

CoA E132 – Local Roads Approval

Western Harbour Tunnel and Warringah Freeway Upgrade

Stage 1A Early and Enabling Works - Critical utility installation, relocation and protection works and Stage 1B Cammeray Golf Course adjustment works (CGC)

Transport for NSW

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Western Harbour Tunnel and Warringah Freeway
Upgrade

Stage 1A Early and Enabling Works - Critical
utility installation, relocation and protection works
and 1B Cammeray Golf Course adjustment
works (CGC)

November 2022

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Document control

Approval

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Signed	
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Version control

The below document status table is for tracking the revisions of this Document, while the project is in construction. The version control table is to be used to track this Document revisions, including those incorporating changes following agency comments.

It may be modified where necessary to fit with requirements of the individual project.

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15	11/11/2022	Updated to include the use of Warringa Road as part of the Stage 1B scope of work. Extension of period of use for stage 1A local roads.	BD

Glossary / abbreviations

Abbreviation	Expanded text
CCS	Community Communication Strategy
CGC	Cammeray Golf Course adjustment works
CoA	Condition of Approval
CPAS	Construction Parking and Access Strategy
CUT	Critical utilities installation, relocation and protection
Document, the	This local roads approval document
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
HV	Heavy vehicle
Pedestrian desire line	An unplanned route or path that is used by numerous pedestrians to travel from one place to another. An example is a road crossing where there is no formal crossing facility
Project, the	Western Harbour Tunnel Warringah Freeway Upgrade
SPA	Sydney Program Alliance
TfNSW	Transport for NSW
TTAMP	Traffic, Transport and Access Management Sub-Plan

Abbreviation	Expanded text
WFU	Warringah Freeway Upgrade
WFUEW	Warringah Freeway Upgrade Early Works
WFUMW	Warringah Freeway Upgrade Main Works
WHT	Western Harbour Tunnel
WHTBL	Western Harbour Tunnel Beaches Link
WHTWFU	Western Harbour Tunnel Warringah Freeway Upgrade

1 Introduction

1.1 Background

The Western Harbour Tunnel and Warringah Freeway Upgrade (WHTWUFU) (the project) forms a core component of the broader Western Harbour Tunnel and Beaches Link (WHTBL) program of works (refer to Figure 1-1 and Figure 1-2). The project comprises two main components:

- A new crossing of Sydney Harbour involving twin tolled motorway tunnels connecting the M4-M5 Link at Rozelle and the Warringah Freeway at North Sydney (the Western Harbour Tunnel)
- Upgrade and integration work along the existing Warringah Freeway, including infrastructure required for connections to the Beaches Link and Gore Hill Freeway Connection project. Reconfiguration works as part of the Warringah Freeway Upgrade would optimise the road corridor and improve the performance of the Sydney Harbour Tunnel, the Sydney Harbour Bridge and the Western Harbour Tunnel.

Due to its importance, the WHTWUFU project was declared to be Critical State Significant Infrastructure (CSSI) by the Minister for Planning and Public Space. On 21 January 2021, Minister for Planning and Public Space approved the construction and operation of the WHTWUFU project (SSI 8863) and the Department of Planning, Industry and Environment (DPIE) issued the NSW Minister for Planning and Public Space's Conditions of Approval (CoA).

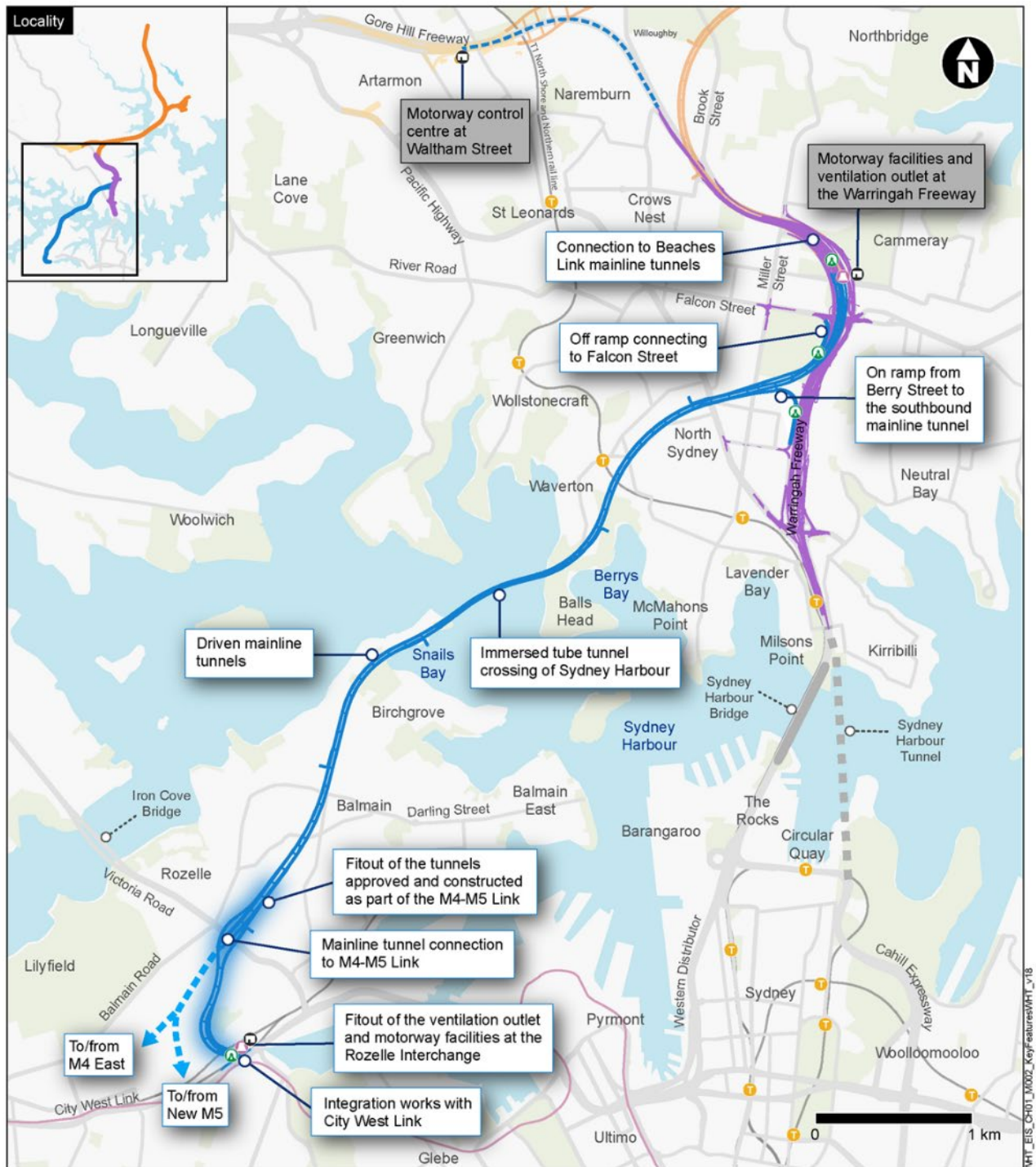
A detailed description of the project is provided in Chapter 5 of the Western Harbour Tunnel and Warringah Freeway Upgrade Environmental Impact Statement (EIS).

The WHTWUFU project will be delivered in numerous stages:

- Stage 1 - Early and enabling works:
 - Stage 1A - Critical utility installation, relocation and protection (CUT) (the subject of this local roads approval document)
 - Stage 1B - Cammeray Golf Course adjustment works (CGC) (the subject of this local roads approval document)
- Stage 2 - Warringah Freeway Upgrade project (WFU)
- Stage 3 - Western Harbour Tunnel project (WHT).

Further detail on each stage is provided in the WHTWUFU project Staging Report.

This local road approval document (this Document) applies to Stage 1A Early and Enabling Works - Critical utility installation, relocation and protection stage of the project (referred to herein as "the critical utility works" or 'CUT') and Stage 1B - Cammeray Golf Course adjustment works (CGC). The critical utility works will support the delivery program of the Main Works of the project by undertaking these works prior to the commencement of the Main Works.



Legend

Operational features

- Western Harbour Tunnel
- Warringah Freeway Upgrade
- - - Communications cable for motorway control centre
- M4-M5 Link tunnel fitout and commissioned as part of Western Harbour Tunnel

- ⓐ Surface connection
- Ⓢ Permanent operational facility
- Ⓢ Ventilation outlet

Connecting projects

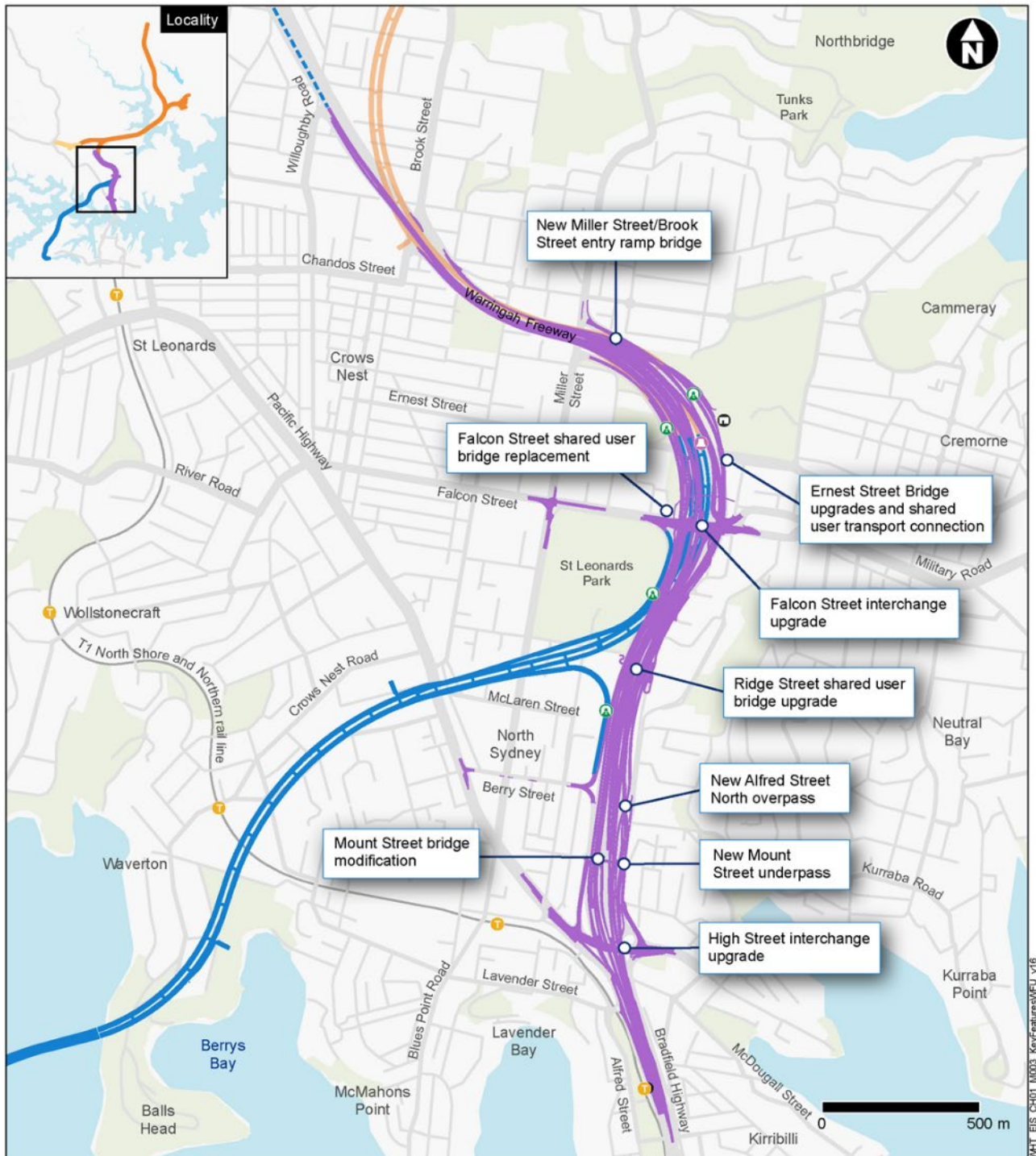
- Beaches Link
- Gore Hill Freeway Connection
- - - M4-M5 Link connections (indicative)

Existing rail network

- Heavy rail
- Light rail
- Ⓢ Train station

(Reference: Western Harbour Tunnel and Warringah Freeway Upgrade Environmental Impact Statement, Figure 1-2)

Figure 1-1 Key features of the Western Harbour Tunnel component of the project



Legend

Operational features

- Warringah Freeway Upgrade
- Western Harbour Tunnel
- - - Communications cable for motorway control centre
- ⓐ Surface connection
- ⓑ Permanent operational facility
- ⓐ Ventilation outlet

Connecting projects

- Beaches Link

Existing rail network

- Heavy rail
- Train station

(Reference: Western Harbour Tunnel and Warringah Freeway Upgrade Environmental Impact Statement, Figure 1-3)

Figure 1-2 Key features of the Warringah Freeway Upgrade component of the project

1.2 Project description

The early and enabling works will support the delivery program of the Main Works of the project by undertaking these works prior to the commencement of the Main Works.

This Document applies to the critical utility installation, relocation and protection early works package of the project (Stage 1A) and Cammeray Golf Course adjustment works (CGC) (Stage 1B). These works are critical to an earlier start on site and will be undertaken as part of early and enabling works of the project as outlined in Table 1-1 and Figure 1-3.

Table 1-2 provides a summary of the activities which will be completed as part of the critical utility works scope and the Cammeray Golf Course adjustment works (CGC).

The works will commence in early 2021 and be completed by late 2022. The program for the remaining stages of the WHTWTFU project is included in the WHTWTFU Project Staging Report.

Table 1-1 Critical utilities and CGC works

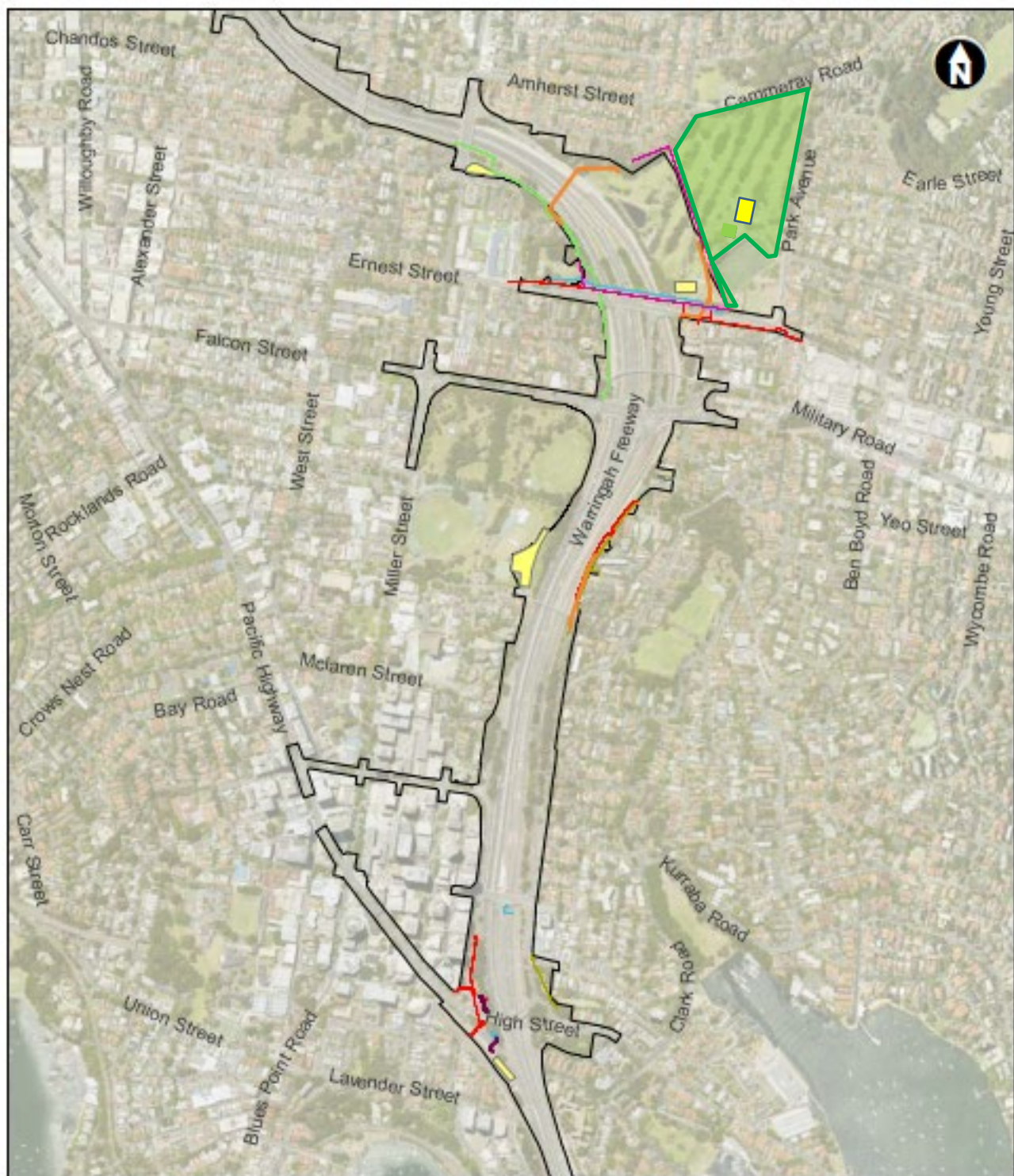
Areas	Key activities
Alfred Street North, Neutral Bay	Deviation of existing Sydney Water sewer mains Relocation of existing Ausgrid assets Relocation of various communication provider assets
Arthur Street / High Street, North Sydney	Relocation of existing Ausgrid assets Relocation of various communication provider assets Relocation of two (2) existing Sydney Harbour Tunnel fire hydrant booster stations Relocation of existing 415V feed to Sydney Harbour Tunnel control room
Cammeray Avenue / Ernest Street / Cammeray Golf Course, Cammeray	Relocation of existing in-ground Ausgrid assets Removal of existing disused in-ground Ausgrid assets Relocation of existing in-ground Sydney Water assets Relocation of existing in-ground communication provider assets Installation of new permanent Intelligent Transport System (ITS) node and temporary connections Installation of temporary construction power supply along Ernest Street from Ben Boyd Road to the Cammeray Golf Course site (WHT10).
Cammeray Golf Course	Adjustments to the golf course to maintain its viability Construction of a 9-hole golf course Upgrades to maintenance facilities Utility protection and adjustment works Installation of a new permanent replacement storage dam and associated infrastructure

Table 1-2 Description of activities for the critical utility works and CGC scope

Activity	Description
Establishment and operation of major ancillary facilities	
Site preparation works	Provision of site security such as temporary fencing and perimeter fencing Clearing and trimming of vegetation within the construction footprint Site levelling, grading and compaction (including fill importation), including temporary stockpiling of materials for site levelling Provision of foundations and buildings for toilet facilities, offices, lunch rooms, signage and pedestrian diversions, and installation of traffic barriers
Site survey and site investigation works	Ground penetrating radar or electromagnetic ground investigation Utility investigation by potholing with a vacuum truck
Initial environmental controls	Erosion and sediment controls, including: Installation of rip rap Drainage sump Diversion of offsite flows Erosion, sediment and water flow controls Delineation of sensitive areas and temporary fencing/hoardings
Fit out, commissioning and install of remaining site infrastructure including	Chemical and hazardous material storage Designated stockpile/laydown areas Office furniture fit out Formalisation of on-site car parking (line marking etc.) Site lighting installed which will involve the use of power saws for cutting steel work
Operation of minor ancillary facilities	Site offices Lunch sheds Staff amenities Off-street car parking Laydown Material stockpiling
Critical utilities work	
Installation of services to the site e.g. water, sewer, power, communications	Establish temporary work area including installation of temporary fencing, storage, laydown and stockpiling areas Installing pre-construction environmental management controls, e.g. sandbags at stormwater drainage outlets Clearing and trimming of vegetation Concrete wet saw cutting to remove concrete or asphalt pavement Trench excavations

Activity	Description
	<p>Stockpiling excavated materials within the work area for reuse or removal for off- site disposal</p> <p>Preparing sub-grade surface (e.g. stabilised sand) to accommodate utility services</p> <p>Laying utility services either as pipes, cables or conduits</p> <p>Constructing joint bays and pits (where required)</p> <p>Pulling feeders and cables through conduits</p> <p>Connecting utility services to existing networks</p> <p>Testing and commissioning of utility services</p> <p>Backfilling trenches and re-instating ground surface to an appropriate condition</p> <p>Rehabilitate areas disturbed by works</p> <p>Site clean-up and decommissioning of temporary work areas and environmental management controls</p>
Installation of relocated utilities e.g. water, sewer, power, communications	<p>Establish temporary work area including installation of temporary fencing, storage, laydown and stockpiling areas</p> <p>Installing pre-construction environmental management controls, e.g. sandbags at stormwater drainage outlets</p> <p>Clearing and trimming of vegetation</p> <p>Concrete wet saw cutting to remove concrete or asphalt pavement</p> <p>Trench excavations</p> <p>Installation of directional drilling launch/receiving sites</p> <p>Stockpiling excavated materials within the work area for reuse or removal for off- site disposal</p> <p>Preparing sub-grade surface (e.g. stabilised sand) to accommodate utility services</p> <p>Laying utility services either as pipes, cables or conduits</p> <p>Constructing joint bays and pits (where required)</p> <p>Pulling feeders and cables through conduits</p> <p>Connecting utility services to existing networks</p> <p>Testing and commissioning of utility services</p> <p>Backfilling trenches and re-instating ground surface to an appropriate condition</p> <p>Removal of redundant utilities</p> <p>Rehabilitate areas disturbed by works</p> <p>Site clean-up and decommissioning of temporary work areas and environmental management controls</p>
Cammeray Golf Course Adjustment works	
Cammeray Golf Course	<p>Adjustments to the golf course to maintain its viability</p> <p>Clearing and grubbing of vegetation</p>

Activity	Description
	<p>Installation of a minor ancillary facility</p> <p>Construction of a 9-hole golf course inclusive of landscaping</p> <p>Relocation of existing maintenance buildings</p> <p>Installation of a practice lesson putting green</p> <p>Connection of existing car park and revised parking facilities to new maintenance buildings</p> <p>Service location and adjustment/removal of services and utilities within the golf course</p> <p>Utility protection and adjustment works</p> <p>Active Transport Link</p>
Stormwater Dam located inside CGC	<p>Decommissioning of the existing Dam at CGC (beyond the scope of this Local Roads Approval)</p> <p>Detailed Site Investigation and native fauna survey at existing dam (beyond the scope of this Local Roads Approval)</p> <p>Installation of a new permanent replacement storage dam and associated infrastructure</p> <p>Installation of a water treatment system and associated mechanical and electrical equipment, and connections to existing stormwater system</p> <p>Installation of access track from Warringa Road in accordance with the final design of the golf course, including access to the pump sheds and installation of electrical power</p>



Legend

- Construction footprint
- Minor Ancillary Facilities boundary

- Utility works
- Comms
 - Uecomm
 - HV and Comms
 - HV
 - ITS
 - Sewer
 - Water

CGC works

- CGC construction footprint



Figure 1-3 Location of critical utility and CGC works scope

1.3 Purpose of this local roads approval

This Document has been prepared to describe how Sydney Program Alliance (SPA), during the critical utilities work, will comply with the requirements of the NSW Minister for Planning and Public Space's CoA E132. This Document will be lodged to DPIE for approval prior to heavy vehicles (HV) use of local roads that have not been identified, assessed and approval as part of the EIS.

