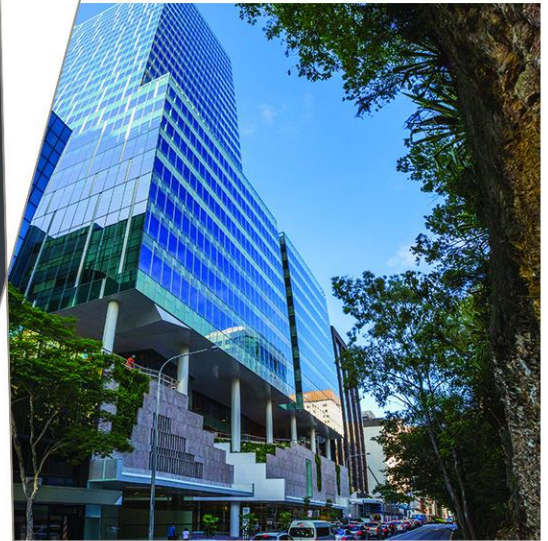


Central Precinct-Basin I

Construction Traffic Management Plan

89914020



Prepared for
Lend Lease

26 November 2019

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1 Introduction

Cardno has been commissioned by Lend Lease to prepare a Construction Traffic Management Plan (CTMP) to support the construction of the regional Basin I located within the Central Precinct. Central Precinct forms part of the broader St Marys development site and is located within Penrith Local Government Area (LGA).

The St Marys Development has an approximate area of 1,545 hectares and is located across Blacktown and Penrith City Council LGAs. It is bounded by Forrester Road and Palmyra Avenue in the east, The Northern Road in the west, Ninth Avenue and Palmyra Avenue in the north and the Dunheved Industrial Area, Dunheved Golf Club and the suburbs of Cambridge Gardens, Werrington Gardens and Werrington County in the south.

1.1 Scope of Works

- > Review background information in relation to proposed works and proposed objectives.
- > Undertake a desktop study to review the proposed haulage routes for fill importation. Consideration will be given to existing land uses, traffic volumes and road network characteristics of the proposed route.
- > Identify the construction time span, hours of operation and the capacity of each truck in order to calculate the number of truck movements added to the external road network.
- > A qualitative assessment of the anticipated traffic impacts arising from the construction vehicles at the key intersections;
- > Assess the requirements / suitability of the access arrangement, as per the AustRoads Guidelines.
- > Provide a sight distance assessment as outlined in AustRoads Guidelines.
- > Provide a concept signage plan for necessary signage items at the proposed new access.
- > Assess the suitability of the proposed temporary truck parking provisions based on empirical information available.
- > Following the assessment of the traffic impacts on the surrounding road network as a result of the proposed bulk earthworks, discuss and propose suitable safeguards and mitigation measures to manage/minimise the temporary impact of the works.

