

2.3 Removal of Darley Road site from the project

The EIS identified the site as the Darley Road civil and tunnel site (C4) for the construction of the project and as the Darley Road motorway operations complex (MOC1) for the operation of the project.

Ongoing construction design and planning has determined that the Darley Road site is no longer required to support the construction and operation of the project.

2.3.1 Relocation of construction activities

Construction activities would not be carried out at the Darley Road civil and tunnel site. The construction activities proposed for Darley Road civil and tunnel site as described in the EIS would be accommodated at other project construction sites.

The approved project involved the removal and transportation of around 550,300 cubic metres of tunnel spoil from the Darley Road civil and tunnel site as described in section 23.3.2 of the EIS. Given that the length of the mainline tunnel would not change for the proposed modification, this spoil volume would be required to be removed from other tunnelling sites.

The overall intensity (rate) of spoil removal at approved tunnelling sites is not expected to change, however the additional spoil to be removed would require the extension of the tunnelling component of the overall construction program by around six months.

2.3.2 Relocation of operational ancillary infrastructure

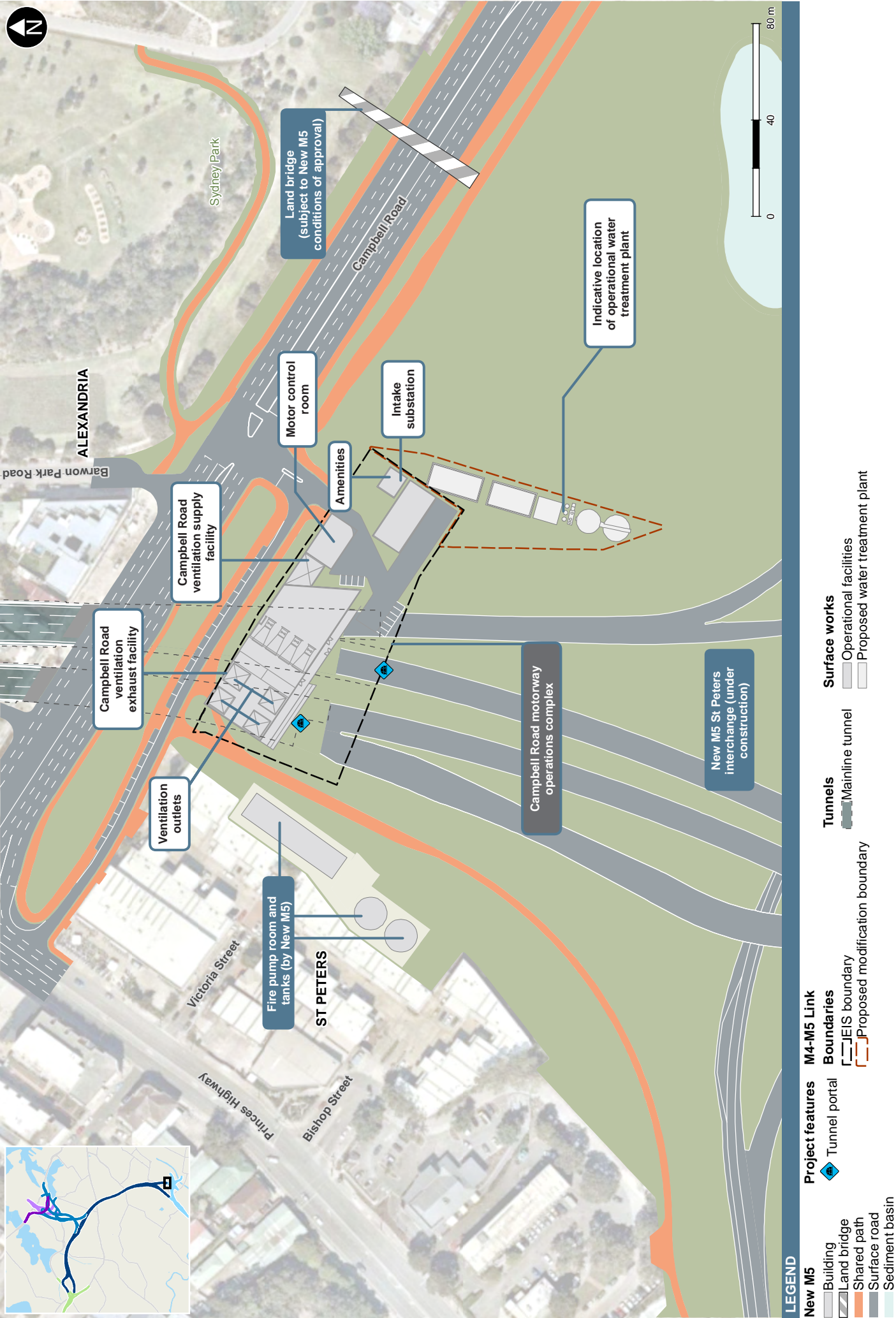
The EIS described that an operational water treatment plant and substation would be located at the Darley Road motorway operations complex. The removal of the Darley Road site from the project would result in the relocation of the operational water treatment plant to the Campbell Road motorway operations complex at St Peters interchange. The relocation of the operational water treatment plant is described in **section 2.4** below.

The permanent substation proposed at the Darley Road site in the EIS is no longer required. As described in the EIS, permanent power for Stage 1 of the M4-M5 link project will be supplied via the intake substation at the Campbell Road motorway operations complex at the St Peters interchange. Section 5.10.1 of the EIS and section 4.2.4 of Appendix F (Utilities Management Strategy) of the EIS provides further details on the proposed arrangements to provide electricity to the project.

The removal of the motorway operation complex from Darley Road would result in no permanent infrastructure for the project being located at this location.

2.4 Relocation of operational water treatment plant to St Peters interchange

The proposed relocation of the operational water treatment plant to the Campbell Road motorway operations complex would result in the operational footprint of the motorway operations complex at St Peters being increased. **Figure 2-15** provides an indicative site layout for the Campbell Road motorway operations complex at St Peters interchange, which includes an indicative location for the operational water treatment plant. The motorway operation complex is located on the cut and cover structure above the M4-M5 Link ramps at the St Peters interchange, which is being constructed by the New M5 project and on land to the immediate east. The motorway operations complex as described in the EIS includes ventilation facilities and a substation. Additional land adjacent to, and to the immediate south east of the motorway operations complex would be required to accommodate the operational water treatment plant.



3 Assessment methodology

3.1 Relevant guidelines and policies

The following guidelines were used in carrying out this assessment:

- *Guide to Traffic Management – Part 3 Traffic Studies and Analysis* (Austroads 2013)
- *Traffic Modelling Guidelines* (Roads and Maritime 2013)
- *Guide to Traffic Generating Developments Version 2.2* (NSW Roads and Traffic Authority (RTA) 2002).

3.2 Key assumptions

The most significant change in construction traffic and transport impacts would be due to the proposed change of use at the Northcote Street civil site to also operate as a tunnelling site, and the deletion of the Darley Road civil and tunnel site from the project. These proposed modifications would mean a change in construction traffic generated by the various construction sites in Haberfield and Ashfield of sufficient scale that further assessment is required, as well as changes to the nominated heavy vehicle spoil haulage routes to and from the Northcote Street civil and tunnel site.

The following assumptions were made in the assessment:

- The forecast traffic from the construction sites associated with Stage 2 (Rozelle interchange) of the project was assumed to remain as in the M4-M5 Link: EIS, as varied by the Submissions and Preferred Infrastructure Report (M4-M5 Link SPIR) (January 2018)
- Trucks using the G-loop (Route B from the Northcote Street civil and tunnel site) would primarily enter the M4 East tunnels westbound after making the turnaround. A scenario where trucks use the surface westbound Wattle Street lanes and the Wattle Street / Parramatta Road intersection after making the turnaround has also been assessed
- The assessment of traffic impacts associated with construction of the temporary pedestrian overpass above Parramatta Road to connect the Parramatta Road East and Parramatta Road West civil sites would be a qualitative assessment as impacts on the road network would occur during establishment and decommissioning only and therefore over a short duration
- The assessment of the relocation of the permanent water treatment plant from Darley Road to the Campbell Road motorway operations complex (MOC5) at the St Peters interchange would also be a qualitative assessment as the change in construction traffic is expected to be minimal
- The project modifications relate to the construction phase of works. No assessment of operational traffic and transport impacts is therefore required.

3.3 Methodology

The traffic impacts of the proposed heavy vehicle and light vehicle project modifications were assessed using existing LinSig traffic models previously used to assess construction impacts for the M4 East and M4-M5 Link projects. The assessments were undertaken on the surrounding road network during the AM and PM peak hours in the forecast peak construction year (2021). The impact of shuttle buses from the Parramatta Road sites was included in this assessment as shuttle buses were included in the light vehicle volumes.

The construction impact assessment was undertaken where construction traffic is forecast to pass through the network in significant volumes. The intersections assessed were grouped into two LinSig corridors or clusters, as follows, and indicated on **Figure 3-1**:

- Cluster 1 in Haberfield and Ashfield
- Cluster 2 in Five Dock.

The Cluster 1 model was previously used in the assessment of the construction impacts for the M4-M5 Link, so already had 2021 future year 'without construction' models, which used traffic forecasts from WestConnex Road Traffic Model (WRTM) v2.3.

The Cluster 2 model was previously used in the assessment of the construction impacts for the M4 East, which assessed a 2017 construction year and used traffic forecasts from WRTM v2.1. To create a consistent assessment year model and forecast volumes, AM and PM peak hour models for 2021 were developed using the growth forecast by WRTM v2.3 applied to the Cluster 2 base models to derive the background traffic demand for 2021 'without construction' models.