In accordance with CoA E133, this Document will:

- Include swept path analyses for local roads that require DPIE approval
- Demonstrate that DPIE approval of local roads nominated in this Document will not compromise the safety of pedestrians and cyclists or the safety of two-way traffic flow on two-way roadways
- Provide details related to the date of road dilapidations that have been conducted for local roads that require DPIE approval
- Detail measures that will be implemented to avoid use of nominated local roads past schools, aged care facilities and childcare facilities during peak operation times
- Include advice from an appropriately qualified traffic engineer regarding the suitability of nominated local roads that require DPIE approval.

The requirements of CoA E132 and E133 and where they are addressed in this Document are shown in Table 1-3.

The requirements of applicable Revised Environmental Management Measures (REMMs) and where they are addressed in this document are shown in Table 1-4.

Table 1-3 CoA E132 and E133 compliance

CoA	Requirement	Where addressed in Document
E132	Local roads proposed to be used by heavy vehicles to directly access the construction boundary and ancillary facilities that are not shown in Figure 5-7 to 5-22 inclusive of Appendix F of the EIS must be approved by the Planning Secretary and included in the Traffic, Transport and Access Management CEMP Sub-plan.	This Document Traffic, Transport and Access Management Sub-plan (TTAMP)
E133	All requests to the Planning Secretary under Condition E132 must include the following:	
(a)	include a swept path analysis	Section 3.1
(b)	demonstration that the use of local roads by heavy vehicles for the CSSI will not compromise the safety of pedestrians and cyclists or the safety of two-way traffic flow on two-way roadways	Section 3.2
(c)	provide details as to the date of completion of the road dilapidation surveys for the subject local roads	Section 3.3
(d)	measures that will be implemented to avoid where practicable the use of roads past schools, aged care facilities and child care facilities during their peak operation times	Section 4
(e)	written advice from an appropriately qualified professional on the suitability of the proposed heavy vehicle route which takes into consideration items (a), (b), (c), and (d) of this condition	Appendix A1

Table 1-4 Revised Environmental Management Measures (REMMs) compliance

REMM	Requirement	Where addressed in Document
CCT1	A road dilapidation report will be prepared, in consultation with relevant councils and road owners, identifying existing conditions of local roads and mechanisms to repair damage to the road network caused by heavy vehicle movements associated with the project.	Section 3.3
CCT6	Construction road traffic will be managed to minimise movements during peak periods.	Section 4
CTT7	Vehicle access movements to and from construction sites will be managed to ensure pedestrian, cyclist and motorist safety. Depending on the location, this may require manual supervision, physical barriers, temporary traffic signals and modifications to existing signals or, on occasion, police presence.	Section 4
CTT8	Directional signage, barriers and/or linemarking will be used as required to direct and guide drivers, cyclists and pedestrians past construction sites and on the surrounding network. This will be supplemented by Variable Message Signs to advise drivers of potential delays, traffic diversions, speed restrictions, or alternative routes.	Section 4
CTT9	Where provision of construction on-site parking cannot accommodate the WHT/WFU full construction workforce, feasible and reasonable management measures that minimise impacts on parking on local roads will be identified and implemented. Depending on the location, management measures may include workforce shuttle buses and the use of public transport.	Section 4

2 Local roads proposed for approval

2.1 Identification of local roads

As required by CoA E132, DPIE approval is required for any local roads that have not been identified and assessed in the EIS. Local roads assessed in the EIS and already approved under CoA E132 are detailed in Table 2-1. Local roads requiring DPIE approval under CoA E132 are detailed in Table 2-2.

Table 2-1 Local roads assessed in the EIS and already approved under CoA E132

Local road	Description of use during construction	Description of potential impacts
Cammeray Avenue (within construction footprint)	Utility relocations	Short and long term traffic control setups Road closures Period of use: 21 months / January 2023
Rosalind Street	Access to minor ancillary facility Access to worksite	Changes to parking arrangements Use by construction traffic accessing minor ancillary facility and utilities worksite Period of use: 21 months / January 2023
Alfred Street North	Access to minor ancillary facility Access to worksite	Changes to parking arrangements Light vehicle access to minor ancillary facility Use by construction traffic accessing utilities worksite Period of use: 18 months / October 2022
Ridge Street	Access to minor ancillary facility	Changes to parking arrangements Use by construction traffic accessing minor ancillary facility Period of use: 21 months / January 2023
Whaling Road	Access to worksite	Use by construction traffic accessing utilities worksite Period of use: 18 months / October 2022
High Street	Access to worksite	Use by construction traffic accessing utilities worksite Period of use: 21 months / January 2023
Blue Street	Access to minor ancillary facility Access to worksite	Use by construction traffic accessing minor ancillary facility Period of use: 18 months / October 2022

Table 2-2 Local roads requiring DPIE approval under CoA E132

Local road	Direction of movement	Description of use during construction	Description of potential impacts
Cammeray Avenue	Eastbound Westbound	Utility relocations	Short and long term traffic control setups Road closures. Period of use: 21 months / January 2023
ANZAC Avenue	Northbound Southbound	Access to work site	Construction vehicle route Period of use: 21 months / January 2023
Bells Avenue	Northbound Southbound	Access to Cammeray Golf Course	Construction vehicle route Period of use: 26 months / June 2023
Warringa Road	Southbound	Access to work site	Construction vehicle route Period of use: 26 months / June 2023
Amherst Street	Eastbound Westbound	Access to work site	Construction vehicle route Period of use: 26 months / June 2023
Cammeray Road (between Park Avenue and Amherst Street)	Westbound	Access to work site	Use by construction traffic Period of use: 26 months / June 2023
Park Avenue	Northbound Southbound	Access to and egress from work site and existing club house	Use by construction traffic Period of use: 26 months / June 2023
Merlin Street	Northbound Southbound	Access to worksite	Use by construction traffic accessing utilities worksite Period of use: 21 months / January 2023
Ben Boyd Road (south of Ernest Street)	Northbound	Access to worksite (refer to Figure 2-2)	Use by construction traffic Period of use: 21 months / January 2023
Ben Boyd Road (north of Belgrave Street)	Northbound	Egress from worksite (refer to Figure 2-2)	Use by construction traffic Period of use: 21 months / January 2023
Sutherland Street	Westbound	Egress from worksite (refer to Figure 2-2)	Use by construction traffic Period of use: 21 months

Figure 2-1 presents local roads requiring DPIE approval for use during CUT works. Figure 2-2 shows access and egress routes that provide justification for the use of Ben Boyd Road and Sutherland Street.

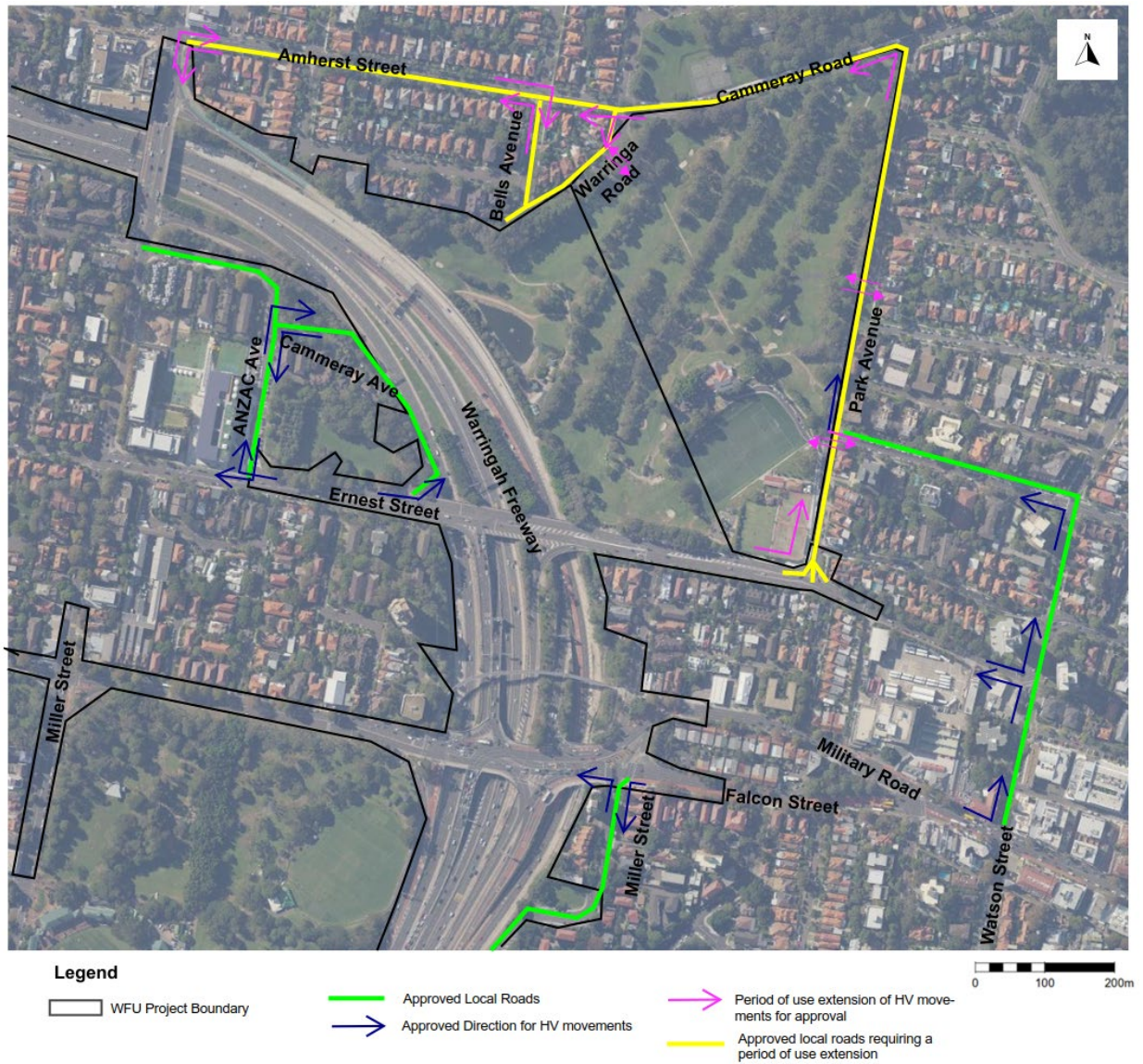
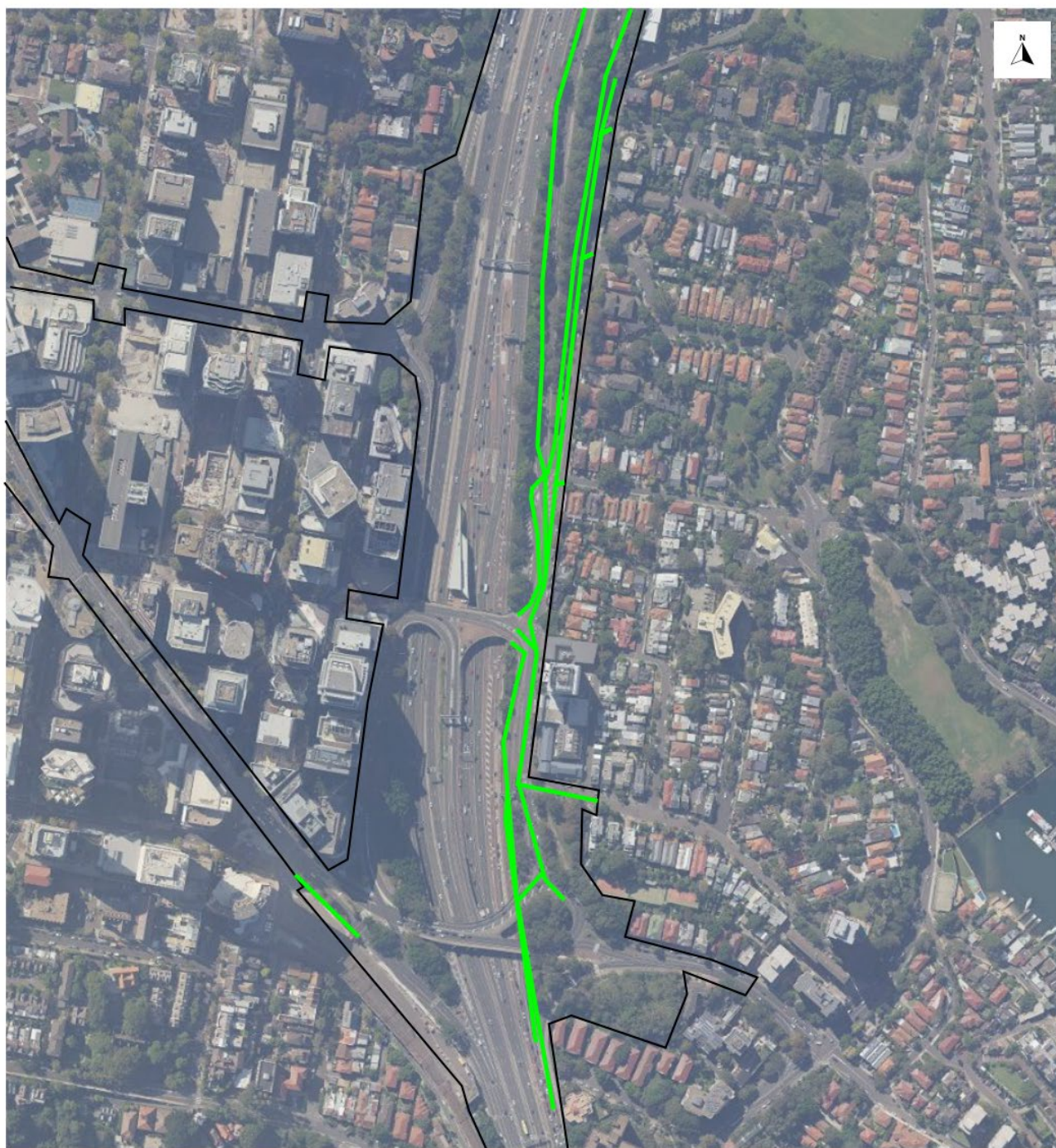



Figure 2-1 Local roads requiring approval (Sheet 1)



Legend

 WFU Project boundary

 Approved Local Roads


 0 100 200m

Figure 2-1 Local roads requiring approval (Sheet 2)

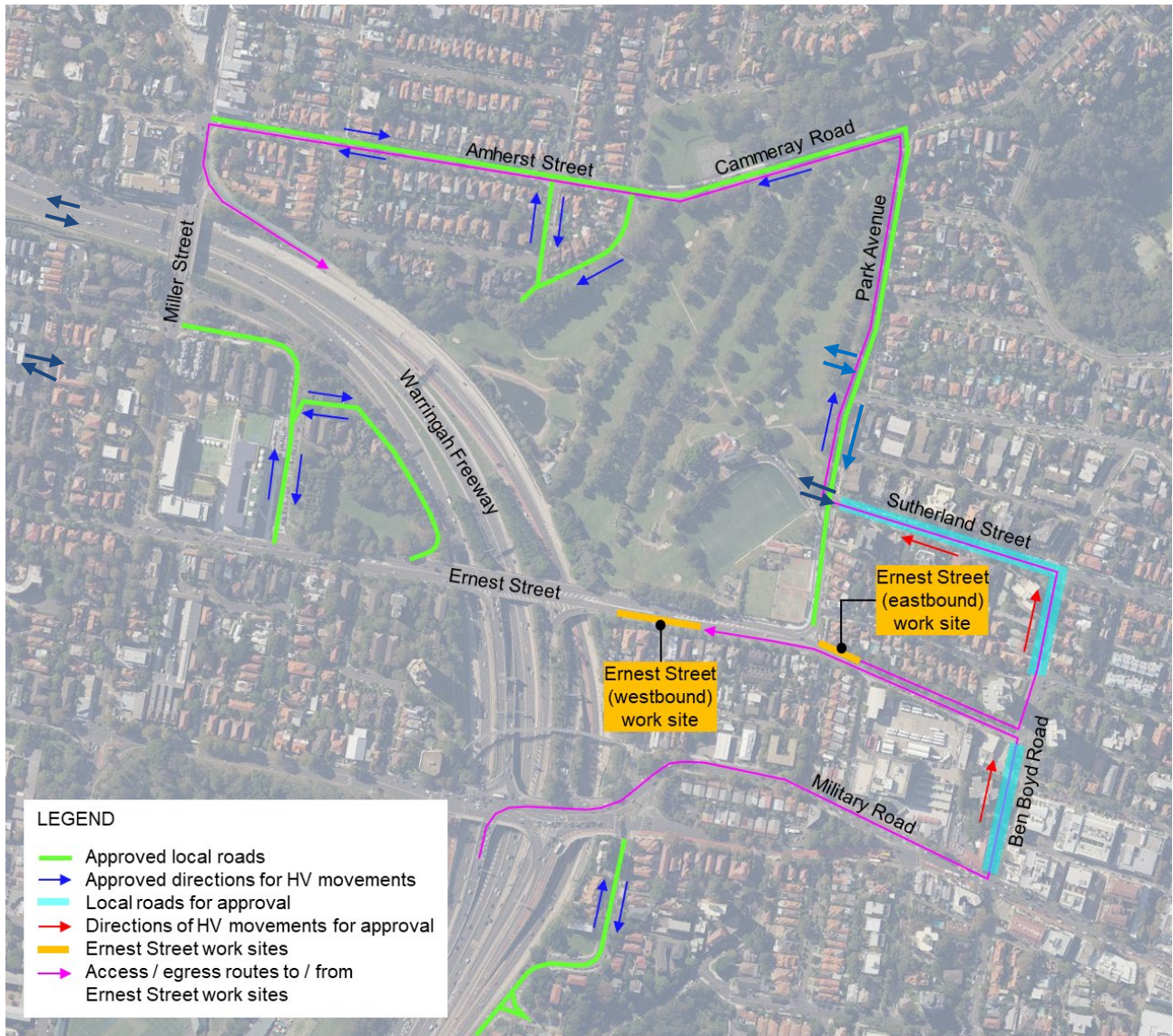


Figure 2 2 Justification for the use of Ben Boyd Road and Sutherland Street (Sheet 1)

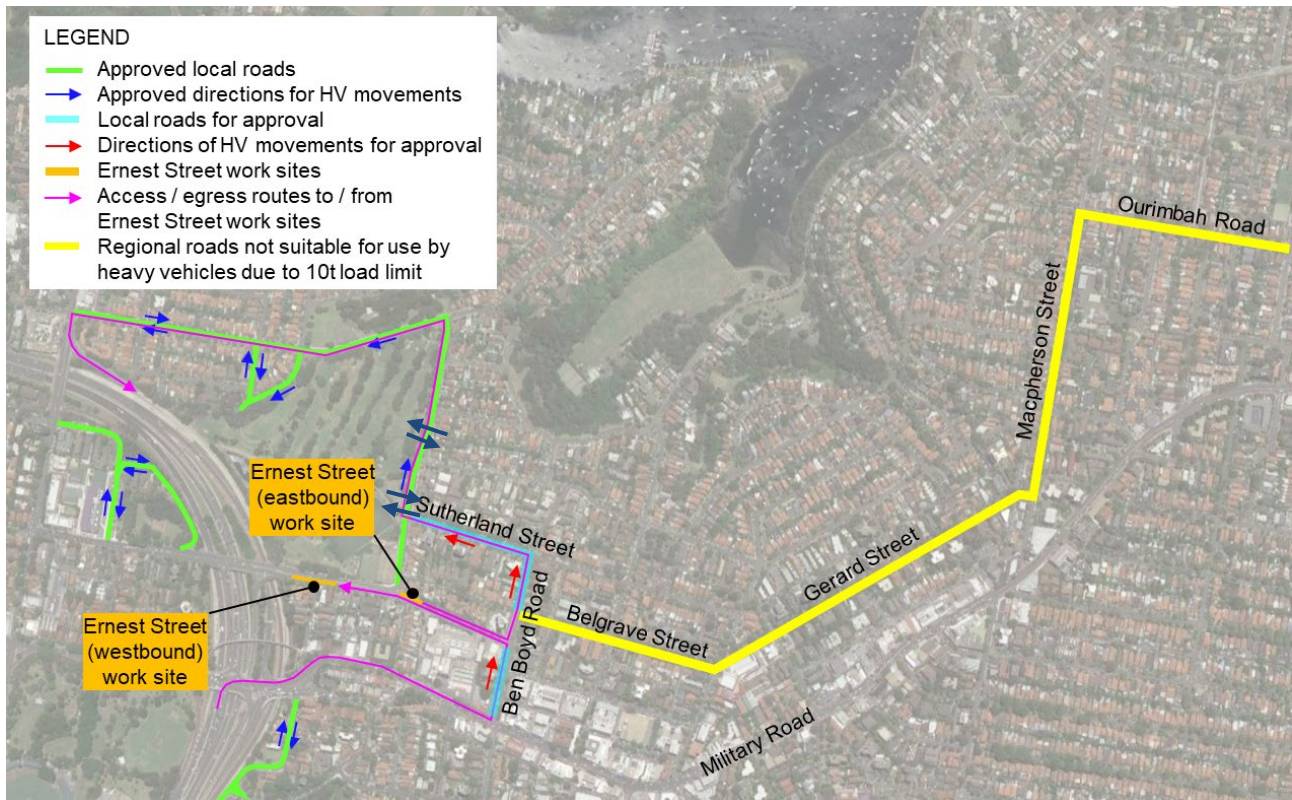


Figure 2-2 Justification for the use of Ben Boyd Road and Sutherland Street (Sheet 2)

