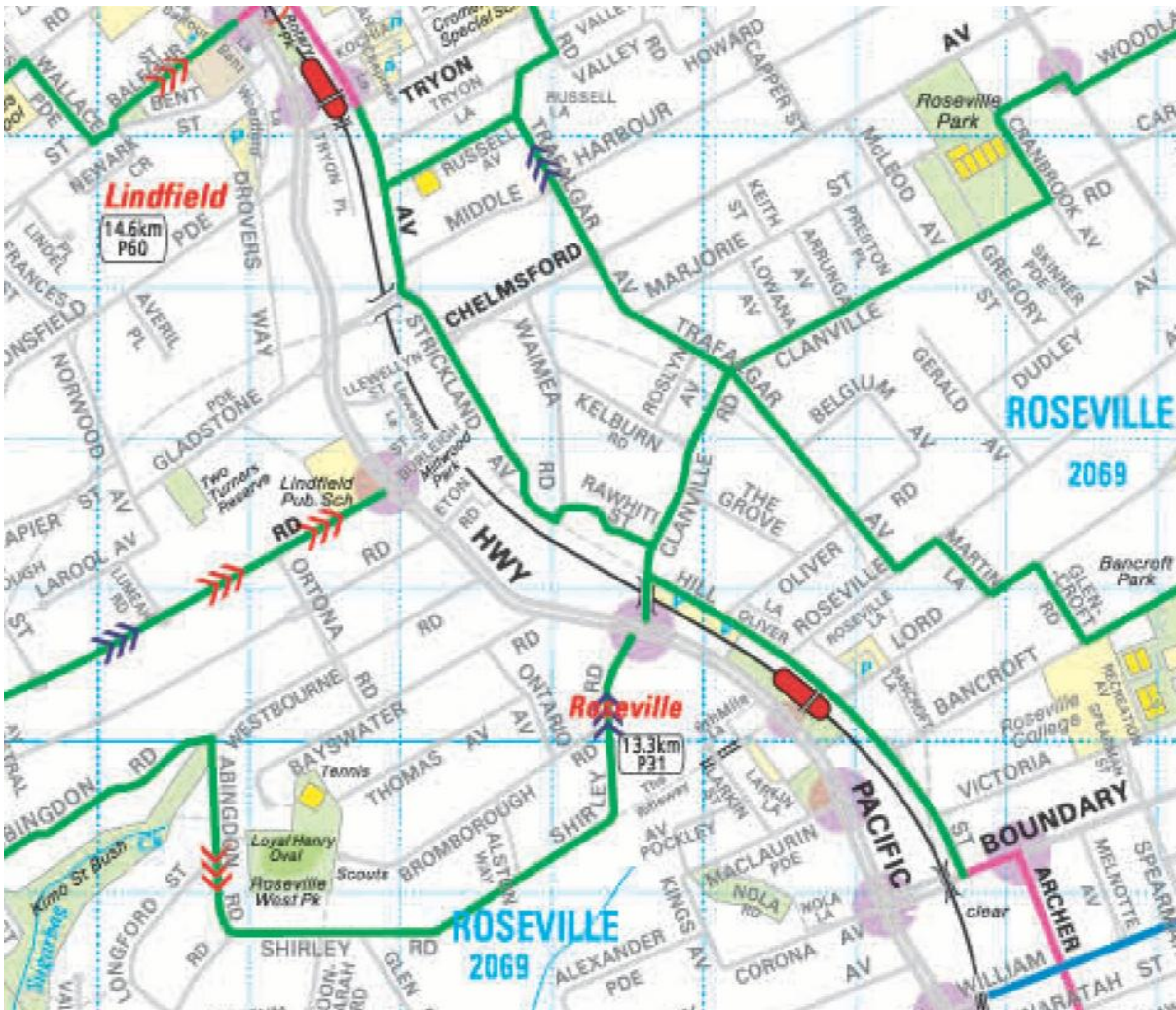
### 3.5.3 Pedestrian network and facilities

Paved concrete footpaths are provided on either side of Lindfield Avenue and Strickland Avenue and provide good quality pedestrian access to and from Lindfield station.

### 3.5.4 Cycle network and facilities

There is no separated cycling path adjacent to the substation site. Cyclists would have to share the traffic lane with vehicles on Lindfield Avenue, Strickland Avenue and Clanville Road.