1.2 Purpose of this report

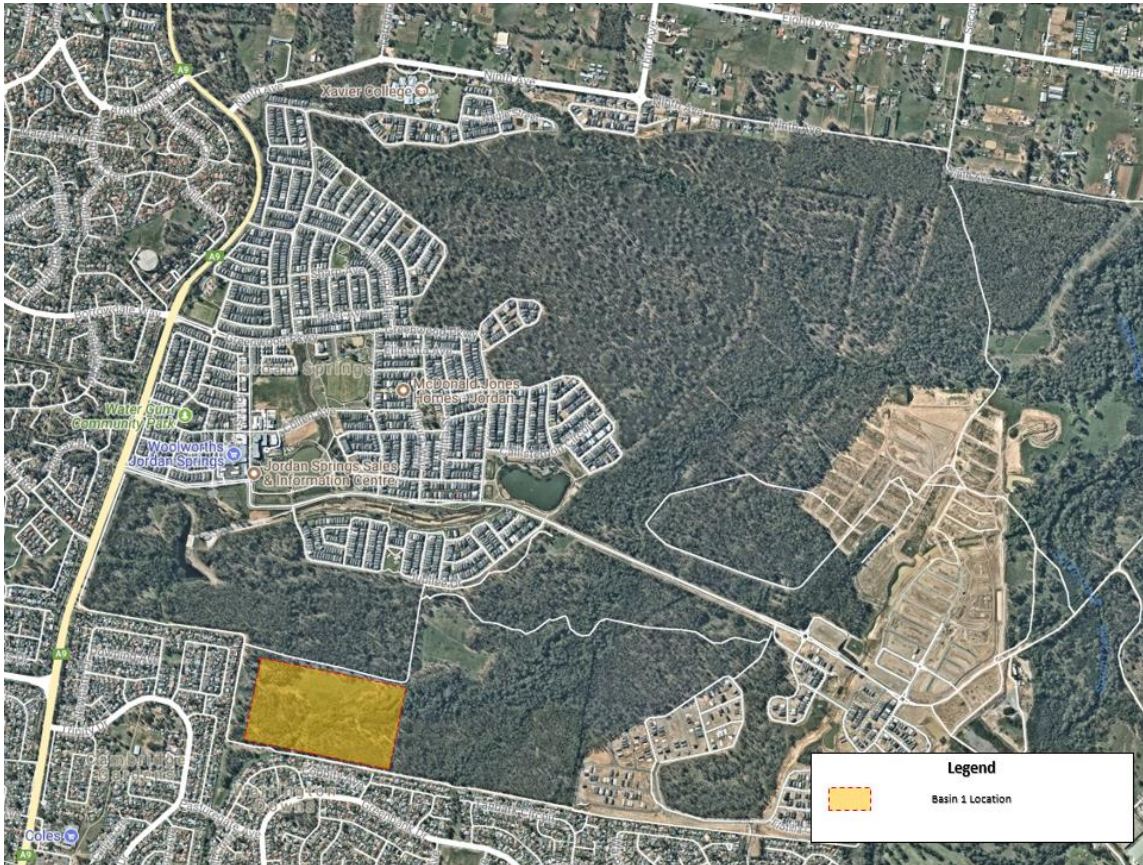
This CTMP has been prepared to address construction vehicle routes, construction vehicle traffic generation, operating hours and access arrangements for works directly associated with the proposed development. The objectives of this report is to:

- > Provide a detailed description of the project
- > Examine and consider the proposed construction activities likely impacts to the existing road network
- > Provide mitigation measures to address identified impacts.

2 Existing Situation

2.1 Site Location

The subject site which is part of the Central Precinct, is located within the St Marys Development Site and is bounded by the Northern Road in the west, Jordan Springs Boulevard and Jubilee Drive in the north. The subject site area and road network is shown in **Figure 2-1** below.



Source: Nearmaps

Figure 2-1 Site Location

2.2 Existing Road Network

Roads are usually classified under two road classification systems. One is the Roads Maritime Services (RMS) administration classification system and the other is the road hierarchy classification system. RMS classifies roads as State Roads, Regional Roads or Local Roads. The road hierarchy system classifies roads as Arterial, Sub-arterial, Collector or Local roads.

A State Road, as classified by RMS is wholly under care and control of RMS. Regional Roads are under the care and control of Council but may receive maintenance funding from RMS. Local Roads are wholly under the care and control of the Council.

Roads are classified under the road hierarchy based on their functional role within the road network and are used to determine the design standards for the road and access to the road from adjacent properties along the road.

The key road network in the vicinity of the subject site consists of:

- > The Northern Road
- > Lakeside Parade
- > Jubilee Drive

2.2.1 The Northern Road

The Northern Road is a State Road under the authority of RMS, which connects to Trinity Drive to the south and Jordan Springs Boulevard to the north. The Northern Road is a four-way road with generally two lanes in each direction. On-street parking is not permitted on both sides of the road. A posted speed limit of 80 km/h applies to The Northern Road.

2.2.2 Lakeside Parade

The Lakeside Parade is a local road under the authority of Council, which connects the Jordan Springs development to the Northern Road. It is a two-way road with generally one lane in each direction. On-street parking is generally permitted on both sides of the road. The road has a speed limit of 50 km/h.