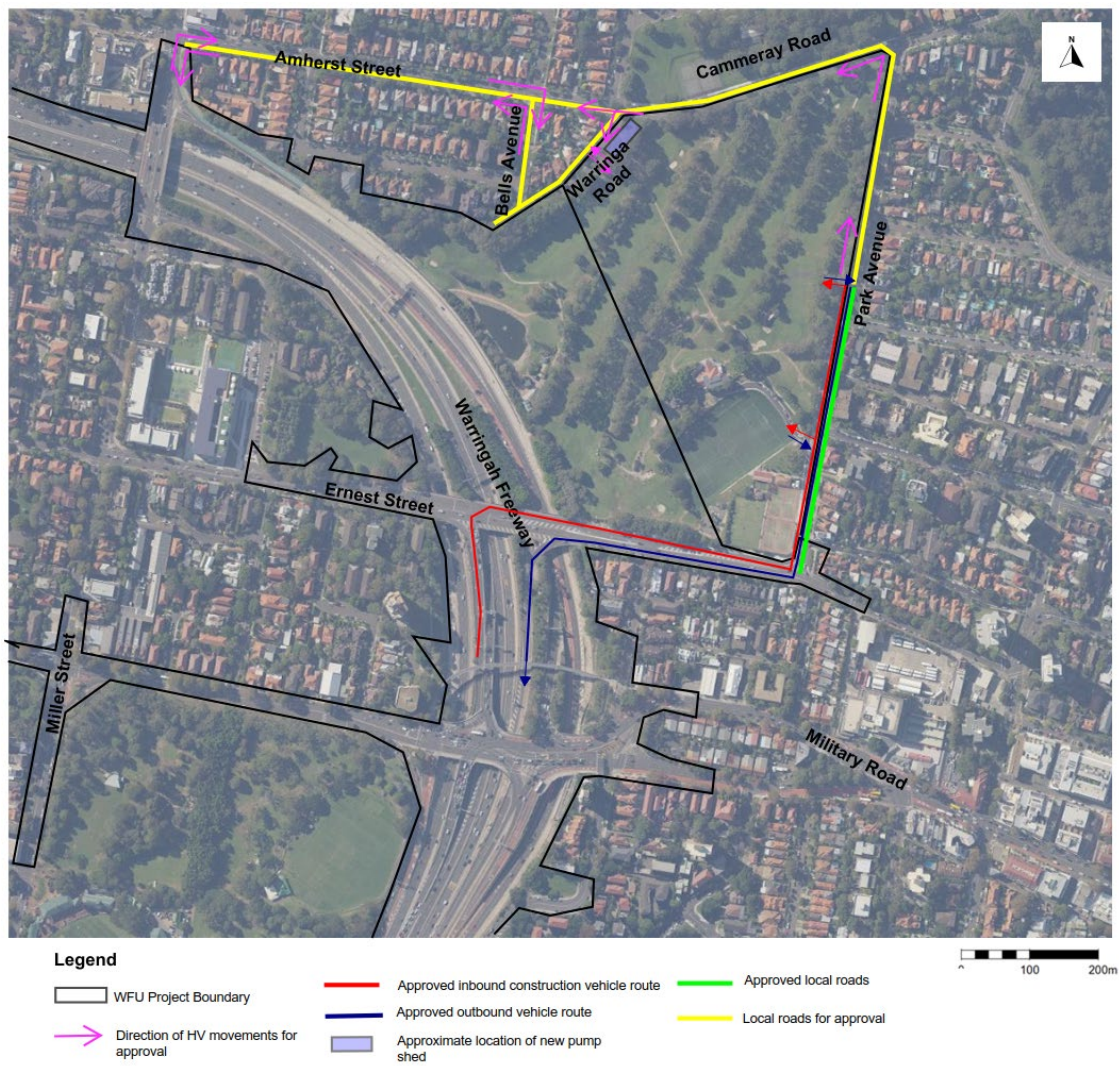


Figure 2-3 Local roads required for stage 1B works

2.2 Proposed volumes of heavy vehicles on local roads

Proposed volumes of heavy vehicles on local roads that are assessed in this Document (shown in Figure 2-1) are detailed in Table 2-3.

Table 2-3 Proposed volumes of heavy vehicles on local roads

Local road	Peak vehicle movements per day (two-way movements)	Morning peak vehicle movements (6 am to 10 am) (two-way movements)	Evening peak vehicle movements (3 pm to 7 pm) (two-way movements)
	Heavy	Heavy	Heavy
Cammeray Avenue	50	20	20
ANZAC Avenue	50	20	20
Bells Avenue	70	25	25
Warringa Road	25 (one-way westbound only)	8 (one-way westbound only)	8 (one-way westbound only)
Amherst Street	70	25	25
Cammeray Road (between Park Avenue and Amherst Street)	70 (one-way westbound only)	25 (one-way westbound only)	25 (one-way westbound only)
Park Avenue (Stage 1A / 1B combined)	50 (one-way northbound)	20 (one-way northbound)	20 (one-way northbound)
Park Avenue (specific to Stage 1B for vehicles using the Park Avenue compound driveway)	30	15	15
Merlin Street	40 (20x semi-trailers)	15 (4x semi-trailers)	15 (4x semi-trailers)
Ben Boyd Road (south of Ernest Street)	10 (one-way northbound only)	4 (one-way northbound only)	4 (one-way northbound only)
Ben Boyd Road (north of Belgrave Street)	10 (one-way northbound only)	4 (one-way northbound only)	4 (one-way northbound only)

Local road	Peak vehicle movements per day (two-way movements)	Morning peak vehicle movements (6 am to 10 am) (two-way movements)	Evening peak vehicle movements (3 pm to 7 pm) (two-way movements)
	Heavy	Heavy	Heavy
Sutherland Street	10 (one-way northbound only)	4 (one-way northbound only)	4 (one-way northbound only)

2.3 Justification for the use of local roads

Justification for the selection of local roads that are assessed in this Document (shown in Figure 2-1) is provided in Table 2-4.

Table 2-4 Justification for the selection of local roads

Local road	Justification
<p>Amherst Street, Cammeray Bells Avenue, Cammeray Cammeray Road, Cammeray</p>	<p>Forms part of the shortest route between the Cammeray Golf Course (north) site and the Ridge Street minor ancillary facility (via Miller Street)</p> <p>The use of other local roads would result in a more circuitous route and impact a greater number of residential properties and sensitive receivers</p>
<p>Park Avenue, Cammeray Warringah Road, Cammeray</p>	<p>Forms part of the shortest route between the Bells Avenue site and the nearest arterial road (Ernest Street) for access to the Sydney motorway network</p> <p>There is no alternative route to access the Bells Avenue site</p> <p>Is the primary and only suitable main egress / access point to the CGC site</p> <p>Forms part of the shortest route between the CGC construction access / egress point and the Warringah Freeway</p> <p>Alternative roads including Cammeray Road and Amherst Street are not suitable for the size of heavy vehicles that are proposed to be used for the works (19 m semi-trailers and 19 m truck-and-dog trailer combinations) for the CGC works</p> <p>The use of other roads including Cammeray Road and Amherst Street would result in a more circuitous route and impact a greater number of adjoining residential properties for the CGC works</p>
<p>Cammeray Avenue, Cammeray ANZAC Avenue, Cammeray</p>	<p>Forms part of the shortest route between the Cammeray Avenue site and the nearest arterial road (Ernest Street) for access to the Sydney motorway network</p> <p>The use of southbound ANZAC Avenue instead of Rosalind Street for access to the arterial road network is not possible for the following reasons:</p> <p>Sight distance issues for vehicles making the u-turn movement from Cammeray Avenue to Rosalind Street</p> <p>A 12.5-metre single unit truck would not be able to make the u-turn movement from Cammeray Avenue to Rosalind Street</p> <p>There will be times when Cammeray Avenue is closed to northbound traffic. At these times, northbound ANZAC Avenue movements will be required to access the Cammeray Avenue work site.</p>
<p>Merlin Street, Neutral Bay</p>	<p>Forms part of the shortest route between the Alfred Street North worksite and the nearest arterial road</p>

Local road	Justification
	<p>(Falcon Street) for access to the Sydney motorway network</p> <p>The use of other local roads would result in a more circuitous route and impact a greater number of residential properties and sensitive receivers</p>
<p>Ben Boyd Road (south of Ernest Street), Neutral Bay</p>	<p>Forms part of the shortest route between the arterial road network (Military Road) and the Ernest Street (westbound) worksite for access from the Sydney motorway network</p> <p>There is a 10-tonne load limit on Belgrave Street, Gerard Street, Macpherson Street and Ourimbah Road. This means heavy vehicles cannot travel from Military Road to the Ernest Street (westbound) worksite via these regional roads</p> <p>The use of other local roads would impact a greater number of residential properties and sensitive receivers</p>
<p>Ben Boyd Road (north of Belgrave Street), Cremorne Sutherland Street, Cremorne</p>	<p>Forms part of the shortest route between the Ernest Street (eastbound) worksite (east of Park Avenue) and the nearest arterial road (Miller Street southbound) for access to the Sydney motorway network</p> <p>There is a 10-tonne load limit on Belgrave Street, Gerard Street, Macpherson Street and Ourimbah Road. This means heavy vehicles cannot travel from the Ernest Street (eastbound) worksite (east of Park Avenue) to Military Road via these regional roads</p> <p>The use of other local roads would result in a more circuitous route and impact a greater number of residential properties and sensitive receivers</p>

3 Local roads assessment

3.1 Swept path analysis

As required by CoA E133(a), swept paths have been prepared for all local roads requiring DPIE approval. Swept path diagrams are provided in Appendix A2 for:

- A 12.5-metre single unit truck, which is the maximum size vehicle that will be used for most of the CUT works
- A 19-metre semi-trailer on Merlin Street, which will be required for works on Alfred Street North
- An 8.8-metre single unit truck, which is the maximum size vehicle that can travel on Ben Boyd Road (north of Belgrave Street) and Sutherland Street given existing geometric constraints at intersections.

The swept paths provided in Appendix A2 are detailed in Table 3-1.

Table 3-1 Summary of swept path analysis

Local road	Drawing number in Appendix A2	Can 8.8 m single unit truck / 12.5 m single unit truck / 19 m semi-trailer make movement without encroaching on existing kerbs, traffic management / traffic control devices or on-street parking spaces?	Additional comments
Amherst Street and Bellevue Street	Appendix A-1	12.5 m single unit truck – yes	N/A
Amherst Street to Bells Avenue	Appendix A-2	12.5 m single unit truck – yes	N/A
Bells Avenue to Amherst Street	Appendix A-3	12.5 m single unit truck – yes	N/A
Cammeray Road and Park Avenue	Appendix A-4	12.5 m single unit truck – yes	N/A
Amherst Street, Cammeray Road and Warringa Road	Appendix A-5	12.5 m single unit truck – yes	N/A
Ernest Street and Park Avenue	Appendix A-6	12.5 m single unit truck – yes	N/A
Miller Street and Amherst Street	Appendix A-7	12.5 m single unit truck – yes	N/A
Ernest Street and Cammeray Avenue	Appendix A-8A Appendix A-8B	12.5 m single unit truck – yes	N/A

Local road	Drawing number in Appendix A2	Can 8.8 m single unit truck / 12.5 m single unit truck / 19 m semi-trailer make movement without encroaching on existing kerbs, traffic management / traffic control devices or on-street parking spaces?	Additional comments
Cammeray Avenue and ANZAC Avenue	Appendix A-9A, Appendix A-9B	12.5 m single unit truck – yes	N/A
Ernest Street and ANZAC Avenue	Appendix A-10A, Appendix A-10B, Appendix A-10C, Appendix A-10D, Appendix A-10E	Left turn from ANZAC Avenue to Ernest Street for a 12.5 single unit truck– no (shown in Appendix A-10A and Appendix A-10B) Right turn from ANZAC Avenue to Ernest Street for a 12.5 single unit truck – yes (shown in Appendix A-10C)	A 12.5-metre single unit truck would not be able to make the left-turn movement without encroaching on the existing kerb and keep within its own lane (refer to drawing Appendix A-10A). In order for a 12.5-metre single unit truck to make this movement without encroaching on an existing kerb, it would need to use part of the northbound lane (refer to drawing Appendix A-10B). This is considered a safety hazard and therefore all trucks will be required to turn right from ANZAC Avenue to Ernest Street (refer to drawing Appendix A-10C).
		Left turn from Ernest Street to ANZAC Avenue for a 12.5 single unit truck – no (shown in Appendix A-10D)	A 12.5-metre single unit truck would not be able to make the left-turn movement without encroaching on the existing kerb and keep within its own lane. In order for a 12.5-metre single unit truck to make this movement without encroaching on an existing kerb, it would need to use part of
		Right turn from Ernest Street to ANZAC Avenue for a 12.5 single unit truck – yes (shown in Appendix A-10E)	

Local road	Drawing number in Appendix A2	Can 8.8 m single unit truck / 12.5 m single unit truck / 19 m semi-trailer make movement without encroaching on existing kerbs, traffic management / traffic control devices or on-street parking spaces?	Additional comments
			the southbound lane (refer to drawing Appendix A-10D). This is considered a safety hazard and therefore all trucks will be required to turn right from Ernest Street to ANZAC Avenue (refer to Appendix A-10E).
Merlin Street and Falcon Street	Appendix A-11A, Appendix A-11B	12.5 m single unit truck – yes (shown in Appendix A-11A) 19 m semi-trailer – yes (shown in Appendix A-11B)	A 19m semi-trailer is required for asphaltting works on Alfred Street North, with vehicles to exit the work site via Merlin Street for access to Falcon Street. Asphaltting works are associated with “backfilling trenches and re-instating ground surface to an appropriate condition” and “rehabilitate areas disturbed by works” as described in Table 1-2.
Alfred Street North and Merin Street	Appendix A-12A, Appendix A-12B, Appendix A-12C	12.5 m single unit truck – yes (shown in Appendix A-12A) 19 m semi-trailer while staying within the northbound / eastbound lane – no (shown in Appendix A-12B) 19 m semi-trailer with use of the southbound / westbound lane – yes (shown in Appendix A-12C)	A 19-metre semi-trailer would not be able to negotiate the bend at the interface between Alfred Street North and Merlin Street while staying within the northbound / eastbound lane without encroaching on an existing kerb or existing on-street parking spaces (refer to drawing Appendix A-12B). In order for a

Local road	Drawing number in Appendix A2	Can 8.8 m single unit truck / 12.5 m single unit truck / 19 m semi-trailer make movement without encroaching on existing kerbs, traffic management / traffic control devices or on-street parking spaces?	Additional comments
			19-metre semi-trailer to make this movement without encroaching on an existing kerb or existing on-street parking spaces, it would need to use the southbound / westbound lane (refer to drawing Appendix A-12C). Traffic controllers are proposed to manage the safe movement of semi-trailers (refer to Section 4).
Military Road and Ben Boyd Road	Appendix A-13	12.5 m single unit truck – yes	N/A
Ernest Street and Ben Boyd Road	Appendix A-14A Appendix A-14B	12.5 m single unit truck – yes	N/A
Ben Boyd Road and Sutherland Street	Appendix A-15A Appendix A-15B	12.5 m single unit truck – no (shown in Appendix A-15A) 8.8 m single unit truck – yes (shown in Appendix A-15B)	A 12.5-metre single unit truck would not be able to make the left-turn movement without encroaching on the existing kerb and keep within its own lane. In order for a 12.5-metre single unit truck to make this movement without encroaching on an existing kerb, it would need to use part of the eastbound lane (refer to drawing Appendix A-15A). This is considered a safety hazard and therefore the maximum truck size will be limited to 8.8

Local road	Drawing number in Appendix A2	Can 8.8 m single unit truck / 12.5 m single unit truck / 19 m semi-trailer make movement without encroaching on existing kerbs, traffic management / traffic control devices or on-street parking spaces?	Additional comments
			metres (refer to Appendix A-15B).
Park Avenue and Sutherland Street	Appendix A-16A Appendix A-16B Appendix A-16C	<p>Left turn from Park Avenue to Sutherland Street for a 12.5 single unit truck – no (shown in Appendix A-16A)</p> <p>Left turn from Park Avenue to Sutherland Street for an 8.8 m single unit truck – no (shown in Appendix A-16B)</p> <p>Right turn from Park Avenue to Sutherland Street for an 8.8 m single unit truck – yes (shown in Appendix A-16C)</p>	<p>An 8.8-metre or 12.5-metre single unit truck would not be able to make the left-turn movement without encroaching on the existing kerb and keep within its own lane. In order for an 8.8-metre or 12.5-metre single unit truck to make this movement without encroaching on an existing kerb, it would need to use part of the northbound lane (refer to drawing Appendix A-16A and Appendix A-16-B). This is considered a safety hazard and therefore all trucks will be required to turn right from Park Avenue to Sutherland Street (refer to Appendix A-16C).</p>
Left turn from Ernest Street eastbound to Park Avenue northbound (<i>Specific to 1B works</i>)	Appendix A2-1 and Appendix A2-2	Yes (For a 19 m semi-trailer and 19 m truck-and-dog trailer combination)	*19 m semi-trailers and 19 m truck-and-dog trailer combinations would be able to make the left turn movement with the proposed removal of the two existing median islands separating northbound and southbound traffic on Park Avenue

Local road	Drawing number in Appendix A2	Can 8.8 m single unit truck / 12.5 m single unit truck / 19 m semi-trailer make movement without encroaching on existing kerbs, traffic management / traffic control devices or on-street parking spaces?	Additional comments
Right turn from Park Avenue southbound to Ernest Street westbound (<i>Specific to 1B works</i>)	Appendix A2-3, Appendix A2-4	Yes (For a 19 m semi-trailer and 19 m truck-and-dog trailer combination)	N/A
Left in and right out from site onto Park Avenue (<i>Specific to 1B works</i>)	Appendix A2	Yes (For a 19 m semi-trailer and 19 m truck-and-dog trailer combination)	*19 m semi-trailers and 19 m truck-and-dog trailer combinations would be able to make the left and right turn movement with the proposed removal of the 2 existing car park spaces on the western side of Park Avenue and removal of approximately 18m of existing median
Left in and right out from existing clubhouse onto Park Avenue	Appendix A2	8.8m single unit truck – Yes 12.5m single unit truck - Yes	*Any vehicle which is 7.5m or longer, may display the words DO NOT OVERTAKE TURNING VEHICLE on one of the rear marking plates. These vehicles may use more than one lane when turning right or left including on single carriageway roads with one lane in each direction.

3.2 Pedestrian, cyclist and two-way traffic flow safety risk assessment

As required by CoA E133(b), a pedestrian, cyclist and two-way traffic flow safety risk assessment has been undertaken to demonstrate that the use of local roads by heavy vehicles will not compromise pedestrian, cyclist and two-way traffic flow safety.

Existing potential hazards to pedestrians, cyclists and two-way traffic were identified during site inspections. These were assessed against a risk matrix. The risks of these potential hazards were then reassessed, taking into consideration the use of local roads by heavy vehicles.

The methodology of identifying hazards and assessing their level of risk is similar to that undertaken for road safety audits. The risk assessment system is the easiest means of identifying the level of risk associated with any given hazard. The risk assessment system is outlined in Appendix A3.

The pedestrian, cyclist and two-way traffic flow safety risk assessment is detailed in Table 3-2 below. Potential hazards to cyclists have been identified where there is an existing designated cycle route (Amherst Street, Cammeray Road, Warringa Road and ANZAC Avenue). The results of the safety risk assessment demonstrate that the use of local roads by heavy vehicles will not have an impact on pedestrian, cyclist and two-way traffic flow safety as indicated by the revised level of risk being the same as the existing level of risk for all identified potential hazards.

During consultation with North Sydney Council (NSC) additional management measure of undertaking a road safety audit (RSA) was recommended and has since been implemented by SPA. The measures as detailed in the RSA will be implemented during the use of the local roads and proposed temporary modifications to enable their safe and efficient use by all road users.