Existing bicycle routes in the Lindfield area are shown in Figure 3.3 on the following page.



Source: [Sydney](#)

Figure 3.3 Existing bicycle network in the Lindfield area

## 3.6 Proposed Lindfield substation site

An existing rail corridor access is provided via a gated access off Lindfield Avenue to the proposed Lindfield substation site. This existing access will be relocated further north along Lindfield Avenue (north of Middle Harbour Road) subject to discussions with Sydney Trains.

### 3.6.1 Parking

Unrestricted on-street parallel parking is currently provided on both sides of Lindfield Avenue adjacent to the proposed substation site. Figure 3.4 shows the existing parking situation adjacent to the substation access.



**Figure 3.4** On-street parking on Lindfield Avenue adjacent to the proposed Lindfield substation

### 3.6.2 Pedestrian network and facilities

Pedestrian footpaths are located on both sides of Lindfield Avenue adjacent to the substation site.

## 3.7 Cable and service relocation sites

As described in section 1.1, the proposal would require the realignment of high voltage lines, the signalling services route, aerial earth wiring and utilities realignment. This is described in further detail in section 5.2.2 to 5.2.5 of the main report for the *Lindfield Substation Review of Environmental Factors* (Parsons Brinckerhoff 2014).

### 3.7.1 Access to the works areas

Access to the work areas would be via existing access gates on Llewellyn Lane, Strickland Lane and Clanville Road. These access locations are shown in Figure 4.2 and Figure 4.3.

### 3.7.2 Parking

No on-street parallel parking is provided at the cable and service relocation accesses on Llewellyn Lane, Strickland Lane or off Clanville Road. On-street parallel parking is however provided on both sides of Llewellyn Street and Burleigh Street which adjoin Llewellyn Lane.

### 3.7.3 Pedestrian network and facilities

Footpaths are provided on both sides of Clanville Road with connection to the Pacific Highway and Roseville station. No footpaths are provided on Llewellyn Lane or Strickland Lane.





# 4. Construction impact assessment

This section describes the impacts anticipated during construction.