Construction traffic was then added to the 2021 background traffic, based on the proposed construction methodology, covering vehicle types, volumes and construction traffic routes to and from the various construction ancillary facilities.

As the proposed modifications relate to the Stage 1 construction sites at Haberfield and Ashfield, and the removal of the Darley Road site from the project, there is negligible change in construction impact forecast on the road network east of these sites along City West Link, and so the roads and intersections assessed in Leichhardt North, Lilyfield and Rozelle in the M4-M5 Link SPIR have not been reassessed.

3.3.1 Roadway level of service

Updated analysis of roadway levels of service (LoS) is detailed in **section 4.4.1** and **section 4.5.1** at relevant locations impacted by the changes compared to the M4-M5 Link SPIR. Mid-block traffic level of service demonstrates the forecast impact of construction traffic in 2021 for construction activities. Theoretical mid-block roadway capacities were based on Austroads *Guide to Traffic Management*, shown in **Table 3-1**, with the six levels of service for mid-block locations, ranging from LoS A to F, with LoS A representing optimum operating conditions (free flow) and LoS F the poorest (forced or breakdown in flow).

In highly congested networks, single-point assessment criteria, such as mid-block levels of service, do not present a complete picture of traffic operations. Nonetheless, this assessment provides a high level indication of the effect construction vehicles would have on roadway levels of service, compared to the background traffic.

A more practical impact assessment of capacity is provided in the intersection level of service assessment.

3.3.2 Intersection level of service

Average delay is commonly used to assess the operational performance of intersections, with level of service used as an index. A summary of the intersection level of service criteria is shown in **Table 3-2**.

The intersection performance results for the road network under the 2021 'without construction' and 'with construction' forecast volumes are summarised for each relevant location in **section 4.4.2** and **section 4.5.2** for the AM and PM peak hours. This allows for comparison with the level of impact reported in Appendix A (Traffic and transport impact assessment) of the M4-M5 Link SPIR.

Intersection modelling was undertaken using passenger car units (PCU) to quantify traffic volumes. This accounts for the amount of road space used by different vehicle types.

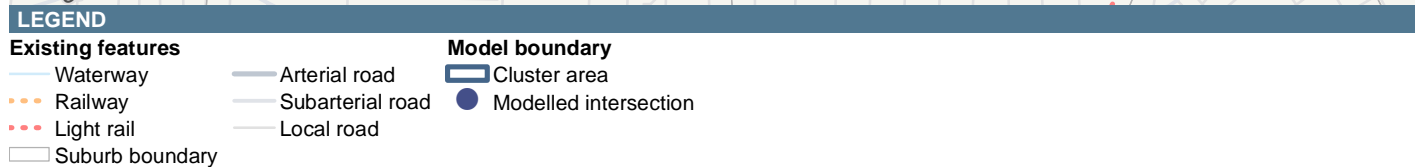
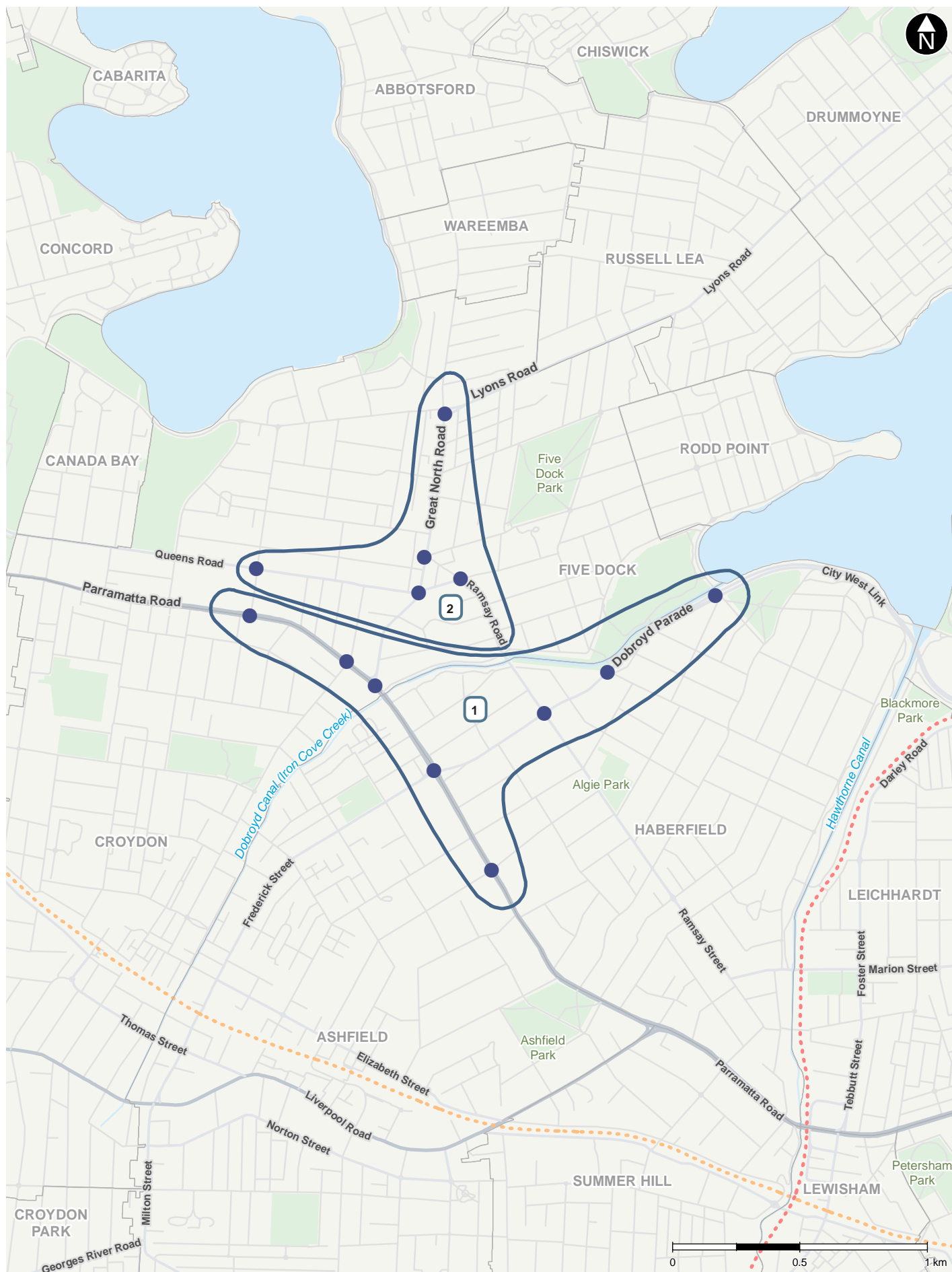


Figure 3-1 LinSig model area coverage

Table 3-1 Mid-block level of service definitions and criteria

LoS	Definition	Multi lane roads ¹	Freeways ²
		V/C ratio ³	Density (PCU/km/lane)
A	A condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high.	≤ 0.26	≤ 7.0
B	In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort is a little less than with level of service A.	0.27 to 0.41	7.1 to 11.0
C	Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.	0.42 to 0.59	11.1 to 16.0
D	Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow would generally cause operational problems.	0.60 to 0.81	16.1 to 22.0
E	Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream would cause breakdown.	0.82 to 1.00	22.1 to 28.0
F	In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.	> 1.00	> 28.0

Notes: ¹ Where free flow speed is taken as 70 kilometres per hour

² Where free flow speed is taken as 90 kilometres per hour

³ V/C ratio = ratio of the traffic volume to the road capacity

Source: Austroads, *Guide to Traffic Management – Part 3 Traffic Studies and Analysis*, Second Edition 2013

Table 3-2 Level of service criteria for intersections

LoS	Average delay/vehicles (sec/veh)	Traffic signals/roundabouts	Give way and stop signs
A	≤ 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents would cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: *Guide to Traffic Generating Developments*, RTA 2002

4 Potential impacts – construction

4.1 Construction traffic generation

Table 4-1 provides details of light and heavy vehicle volumes predicted to arrive and depart from the modelled M4-M5 Link construction sites during the typical network AM peak hour (7.30 am to 8.30 am), PM peak hour (4.15 pm to 5.15 pm) and daily period. These forecast construction volumes are based on the information available at the time of preparing this assessment and are subject to detailed construction planning and detailed design.

Compared to the M4-M5 Link SPIR construction vehicle volumes, the following changes in the peak hour volumes at the Stage 1 construction sites are proposed:

- Heavy vehicles
 - Increase at the Northcote Street civil and tunnel site from five heavy vehicles to eight heavy vehicles (one-way) during the AM and PM peak hours
 - Decrease at the Parramatta Road East civil site from three heavy vehicles to one heavy vehicle (one-way) during the AM and PM peak hours
- Light vehicles
 - Decrease at the Northcote Street civil and tunnel site from 50 light vehicles to seven light vehicles (one-way) during the AM peak hour and from 150 light vehicles to seven light vehicles (one-way) in the PM peak hour
 - Increase at the Parramatta Road West civil site from 10 light vehicles to 18 light vehicles (one-way) during the AM peak hour and from 10 light vehicles to 31 light vehicles (one-way) in the PM peak hour
 - Decrease at the Parramatta Road East civil site from 50 light vehicles to 12 light vehicles (one-way) during the AM peak hour and from 150 light vehicles to 20 light vehicles (one-way) in the PM peak hour.

No changes to the indicative construction volumes from the other construction sites are proposed, subject to ongoing detailed construction planning.