2.2.3 Jubilee Drive

Jubilee Drive is a local, unclassified road under the care and maintenance of local council. This road runs along the northern side of the subject site, intersecting with Lakeside Parade (sign controlled). Jubilee Drive is generally configured with a two lane undivided carriageway (Single lane in each direction). Unrestricted kerbside parking is generally available along both sides of the road. The road has a speed limit of 50 km/h.

2.2.4 Northern Road / Haul Road 001

The proposed intersection of the haul road 001 with Northern Road is to be under a priority controlled intersection as shown in **Figure 2-2**. The access will be restricted to left in / left out only.

The temporary intersection will be designed to accommodate the swept path of the largest vehicle expected to turn into / out of the site, i.e. a 19m truck and dog trailer combination. The suitability of the nominated intersection location is discussed further in **Section 7**.



Figure 2-2 Approximate location of Northern Road/ Site Access Intersection

2.2.5 Jubilee Drive / Haul Road 002

The proposed intersection of the haul road 002 with Jubilee Drive is to be under a priority controlled intersection as shown in **Figure 2-2**. The driveway access will permit all movements, however it is envisaged that majority of vehicles will turn right in and left out towards Lakeside Parade.

The temporary intersection will be designed to accommodate small truck (SRV) access only to turn into / out of the site. HRV movement should not be allowed to enter into the site, as the internal roads surrounding the intersection are not designed to cater for large vehicle trucks. The suitability of the nominated intersection location is discussed further in **Section 7**.



Figure 2-3 Approximate location of Northern Road/ proposed Site Access Intersection (not to scale)

2.2.6 Approves Routes for Heavy vehicles – B-Doubles and high Clearance Vehicles

The NSW Roads and Maritime Services (RMS) have designated approved routes (or otherwise conditional routes) for B-Doubles (over 50 tonnes) and vehicles requiring bridge / underpass clearance greater than 4.6m. These designated routes are presented in **Figure 2-3** (in green colour).

There are generally no restrictions within the western/north-western region of Sydney, with major routes (such as Great Western Highway, Mamre Road, Glossop Street and Forrester Road) being available for use by B-Doubles and High Clearance Vehicles. As such, both B-Doubles and semi-trailers greater than 19m have unrestricted access to the site via these routes.