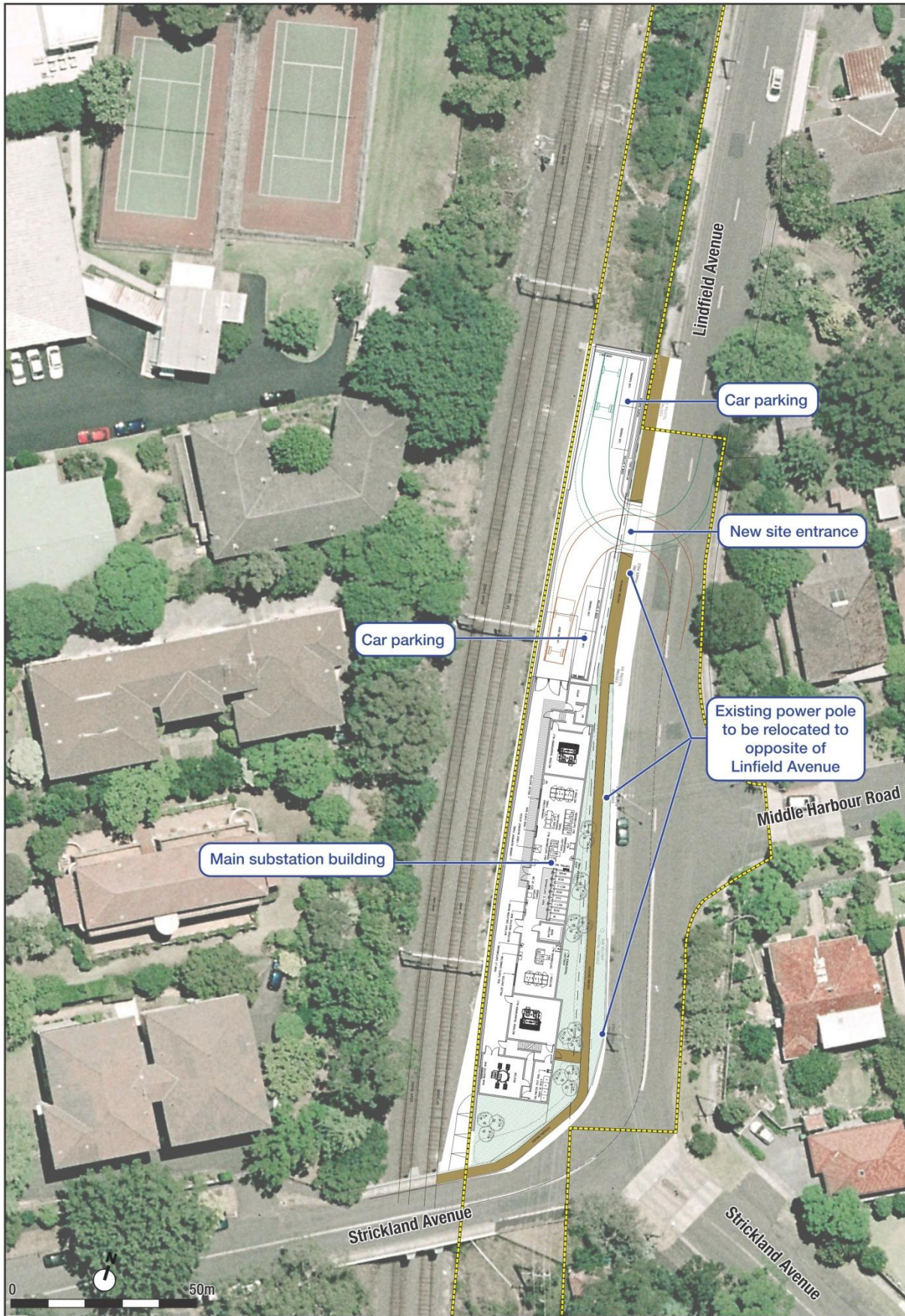
## 4.1 Rail corridor access points

### 4.1.1 Lindfield substation

Access to the substation is proposed off Lindfield Avenue which would require the temporary removal of approximately six on-street parking spaces during construction to allow vehicle site access. Four on-street car parking spaces would be reclaimed once the site becomes operational. Short term temporary road closures would be required on Lindfield Avenue to accommodate construction vehicle access to the substation site and ancillary electrical works. No long term road closures of Lindfield Avenue are proposed or required as part of this proposal. The location of this substation and its access is shown in Figure 4.1.

### 4.1.2 Cable and service relocation sites

All access driveways to the proposed cable and service relocation sites is existing and would not require any temporary removal of on-street car parking spaces. No road closures would be required for the cable and service relocation sites. The proposed haulage routes to these access driveways are shown in Figure 4.2 and Figure 4.3.



--- Proposal boundary

Figure 4.1 Lindfield substation location and access

## 4.2 Construction vehicle routes

Construction vehicles routes to and from the substation site and access to the cable and service relocation areas is described below and shown in Figure 4.2 and Figure 4.3.

The access routes to the substation site include:

### ROUTE 1

- To the site:
  - ▶ left or right from the Pacific Highway onto Havilah Road
  - ▶ right onto Lindfield Avenue
  - ▶ right into the site.
- From the site:
  - ▶ left onto Lindfield Avenue
  - ▶ left onto Havilah Road
  - ▶ left or right onto the Pacific Highway.

### ROUTE 2

- To the site:
  - ▶ left or right from the Pacific Highway onto Strickland Avenue
  - ▶ left onto Lindfield Avenue
  - ▶ left into the site.
- From the site:
  - ▶ right onto Lindfield Avenue
  - ▶ right onto Strickland Avenue
  - ▶ left or right onto the Pacific Highway.

The access route to the Llewellyn Lane access include:

### ROUTE 3

- To the site:
  - ▶ left onto Llewellyn Street from the Pacific Highway
  - ▶ onto Llewellyn Lane
  - ▶ left into the site
- From the site:
  - ▶ left onto Llewellyn Lane
  - ▶ right onto Burleigh Street
  - ▶ left or right onto the Pacific Highway.

The access routes to the Strickland Lane access include:

#### ROUTE 4

- To the site:
  - ▶ left or right from the Pacific Highway onto Strickland Avenue
  - ▶ right onto Strickland Avenue
  - ▶ right onto Strickland Lane
  - ▶ left into the site
- From the site:
  - ▶ right onto Strickland Lane
  - ▶ left onto Strickland Avenue
  - ▶ left onto Strickland Avenue (at Lindfield Avenue intersection)
  - ▶ left or right onto the Pacific Highway.