The peak hours for the sites are slightly different to the surrounding road network peak hours, ie the busiest periods on the general road network and at the sites do not coincide, but for a conservative assessment they have been assumed to occur in the modelled road network peak hour. With a shift start time of 7.00 am, the majority of light vehicle arrivals would occur before the road network AM peak hour at these locations. The end of the shift is more likely to impact on the road network PM peak hour, and although some vehicles would leave before the modelled road network peak hour, they have been conservatively assessed in the PM peak hour.

Table 4-1 Modified indicative daily and peak period construction traffic volumes

Location		Daily vehicles		AM peak hour				PM peak hour			
		(one way)		(7.30–8.30 am)				(4.15–5.15 pm)			
		Heavy vehicles	Light vehicles	Heavy vehicles		Light vehicles		Heavy vehicles		Light vehicles	
				Arrive	Depart	Arrive	Depart	Arrive	Depart	Arrive	Depart
Stage 1 construction sites											
C1a	Wattle Street civil and tunnel site	133	50	7	7	10	–	7	7	–	50
C3a	Northcote Street civil and tunnel site*	143 (+43)	20 (-130)	8 (+3)	8 (+3)	7 (-43)	4 (+4)	8 (+3)	8 (+3)	4 (+4)	7 (-143)
C1b	Parramatta Road West civil site*	25 (-115)	306 (+296)	7	7	18 (+8)	5 (+5)	7	7	5 (+5)	31(+21)
C2a/C2b	Haberfield civil site [#]	10	20	2	2	10	–	2	2	–	10
C3a/C3b	Parramatta Road East civil site*	25 (-5)	210 (+60)	1 (-2)	1 (-2)	12 (-38)	4 (+4)	1 (-2)	1 (-2)	4 (+4)	20 (-130)
C4	Darley Road civil and tunnel site – removed										
C9	Pyrmont Bridge Road tunnel site	133	70	7	7	20	–	7	7	–	70
C10	Campbell Road civil and tunnel site	133	70	7	7	20	–	7	7	–	70
C11	White Bay civil site	284	100	21	21	50	50	10	21	50	50
Stage 2 construction sites											
C5	Rozelle civil and tunnel site	517	350	23	23	100	–	23	23	–	350
C6	The Crescent civil site	10	20	2	2	0		2	2		5
C7	Victoria Road civil site	42	140	2	2	0	–	2	2	–	0
C8	Iron Cove Link civil site	42	140	2	2	15	–	2	2	–	140

Note: * Light vehicle volumes include forecast project shuttle bus movements

[#] The use and footprint of this site was amended in sections B11.6.8 and C6.1.3 of the SPIR to be as per the arrangement for the Haberfield civil site (C2b)

(+X or -X) = change in volume from the M4-M5 Link EIS

4.2 Construction workforce parking

A preliminary assessment of parking provision, based on approximate peak workforce estimates, anticipate that the total parking provision within the Haberfield and Ashfield construction sites (ie Wattle Street civil and tunnel site (C1a), Northcote Street civil and tunnel site (C3a), Haberfield civil site (C2b) and Parramatta Road West and East civil sites (C1b and C3b)) would be able to meet the forecast parking demand, as shown in **Table 4-2**.

To assist in minimising impacts from the construction workforce using on-street parking, the use of public transport would be encouraged (where feasible). The sites, situated along Parramatta Road, would be serviced by numerous bus routes. However, workers starting or ending shifts very early or very late would be more likely to use private vehicles.

Table 4-2 Parking demand and provision at Haberfield and Ashfield construction ancillary facilities

Location	Approximate day shift peak construction workforce	Estimate of parking demand (0.7 spaces/staff)	Approximate proposed parking numbers	Surplus or Deficit
Haberfield and Ashfield construction ancillary facilities	260	182	200	+18

A Construction Parking and Access Strategy would be developed to identify actions that would be implemented by the contractor to avoid or minimise the use of on-street parking in the vicinity of construction sites by the construction workforce. The car parking strategy would consider forecast parking demand, review of existing parking supply, alternative parking arrangements and communication and engagement. Processes for monitoring, reporting and corrective actions would also be part of the strategy.

4.3 Construction access points and routes

The proposed access points and routes to and from the Stage 1 construction sites considered in this assessment are summarised in **Table 4-3**. These routes were used to inform the assessment of construction traffic impacts and would be confirmed during detailed design and detailed construction planning through the Construction Traffic Transport and Access Management Sub-Plan. Spoil haulage routes are based on the assumption that spoil management sites would be located in western Sydney.

The nominated routes for exiting spoil haulage vehicles from the Northcote Street civil and tunnel site are shown in **Figure 4-1**. As described in **section 2.1**, there are two nominated egress routes for spoil haulage vehicles from the Northcote Street civil and tunnel site. The roads along these nominated routes are classified as state roads. Each spoil haulage vehicle egress route was assessed for use by up to eight heavy vehicles and four light vehicles in the AM peak hour and by eight heavy vehicles and seven light vehicles in the PM peak hour.

The proposed spoil haulage routes for the Northcote Street civil and tunnel site would be more direct and less constrained compared to the spoil haulage route for the Parramatta Road West site described in the EIS and SPIR which included the use of Centenary Drive and the Hume Highway. Inbound vehicles would be able to access the site traveling eastbound on the M4 East Motorway and Parramatta Road, and use of the G-loop would allow outbound spoil haulage vehicles to use the M4 East entry ramps on Wattle Street. Spoil haulage routes would be restricted to state roads that are controlled by Roads and Maritime.

Once the G-loop is in operation, Route B would be the preferred spoil haulage route and would be available for use 24 hours a day and 7 days a week in accordance with condition E70 of the project approval. Route A would also be used as a spoil haulage route. However, in response to feedback received from stakeholders during the consultation process, it is proposed that Route A would generally only be used between 7am and 6pm Monday to Friday and 8am to 6pm on Saturdays except in the circumstances identified in **section 2.1.4**.

A spoil haulage protocol would be developed by the contractor in consultation with Roads and Maritime and the Transport for NSW Traffic Management Centre to manage spoil haulage movements on Routes A and B. The protocol would be documented in the Construction Traffic Transport and Access Management Sub-Plan.

Table 4-3 Proposed routes to and from construction ancillary facilities assessed in this report

Site	Access and egress routes (heavy vehicles)^{1,2}	Access and egress points (light vehicles)
Wattle Street civil and tunnel site	Access from Parramatta Road, then Wattle Street via M4-M5 Link entry and exit ramps. Egress follows the same route in reverse. Spoil haulage route is the same. No change from M4-M5 Link SPIR.	Access from Parramatta Road, then Wattle Street northern (eastbound) carriageway (right-in). Egress (right-out) on Wattle Street southern (westbound), then into Parramatta Road. No change from M4-M5 Link SPIR.
Northcote Street civil and tunnel site	Access from Parramatta Road (left-in). Egress onto Wattle Street (left-out). Spoil haulage Route A: Access from Parramatta Road (left-in). Egress onto Wattle Street (left-out), then left into Ramsay Street / Road, left into Fairlight Street, left into Great North Road and right into Parramatta Road. This is a new route that was not assessed in the M4-M5 Link EIS or M4-M5 Link SPIR.	Access from Parramatta Road (left-in). Egress onto Wattle Street (left-out).
	Access from Parramatta Road (left-in). Egress onto Wattle Street (left-out). Spoil haulage Route B: Access from Parramatta Road (left-in). Egress onto Wattle Street (left-out), then along Dobroyd Parade to the G-loop, right turn at Waratah Street into Dobroyd Parade westbound and either into the M4 East westbound or westbound along Wattle Street and then Parramatta Road to head west. This is a new route that was not assessed in the M4-M5 Link EIS or M4-M5 Link SPIR.	Access from Parramatta Road (left-in). Egress onto Wattle Street (left-out).
Parramatta Road West civil site	Access and egress from Parramatta Road (left-in / left-out), Alt Street and Bland Street (west of Parramatta Road). Crossover between sites on Alt Street.	Same as for heavy vehicles.
Parramatta Road East civil site	Access and egress from Parramatta Road (left-in / left-out) and Alt Street. Crossover between sites on Alt Street.	Same as for heavy vehicles.

Note:

1. Some use of local roads by heavy vehicles delivering materials and/or equipment may also be required, however this would be minimised as far as practicable.
2. Access and egress routes for heavy vehicles relate to spoil haulage vehicles only. Some use of other routes by other construction related vehicles (including heavy vehicles) may be undertaken. These movements would occur in accordance with the relevant conditions of approval for the project.