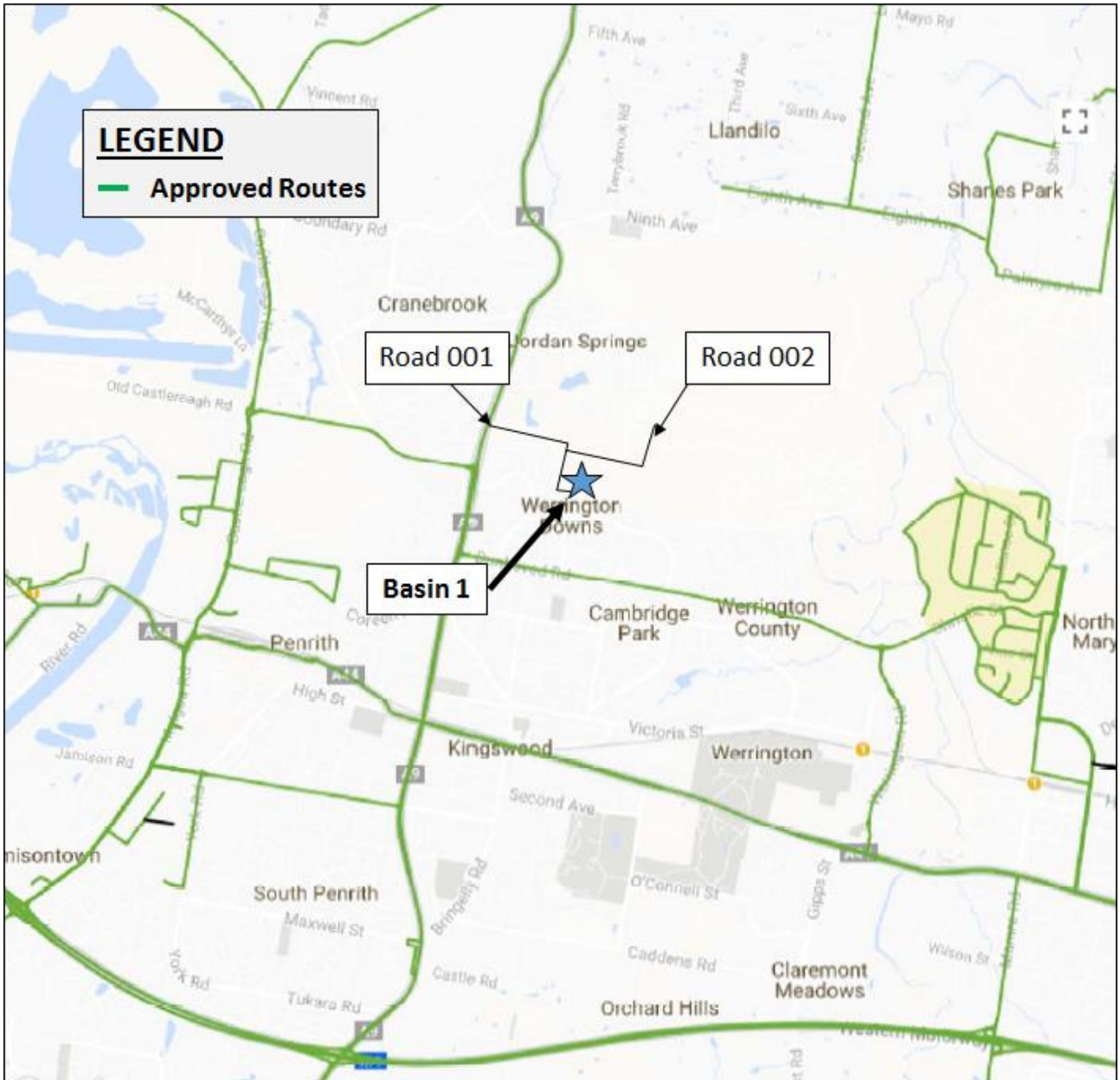


Figure 2-4 Approved Routes for Heavy Vehicles (RMS Designated 19m B-Doubles and High Clearance Vehicle Routes)

Source: Roads and Maritime Services

3 Proposed Works

3.1 General

Based on the information provided by Lend Lease, Basin I requires approximately 2,000 m³ of rock and approximately 3,600 m³ of topsoil to be imported to site. In addition, approximately 140,000 m³ of bulk excavation to be removed from site. As such, the majority of truck movements will be associated with the export of 140,000 m³ of fill material from the Basin I works area. In addition, there will be some additional vehicle movements such as floating of mobile plant, maintenance vehicles, etc., even though these movements are not expected to be significant.

3.2 Fill Program

Material to be removed from site will either be stockpiled within Central Precinct or removed to a fill located off site. Rock would be source from a local quarry and topsoil will be sourced from existing stockpiles on site.

Based on the preliminary construction program and methodology provided to Cardno the total number of construction days for Basin I will be 74 working days assuming 30% bulking factor and another 1 month for the import of the remainder of the material.

3.3 Construction Vehicles

The main type of construction vehicle that is anticipated to access the site is Truck & Dog trailers, which are 19 metres in length. In addition, excavators will be operating on site as well as scrapers, compacters, bulldozers etc. Other miscellaneous site vehicles will also be utilised.

3.4 Proposed Hours of Operation

The proposed hours of operation for the Bulk Earthworks stage are as follows:

- > 7am to 5pm Monday to Friday

3.5 Proposed Access and internal Road Transport Measures

The contractor shall be responsible for the establishment of proposed haulage routes internal to the site. Notwithstanding, the following guidelines are recommended:

Road 001

- > One (1) temporary construction access point shall be provided off Northern Road. All construction vehicles will enter and egress the site at this location;
- > The internal roads shall be of sufficient width to accommodate two-way truck movements;
- > A waiting and turning area designed to accommodate 19m Truck & Dog trailer vehicles shall be provided at a suitable location within the site based on construction sequencing and stockpile locations; and
- > Vehicles remaining on site, including earth moving equipment, will be required to observe the internal speed restriction of 20km/h.