Table 3-2 Pedestrian, cyclist and two-way traffic flow safety risk assessment

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Amherst Street westbound approach to Bellevue Street, Cammeray	There is the potential for conflict between cyclists and vehicles where the cycle lane and traffic lane converge on approach to the roundabout	Occasional	Minor	Medium	<p>Heavy vehicles would travel at lower speed in the westbound direction due to the uphill grade</p> <p>Existing low numbers of cyclists</p> <p>Signage to warn cyclists (and other vehicles) of the presence of heavy vehicles</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Occasional	Minor	Medium
Amherst Street (both directions), Cammeray	There is the potential for conflict between cyclists and vehicles travelling in the same direction on Amherst Street as they share the same road space	Improbable	Serious	Medium	<p>Existing low numbers of cyclists</p> <p>Signage to warn cyclists (and other vehicles) of the presence of heavy vehicles</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Amherst Street, Cammeray	There is the potential for conflict between pedestrians crossing Amherst Street and vehicles travelling on Amherst Street	Improbable	Serious	Medium	<p>Presence of pedestrian refuge islands on the approaches to Bellevue Street, Echo Street / Bells Avenue and Warringa Road</p> <p>Existing low numbers of pedestrians</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Amherst Street, Cammeray	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Amherst Street	Improbable	Serious	Medium	<p>Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths</p> <p>Existing low numbers of pedestrians</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Bells Avenue, Cammeray	There is the potential for conflict between pedestrians crossing Bells Avenue and vehicles travelling on Bells Avenue	Improbable	Serious	Medium	Existing low numbers of pedestrians Existing 50 km/h posted speed limit Driver induction process to include safety awareness in relation to all road users	Improbable	Serious	Medium
Bells Avenue, Cammeray	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Bells Avenue	Improbable	Serious	Medium	Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths Existing low numbers of pedestrians Driver induction process to include safety awareness in relation to all road users	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Cammeray Road, Cammeray	There is the potential for conflict between cyclists and vehicles travelling in the same direction on Cammeray Road as they share the same road space	Improbable	Serious	Medium	<p>There is an existing separated shared path on the northern side of Cammeray Road</p> <p>Existing low numbers of cyclists</p> <p>Signage to warn cyclists (and other vehicles) of the presence of heavy vehicles</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Cammeray Road, Cammeray	There is the potential for conflict between pedestrians crossing Cammeray Road and vehicles travelling on Cammeray Road	Improbable	Serious	Medium	<p>Existing lack of pedestrian desire lines across Cammeray Road</p> <p>Existing low numbers of pedestrians</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Cammeray Road, Cammeray	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Cammeray Road	Improbable	Serious	Medium	<p>Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths</p> <p>Existing low numbers of pedestrians</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Park Avenue (northbound between Ernest Street and Cammeray Road), Cammeray	There is the potential for conflict between cyclists and vehicles travelling in the same direction on Park Avenue as they share the same road space	Improbable	Serious	Medium	<p>There is an existing separated cycleway on the western side of Park Avenue south of Sutherland Street</p> <p>Existing low numbers of cyclists</p> <p>Signage to warn cyclists (and other vehicles) of the presence of heavy vehicles</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Park Avenue (northbound between Ernest Street and Cammeray Road), Cammeray	There is the potential for conflict between pedestrians crossing Park Avenue and vehicles travelling on Park Avenue	Improbable	Serious	Medium	<p>Existing lack of pedestrian desire lines across the majority of Park Avenue</p> <p>Existing low numbers of pedestrians</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Park Avenue (northbound between Ernest Street and Cammeray Road), Cammeray	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Park Avenue	Improbable	Serious	Medium	<p>Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths</p> <p>Existing low numbers of pedestrians</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Warringa Road, Cammeray	There is the potential for conflict between cyclists and vehicles travelling in the same direction on Warringa Road as they share the same road space	Improbable	Serious	Medium	<p>Existing low numbers of cyclists</p> <p>Signage to warn cyclists (and other vehicles) of the presence of heavy vehicles</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Warringa Road, Cammeray	There is the potential for conflict between pedestrians crossing Warringa Road and vehicles travelling on Warringa Road	Improbable	Serious	Medium	<p>Existing lack of pedestrian desire lines across Warringa Road</p> <p>Existing low numbers of pedestrians</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Warringa Road, Cammeray	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Warringa Road	Improbable	Serious	Medium	<p>Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths</p> <p>Existing low numbers of pedestrians</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Cammeray Avenue, Cammeray	There is the potential for conflict between pedestrians crossing Cammeray Avenue and vehicles travelling on Cammeray Avenue	Improbable	Serious	Medium	<p>Existing lack of pedestrian desire lines across Cammeray Avenue</p> <p>Existing low numbers of pedestrians (outside of school hours)</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Cammeray Avenue, Cammeray	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Cammeray Avenue	Improbable	Serious	Medium	<p>Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths</p> <p>Existing low numbers of pedestrians</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
ANZAC Avenue, Cammeray	There is the potential for conflict between cyclists and vehicles travelling in the same direction on ANZAC Avenue as they share the same road space	Improbable	Serious	Medium	<p>Existing low numbers of cyclists</p> <p>Signage to warn cyclists (and other vehicles) of the presence of heavy vehicles</p> <p>Existing 50 km/h posted speed limit (40 km/h during school zone times)</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
ANZAC Avenue, Cammeray	There is the potential for conflict between pedestrians crossing ANZAC Avenue and vehicles travelling on ANZAC Avenue	Improbable	Serious	Medium	<p>Heavy vehicles will not be permitted to travel to or from the Cammeray Avenue worksite via ANZAC Avenue during school zone times on school days (8 am to 9.30 am and 2.30 pm to 4 pm)</p> <p>All heavy vehicles will be required to turn right from ANZAC Avenue to Ernest Street</p> <p>Existing low numbers of pedestrians (outside of school hours)</p> <p>Existing 50 km/h posted speed limit (40 km/h during school zone times)</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
ANZAC Avenue, Cammeray	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using ANZAC Avenue	Improbable	Serious	Medium	<p>Heavy vehicles will not be permitted to travel to or from the Cammeray Avenue worksite via ANZAC Avenue during school zone times on school days (8 am to 9.30 am and 2.30 pm to 4 pm)</p> <p>Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths if turning right from ANZAC Avenue to Ernest Street</p> <p>All heavy vehicles will be required to turn right from ANZAC Avenue to Ernest Street</p> <p>Existing low numbers of pedestrians (outside of school hours)</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Merlin Street, Neutral Bay	There is the potential for conflict between pedestrians crossing Merlin Street and vehicles travelling on Merlin Street	Improbable	Serious	Medium	<p>Existing lack of pedestrian desire lines across Merlin Street</p> <p>Existing low numbers of pedestrians</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Merlin Street, Neutral Bay	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Merlin Street	Improbable	Serious	Medium	<p>Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths</p> <p>Existing low numbers of pedestrians</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Ben Boyd Road (south of Ernest Street), Neutral Bay	There is the potential for conflict between pedestrians crossing Ben Boyd Road and vehicles travelling on Ben Boyd Road	Improbable	Serious	Medium	<p>Signalised pedestrian crossings of Ben Boyd Road at Military Road and Ernest Street</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Ben Boyd Road (south of Ernest Street), Neutral Bay	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Ben Boyd Road	Improbable	Serious	Medium	<p>Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths</p> <p>Signalised pedestrian crossings of Ben Boyd Road at Military Road and Ernest Street</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Ben Boyd Road (north of Belgrave Street), Cremorne	There is the potential for conflict between pedestrians crossing Ben Boyd Road and vehicles travelling on Ben Boyd Road	Improbable	Serious	Medium	<p>Existing lack of pedestrian desire lines across Ben Boyd Road</p> <p>Existing low numbers of pedestrians</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Ben Boyd Road (north of Belgrave Street), Cremorne	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Ben Boyd Road	Improbable	Serious	Medium	<p>Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths</p> <p>Existing low numbers of pedestrians</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Sutherland Street, Cremorne	There is the potential for conflict between cyclists and vehicles travelling in the same direction on Sutherland Street as they share the same road space	Improbable	Serious	Medium	<p>There is an existing separated shared path on the northern side of Sutherland Street</p> <p>Existing low numbers of cyclists</p> <p>Signage to warn cyclists (and other vehicles) of the presence of heavy vehicles</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Sutherland Street, Cremorne	There is the potential for conflict between pedestrians crossing Sutherland Street and vehicles travelling on Sutherland Street	Improbable	Serious	Medium	<p>Existing lack of pedestrian desire lines across Sutherland Street</p> <p>Existing low numbers of pedestrians</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Sutherland Street, Cremorne	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Sutherland Street	Improbable	Serious	Medium	<p>Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths</p> <p>Existing low numbers of pedestrians</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Park Avenue (southbound south of Sutherland Street), Cremorne	There is the potential for conflict between cyclists and vehicles travelling in the same direction on Park Avenue as they share the same road space	Improbable	Serious	Medium	<p>There is an existing separated cycleway on the western side of Park Avenue south of Sutherland Street</p> <p>Existing low numbers of cyclists</p> <p>Signage to warn cyclists (and other vehicles) of the presence of heavy vehicles</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Park Avenue (southbound south of Sutherland Street), Cremorne	There is the potential for conflict between pedestrians crossing Park Avenue and vehicles travelling on Park Avenue	Improbable	Serious	Medium	Existing low numbers of pedestrians Existing 50 km/h posted speed limit Driver induction process to include safety awareness in relation to all road users	Improbable	Serious	Medium
Park Avenue (southbound south of Sutherland Street), Cremorne	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Park Avenue	Improbable	Serious	Medium	Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths Existing low numbers of pedestrians Driver induction process to include safety awareness in relation to all road users	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
All local roads	There is the potential for side-swipe and head-on crashes between two vehicles travelling in opposite directions on two-way roads	Improbable	Serious	Medium	<p>Road widths are sufficient for two heavy vehicles to pass each other</p> <p>Existing 50 km/h posted speed limit (40 km/h during school zone times on ANZAC Avenue)</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Park Avenue, Cammeray <i>(specific to 1b works)</i>	There is the potential for conflict between cyclists and vehicles travelling in the same direction on Park Avenue	Improbable	Serious	Medium	<p>There is an existing separated cycleway located on the western side of Park Avenue</p> <p>Existing low numbers of cyclists</p> <p>Signage to warn cyclists (and other vehicles) of the presence of heavy vehicles</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Park Avenue, Cammeray (Specific to 1b works)	There is the potential for conflict between pedestrians crossing Park Avenue and vehicles travelling on Park Avenue	Improbable	Serious	Medium	<p>Low volume of turning movements outside of construction hours allows ample opportunity for pedestrians to cross</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium
Park Avenue, Cammeray (Specific to 1b works)	There is the potential for conflict between heavy vehicles undertaking turning manoeuvres and pedestrians using Park Avenue	Improbable	Serious	Medium	<p>Swept path analysis shows heavy vehicles undertaking turning manoeuvres would not encroach on footpaths</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

Location	Description of existing hazard	Existing conditions			Use of local roads by heavy vehicles			
		Crash frequency	Crash severity	Level of risk	Mitigating factors	Revised crash frequency	Revised crash severity	Revised level of risk
Park Avenue, Cammeray (Specific to 1b works)	There is the potential for side-swipe and head-on crashes between two vehicles travelling in opposite directions on two-way roads	Improbable	Serious	Medium	<p>To safely maintain two-way traffic flow on Park Avenue, traffic controllers will be positioned on Park Avenue near Ernest Street to ensure southbound vehicles on Park Avenue are stopped when trucks are turning left from Ernest Street eastbound to Park Avenue northbound. This will reduce the potential for side-swipe and head-on crashes between two vehicles travelling in opposite directions on Park Avenue. Traffic controllers will be deployed during construction hours when heavy vehicle movements are occurring</p> <p>Existing 50 km/h posted speed limit</p> <p>Driver induction process to include safety awareness in relation to all road users</p>	Improbable	Serious	Medium

3.3 Details of road dilapidation surveys undertaken

As required by CoA E133(c), road dilapidation surveys have been undertaken on all local roads requiring DPIE approval. The road dilapidation surveys were completed on 20 February 2021. These road dilapidations were provided to North Sydney Council for information in accordance with CoA E136.

4 Mitigation measures

As required by CoA E133(d), measures are required to be implemented to avoid where practicable the use of roads past schools, aged care facilities and child care facilities during their peak operation times. To mitigate any potential impacts:

- Heavy vehicles will not be permitted to travel to or from the Cammeray Avenue worksite via ANZAC Avenue during school zone times on school days (8 am to 9.30 am and 2.30 pm to 4 pm)
- All heavy vehicles will be required to turn right from ANZAC Avenue to Ernest Street, and to turn right from Ernest Street to ANZAC Avenue, which will be included in the vehicle movement plan for the Cammeray Avenue worksite
- To safely maintain two-way traffic flow on Cammeray Avenue, traffic controllers will be positioned at both ends of the east-west section of Cammeray Avenue to ensure only one vehicle can travel along Cammeray Avenue at the one time. Traffic controllers will be deployed during construction hours when heavy vehicle movements are occurring
- To safely manage the movement of 19-metre semi-trailers in the northbound / eastbound direction on Merlin Street, traffic controllers will be positioned at the intersection of Alfred Street North / Wyagdon Street and at the southern end of the north-south section of Merlin Street to ensure no other vehicles can travel on Merlin Street during movements of 19-metre semi-trailers. Traffic controllers will be deployed during construction hours when heavy vehicle movements are occurring
- To safely maintain two-way traffic flow on Park Avenue, traffic controllers will be positioned on Park Avenue near Ernest Street to ensure southbound vehicles on Park Avenue are stopped when trucks are turning left from Ernest Street eastbound to Park Avenue northbound. This will reduce the potential for side-swipe and head-on crashes between two vehicles travelling in opposite directions on Park Avenue. Traffic controllers will be deployed during construction hours when heavy vehicle movements are occurring
- Any vehicle over 7.5m or longer, may display the words DO NOT OVERTAKE TURNING VEHICLE on one of the rear marking plates. These vehicles may use more than one lane when turning right or left including on single carriageway roads with one lane in each direction
- For heavy vehicles egressing from the Ernest Street (eastbound) worksite (east of Park Avenue), the maximum size of heavy vehicle that will be permitted to travel on Ben Boyd Road (north of Belgrave Street) and Sutherland Street is an 8.8-metre single unit truck
- All heavy vehicles will be required to turn right from Sutherland Street to Park Avenue
- Vehicle movement plans showing approved routes and vehicle sizes to and from each origin and destination will be issued to all subcontractors as part of contract documentation upon engagement. Signage will also be installed along approved routes to guide heavy vehicle drivers
- An additional crossing supervisor will be positioned at the zebra crossing on ANZAC Avenue to supplement the existing school crossing supervisor. The additional crossing supervisor will be present from 6.30 am to 10.30 am, and 2 pm to 6 pm on school days. The purpose of the additional crossing supervisor is to manage the movement of pedestrians across ANZAC Avenue
- Heavy vehicle movements on Warringa Road will be restricted to two movements per hour in the westbound direction. In the unlikely event that heavy vehicle movements on Warringa Road exceed two movements per hour, traffic controllers will be deployed at both ends of Warringa Road to manage the movement of heavy vehicles and general traffic to avoid

conflict. Traffic controllers will be deployed during construction hours when heavy vehicle movements are occurring

- Signage will be installed on cyclist routes to warn cyclists (and other vehicles) of the presence of heavy vehicles
- Implementation of a Driver's Code of Conduct (refer to Appendix A4)
- The driver induction process will include safety awareness in relation to all road users (including pedestrians and cyclists) and the strict requirement to obey all road rules and to travel only on approved roads (refer to Section 3.5 of the CEMP)
- Workforce shuttle buses and the use of public transport will be prioritised by the project team where the provision of construction on-site parking cannot accommodate the WHT/WFU full construction workforce
- Both contractors for Stage 1A-B and Stage 2 works will work collaboratively to ensure the maximum approved movements as detailed in Section 2 are not exceeded
- HV drivers will be inducted to the Project with specific emphasis on the requirements for using local roads. In particular, the need for additional vigilance when entering and exiting the Cammeray Golf Course driveway will be stressed
- Construction vehicle movements will be monitored on a daily basis and additional Traffic Control provided as required
- Additional signage to alert HV drivers of 'High Pedestrian Activity' have been installed on Park Avenue
- This is in addition to the typical 'Trucks Turning' warning signs (W5-22) and their supplementary information plates (W8-207 series)
- Community consultation will be undertaken in accordance with the Community Communication Strategy (CCS). This will include engagement activities such as:
 - Fact sheets showing overall impacts in the area which will include traffic detours, loss of on-street parking
 - Maps showing traffic diversions/parking impacts
 - Property access plans to discuss impacts of detours on individual properties
 - Detour specific notifications
 - Doorknocks for impacted properties to understand access requirements
- Coordination meetings between SPA, TfNSW, Transport Management Centre and Customer Journey Planning – Operations will occur on a regular basis throughout the delivery of the CSSI. Key issues for discussion at the coordination meetings will include road occupancy licences and any other transport network changes or impacts resulting from construction of the CSSI
- Continuous review and improvement will be undertaken (refer to Section 3.12 of the CEMP). This CoA E132 local roads approval document will be reviewed and updated as required:
 - Following reportable environmental incidents
 - Upon identification of new 'significant' risks, including risks identified during risk register updates
 - When non-compliances are identified
 - When the root cause of incident or non-conformance is identified as part of the investigation
 - In response to significant project change (including modifications to the CSSI)

- Within one month of any of the above occurrences
- As part of a continuous improvement process
- The effect of changes in standards and legislation.
- Regular monitoring of mitigation measures for compliance and effectiveness will be undertaken (refer to Section 3.9 of the CEMP). Further detail on regular inspections is detailed in Section 4.1 below.

4.1 Inspections

In accordance with Section 7.1 of the TTAMP SPA will undertake regular inspections to ensure the safety of all traffic movements, as well as the wellbeing of pedestrians, cyclists, drivers and property through and surrounding all worksites. The responsibility and frequency of inspections is stipulated in section 6.1 of the TfNSW Traffic Control at Worksites Manual.

These regular inspections will also verify the on-street parking commitments established by the 'Driver Code of Conduct'.

Three main types of inspections and records will occur:

- Inspections of short-term (single shift) traffic controls during the shift
- Regular daytime inspections of long-term traffic controls after implementation
- Regular night time inspections of long-term traffic controls after implementation.

Pre-opening inspections will be carried out by the Traffic Manager before the start of each new temporary roadwork site or major modification.

Any signage or devices identified during the checks or audits requiring attention will either be rectified at the time or advised to the Traffic Manager during that shift for follow-up action.

Appendix A1 Advice regarding the suitability of local roads as proposed heavy vehicle routes

Appendix A2 Swept path diagrams





WESTERN HARBOUR TUNNEL AND WARRINGAH FREEWAY UPGRADE
STAGE 1A EARLY AND ENABLING WORKS - CRITICAL UTILITY INSTALLATION, RELOCATION AND PROTECTION WORKS

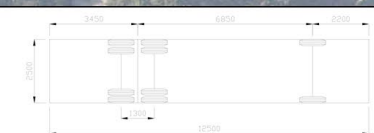
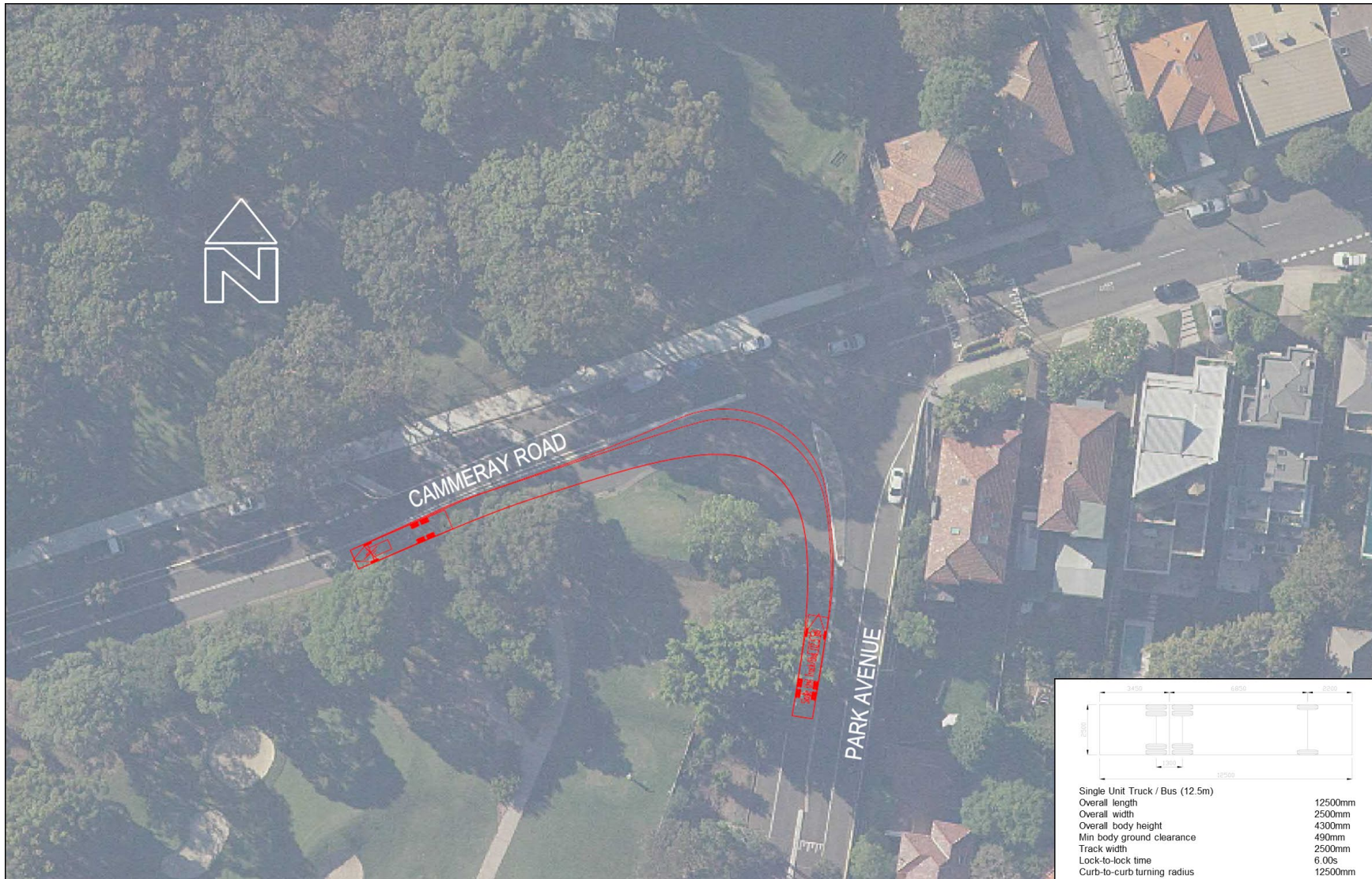
SWEPT PATH ANALYSIS – BELLS AVENUE TO AMHERST STREET
12.5m SINGLE UNIT TRUCK / BUS

DWG No.