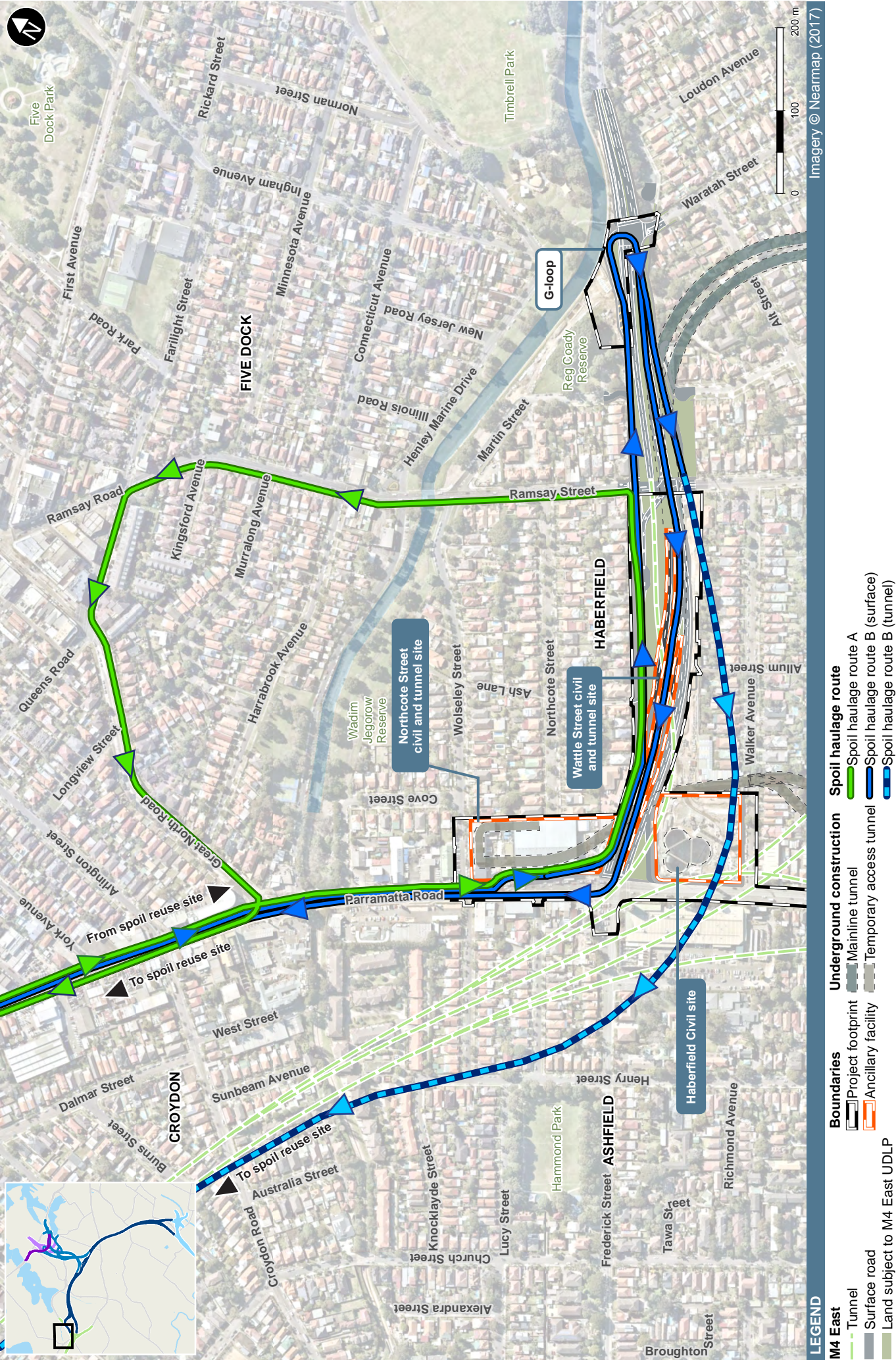


Figure 4-1 Northcote Street civil and tunnel site - proposed spoil haulage routes

4.4 Impact assessment – Haberfield and Ashfield

This section presents changes to the impact assessment of construction activities on proposed access routes in the Haberfield and Ashfield area compared to the M4-M5 Link SPIR assessment. Cluster 1 covers the Parramatta Road and Wattle Street corridors in Haberfield and consists of the following intersections:

- Parramatta Road/Harris Road
- Parramatta Road/Croydon Road/Arlington Street
- Parramatta Road/Great North Road
- Parramatta Road/Frederick Street/Wattle Street
- Parramatta Road/Bland Street
- Wattle Street/Ramsay Street
- Dobroyd Parade/Waratah Street
- Dobroyd Parade/Timbrell Drive/Mortley Avenue.

The Parramatta Road/Great North Road intersection modelling includes the planned Roads and Maritime intersection improvements at this location, which includes an additional right turn lane from Parramatta Road into Great North Road to increase capacity and minimise queuing into the through traffic lanes.

Roads and Maritime is also planning to construct an additional eastbound traffic lane on City West Link between Waratah Street, Haberfield and James Street, Leichhardt, within the existing road footprint. Due to the timing of the announcement, it was not possible to include this proposed upgrade in the traffic modelling. However, this reallocation of road space to allow additional eastbound capacity would be expected to improve the intersection and mid-block performance along Dobroyd Parade/City West Link. Therefore, the analysis undertaken is a worse-case scenario and would be expected to improve with this upgrade.

4.4.1 Impacts on roadway level of service

As described in **section 3.3**, an update of the analysis of the roadway levels of service was carried out to determine the impact of the modification on construction traffic in 2021. Theoretical mid-block roadway capacities were based on Austroads *Guide to Traffic Management* and these capacities and assessment results are shown in **Table 4-4** and **Table 4-5** for the AM and PM peak hours.

A comparison to the results from Appendix A (Traffic and transport impact assessment) of the M4-M5 Link SPIR are also provided in the tables. While the M4-M5 Link SPIR presented two construction site options (Option A and Option B), a comparison against Option A has been provided, as it is the most comparable in terms of the construction sites assessed as Option A included the use of Northcote Street as a civil site.

The results for Haberfield and Ashfield show limited change in terms of volume over capacity (V/C) from the assessment in Appendix A (Traffic and transport impact assessment) of the M4-M5 Link SPIR and indicate that the relevant mid-blocks would remain within their theoretical capacity. The small change in V/C indicates a small change in forecast volume on these links and therefore a limited impact. The results presented are for the Route A haulage route option. However, the choice of Northcote Street civil and tunnel site egress option – either via Five Dock or via the G-loop – has minimal impact on the mid-block operational performance.

Table 4-4 2021 AM peak hour mid-block operational performance summary¹

Location and direction		Mid block capacity	Without construction			With construction (M4 M5 Link SPIR Option A)			With construction (Modification)		
			Flow	V/C ²	LoS	Flow	V/C	LoS	Flow	V/C	LoS
Parramatta Road, north of Wattle Street – Haberfield	SB	3,300	1,840	0.56	C	1,890	0.57	C	1,910	0.58	C
	NB	3,300	1,310	0.40	C	1,340	0.41	C	1,350	0.41	C
Wattle Street, east of Parramatta Road – Haberfield	EB	2,000	740	0.37	B	780	0.39	B	770	0.38	B
	WB	2,000	860	0.43	C	890	0.45	C	880	0.44	C
M4 East ramps at Wattle Street ³	EB	2,200	1,170	0.53	C	1,310	0.60	D	1,250	0.57	C
	WB	4,500	1,260	0.28	B	1,340	0.30	B	1,310	0.29	B

Notes:

1. Traffic volume rounded to nearest 10
2. Volume over capacity ratio
3. Freeway LoS is evaluated in PCU, eastbound (EB) capacity treated as urban road with interrupted flow due to downstream traffic signals.

Table 4-5 2021 PM peak hour mid-block operational performance summary¹

Location and direction		Mid block capacity	Without construction			With construction (M4 M5 Link SPIR Option A)			With construction (Modification)		
			Flow	V/C ²	LoS	Flow	V/C	LoS	Flow	V/C	LoS
Parramatta Road, north of Wattle Street – Haberfield	SB	3,300	2,080	0.63	D	2,260	0.68	D	2,120	0.64	D
	NB	3,300	1,310	0.40	C	1,380	0.42	C	1,380	0.42	C
Wattle Street, east of Parramatta Road – Haberfield	EB	2,000	1,110	0.55	C	1,270	0.64	D	1,130	0.57	C
	WB	2,000	730	0.37	B	800	0.40	C	760	0.38	B
M4 East ramps at Wattle Street ³	EB	2,200	910	0.41	C	1,010	0.46	C	970	0.44	C
	WB	4,500	1,090	0.24	A	1,290	0.29	B	1,240	0.28	B

Notes:

1. Traffic volume rounded to nearest 10
2. Volume over capacity ratio.
3. Freeway LoS is evaluated in PCU, eastbound (EB) capacity treated as urban road with interrupted flow due to downstream traffic signals.

4.4.2 Impacts on intersection level of service

Route A: Northcote Street civil and tunnel site egress via Five Dock

The intersection performance results for the road network under the 2021 'without construction' and 'with construction' scenarios are summarised in **Table 4-6** and **Table 4-7** for the AM and PM peak hours. This allows for comparison with the level of impact reported in Appendix A (Traffic and transport impact assessment) of the M4-M5 Link SPIR. As above, Option A from the M4-M5 Link SPIR was used as the basis for comparison.

Compared to the M4-M5 Link SPIR Option A scenario, there is a relatively small change in the volume of construction traffic on parts of the network due to the proposed modification, rising by a maximum of about 60 PCU in the PM peak at the Parramatta Road/Great North Road intersection. This increase in PCUs does not change the LoS at this intersection and there is limited change elsewhere on the network.

The change in intersection performance relative to the M4-M5 Link SPIR assessment is limited with a change in the LoS band seen at two intersections during the PM peak hour:

- Wattle Street/Ramsay Street intersection – improvement from LoS E to LoS D
- Parramatta Road/Croydon Road/Arlington Street intersection – deterioration from LoS E to LoS F. This intersection is at capacity even in the 'without construction' scenario – it is close to LoS E – so even a small change in demand has a large impact on intersection delay. The capacity constraint is caused by exit blocking from downstream intersections, so upgrades at this intersection would not alleviate the forecast delay.

This analysis shows that there is a relatively minor difference in volumes on the modelled road network between the 'without construction', 'with construction' (M4-M5 Link SPIR Option A) and 'with construction' modification scenarios. The location forecast to experience the most substantial increase in demand (compared to the 'without construction' scenario) is the Dobroyd Parade/Waratah Street intersection in the PM peak hour (an increase of around 310 PCU or 10 per cent compared to the 'without construction' scenario). However, this is a reduction of 10 PCU when compared to the 'with construction' (M4-M5 Link SPIR Option A) scenario.