#### ROUTE 5

- To the site (light vehicles only):
  - ▶ left or right from the Pacific Highway into Clanville Road
  - ▶ left onto Rawhiti Street
  - ▶ left onto Strickland Avenue
  - ▶ left onto Strickland Lane
  - ▶ left into site
- From the site (light vehicles only):
  - ▶ right onto Strickland Lane
  - ▶ right onto Strickland Avenue
  - ▶ right onto Rawhiti Street
  - ▶ right onto Clanville Road
  - ▶ left or right onto the Pacific Highway.

The access route to the Clanville Road access include:

#### ROUTE 6

- To the site:
  - ▶ left or right from the Pacific Highway into Clanville Road
  - ▶ left into the site
- From the site:
  - ▶ right onto Clanville Road
  - ▶ left or right onto the Pacific Highway.

Permits to exceed the local load limit will be obtained from Ku-Ring-Gai Council on an as required basis for delivery of construction equipment, removal of excess spoil from site excavation activities, concrete deliveries and delivery of construction materials and equipment.

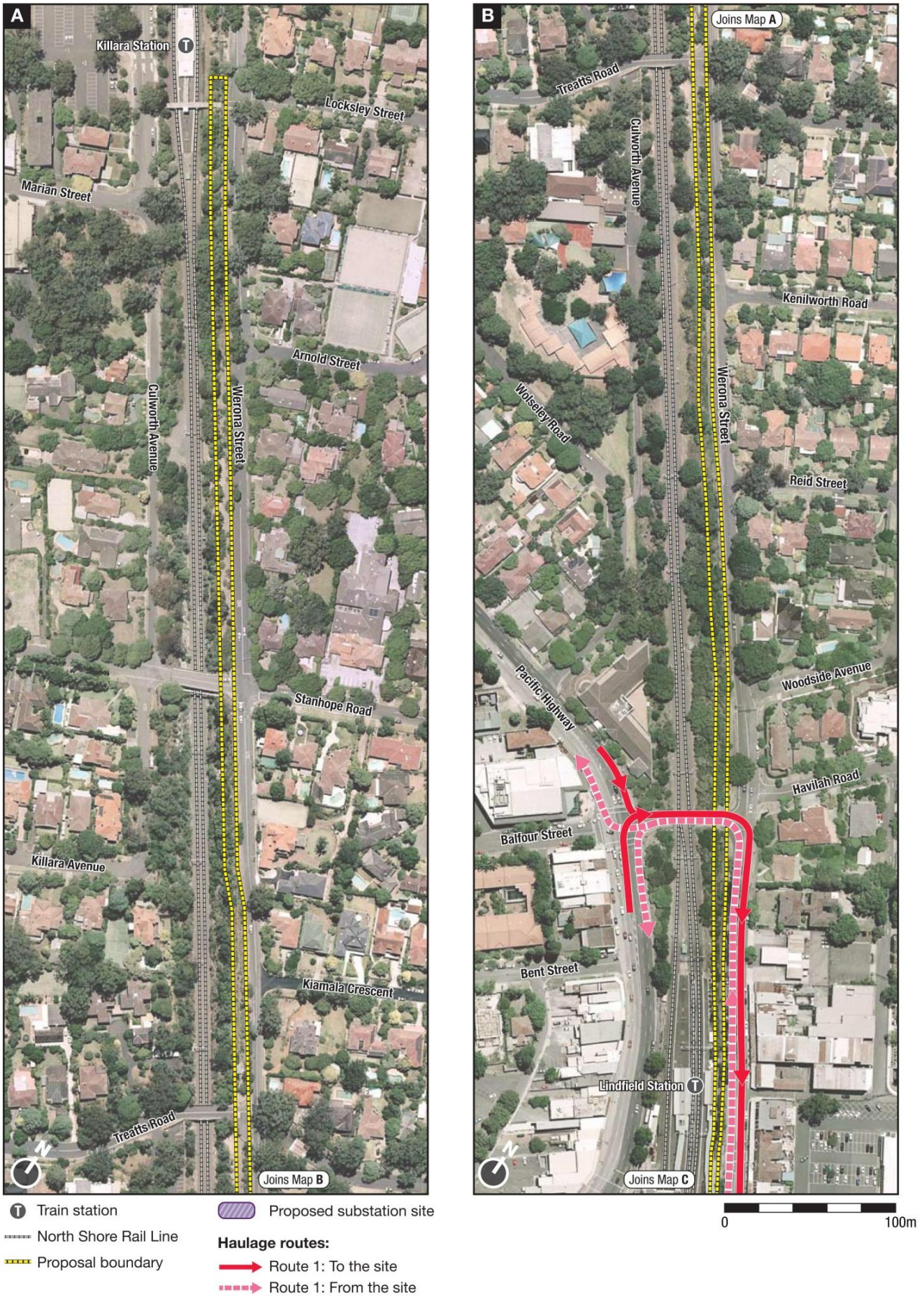


Figure 4.2 Construction vehicle routes to and from the project site



Figure 4.3 Construction vehicle routes to and from the project site

## 4.3 Construction traffic generation and distribution

Traffic generation during construction of the project is assumed to comprise traffic generated by construction personnel and construction vehicles travelling to and from the site. Project staff are assumed to arrive at the sites by personal vehicle.

The anticipated construction traffic generated by this project is presented in Table 4.1.

**Table 4.1 Construction traffic generation**

Location/Construction elements	Number of workforce (daytime shift)	Trips during the PM peak hour	Total daily trips during a weekday (in and out)
<b>Substation works</b>			
<b>Construction of substation</b>	Up to 20	10	40
<b>Cable and services relocation works</b>	Up to 10	5	20

As construction staff would arrive at the site before the shift start at 7.00 am and depart the site after the shift between 3.00 pm and 6.00 pm. The construction light vehicle trips were not considered for the AM peak hour traffic assessment as they do not coincide with the existing AM traffic peak. However they were considered for the PM peak hour traffic assessment as they would coincide with the existing PM traffic peak. It is assumed 50 per cent of construction light vehicle outbound trips would occur during the PM peak hour. Construction vehicle trips (heavy vehicles) would occur throughout the working day (shift).

## 4.4 Construction vehicle and staff parking

Construction vehicles would be parked off-street within the rail corridor at the substation site. Personal construction staff vehicles would be parked on-street. Suggested suitable locations for construction staff parking include Lindfield Avenue, Strickland Avenue and Middle Harbour Road.