APPENDIX A-3

DATE STAMP

11 DECEMBER 2020



Single Unit Truck / Bus (12.5m)	
Overall length	12500mm
Overall width	2500mm
Overall body height	4300mm
Min body ground clearance	490mm
Track width	2500mm
Lock-to-lock time	6.00s
Curb-to-curb turning radius	12500mm



WESTERN HARBOUR TUNNEL AND WARRINGAH FREEWAY UPGRADE
STAGE 1A EARLY AND ENABLING WORKS - CRITICAL UTILITY INSTALLATION, RELOCATION AND PROTECTION WORKS

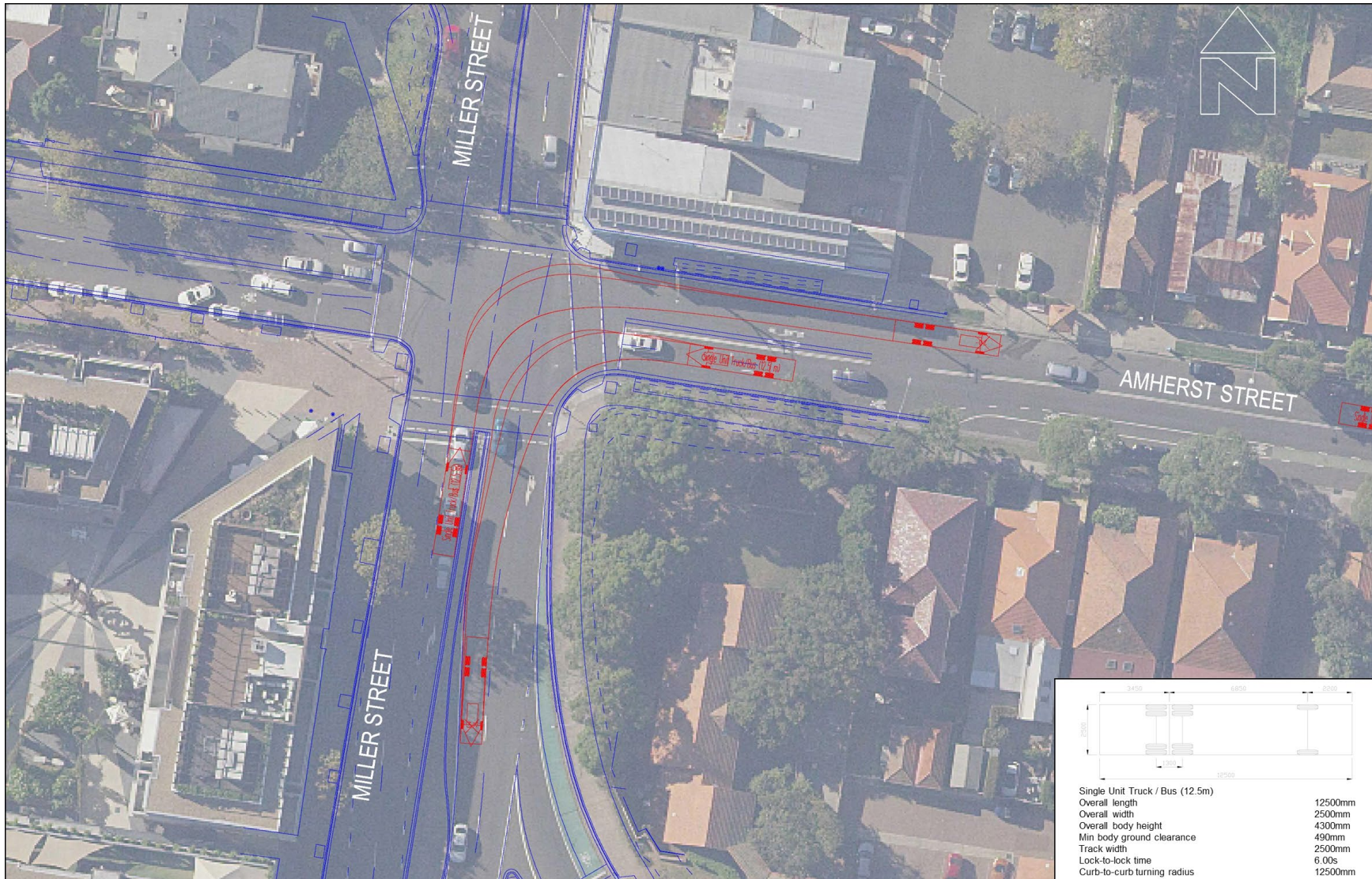
SWEPT PATH ANALYSIS - CAMMERAY ROAD AND PARK AVENUE
12.5m SINGLE UNIT TRUCK / BUS

DWG No. APPENDIX A-4

DATE STAMP
20 JANUARY 2021







WESTERN HARBOUR TUNNEL AND WARRINGAH FREEWAY UPGRADE
STAGE 1A EARLY AND ENABLING WORKS - CRITICAL UTILITY INSTALLATION, RELOCATION AND PROTECTION WORKS

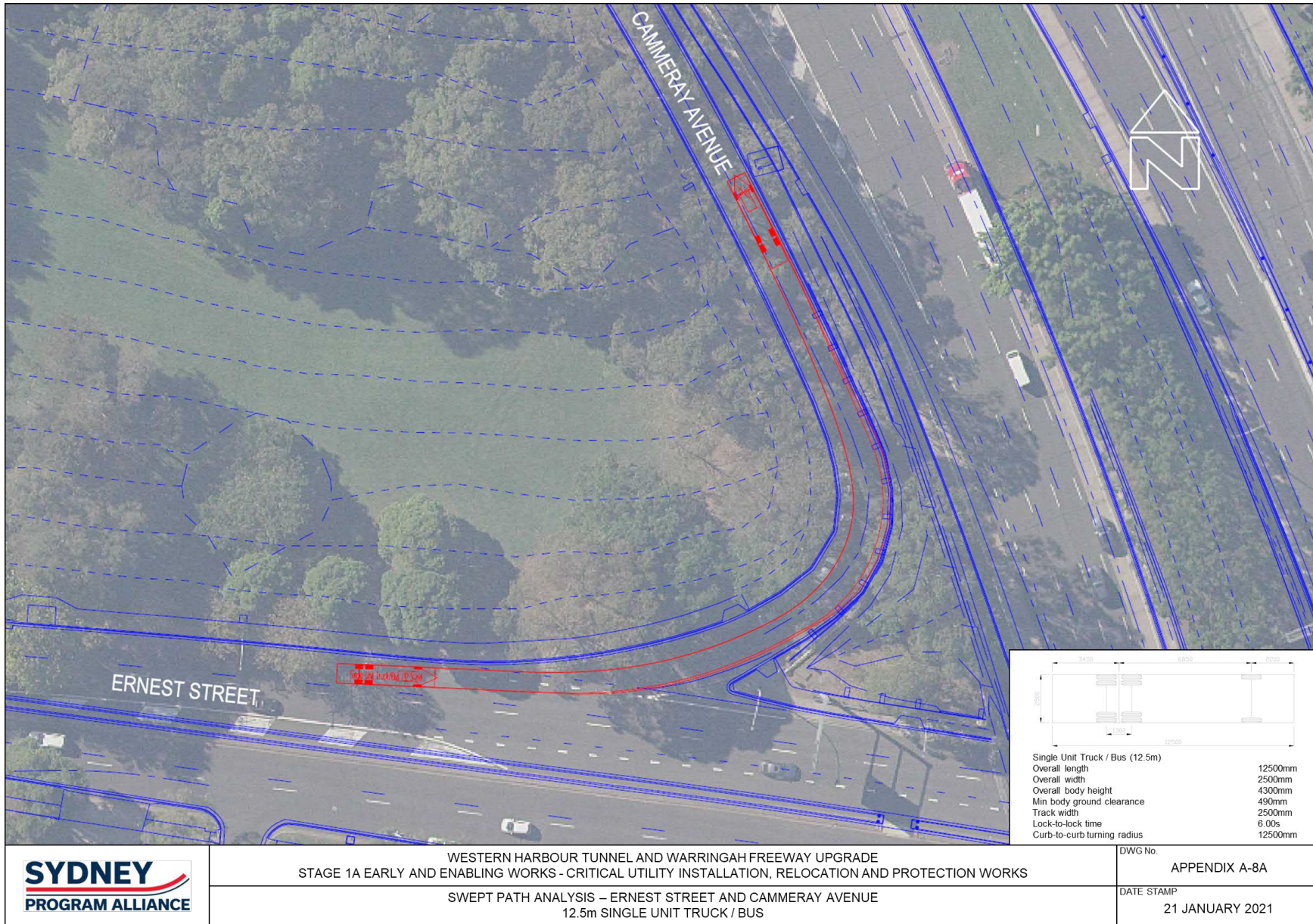
SWEEP PATH ANALYSIS – MILLER STREET AND AMHERST STREET
12.5m SINGLE UNIT TRUCK / BUS

DWG No.

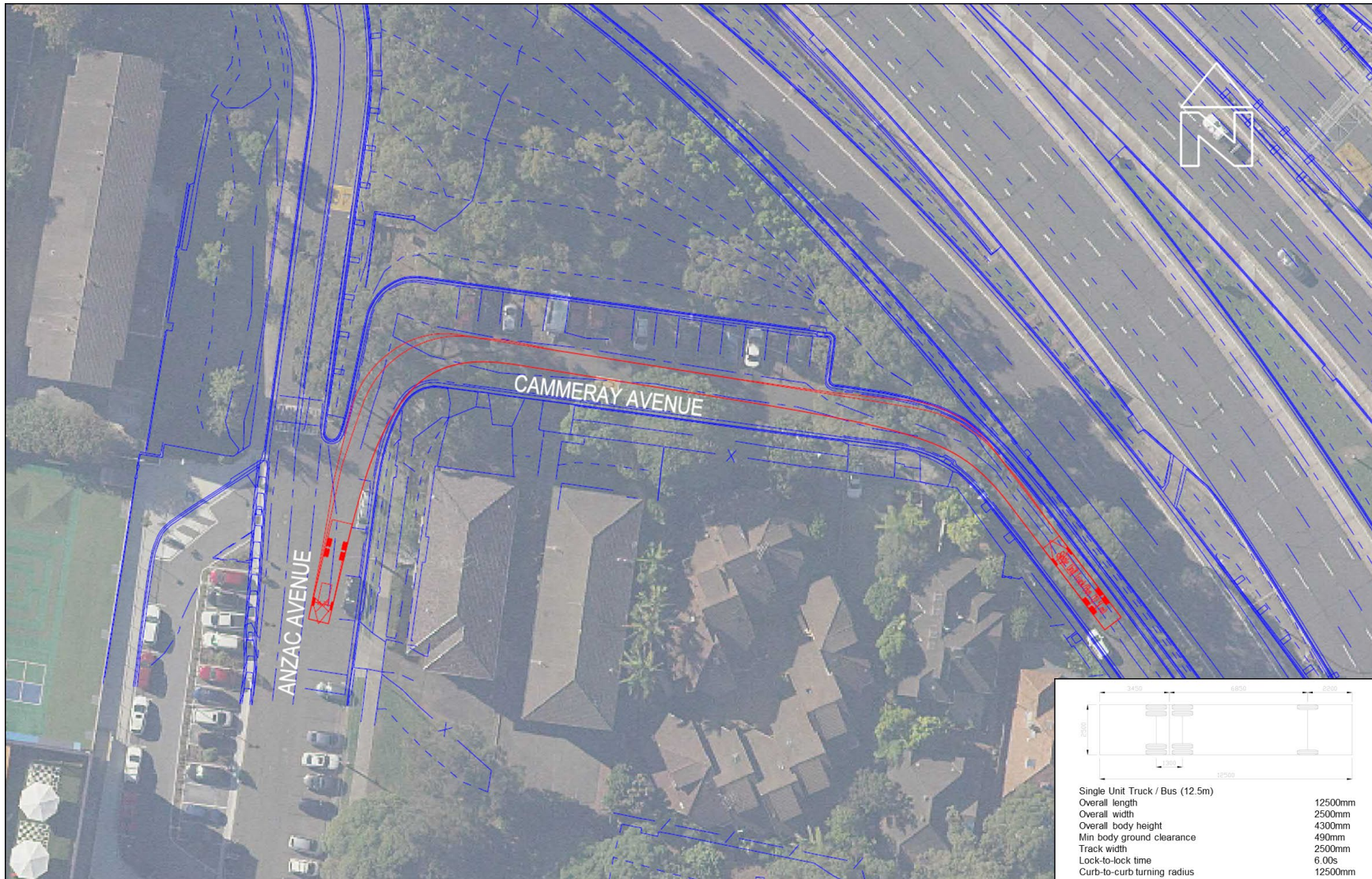
APPENDIX A-7

DATE STAMP

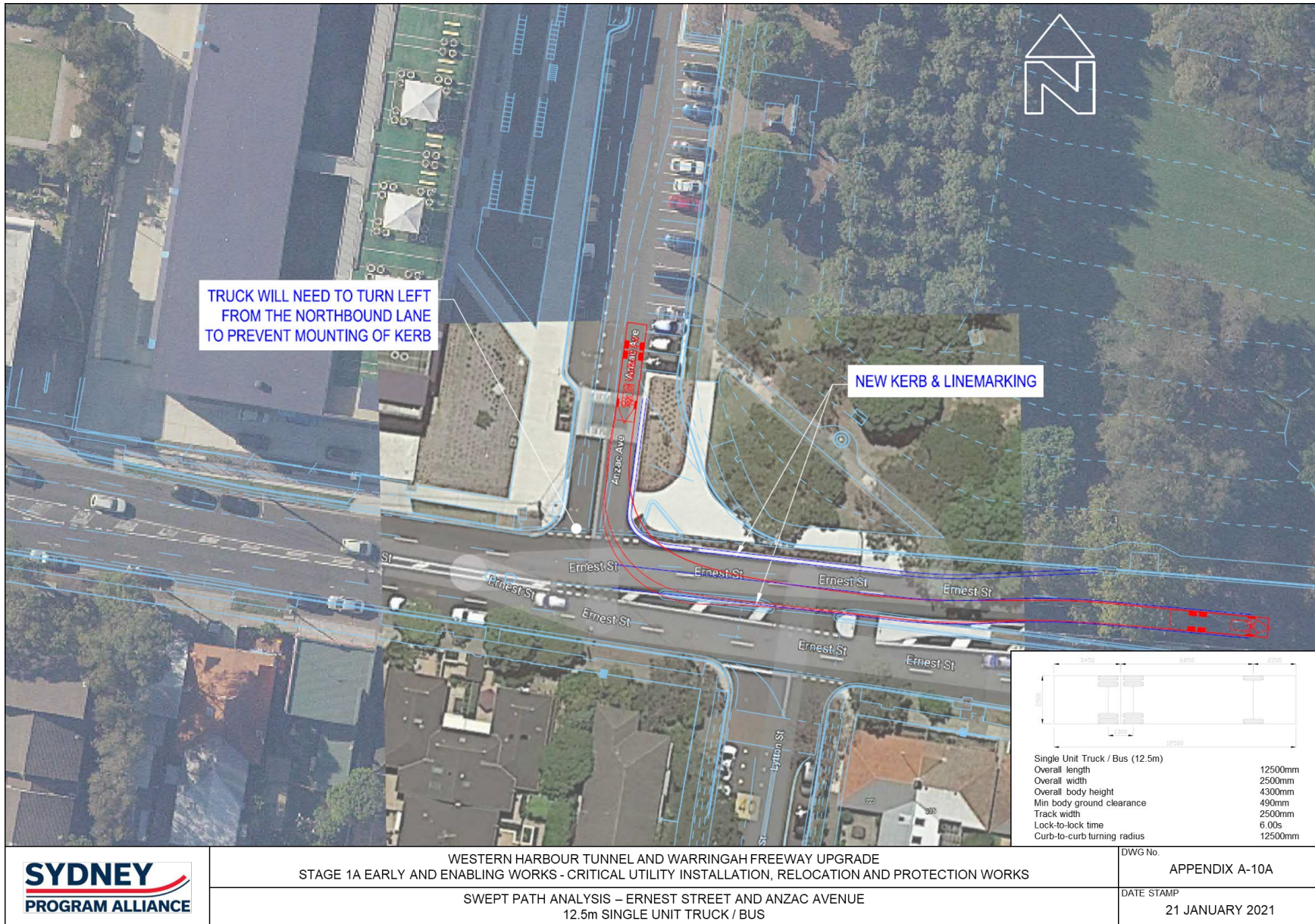
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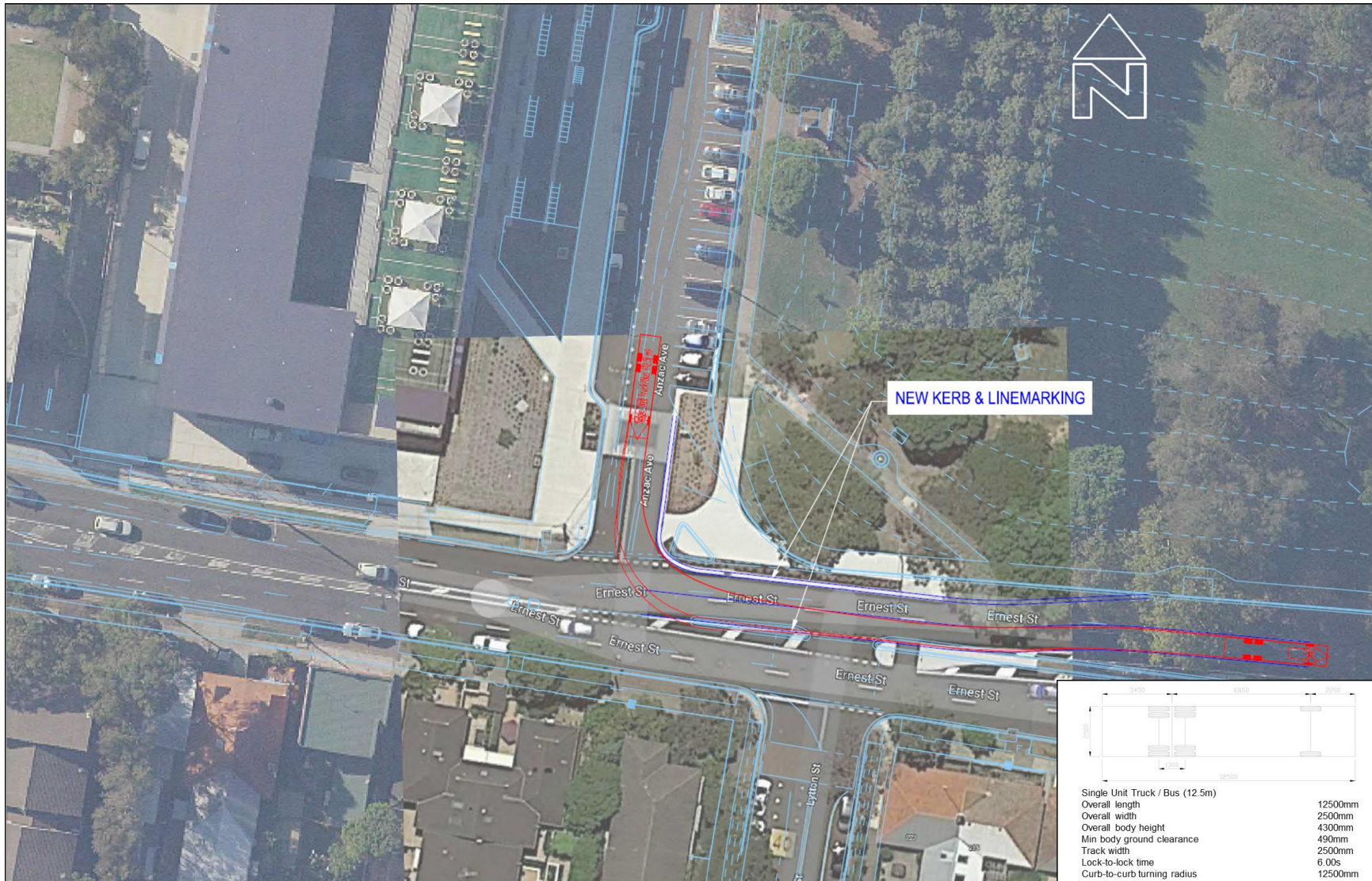