There is minimal impact in terms of performance at this intersection with the intersection remaining at LoS B under all modelled scenarios in the PM peak. The increases at other intersections are forecast to be between one and seven per cent (compared to the 'without construction' scenario) – generally well within the typical daily fluctuations of traffic demands.

Table 4-6 2021 AM peak hour intersection operational performance summary¹

Cluster	Intersection	Without construction		With construction (M4 M5 Link SPIR Option A)		With construction (Modification Northcote Street site egress via Five Dock)	
		Volume (PCU)	LoS	Volume (PCU)	LoS	Volume (PCU)	LoS
1	Parramatta Rd Harris Rd	2,550	B	2,650	C	2,690	C
	Parramatta Rd Croydon Rd Arlington St	3,280	B	3,370	C	3,420	C
	Parramatta Rd Great North Rd	3,810	C	3,940	C	3,960	C
	Parramatta Rd Frederick St Wattle St	4,880	D	4,960	D	4,990	D
	Parramatta Rd Bland St	2,870	F	2,870	F	2,930	F
	Wattle St Ramsay St	3,260	C	3,280	C	3,310	C
	Dobroyd Parade Waratah St	3,470	B	3,710	B	3,720	B
	Dobroyd Parade Timbrell Dr Mortley Ave	5,530	F	5,780	F	5,780	F

Notes:

1. Traffic volume rounded to nearest 10.

Table 4-7 2021 PM peak hour intersection operational performance summary¹

Cluster	Intersection	Without construction		With construction (M4 M5 Link SPIR Option A)		With construction (Modification Northcote Street site egress via Five Dock)	
		Volume (PCU)	LoS	Volume (PCU)	LoS	Volume (PCU)	LoS
1	Parramatta Rd Harris Rd	3,040	B	3,240	C	3,220	C
	Parramatta Rd Croydon Rd Arlington St	3,610	D	3,710	E	3,760	F
	Parramatta Rd Great North Rd	3,820	F	3,920	F	3,980	F
	Parramatta Rd Frederick St Wattle St	4,950	E	5,200	E	5,070	E
	Parramatta Rd Bland St	2,500	B	2,530	B	2,570	B
	Wattle St Ramsay St	3,080	D	3,330	E	3,170	D
	Dobroyd Parade Waratah St	2,960	B	3,280	B	3,270	B
	Dobroyd Parade Timbrell Dr Mortley Ave	5,450	F	5,800	F	5,760	F

Notes:

1. Traffic volume rounded to nearest 10.

Route B: Northcote Street civil and tunnel site egress via the G-loop

The assessment of Route B used the same LinSig models as Route A, with the addition of the G-loop into the model network. The reinstatement of the northern leg (the G-loop exit) of the Dobroyd Parade / Waratah Street intersection would impact signal phasing at this intersection. The total cycle time remained the same as the Route A and previously tested scenarios, with a diamond phase introduced to allow the right turn movement from the G-loop and the right turn out of Waratah Street to occur at the same time. This arrangement was based on swept path analysis (see **section 4.7**) that indicated that the two right turn movements could occur simultaneously. An independent road safety audit will be undertaken at this intersection during detailed design to assess safety performance in accordance with condition E56 of the project approval.

Two scenarios have been assessed for Route B:

- Trucks exiting the G-loop and entering the M4 East westbound entry ramp
- Trucks exiting the G-loop and using the surface westbound Wattle Street lanes and the Parramatta Road/Wattle Street intersection.

The results of the assessment for these two scenarios are provided in the following sections.

G-loop to M4 East westbound entry ramp scenario

The intersection performance results for the road network under the 2021 'without construction' and 'with construction' scenarios with the trucks exiting the G-loop and entering the M4 East westbound entry ramp are summarised in **Table 4-8** and **Table 4-9** for the AM and PM peak hours. As above, Option A from the M4-M5 Link SPIR was used as the basis for comparison.

Table 4-8 2021 AM peak hour intersection operational performance summary¹

Cluster	Intersection	Without construction		With construction (M4 M5 Link SPIR Option A)		With construction (Modification Northcote Street site egress via G loop and M4 East)	
		Volume (PCU)	LoS	Volume (PCU)	LoS	Volume (PCU)	LoS
1	Parramatta Rd Harris Rd	2,550	B	2,650	C	2,680	C
	Parramatta Rd Croydon Rd Arlington St	3,280	B	3,370	C	3,400	C
	Parramatta Rd Great North Rd	3,810	C	3,940	C	3,940	C
	Parramatta Rd Frederick St Wattle St	4,880	D	4,960	D	4,990	D
	Parramatta Rd Bland St	2,870	F	2,870	F	2,930	F
	Wattle St Ramsay St	3,260	C	3,280	C	3,310	C
	Dobroyd Parade Waratah St	3,470	B	3,710	B	3,730	C
	Dobroyd Parade Timbrell Dr Mortley Ave	5,530	F	5,780	F	5,780	F

Notes:

1. Traffic volume rounded to nearest 10.

Table 4-9 2021 PM peak hour intersection operational performance summary¹

Cluster	Intersection	Without construction		With construction (M4 M5 Link SPIR Option A)		With construction (Modification Northcote Street site egress via G loop and M4 East)	
		Volume (PCU)	LoS	Volume (PCU)	LoS	Volume (PCU)	LoS
1	Parramatta Rd Harris Rd	3,040	B	3,240	C	3,200	C
	Parramatta Rd Croydon Rd Arlington St	3,610	D	3,710	E	3,740	F
	Parramatta Rd Great North Rd	3,820	F	3,920	F	3,960	F
	Parramatta Rd Frederick St Wattle St	4,950	E	5,200	E	5,070	E
	Parramatta Rd Bland St	2,500	B	2,530	B	2,570	B
	Wattle St Ramsay St	3,080	D	3,330	E	3,170	D
	Dobroyd Parade Waratah St	2,960	B	3,280	B	3,290	B
	Dobroyd Parade Timbrell Dr Mortley Ave	5,450	F	5,800	F	5,760	F

Notes:

1. Traffic volume rounded to nearest 10.

As with Route A, the change in intersection performance relative to the M4-M5 Link SPIR assessment is limited with a change in the LoS band seen at the following intersections:

- Dobroyd Parade/Waratah Street intersection – deterioration from LoS B to LoS C during the AM peak hour. This is mainly due to the additional signal phase for the northern leg (G-loop exit), which reduces the capacity on the other approaches. Compared to the construction scenario of using the Route A haulage route, the maximum queue length on the eastbound lanes from the M4 East exit ramp is forecast to increase from about 115 metres to 180 metres during the AM peak hour. This is some distance from the tunnel portal, located at Ramsay Street, which is about 280 metres from the intersection stop line. The use of the G-loop route (Route B) is therefore not expected to result in queuing back on to the M4 East exit ramps during the AM peak
- Wattle Street/Ramsay Street intersection – improvement from LoS E to LoS D during the PM peak hour, with the forecast reduction in construction vehicles compared to the SPIR
- Parramatta Road/Croydon Road/Arlington Street intersection – deterioration from LoS E to LoS F during the PM peak hour. As noted in the Route A discussion, the capacity constraint at this intersection is caused by exit blocking from downstream intersections, so upgrades at this intersection would not alleviate the forecast delay.

The analysis shows there is a relatively minor difference in volumes on the modelled road network between the 'without construction' and 'with construction' modification scenarios. The Dobroyd Parade/Waratah Street intersection in the PM peak hour is forecast to experience the highest increase in demand (330 PCU, about 11 per cent compared to the 'without construction' scenario). However, this is an increase of only 10 PCU compared to the 'with construction' (M4-M5 Link SPIR) scenario. The increases at other intersections are forecast to be between one and eight per cent when comparing the modification to the 'without construction' scenario (and negligible when comparing the modification to the M4-M5 Link SPIR Option A scenario) – and therefore generally well within the typical daily fluctuations of traffic demands.

G-loop to Wattle Street westbound surface lanes scenario

A scenario where trucks use the surface westbound Wattle Street lanes and the Wattle Street / Parramatta Road intersection after making the G-loop turnaround has also been assessed. The intersection performance results for the road network under the 2021 'without construction' and 'with construction' scenarios with the trucks exiting the G-loop and travelling westbound along Wattle Street and then Parramatta Road to head west are summarised in **Table 4-10** and **Table 4-11** for the AM and PM peak hours. As above, Option A from the M4-M5 Link SPIR was used as the basis for comparison.

The use of this route adds an additional 20 PCU to the intersections west of the Dobroyd Parade/ Waratah Street intersection compared to the scenario where trucks use the G-loop and enter the M4 East. However, this does not impact the forecast level of service of the modelled intersections compared to the route using the M4 East. Therefore, the impacts relative to the M4-M5 Link SPIR assessment are consistent with those described above for M4 East route option.