There would be limited or no space for construction staff vehicle parking at the substation and cable and service relocation sites. The contractor is to consider parking requirements during project implementation.

## 4.5 Impacts during construction

### 4.5.1 Intersection performance

At the Lindfield substation location, up to 10 vehicles (refer to Table 4.2) could be leaving the site in the PM peak hour. These vehicles are likely to travel to the Pacific Highway via either Balfour Street or the adjacent intersection at Strickland Avenue. The Strickland Avenue intersection is unsignalised and therefore the impacts would be minimal. The low vehicle volume would also mean minimal impacts at the Balfour Street intersection.

Minimal construction related traffic is anticipated at the Llewellyn Lane, Strickland Lane and Clanville Road accesses and therefore minimal impact is expected at local intersections. It is expected that up to five vehicles (refer to Table 4.2) could be leaving the site in the PM peak hour.

## 4.5.2 Station access

No impacts to the existing Lindfield railway station access or operation are anticipated.

## 4.5.3 Parking

Substation access proposed off Lindfield Avenue during construction would require the temporary removal of approximately six on-street parking spaces to allow vehicle site access.

## 4.5.4 Pedestrians and cyclists

Temporary footpath closures are expected on the western side of Lindfield Avenue during the undergrounding of the transmission lines and the construction of a new driveway access to the substation.



# 5. Operational impact assessment

## 5.1 Lindfield substation

Once construction is completed, the Lindfield substation would undergo testing and would be commissioned for service. Once operational, the maintenance requirements of the substation are anticipated to be small, in the form of one site visit per month by one person for maintenance and attendance for switching operations during power isolations. It is anticipated that approximately two on-street parking spaces would be removed on Lindfield Avenue to allow for driveway access to the substation.

## 5.2 Cable and service relocation accesses

Once construction is completed, maintenance requirements of the cables and relocated services is anticipated to be small and have only negligible traffic impacts on the surrounding road network and local intersections.



# 6. Mitigation measures and strategies

The following mitigation measures and strategies would be applied where possible to this project.