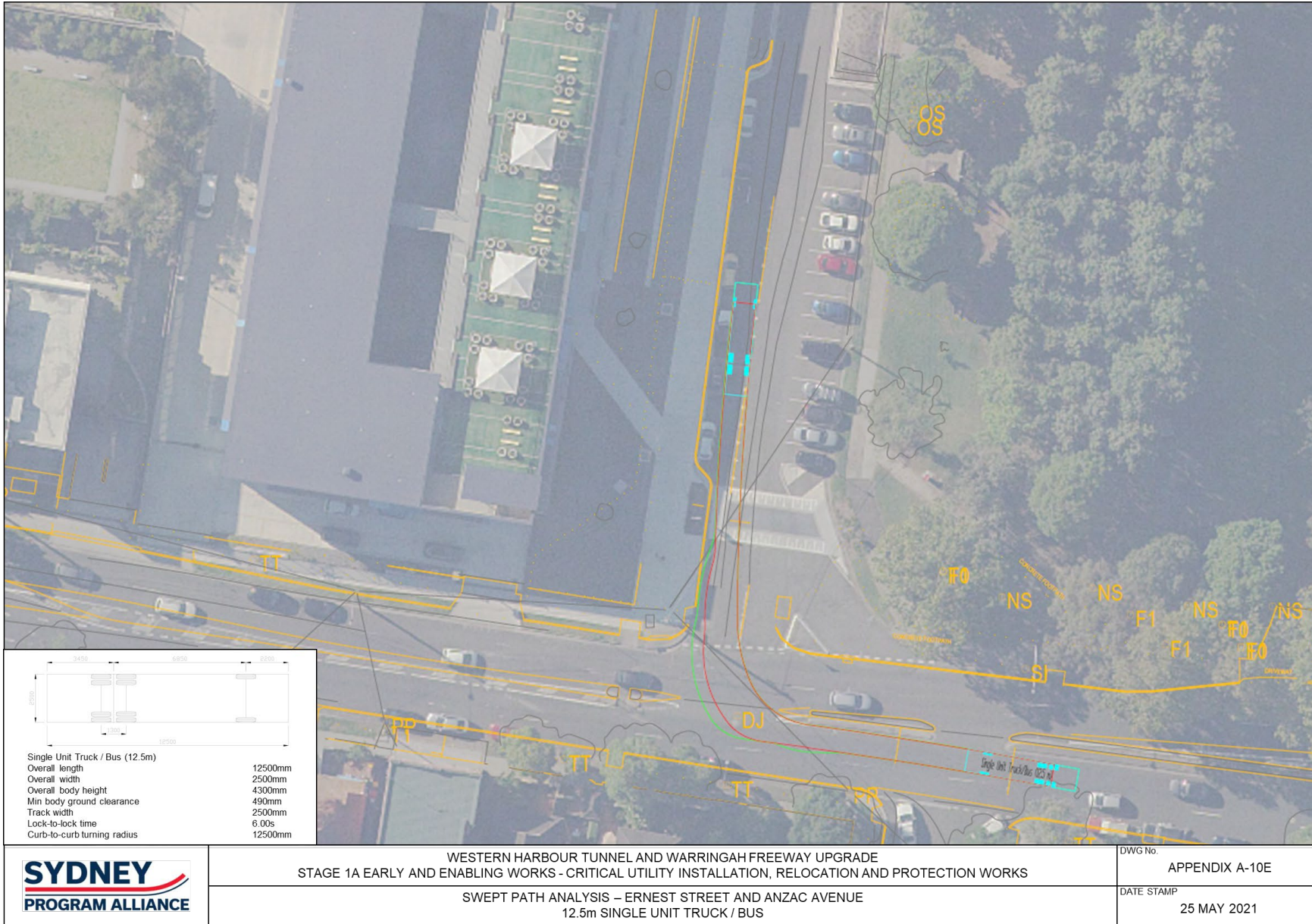


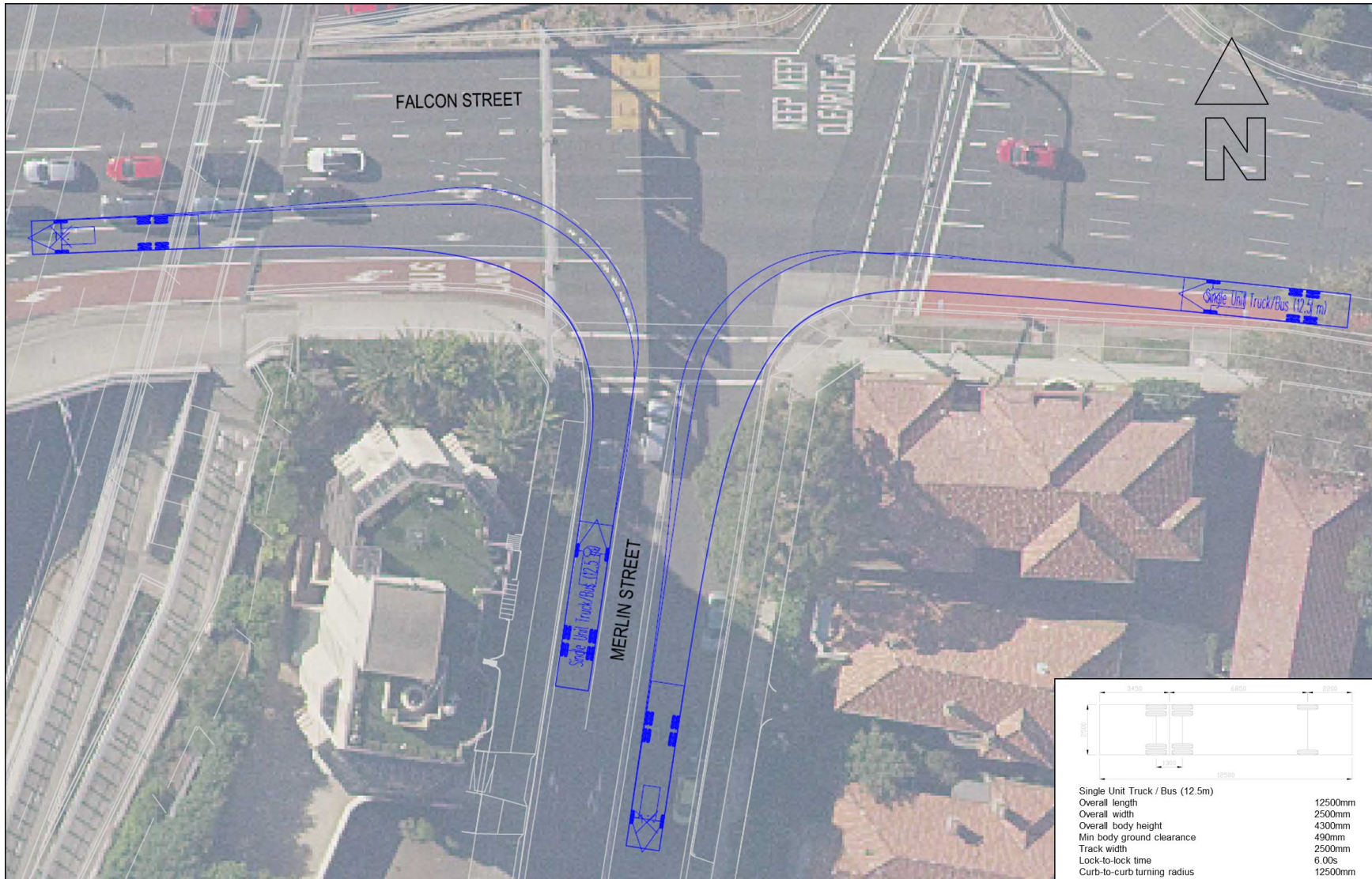


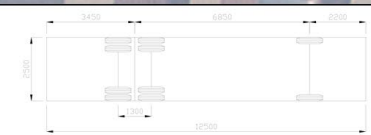
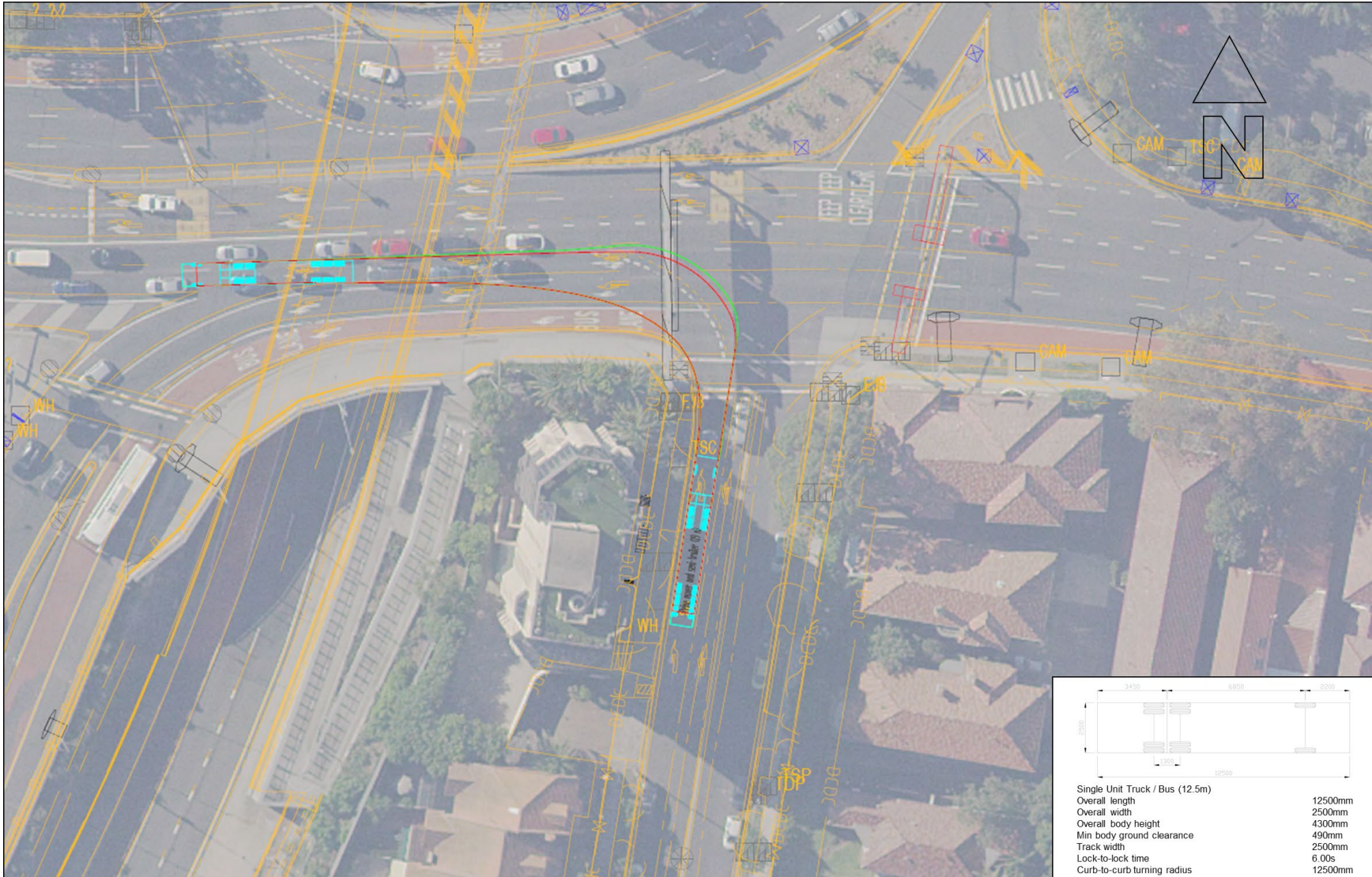












Single Unit Truck / Bus (12.5m)	
Overall length	12500mm
Overall width	2500mm
Overall body height	4300mm
Min body ground clearance	490mm
Track width	2500mm
Lock-to-lock time	6.00s
Curb-to-curb turning radius	12500mm

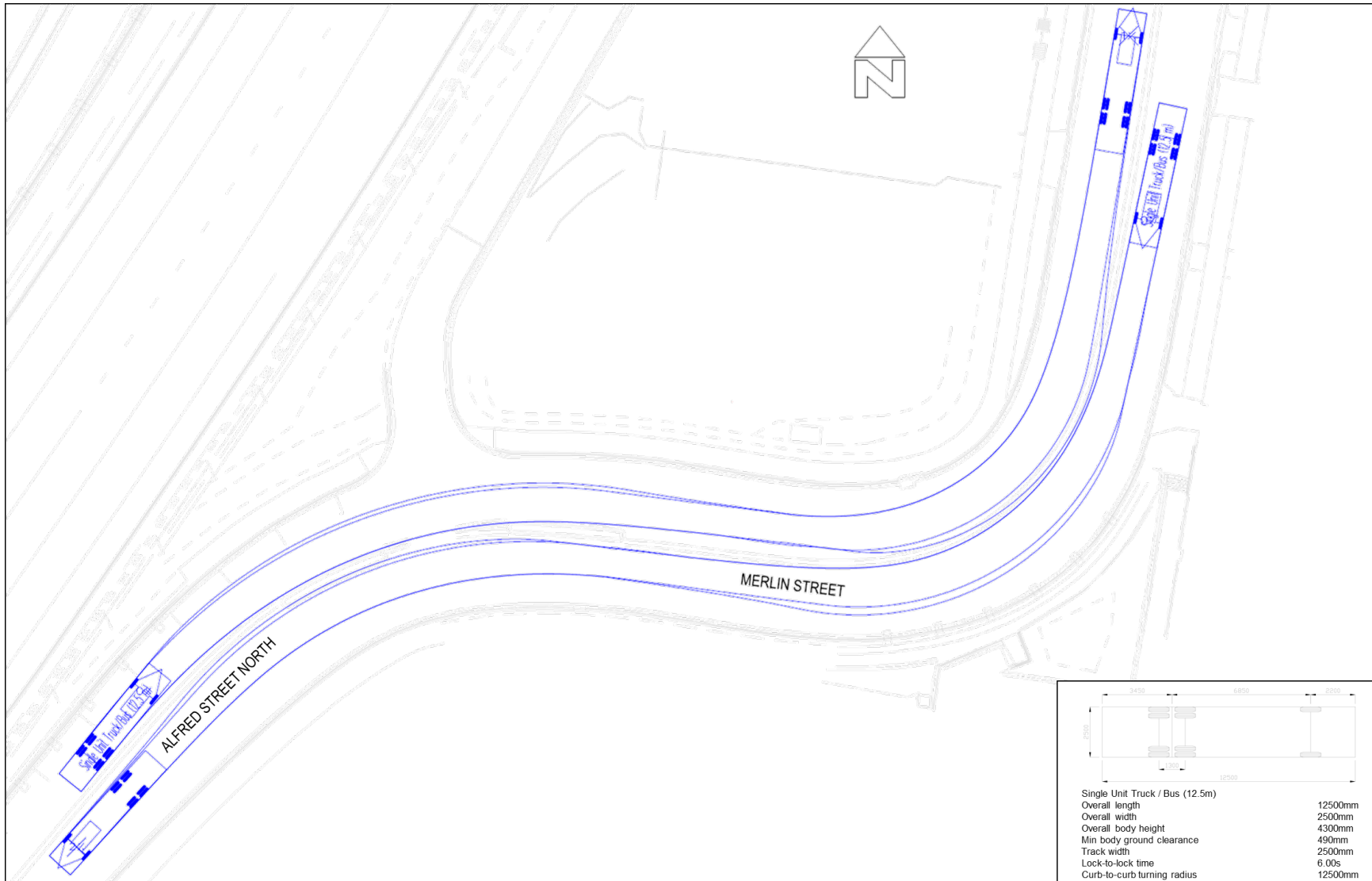


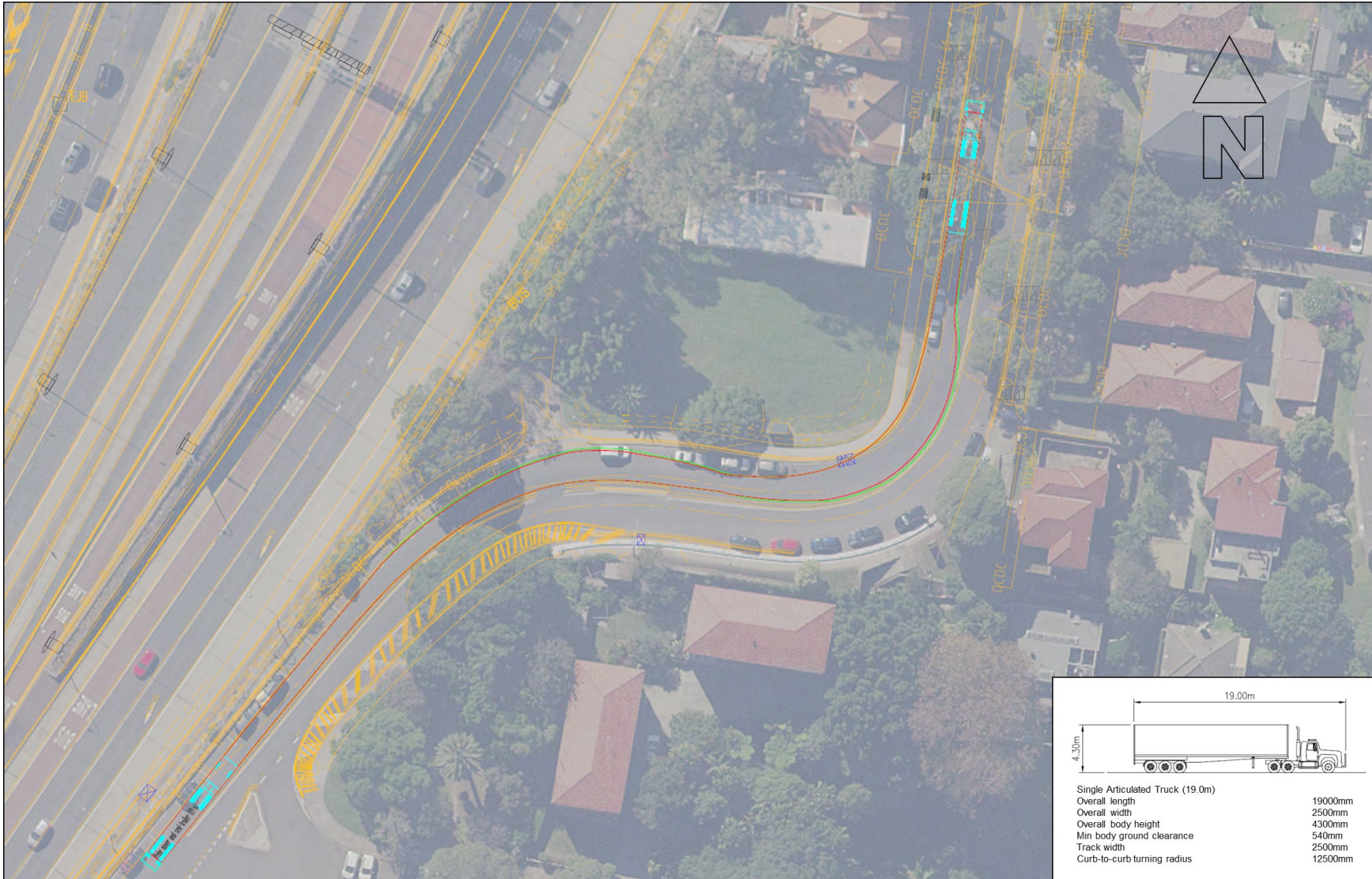
WESTERN HARBOUR TUNNEL AND WARRINGAH FREEWAY UPGRADE
STAGE 1A EARLY AND ENABLING WORKS - CRITICAL UTILITY INSTALLATION, RELOCATION AND PROTECTION WORKS

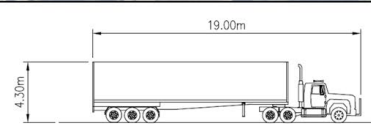
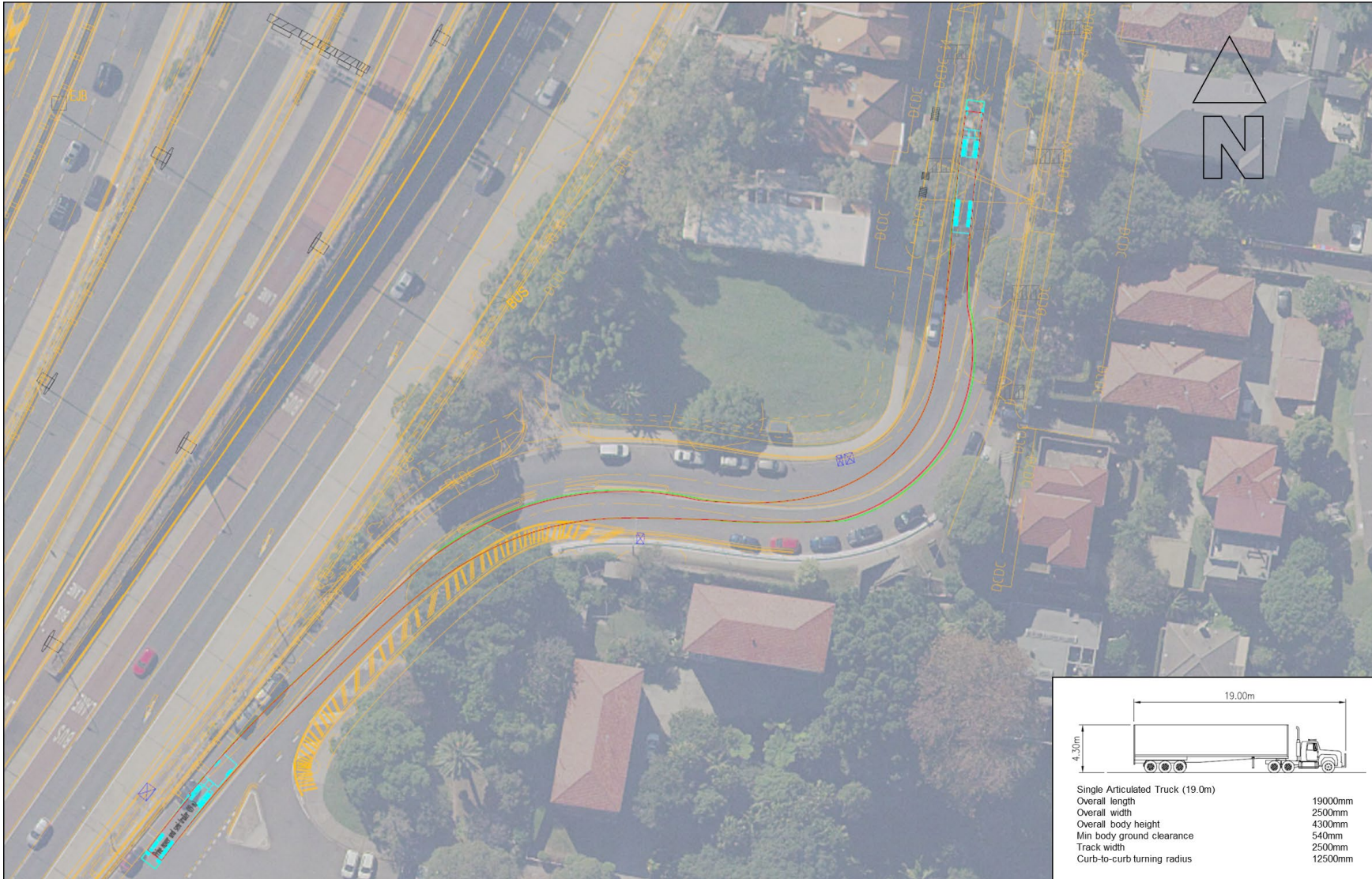
SWEPT PATH ANALYSIS – FALCON STREET AND MERLIN STREET
19m SEMI-TRAILER

DWG No. APPENDIX A-11B

DATE STAMP
13 JULY 2021







Single Articulated Truck (19.0m)	
Overall length	19000mm
Overall width	2500mm
Overall body height	4300mm
Min body ground clearance	540mm
Track width	2500mm
Curb-to-curb turning radius	12500mm