Table 4-10 2021 AM peak hour intersection operational performance summary¹

Cluster	Intersection	Without construction		With construction (M4 M5 Link SPIR Option A)		With construction (Modification Northcote Street site egress via G-loop and Parramatta Road)	
		Volume (PCU)	LoS	Volume (PCU)	LoS	Volume (PCU)	LoS
1	Parramatta Rd Harris Rd	2,550	B	2,650	C	2,700	C
	Parramatta Rd Croydon Rd Arlington St	3,280	B	3,370	C	3,420	C
	Parramatta Rd Great North Rd	3,810	C	3,940	C	3,960	C
	Parramatta Rd Frederick St Wattle St	4,880	D	4,960	D	5,010	D
	Parramatta Rd Bland St	2,870	F	2,870	F	2,930	F
	Wattle St Ramsay St	3,260	C	3,280	C	3,330	C
	Dobroyd Parade Waratah St	3,470	B	3,710	B	3,730	C
	Dobroyd Parade Timbrell Dr Mortley Ave	5,530	F	5,780	F	5,780	F

Notes:

1. Traffic volume rounded to nearest 10.

Table 4-11 2021 PM peak hour intersection operational performance summary¹

Cluster	Intersection	Without construction		With construction (M4 M5 Link SPIR Option A)		With construction (Modification Northcote Street site egress via G-loop and Parramatta Road)	
		Volume (PCU)	LoS	Volume (PCU)	LoS	Volume (PCU)	LoS
1	Parramatta Rd Harris Rd	3,040	B	3,240	C	3,220	C
	Parramatta Rd Croydon Rd Arlington St	3,610	D	3,710	E	3,760	F
	Parramatta Rd Great North Rd	3,820	F	3,920	F	3,980	F
	Parramatta Rd Frederick St Wattle St	4,950	E	5,200	E	5,090	E
	Parramatta Rd Bland St	2,500	B	2,530	B	2,570	B
	Wattle St Ramsay St	3,080	D	3,330	E	3,190	D
	Dobroyd Parade Waratah St	2,960	B	3,280	B	3,290	B
	Dobroyd Parade Timbrell Dr Mortley Ave	5,450	F	5,800	F	5,760	F

Notes:

1. Traffic volume rounded to nearest 10.

4.4.3 Temporary road network changes, closures and diversions

Works would be required to reinstate the G-loop, which would necessitate amendments to the northern kerb of the eastbound carriageway of Dobroyd Parade to allow the G-loop entry and exit to be reinstated, and to the median between the eastbound Dobroyd Parade and the eastbound M4 East Wattle Street exit ramp to allow trucks to turn right out of the G-loop into Dobroyd Parade (westbound).

These works would be carried out under an ROL and in consultation with TMC. Works would likely be carried out outside of the peak traffic periods, with establishment and decommissioning works carried out in accordance with the conditions of approval for the project, including the Construction Traffic Transport and Access Management Sub-Plan.

There are no other changes proposed to the temporary road network changes, closures and diversions described in the M4-M5 Link SPIR.

4.4.4 Impacts on on-street parking

No changes are proposed to the on-street parking impacts identified in the M4-M5 Link EIS and M4-M5 Link SPIR as part of this modification. Potential impacts on on-street parking would be confirmed during detailed construction planning and detailed design and managed in accordance with the Construction Traffic Transport and Access Management Sub-Plan.

4.4.5 Impacts on pedestrians and cyclists

Key elements of the Northcote Street civil and tunnel site would be consistent with the layout used for the M4 East project, including the vehicle entry and exit locations and the arrangements around the G-loop. The traffic control measures in place to manage impacts on pedestrian and cyclists during construction of the M4 East project would generally be retained or reinstated for the M4-M5 Link Stage 1 construction. These would be further detailed in the Construction Traffic Transport and Access Management Sub-Plan that will be prepared for the project.

Safe pedestrian and cyclist access would be maintained around the G-loop during construction in accordance with condition E57 of the project approval.

4.4.6 Impacts on public transport

With the small changes in peak hour construction volumes compared to the M4-M5 Link SPIR, there is likely to be a small impact on buses commensurate with the impact on general traffic. No changes to bus stops are proposed.

4.4.7 Impacts on traffic crashes

The change in construction traffic volumes is low when compared to existing traffic volumes on key arterial roads connecting to the construction ancillary facility locations and is not expected to substantially impact road safety.

There is still a risk with construction traffic interacting with general traffic, with elevated risk when construction-related vehicles are entering and leaving construction sites. Any foreseen impacts on road safety for all users during construction would be mitigated as much as possible through the provision of tailored construction traffic management plans and other measures detailed in the M4-M5 Link SPIR and in the Construction Traffic Transport and Access Management Sub-Plan that will be prepared for the project.

4.5 Impact assessment – Five Dock

This section presents the impact assessment of the Route A spoil haulage route from Northcote Street civil and tunnel site through the Five Dock road network. As this route was not assessed in the M4-M5 Link EIS or SPIR, comparison is made to the 'without construction' scenario only.

As noted in **section 3.3**, The Cluster 2 model was previously used in the assessment of the construction impacts for the M4 East. The base models were calibrated and validated for the peak periods and took into account any influence of traffic outside the models, eg Queens Road west of Great North Road queueing back and causing exit blocking at the intersections within the models.

Cluster 2 consists of the following intersections:

- Ramsay Road/Fairlight Street
- Great North Road/Queens Road/Fairlight Street
- Great North Road/Ramsay Road/First Avenue
- Queens Road/Harris Street
- Great North Road/Lyons Road.

The impact on the Wattle Street/Ramsay Street and Parramatta Road/Great North Road intersections was assessed in the Cluster 1 model for Route A presented in **section 4.2**.

4.5.1 Impact on roadway level of service

An analysis of the roadway levels of service was carried out to determine the impact of the modification on construction traffic in 2021. Theoretical mid-block roadway capacities were based on Austroads *Guide to Traffic Management* and these capacities and assessment results are shown in **Table 4-12** and **Table 4-13** for the AM and PM peak hours.

The results in the Five Dock model show limited impact in terms of volume over capacity and indicate that the relevant mid-blocks will remain within their theoretical capacity. This analysis shows that there are no significant adverse changes forecast on the modelled network from construction traffic generated from the proposed modification.

Table 4-12 2021 AM peak hour mid-block operational performance summary¹

Location and direction		Mid block capacity	Without construction			With construction (Modification)		
			Flow	V/C ²	LoS	Flow	V/C	LoS
Ramsay Rd, south of Fairlight St	NB	1800	690	0.38	B	710	0.39	B
	SB	1800	770	0.43	C	770	0.43	C
Fairlight St, west of Ramsay Rd	EB	1800	790	0.44	C	790	0.44	C
	WB	1800	700	0.39	B	720	0.40	C
Great North Rd, south of Fairlight St	NB	900	540	0.60	D	540	0.60	D
	SB	900	550	0.61	D	570	0.63	D

Notes:

1. Traffic volume rounded to nearest 10.
2. Volume over capacity ratio.

Table 4-13 2021 PM peak hour mid-block operational performance summary¹

Location and direction		Mid block capacity	Without construction			With construction (Modification)		
			Flow	V/C ²	LoS	Flow	V/C	LoS
Ramsay Rd, south of Fairlight St	NB	1800	800	0.44	C	820	0.46	C
	SB	1800	690	0.38	B	690	0.38	B
Fairlight St, west of Ramsay Rd	EB	1800	630	0.35	B	630	0.35	B
	WB	1800	690	0.38	B	710	0.39	B
Great North Rd, south of Fairlight St	NB	900	350	0.39	B	350	0.39	B
	SB	900	510	0.57	C	530	0.59	D

Notes:

1. Traffic volume rounded to nearest 10.
2. Volume over capacity ratio.

4.5.2 Impact on intersection level of service

The intersection performance results for the road network within the Five Dock cluster under the 2021 'without construction' and 'with construction' scenarios are summarised in **Table 4-14** and **Table 4-15** for the AM and PM peak hours.

There is a relatively small change in traffic volume at parts of the network under the 'with construction' (modification) scenario when compared to the 'without construction' scenario, rising by a maximum of about 30 PCU in each peak hour. This increase in PCUs is not forecast to change the level of service at the modelled intersections compared to the 'without construction' scenario. These tables show the proposed modification is not forecast to have a material impact on the performance of the modelled road network.

Table 4-14 2021 AM peak hour intersection operational performance summary¹

Cluster	Intersection	Without construction		With construction (Modification)	
		Volume (PCU)	LoS	Volume (PCU)	LoS
2	Ramsay Rd Fairlight St	2,070	D	2,090	D
	Great North Rd Queens Rd Fairlight St	2,840	E	2,860	E
	Great North Rd Ramsay Rd First Ave	1,880	F	1,880	F
	Queens Rd Harris St	2,460	C	2,460	C
	Great North Rd Lyons Rd	3,530	F	3,530	F

Notes:

1. Traffic volume rounded to nearest 10.

Table 4-15 2021 PM peak hour intersection operational performance summary¹

Cluster	Intersection	Without construction		With construction (Modification)	
		Volume (PCU)	LoS	Volume (PCU)	LoS
2	Ramsay Rd Fairlight St	1,950	C	1,970	C
	Great North Rd Queens Rd Fairlight St	2,410	B	2,440	B
	Great North Rd Ramsay Rd First Ave	1,780	F	1,780	F
	Queens Rd Harris St	2,300	C	2,300	C
	Great North Rd Lyons Rd	3,650	F	3,650	F

Notes:

1. Traffic volume rounded to nearest 10.

4.5.3 Temporary road network changes, closures and diversions

No temporary road network changes, closures or diversions are identified as being required along this route during construction.

4.5.4 Impacts on on-street parking

The proposed Route A spoil haulage route is not expected to result in impacts on on-street parking.

4.5.5 Impacts on pedestrians and cyclists

Key elements of the Northcote Street civil and tunnel site would be consistent with the existing layout for the M4 East project including the vehicle entry and exit locations. The traffic control measures in place to manage impacts on pedestrian and cyclists around the Northcote Street site during construction of the M4 East project would generally be retained for the M4-M5 Link Stage 1 construction.