## 6.1 General requirements

As part of the Construction Environmental Management Plan (CEMP), traffic management plans would be developed to address construction traffic and transport management. The objectives would be to:

- ensure public safety
- maintain a reasonable level of public access across the rail line and to public transport services
- minimise disruption to public transport services and, where necessary manage disruption in consultation with the relevant transport provider
- ensure that affected local residents and businesses are advised of any disruption to traffic flows, parking and public transport services
- ensure that disruptions to traffic flows on public streets are minimised and, where unavoidable, managed in consultation with the relevant road authority
- reduce the exposure of the community to heavy construction vehicle traffic impacts and associated noise and vibration, where possible
- ensure adequate access to work site including sight distance
- ensure that road damage from construction traffic is monitored and addressed in consultation with the relevant road authority.

To ensure the key objectives are achieved, the following mitigation actions would be undertaken:

- traffic controllers positioned at access gates adjacent to residential areas and access driveways to assist with vehicle ingress and egress, to stop traffic if required and to assist pedestrian crossing movements
- road occupancy licences for temporary closure of roads would be obtained, where required
- heavy vehicles would be restricted to the routes specified and route markers installed for heavy vehicles along designated routes
- restricting construction traffic movements to and from the sites outside of peak periods
- signs would be provided at each access point to assist in deliveries to each work site
- signs would be provided at each access point for pedestrian and cyclist guidance
- signs would be installed to advise pedestrians of temporary footpath closures and signs advising of the alternative pedestrian detour route installed
- local bus operators would be consulted to ensure that they are aware of proposed operation changes and that impacts to bus services are minimised
- an emergency response plan would be developed for construction traffic incidents
- a pre and post construction assessment of road pavement assets would be conducted in areas likely to be used by construction traffic

- public communications would be conducted to warn the community and local residents of vehicle movements and anticipated effects on the local road network relating to the site works
- access to all private properties adjacent to the works would be maintained during construction
- during project inductions all heavy vehicle drivers would be provided with the emergency response plan for construction traffic incidents
- undertake road safety audits where required or deemed necessary
- coordination of project staging, vehicle movement and scheduling, equipment and resourcing.

## 6.2 Construction methods

Construction methods would seek to manage the construction traffic impacts for the following:

- heavy vehicle traffic:
  - ▶ minimise the number of heavy vehicle trips on road
  - ▶ minimise the distance travelled by heavy vehicles by encouraging multi-drop delivery trips
  - ▶ minimise disruption on the local road network by using nominated haulage routes, which avoid sensitive areas such as schools
  - ▶ minimise the running of empty trucks
- construction worker traffic:
  - ▶ encourage the use of alternative travel modes to the work sites. Encourage car 'pooling' where alternatives are not practical
  - ▶ provide emergency vehicle parking within worksites
- temporary worksite access:
  - ▶ use existing accesses wherever possible
  - ▶ use traffic controllers to manage site access
  - ▶ close and lock site access points/gates after construction hours
  - ▶ minimise construction traffic during school start and end times near the following schools:
    - Lindfield Public School, corner of Pacific Highway and Grosvenor Road, Lindfield.

## 7. Conclusion

The construction related traffic associated with the construction of the proposed substation site works and the cable and service relocation works is minimal and would have a negligible impact on the operation and the performance of the surrounding road network and intersection operation. The volumes of traffic generated by the construction works is minimal and is likely to occur outside of peak periods. There would be minor impacts to pedestrians due to temporary closures of the footpath on the western side of Lindfield Avenue adjacent to the proposal site to allow the construction of the new substation driveway access and ancillary works. It is anticipated that approximately six on-street parking spaces would be temporarily removed on Lindfield Avenue to allow for driveway access to the substation during construction.

Operational traffic is anticipated to minimal and therefore only negligible impact is expected to the operation and the performance of the surrounding road network and intersection operation. It is anticipated that approximately two on-street parking spaces would be removed on Lindfield Avenue to allow for driveway access to the substation during operation.

Project related impacts would be removed, reduced or ameliorated where possible. Signs would be installed to advise pedestrians of temporary footpath closures and signs advising of the alternative pedestrian detour route installed. Traffic controllers positioned at access gates adjacent to residential areas and access driveways to assist with vehicle ingress and egress, to stop traffic if required and to assist pedestrian crossing movements. No major impacts are foreseen with the construction or operation of this proposal.