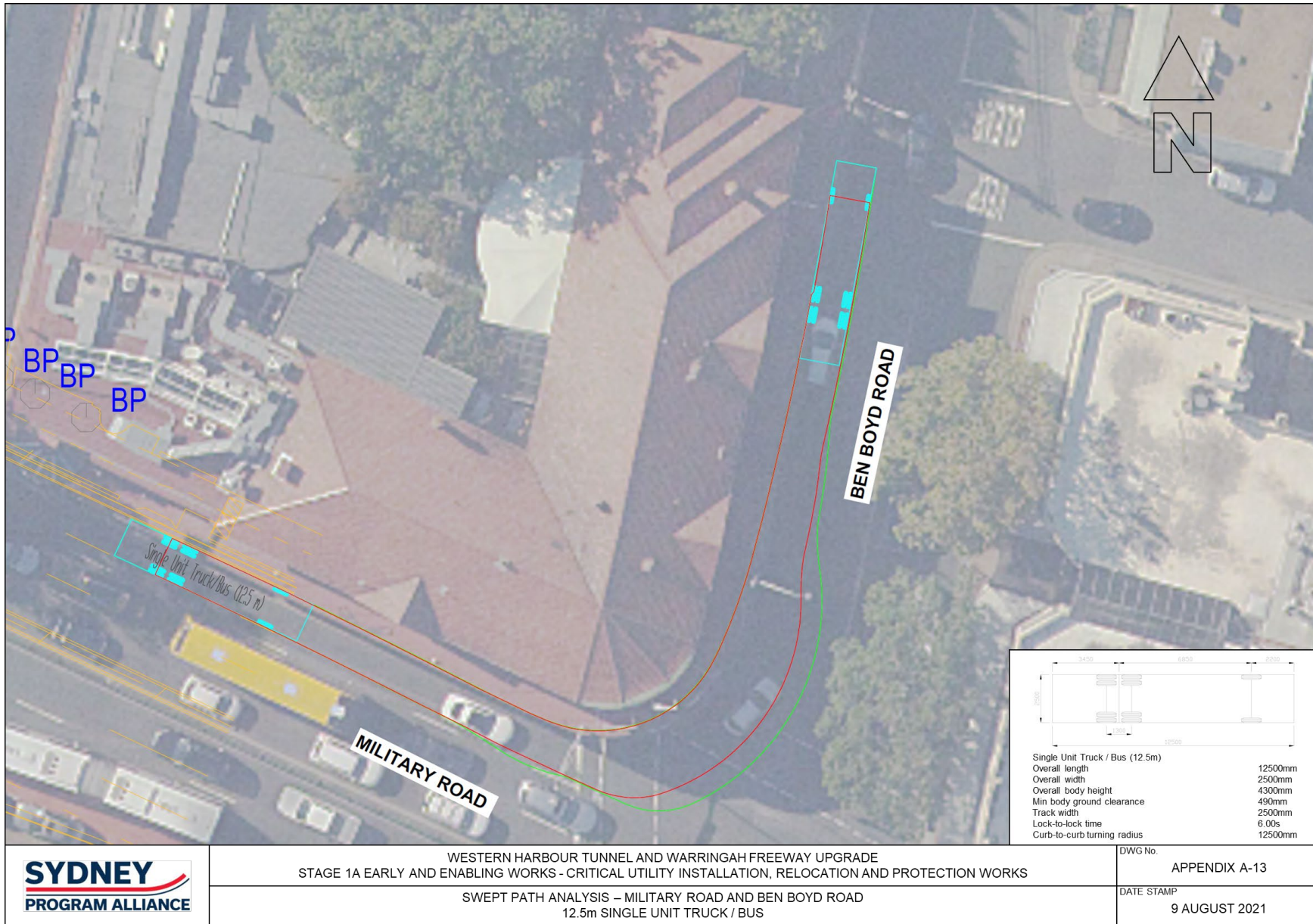


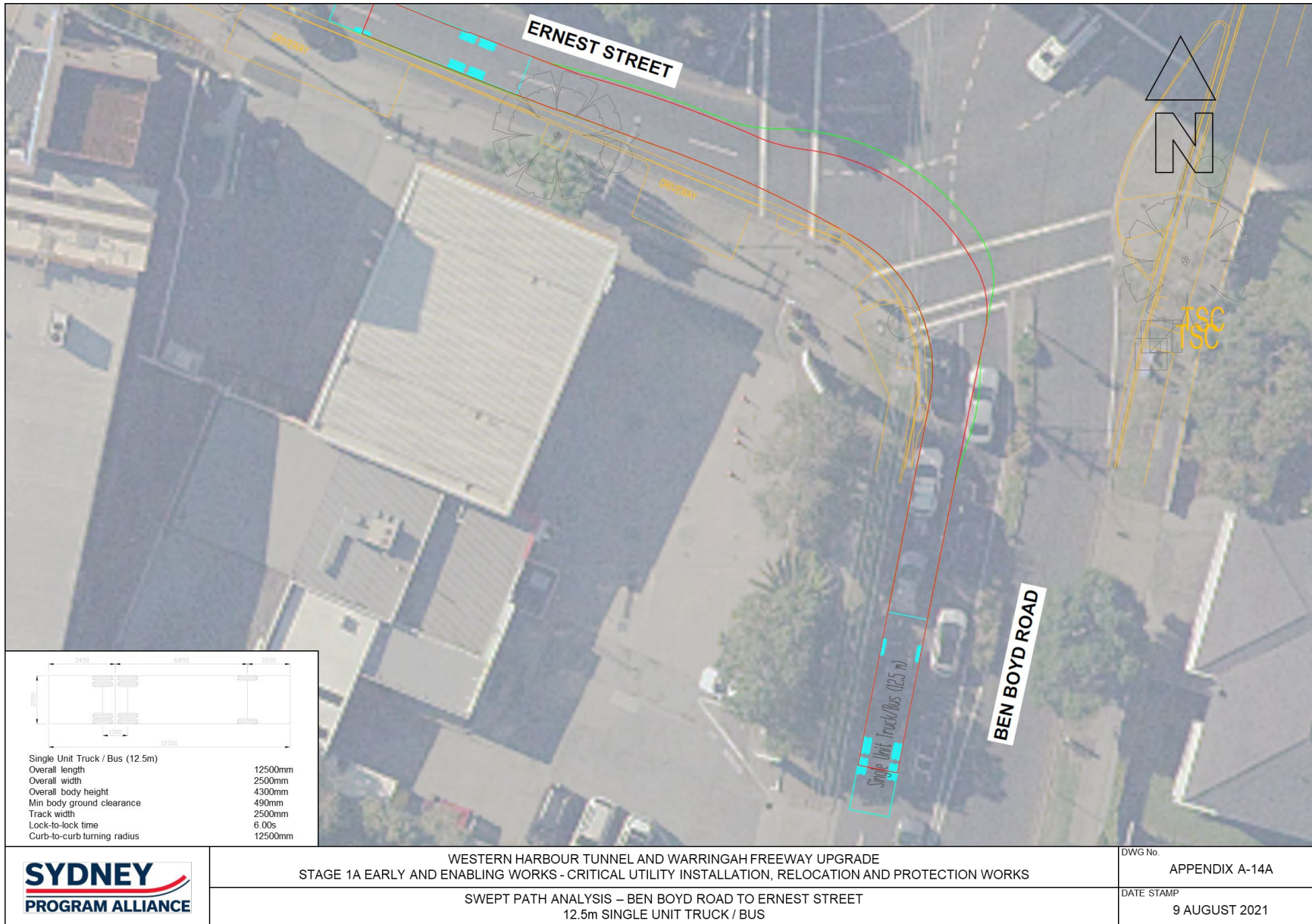
WESTERN HARBOUR TUNNEL AND WARRINGAH FREEWAY UPGRADE
STAGE 1A EARLY AND ENABLING WORKS - CRITICAL UTILITY INSTALLATION, RELOCATION AND PROTECTION WORKS

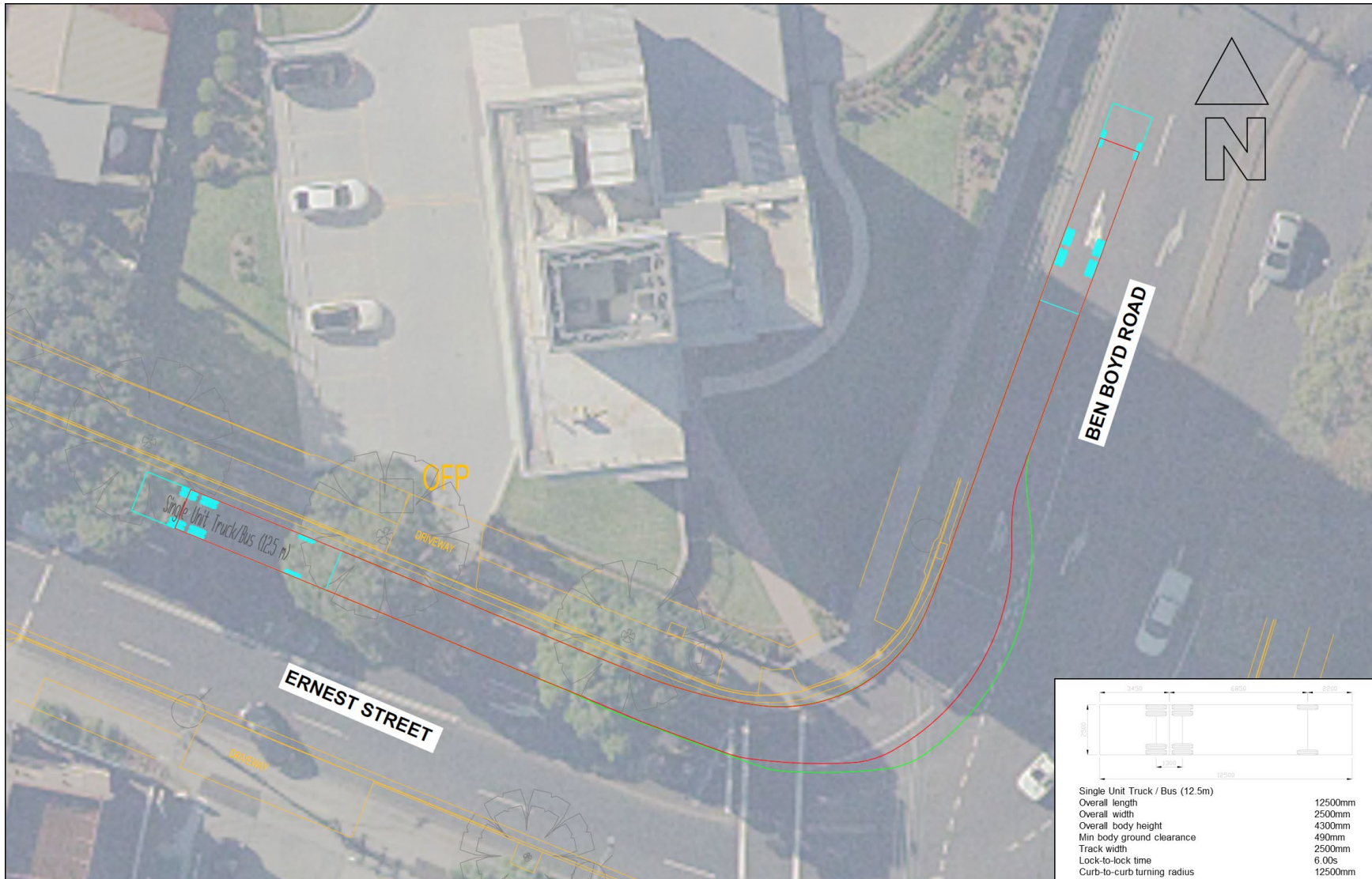
SWEPT PATH ANALYSIS – ALFRED STREET NORTH AND MERLIN STREET
19m SEMI-TRAILER

DWG No. APPENDIX A-12C

DATE STAMP
13 JULY 2021







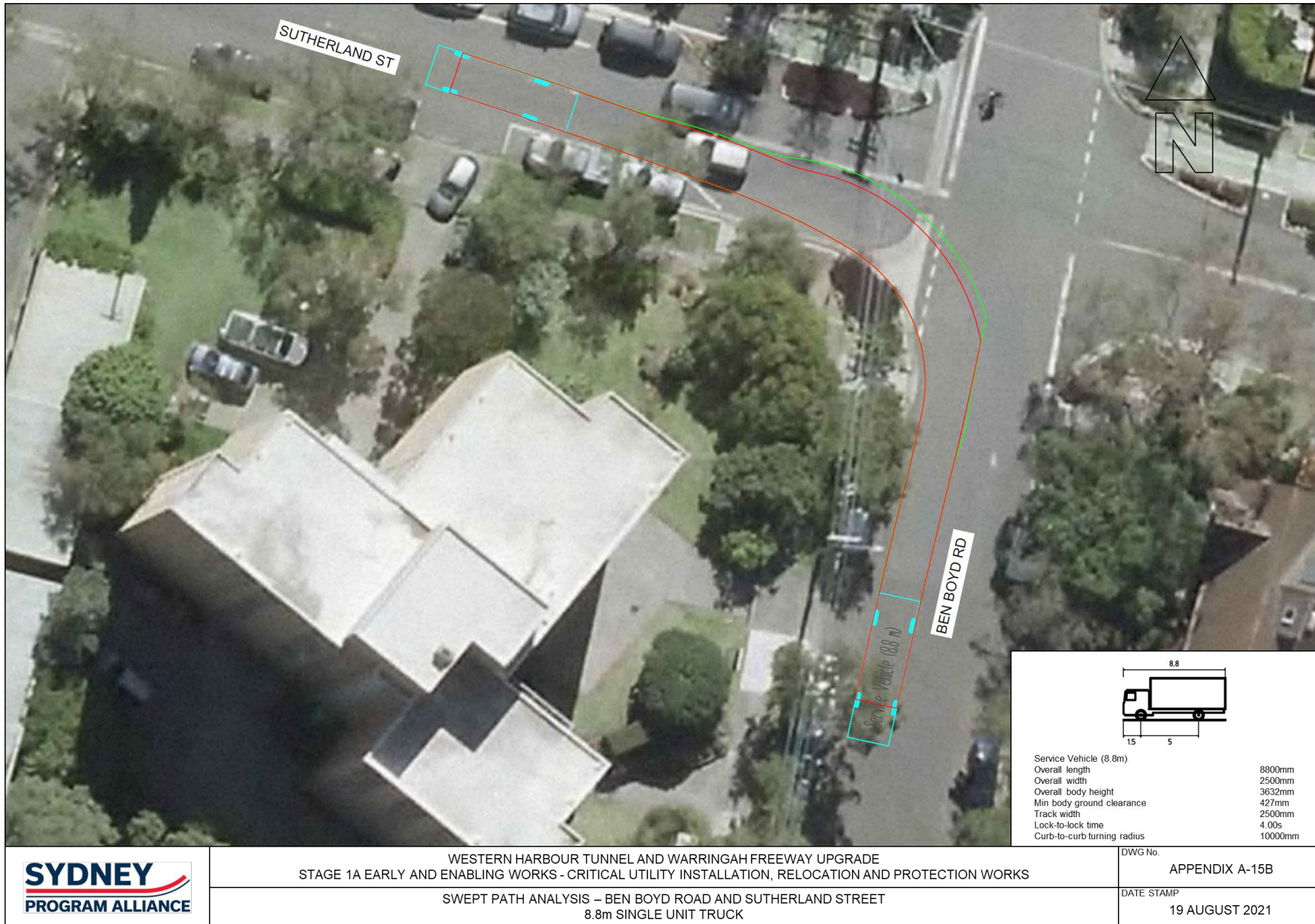


WESTERN HARBOUR TUNNEL AND WARRINGAH FREEWAY UPGRADE
STAGE 1A EARLY AND ENABLING WORKS - CRITICAL UTILITY INSTALLATION, RELOCATION AND PROTECTION WORKS

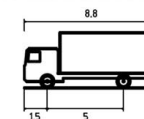
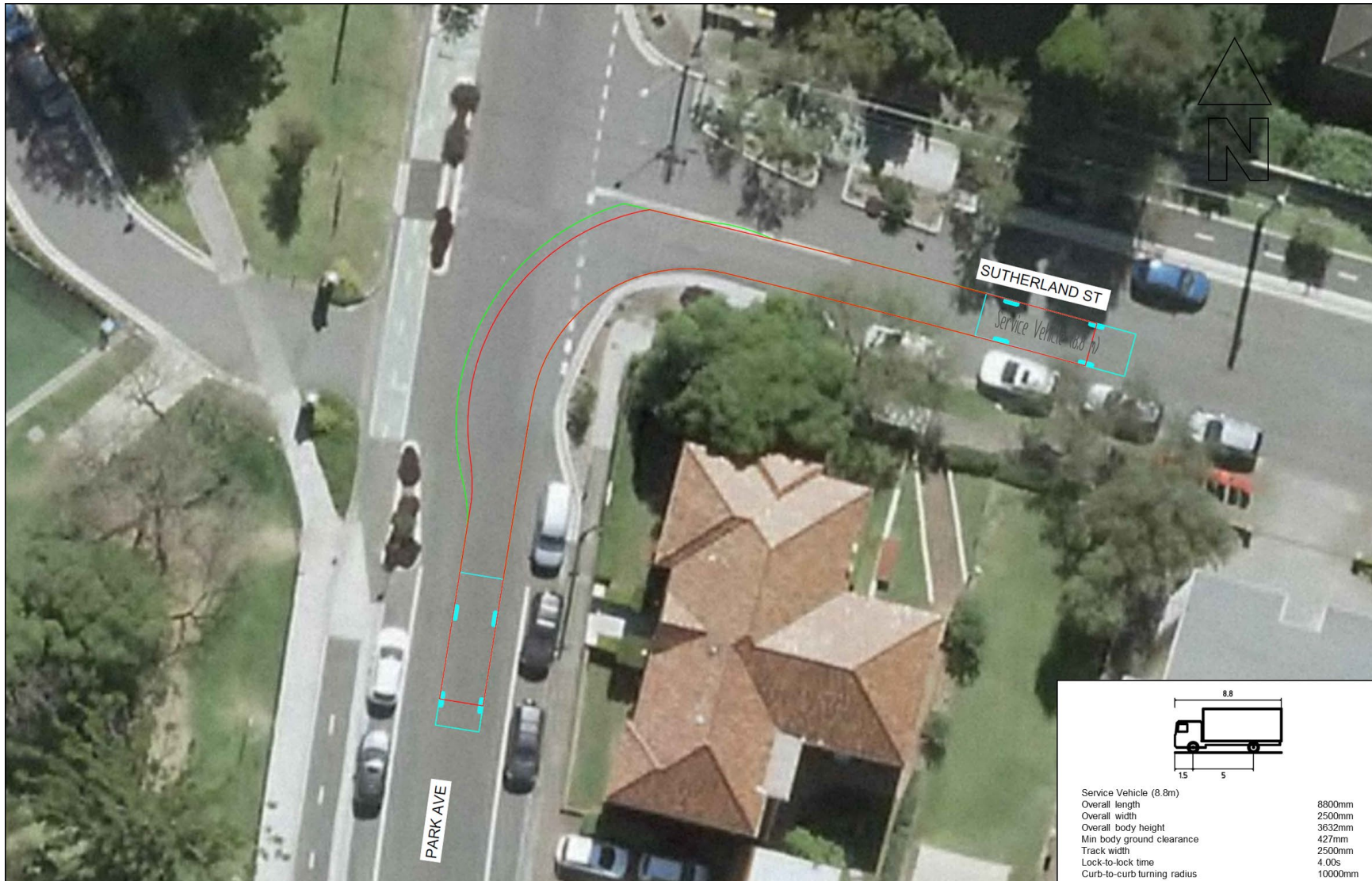
SWEPT PATH ANALYSIS – BEN BOYD ROAD AND SUTHERLAND STREET
12.5m SINGLE UNIT TRUCK / BUS

DWG No. APPENDIX A-15A

DATE STAMP
9 AUGUST 2021







Service Vehicle (8.8m)	
Overall length	8800mm
Overall width	2500mm
Overall body height	3632mm
Min body ground clearance	427mm
Track width	2500mm
Lock-to-lock time	4.00s
Curb-to-curb turning radius	10000mm



WESTERN HARBOUR TUNNEL AND WARRINGAH FREEWAY UPGRADE
STAGE 1A EARLY AND ENABLING WORKS - CRITICAL UTILITY INSTALLATION, RELOCATION AND PROTECTION WORKS