The Route A spoil haulage route may require pedestrian protection in the signal timing (i.e. a head start for the green signal for pedestrians before the green signal for left-turning vehicles) for pedestrian crossings on the western leg of the Great North Road/Parramatta Road, Ramsay Road/Fairlight Street and Fairlight Road/Great North Road intersections. This would be decided in conjunction with TMC and would be documented in the Construction Traffic Transport and Access Management Sub-Plan that will be prepared for the project.

4.5.6 Impacts on public transport

The small changes in forecast peak hour construction volumes would result in a minor impact on buses commensurate with the impact on general traffic. No temporary or permanent impact on bus stops is expected to occur.

4.5.7 Impacts on traffic crashes

The change in construction traffic volumes is low when compared to existing traffic volumes on key arterial roads connecting to the construction ancillary facilities and is not expected to substantially impact road safety in the study area.

There is still a risk with construction traffic interacting with general traffic, with elevated risk when construction-related vehicles are entering and leaving construction sites. Any foreseen impacts on road safety for all users during construction would be mitigated as much as possible through the provision of tailored construction traffic management plans and other measures detailed in the M4-M5 Link SPIR and in the Construction Traffic Transport and Access Management Sub-Plan that will be prepared for the project.

4.6 Cumulative scenario

With regard to the cumulative scenario assessment, cumulative traffic volumes included in the M4-M5 Link SPIR (in addition to the construction traffic volumes being generated by the project) were the proposed Western Harbour Tunnel construction site at Rozelle and the Multi-User Facility and Concrete Batching Plant planned at Glebe Island.

Based on forecast traffic distribution, traffic from these facilities is likely to have minimal impact on the Haberfield and Ashfield road network. Some traffic would access the M4 East Wattle Street ramps, which is forecast to have a minor impact on the Dobroyd Parade/Waratah Street and Dobroyd Parade/Timbrell Drive intersections, with no change in level of service.

4.7 Swept path analyses

An assessment of the intersections along the two proposed spoil haulage routes for the Northcote Street civil and tunnel site was carried out to identify intersections that needed further analysis to ensure the proposed turning movements could be made safely by a truck and dog vehicle. Two intersections were identified as requiring further analysis: the Wattle Street/Ramsay Street intersection (Route A) and the G-loop/Dobroyd Parade/Waratah Street intersection (Route B).

4.7.1 Wattle Street/Ramsay Street intersection

Along the proposed access route from the Northcote Street civil and tunnel site through the Five Dock road network (Route A), the left turn from Wattle Street into Ramsay Street was highlighted as a potential tight turn and therefore a swept path for a truck and dog construction vehicle was assessed at this location.

Figure 4-2 illustrates the swept path for a truck and dog trailer combo (20 metres). This shows that, while the truck would use two lanes of Wattle Street as is permitted under the road rules, it would not turn into opposing traffic when making the left turn into Ramsay Street and therefore impacts on the operation of the road network at this intersection would be negligible.

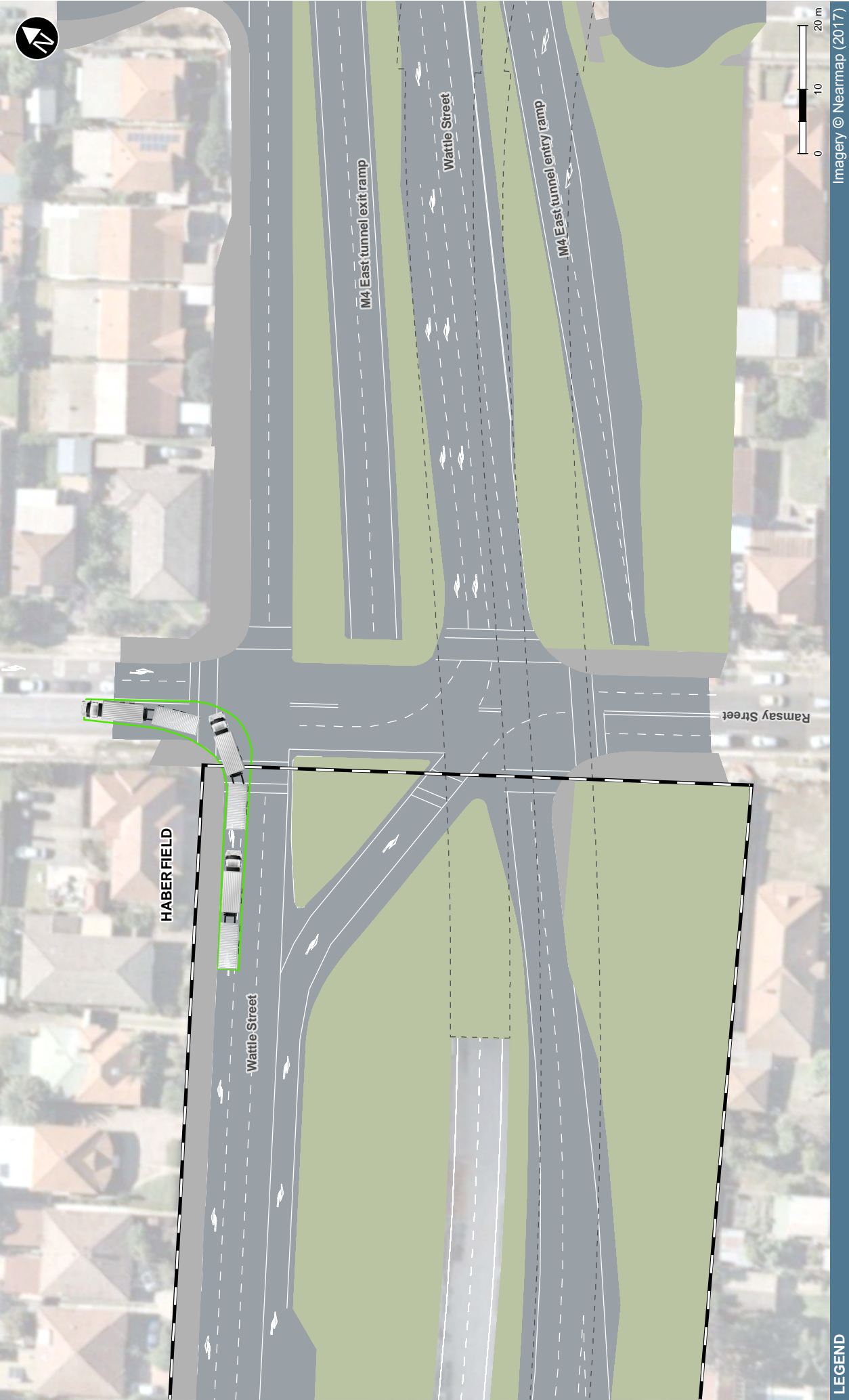


Figure 4-2 Swept path analysis for left turn by truck and dog at Wattle Street/ Ramsay Street intersection

4.7.2 G-loop/Dobroyd Parade/Waratah Street intersection

Figure 4-3 illustrates the swept path of a truck and dog trailer combo (20 metres long) exiting from the G-loop and, to test a worst case, a single unit truck / bus (12.5 metres long) turning right from Waratah Street into the furthest exit lane on Dobroyd Parade eastbound at the same time. Waratah Street is not currently a bus route and the chevron east of the intersection prevents this movement, with the right turning movement directed into the two closer exit lanes. However, the swept path analysis was done using this scenario to illustrate a potential worst case.

In **Figure 4-3**, the green line represents a 500 millimetre clearance to the body of the vehicle. The distance between the vehicles at the closest point is about 1.8 metres, with one metre being the required minimum according to guidance (Austroads GTRD Part 4A). Smaller vehicles turning from Waratah Street into the closer exit lanes would result in a greater distance between the turning vehicles. The swept path indicates the right turn movement out of the G-loop and the right turn movement out of Waratah Street can occur at the same time in the same signal phase under a conservative assessment scenario.

The figure also shows that the truck exiting the G-loop can turn into the second westbound lane of Dobroyd Parade and therefore can travel to either the M4 East entry ramp or to Dobroyd Parade and Parramatta Road. With the M4 East operational, queuing from the Wattle Street/Ramsay Street intersection is not forecast to reach the Dobroyd Parade/Waratah Street intersection as westbound demand on Dobroyd Parade/Wattle Street is split between the surface road network and the M4 East westbound entry ramp.



Figure 4-3 Swept path analysis for G-loop traffic at the Dobroyd Parade/ Waratah Street intersection

4.8 Parramatta Road West and Parramatta Road East civil sites

The use of the Parramatta Road West and Parramatta Road East civil sites generally in accordance with condition of approval C19 for the project would mean a reduction in heavy vehicle traffic impacts compared to the M4-M5 Link SPIR.

The largest change would be the reduction in daily forecast heavy vehicles to and from the Parramatta Road West site, reducing to 25 heavy vehicles per day compared to 140 as assessed in the M4-M5 Link SPIR. There would be an increase in the number of light vehicles accessing these sites due to the increase in parking provision at these sites.

The proposed modification would move the entry point from Bland Street, east of Parramatta Road as described in the EIS, to Bland Street, west of Parramatta Road. The access from Bland Street into the Parramatta Road West site would enable trucks needing to access the warehouse / workshop building to move through the site in a forward direction, minimising conflict with other site vehicles and workers, and minimising the need for reversing.

Entry and exit points to the site on Alt Street have remained. Construction vehicles would only use the Bland Street and Alt Street entry and exit points to travel to and from Parramatta Road, or in the case of Alt Street, between the sites on either side of Alt Street. The access points on Parramatta Road, Alt Street and Bland Street (west of Parramatta Road only) would be used by heavy and light vehicles.