Road 002

- > One (1) temporary construction access point shall be provided off Jubilee Drive. Only SRV vehicles will enter and egress the site at this location
- > The internal roads shall be of sufficient width to accommodate two-way truck movements;
- > A waiting and turning area designed to accommodate small truck (SRV) shall be provided at a suitable location within the site based on construction sequencing and stockpile locations; and
- > Vehicles remaining on site, including earth moving equipment, will be required to observe the internal speed restriction of 20km/h.

The access arrangements proposed for the site are priority controlled arrangement off Northern Road and Jubilee Drive as indicatively illustrated in **Figure 2-2 and Figure 2-3**.

3.6 Construction Vehicle Parking and Layover Areas

In the event that there are delays at the construction site and the works are unable to continue accepting construction vehicles, it is desirable to identify an area where heavy vehicles may park within the site. As such, a truck layover and parking area to accommodate general construction heavy vehicles and light vehicles shall be nominated and constructed as a hardstand area within the site.

4 Traffic Generation and Traffic Impact

4.1 Heavy Vehicle Routes

Heavy vehicle routes have been considered within 5-10 kilometres of the site, connecting to major highway, road and arterial routes, e.g. Great Western Highway and the Northern Road.

The routes have been identified and are nominated under the sub-headings below.

> Option 1



> Option 2



> Option 3



As outlined in the figures above, the fill importation trucks will utilise the following routes to reach the site access point on Route 1:

- > Trucks to / from the north will use Northern Road or will enter the site via Jordan Springs
- > Trucks to / from the south west will use the St Mary's development site by via Great Western Highway via Werrington Road via Dunheved Road via Forrester road via links road via Lakeside Parade.
- > Trucks to / from the south will use Northern Road via M4 Western Motorway

It is noted that the heavy vehicle routes have been proposed to be consistent with the RMS designated B-Double routes (see **Figure 2-3**) in order to minimise any potential impacts. The exception is the Jordan Spring precinct (as identified in option 2) and south east routes (as identified in Option 3) where it is necessary to use in order to access the site via Forrester Road, Links Road and Lakeside Road.

4.2 Traffic Generation

The traffic generation associated with material importation and bulk excavation activities were calculated using the conservative assumptions outlined in Table 4-1 and Table 4-2 below.

Table 4-1 Traffic Generation Assumption – Amount of Excavation

Item	Quantity	Comments
Amount of bulk excavation to be removed from site	140,000	Cubic metres
Capacity of each truck	19	Cubic metres. It is noted that a typical Truck and Dog trailer vehicle can carry up to 19 cubic metres of material
Total days of operation	74	Working days
Total working hours per day	10	Working Hours
Bulk excavation trucks exiting the site per hour	10	
General operational (other than fill) trucks entering the site per hour	3	Assumed Heavy/ medium Rigid vehicle movements other than Truck and Dog trailers vehicle
Total bulk excavation trucks exiting site per hour	13	
Total bulk truck movements (in and out) per hour	26	In and out of the site.

Table 4-2 Traffic Generation Assumption – Amount of Fill

Item	Quantity	Comments
Amount of fill anticipated to be imported during the fill importation period	5600	Cubic metres
Capacity of each truck	19	Cubic metres. It is noted that a typical Truck and Dog trailer vehicle can carry up to 19 cubic metres of material
Total days of operation for fill importation	22	5 working days a week for one month period has been assumed
Total working hours per day	10	Working Hours
Fill importation trucks entering the site per hour	1	
Total fill importation truck movements (in and out) per hour	2	In and out of the site.

As outlined in the tables above, it is evident that approximately 26 truck movements per hour will be generated by the bulk excavation and approximately 2 truck movements per hour will be generated by the fill importation and general construction activities on the site during the approximately four months excavation/fill period.