SWEPT PATH ANALYSIS - SUTHERLAND STREET AND PARK AVENUE
8.8 m SINGLE UNIT TRUCK

DWG No. APPENDIX A-16B

DATE STAMP
19 AUGUST 2021

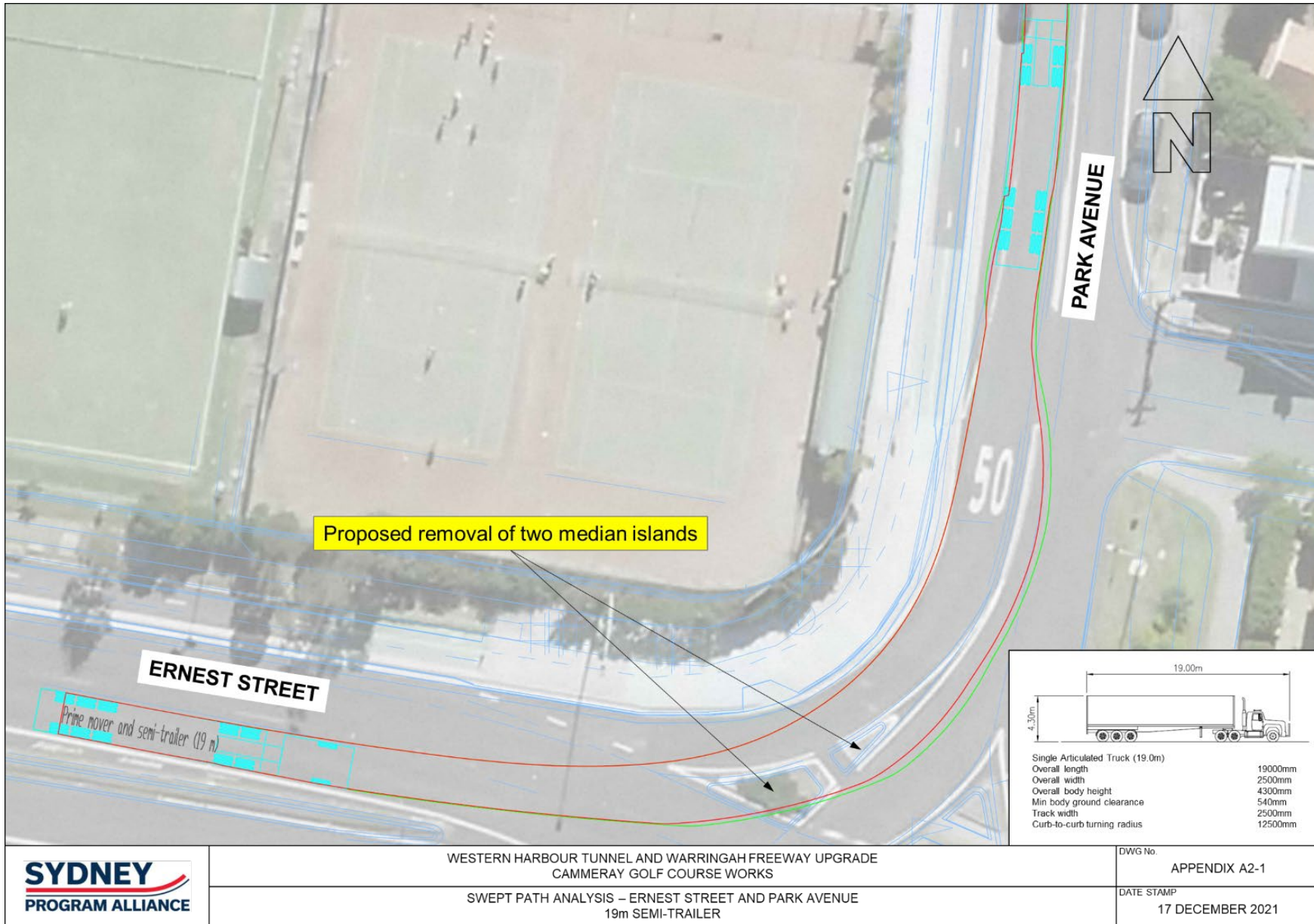


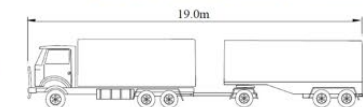
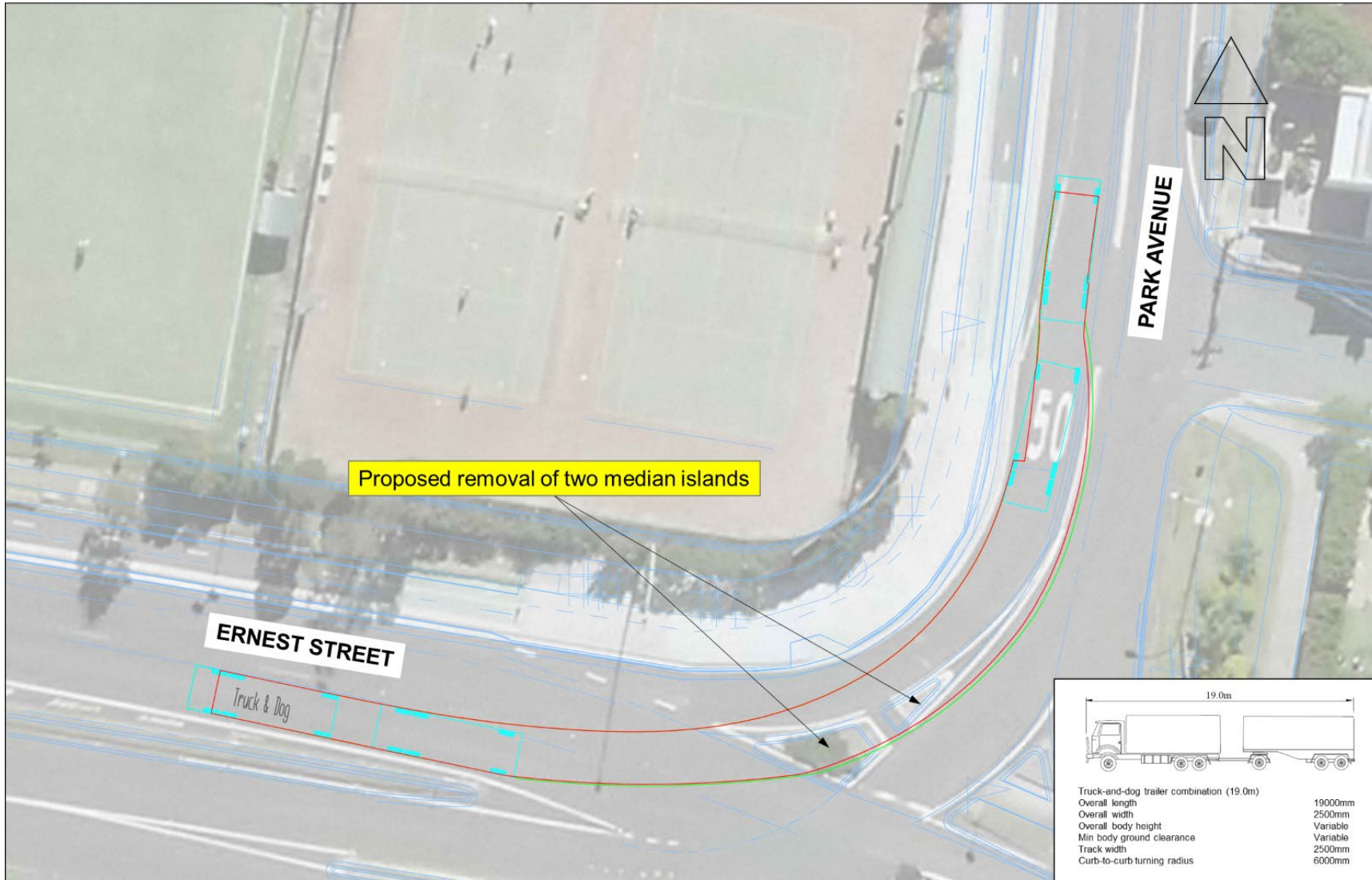
WESTERN HARBOUR TUNNEL AND WARRINGAH FREEWAY UPGRADE
STAGE 1A EARLY AND ENABLING WORKS - CRITICAL UTILITY INSTALLATION, RELOCATION AND PROTECTION WORKS

SWEPT PATH ANALYSIS – SUTHERLAND STREET AND PARK AVENUE
8.8 m SINGLE UNIT TRUCK

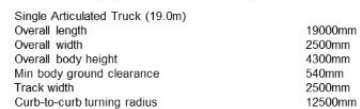
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DATE STAMP
19 AUGUST 2021



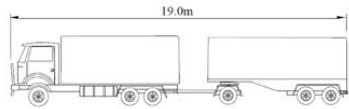


Truck-and-dog trailer combination (19.0m)	
Overall length	19000mm
Overall width	2500mm
Overall body height	Variable
Min body ground clearance	Variable
Track width	2500mm
Curb-to-curb turning radius	6000mm



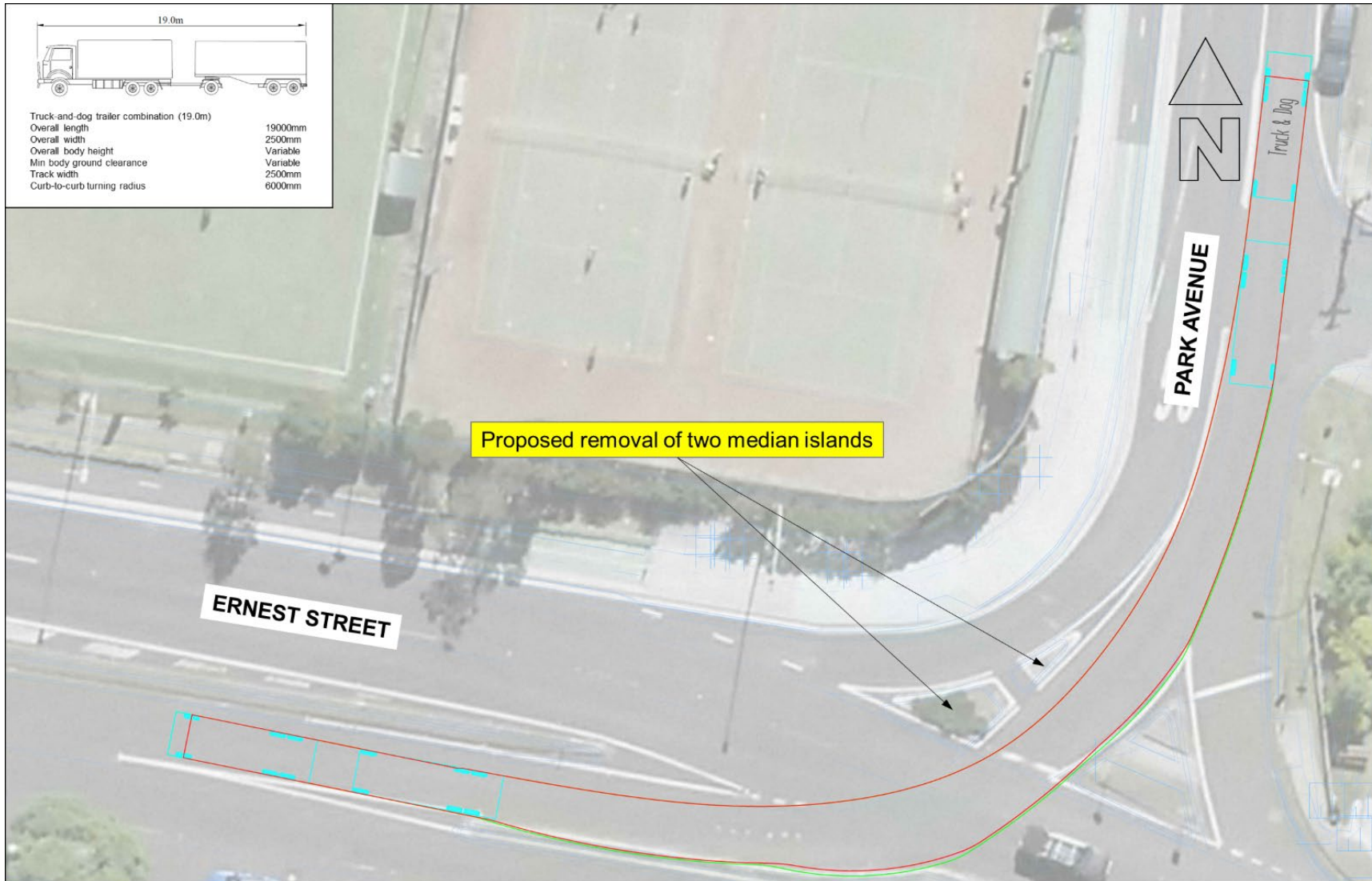
SWEPT PATH ANALYSIS – ERNEST STREET AND PARK AVENUE
19m SEMI-TRAILER

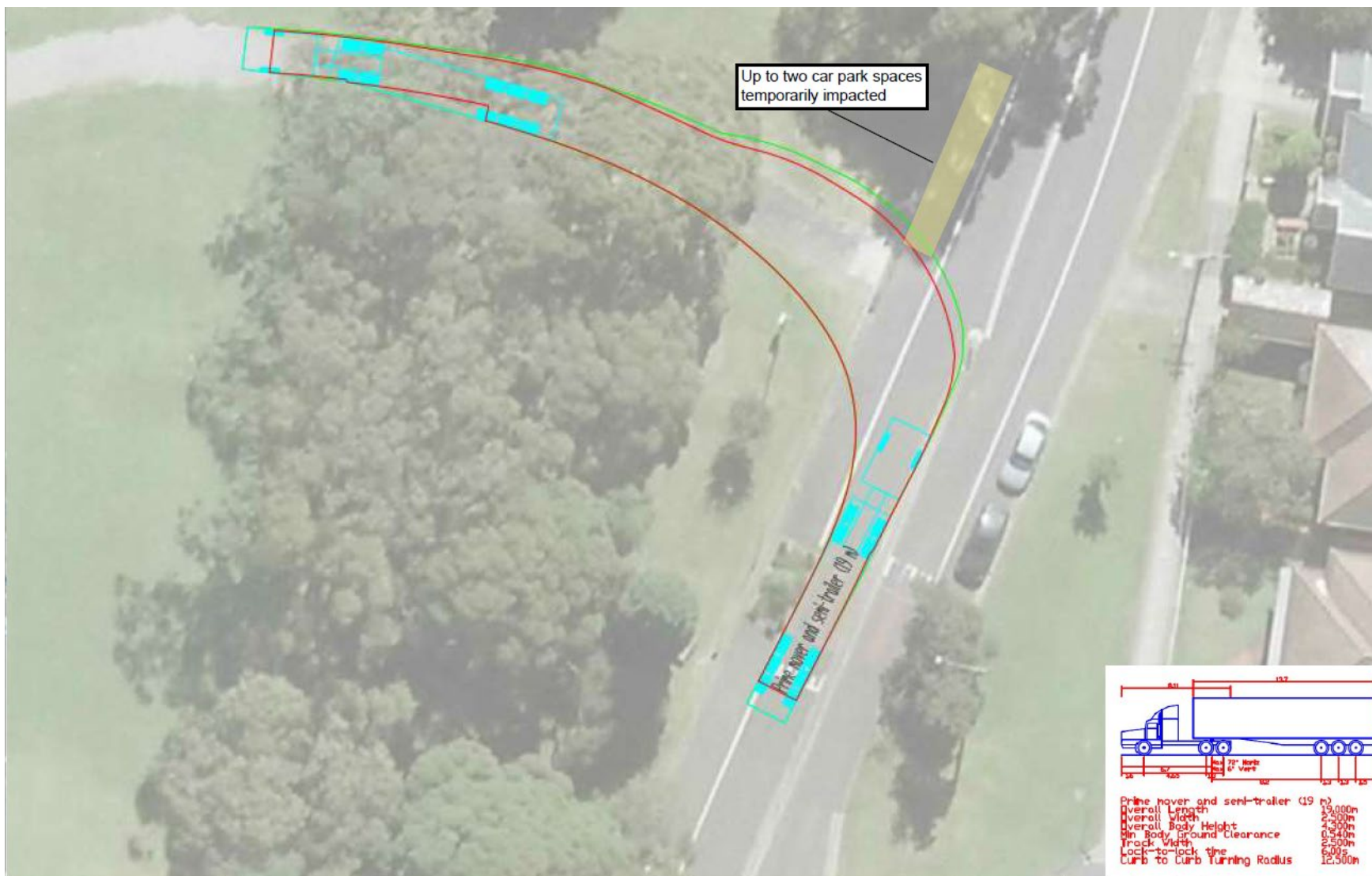
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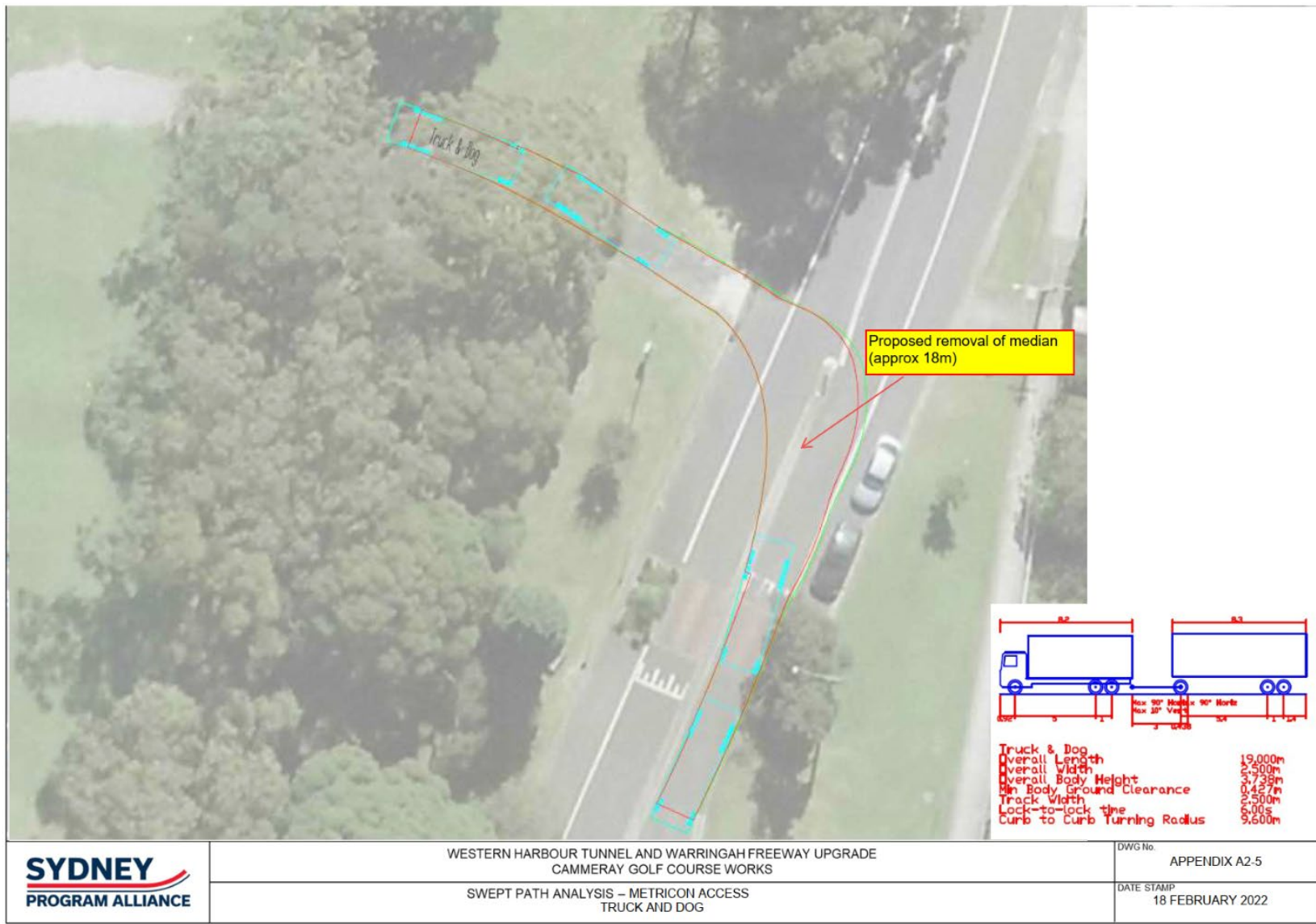


Truck-and-dog trailer combination (19.0m)

Overall length	19000mm
Overall width	2500mm
Overall body height	Variable
Min body ground clearance	Variable
Track width	2500mm
Curb-to-curb turning radius	6000mm

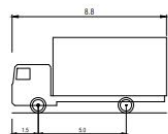






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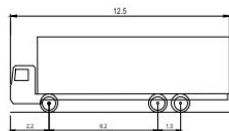
100mm ON A3 SIZE ORIGINAL



Service Vehicle (8.8 m)
Overall Length 8.800m
Overall Width 2.500m
Overall Body Height 2.300m
Mini Body Ground Clearance 0.427m
Track Width 2.500m
Lock-to-lock time 4.00s
Curb to Curb Turning Radius 12.500m


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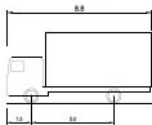
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Single Unit Truck/Bus (12.5 m)
Overall Length 12.500m
Overall Width 2.500m
Overall Body Height 4.300m
Min Body Ground Clearance 0.450m
Track Width 2.500m
Lock-to-lock time 6.700s
Curb to Curb Turning Radius 12.500m

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														ISSUE STATUS	
														SKETCH	
														SHEET NO:	
														ROD-003	
														REV	
														0	



Service Vehicle (8.8 m)
 Overall Length 8.800m
 Overall Width 2.500m
 Overall Body Height 4.500m
 Min Body Ground Clearance 0.427m
 Track Width 2.500m
 Lock-to-lock time 4.00s
 Curb to Curb Turning Radius 12.500m

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED FROM A PREVIOUS EDITION.

DRAWING FILE LOCATION NAME: C:\working\2020\000061\project\deliv\deliv_001\JAN2020\SP4-JGA-8T-ROD-WP15-0-002.DWG			PLOT DATE/TIME: 3/06/2022 2:53:31 PM			PLOT BY: ZHANGC2			CLIENT: CITY OF NORTH SYDNEY COUNCIL CAMMERAY GOLF CLUB ALTERATIONS CIVIL WORKS			A3
DESIGN MODEL FILED FOR DOCUMENTATION OF THIS DRAWING			DRAWINGS / DESIGN PREPARED BY			TITLE			SWEEP PATH ANALYSIS GOLF CLUB ACCESS ROAD - 8.8m LONG VEHICLE - RIGHT OUT			
REV	DATE	AMENDMENT / REVISION DESCRIPTION	APPROVAL	SCALE ON A3 SIZE DRAWING		DRAWN	DATE	NSW GOVERNMENT			PART	
01	23.05.2022	SKETCH	APPROVAL	SCALE 1:500		DESIGN CHECK	DATE	Transport for NSW				
				SCALE 1:500		DESIGN	DATE					
				SCALE 1:500		DESIGN CHECK	DATE					
				SCALE 1:500		DESIGN MARKER	DATE					
				SCALE 1:500		PROJECT MARKER	DATE					
COORDINATE SYSTEM: MGA ZONE 56			HEIGHT DATUM: AHD			SYDNEY PROGRAM ALLIANCE			PREPARED FOR: ENGINEERING SERVICES PROJECTS DELIVERY DESIGN WESTERN			
									FRAME REGISTRATION No: DS2020/000061			
									FRAME STATUS: SKETCH			
									SHEET No: ROD-005			REV: 0

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Appendix A3 The risk assessment system

Each identified hazard has been recorded and assessed in accordance with the Austroads *Guide to Road Safety Part 6: Managing Road Safety Audits* (Edition 1.0), 2019. The guide recommends a risk matrix be used to determine the level of risk associated with each hazard. This risk matrix is described below.

Estimated crash frequency: the probable frequency of an incident occurring as a direct result of the hazard was determined using the scale displayed in Table A2-4-1.

Table A2-4-1 Estimated crash frequency

Frequency	Description
Frequent	Once or more per week
Probable	Once or more per year (but less than once a week)
Occasional	Once every five or ten years
Improbable	Less often than once every ten years

Estimated crash severity: the likely severity of the incident which occurred as a direct result of the hazard was determined using the scale displayed in Table A2-4-2.

Table A2-4-2 Estimated crash severity

Severity	Description	Examples
Catastrophic	Likely multiple deaths	High-speed, multi-vehicle crash on freeway Car runs into crowded bus stop Bus and petrol tanker collide Collapse of a bridge or tunnel
Serious	Likely death or serious injury	High or medium-speed vehicle/vehicle collision High or medium-speed collision with a fixed roadside object Pedestrian or cyclist struck by a car
Minor	Likely minor injury	Some low-speed vehicle collisions Cyclists falls from bicycle at low speed Left-turn rear-end crash in a slip lane
Limited	Likely trivial injury or property damage only	Some low speed vehicle collisions Pedestrian walks into object (no head injury) Car reverses into post

Deemed level of risk: the risk matrix displayed in Table A2-4-3 was used to assess the level of risk for each hazard. The risk matrix uses the frequency / severity determined above to determine the likely level of risk for each hazard.

Table A2-4-3 Deemed level of risk

		Frequency			
		Frequent	Probable	Occasional	Improbable
Severity	Catastrophic	Intolerable	Intolerable	Intolerable	High
	Serious	Intolerable	Intolerable	High	Medium
	Minor	Intolerable	High	Medium	Low
	Limited	High	Medium	Low	Low

Appendix A4 Driver's Code of Conduct

Appendix A5 size

Heavy vehicle routes according to vehicle