It is proposed that the existing bus stop on the western side of Parramatta Road, north of the intersection with Bland Street, would be relocated to avoid conflict between buses and heavy vehicles attempting to access the nearby Parramatta Road West civil site. The bus stop would be moved to a new location around 150 metres to the north on Parramatta Road. The relocation of the bus stop would be subject to on-going consultation with Transport for NSW, Transit Services and other stakeholders and would be detailed in the Construction Traffic, Transport and Access Management Sub-Plan.

Safe pedestrian and cyclist access will be maintained during construction in accordance with condition of approval E57 and will be documented in the Construction Traffic Transport and Access Management Sub-Plan. Access to nearby properties would be maintained during construction in accordance with condition E46 of the project approval.

4.9 Pedestrian walkway to connect Parramatta Road East and Parramatta Road West sites

The provision of a temporary pedestrian walkway connection above Parramatta Road to connect the Parramatta Road East and Parramatta Road West civil sites, which would only be available for use by project staff during the construction phase of the project, is likely to have a minimal impact on traffic and transport. Impacts on the road network would occur primarily during establishment and decommissioning and therefore over a short duration. It is likely Parramatta Road would need to be closed overnight for installation of the pedestrian bridge. Approval would be required from TMC for a Road Occupancy Licence and diversion routes would be in place during the overnight installation. The Roads and Maritime Special Permits Unit would need to be notified for the management of over height vehicle permits.

A road safety audit would be carried out during detailed design to ensure that the bridge would not obstruct or reduce motorists' sight distance to any signs / directional signs or important traffic directions / infrastructure (in accordance with condition of approval E56).

Impacts on pedestrian, cycle or public transport users are likely to be negligible and able to be adequately managed through the Construction Traffic Transport and Access Management Sub-Plan that will be prepared for the project.

4.10 Removal of Darley Road site from the project

Detailed construction planning of the approved project has determined that the Darley Road site is no longer required to support the construction and operation of the project. The removal of the Darley Road site means that construction vehicles would not need to turn into and out of James Street at the City West Link/James Street intersection. This would improve the performance of this intersection compared to the M4-M5 Link SPIR as construction traffic would now be travelling through the intersection (to and from sites to the east and west of this intersection). The removal of turning movements would also reduce delays at this intersection compared to the M4-M5 Link SPIR.

The removal of site access/egress on Darley Road also removes any potential conflicts with other road users, pedestrians and cyclists and persons using the adjacent light rail stop.

The removal of the Darley Road site from the project therefore has a beneficial impact on network performance, road safety and amenity at this location, compared to the M4-M5 Link SPIR.

4.11 Relocation of permanent water treatment plant from Darley Road to Campbell Road motorway operation complex at St Peters interchange

The relocation of the permanent water treatment plant from Darley Road to the Campbell Road motorway operation complex at St Peters interchange is likely to result in a negligible change in impact on traffic and transport users compared to the impact assessment in the M4-M5 Link EIS, as no change in peak construction traffic volumes are forecast, and the length of construction would be consistent with that assessed in the EIS.

5 Management of impacts

The impacts assessed indicate the proposed modification would result in minimal change to the traffic and transport impacts previously assessed in the M4-M5 Link EIS and SPIR. The proposed Route A haulage route for the Northcote Street civil and tunnel site, which was not considered in the M4-M5 Link EIS or SPIR, is also forecast to have minimal impact on the modelled road network around Five Dock when compared to the 'without construction' scenario.

Impacts would therefore continue to be managed through the construction management measures contained in the conditions of approval for the project, specifically those in the Construction Traffic Transport and Access Management Sub-Plan and the Construction Parking and Access Strategy. Safe pedestrian and cyclist access would be maintained during construction in accordance with condition of approval E57 and road safety audits would be carried during detailed design to assess the safety performance of new or modified road and pedestrian and cyclist infrastructure (including around construction ancillary facilities).

These plans and strategies will indicate how:

- The environmental performance outcomes identified in the M4-M5 Link EIS and SPIR as modified by the conditions of approval will be achieved
- The mitigation measures identified in the M4-M5 Link EIS and SPIR as modified by the conditions of approval will be implemented
- The relevant terms of the project approval will be complied with
- Issues requiring management during construction (including cumulative impacts) will be managed.

The plans and strategies will include:

- Ensuring all stakeholders are considered during all stages of the project
- Providing safe routes for pedestrians and cyclists during construction
- Developing construction methodologies so that interaction with existing road users is minimised thereby creating a safer work and road user environment
- Planning and staging works to minimise the need for road occupancy, where possible
- Developing project staging plans in consultation with relevant traffic and transport stakeholders
- Minimising the number of changes to the road users' travel paths and, where changes are required, developing and implementing an effective community communication strategy, coupled with temporary wayfinding signage to warn, inform and guide. This would aim to minimise confusion by providing clear and concise traffic management schemes
- Comprehensively communicate changes in traffic conditions to emergency services, public transport operators, other road user groups and any other affected stakeholders
- Identify measures to manage the movements of construction-related traffic to minimise traffic and access disruptions in the public road network
- Minimising the use of local roads for heavy vehicles
- Minimising the loss of on-road parking for local residents, by describing a construction car parking and access strategy for construction staff at the various work sites and ancillary facilities.

6 Conclusion

The changes in construction methodology and forecast heavy and light construction vehicle volumes introduced by the proposed modification result primarily from:

- Change in use of the Northcote Street civil site at Haberfield to a civil and tunnel site, which would result in 24 hours, seven day a week tunnelling works being carried out from this location and a new spoil haulage route to and from the site along state roads. Two spoil haulage routes for this site have been assessed
- Deletion of the Darley Road civil and tunnel site from the project.

These modifications would result in a small change in construction traffic volumes across the network relative to those identified in the M4-M5 Link SPIR and/or the 'without construction' scenario. The updated traffic modelling analysis undertaken at the relevant locations suggests that there would be minimal impact on the mid-block roadway and intersection level of service compared to the assessment presented in the M4-M5 Link SPIR and the 'without construction' scenarios for the Haberfield and Ashfield modelled road network.

Forecast impacts on modelled roads associated with Route A from the Northcote Street civil and tunnel site would comprise:

- Wattle Street/Ramsay Street intersection – improvement from LoS E to LoS D during the PM peak hour
- Parramatta Road/Croydon Road/Arlington Street intersection – deterioration from LoS E to LoS F during the PM peak hour. This intersection is at capacity even in the 'without construction' scenario – it is close to LoS E – so even a small change in demand has a large impact on intersection delay. The capacity constraint is caused by exit blocking from downstream intersections, so upgrades at this intersection would not alleviate the forecast delay.

Forecast impacts on modelled roads associated with Route B from the Northcote Street civil and tunnel site would comprise:

- Dobroyd Parade/Waratah Street intersection – deterioration from LoS B to LoS C during the AM peak hour. This is mainly due to the additional signal phase for the northern leg (G-loop exit), which reduces the capacity on the other approaches
- Wattle Street/Ramsay Street intersection – improvement from LoS E to LoS D during the PM peak hour
- Parramatta Road/Croydon Road/Arlington Street intersection – deterioration from LoS E to LoS F during the PM peak hour. As noted above, the capacity constraint is caused by exit blocking from downstream intersections, so upgrades at this intersection would not alleviate the forecast delay.

No changes in roadway or intersection level of service compared to the 'without construction' scenario are forecast through the Five Dock modelled road network as a result of the proposed modification.

The proposed spoil haulage routes for the Northcote Street civil and tunnel site would be more direct and less constrained compared to the spoil haulage route for the Parramatta Road West site described in the EIS and SPIR. Inbound spoil haulage vehicles would be able to use the M4 East Motorway and Parramatta Road to access the Northcote Street civil and tunnel site directly from Parramatta Road, and use of the G-loop would allow outbound spoil haulage vehicles to use the M4 East Motorway tunnels. Spoil haulage routes would be restricted to state roads that are controlled by Roads and Maritime.

Impacts from the construction of a temporary pedestrian walkway connection above Parramatta Road to connect the Parramatta Road East and Parramatta Road West civil sites on the road network would occur primarily during establishment and decommissioning and therefore over a short duration. It is likely Parramatta Road would need to be closed overnight for installation of the pedestrian bridge. Approval would be required from TMC for a Road Occupancy Licence and diversion routes would be in place during the overnight installation. Impacts on pedestrian, cycle or public transport users are likely to be negligible and able to be adequately managed through the Construction Traffic Transport and Access Management Sub-Plan that will be prepared for the project.

Compared to the M4-M5 Link SPIR, the removal of the Darley Road site from the project would have a beneficial impact on motorists, pedestrians and cyclists around Darley Road and the City West Link/James Street intersection, as heavy and light construction-related vehicles would not need to turn into and out of City West Link and the site entry and exit points on Darley Road. Construction traffic would continue to travel through the City West Link/James Street intersection, but forecast delays would be reduced as construction vehicle turning movements are removed.

The relocation of the permanent water treatment plant from Darley Road to the Campbell Road motorway operation complex at St Peters interchange is likely to have a negligible change in impact on traffic and transport users compared to the impact assessment in the M4-M5 Link EIS, as no change in peak construction traffic volume is forecast.

The management and mitigation measures identified in Chapter E1 of the M4-M5 Link SPIR and the conditions of approval for the project would appropriately manage impacts from the proposed modifications.

7 References

WestConnex M4-M5 Link: Environmental Impact Statement, Roads and Maritime Services, August 2017

WestConnex M4-M5 Link: Submissions and preferred infrastructure report, Roads and Maritime Services, January 2018

WestConnex M4-M5 Link: Infrastructure approval, Department of Planning & Environment, April 2018