These levels of truck movements are anticipated to spread out uniformly across the construction period of Basin I. As such, these low level truck movements are not considered to have a significant adverse impact on the existing road network traffic operations.

5 Drivers Code of Conduct

Management of vehicular access to and from the site is essential to maintain the safety of the general public as well as the labour force. The following code is recommended as a preliminary measure to inform safety standards:

- > Utilisation of only the designated transport routes
- > Haulage / Construction vehicle movements are to abide by the schedules agreed with the Council and RMS; and
- > Site parking guidelines shall be developed by the contractor as part of the final Construction Traffic Management Plan to ensure that construction traffic parks only in appropriate and designated locations.

5.1 Noise Minimisation Controls

This section discusses the noise mitigation measures which should be adhered to as follows:

5.1.1 Compression Braking Noise

Compression braking can be extremely noisy and impacts on residential amenity. Compression braking should be minimised in residential areas (such as Werrington Road, Jubilee Drive) and avoided completely in built up areas.

5.1.2 Speed

In general, the speed limit on Northern Road is 70 km/hr. As such, no reduction in speed limit is proposed along the stretch of Northern Road that lies at the frontage of the haul road access point.

Road 001 is understood to be a private road which is gated off for public access. As such, it is unlikely to generate high volumes of through traffic. As per the above, a speed limit reduction is not proposed for this road.

5.2 Delivery Standards

Road delivery standards in relation to delivery to the site will be discussed in this section as follows. It is noted that the entirety of the proposed route travelled by haulage / operational vehicles are on arterial / B-Double approved routes.

5.2.1 Queuing

While no overflow is anticipated, vehicles arriving at the site are not permitted to park / queue on Jubilee Drive and Northern Road.

5.2.2 Braking

Brakes are to be applied in a way that excessive noise (such as from compression braking) is avoided, so as not to negatively affect residential amenity.

5.2.3 Covering of Loads

All trucks delivering to the site are required to have an effective load covering.

5.2.4 Truck Wash

All trucks are to utilise the shake down / wash areas before leaving the site.

6 Mitigation of Traffic Impacts

The contractor will be required to prepare a Traffic Management Plan (TMP) prior to the commencement of works. Traffic will generally be managed at the site in the following way:

- > Designated transport routes shall be communicated to all personnel;
- > Utilising Werrington Road as an alternate route from the M4 Motorway to the Great Western Highway in instances where Northern Road becomes significantly congested; and
- > Scheduling of vehicle movements should occur in order to minimise vehicles waiting off the site.

The following issues will be considered in more detail in the completed Traffic Management Plan:

- > Traffic/Parking Impact; and
- > Construction Traffic Management, Signage and Devices.

7 Northern Road / Haul Road Intersection

This section will investigate the suitability of the proposed Northern Road / haul road intersection location. As a part of this investigation, consideration has been given to the sight distance and signage requirements at the proposed Northern Road / Haul road intersection.

7.1 Sight Distance Assessment

It is understood that access to the haul road construction area will be obtained via the proposed future haul road/Northern Road intersection. As such, the Safe Intersection Sight Distance (SISD) was assessed for the proposed intersection of haul road with Northern Road based on the guidelines provided in Austroads Guidelines: Guide to Road Design Part 4A - Unsignalised and Signalised Intersections (2009).

The SISD determines the minimum distance which should be provided on a major road at any intersection and is dependent on a number of factors including the major road speed limit and type of vehicle travelling on the road.

The following figure outlines the formula used to obtain the SISD value for the subject intersection.

Figure 7-1 The SISD Formula

$$SISD = \frac{D_T \times V}{3.6} + \frac{V^2}{254 \times (d + 0.01 \times a)}$$

Source: Austroads Guide to Road Design: Part 4A – Unsignalised and signalised Intersections

The above formula was used to determine the SISD required for a heavy vehicle, which is exiting the haul road onto Northern Road, to obtain safe sight distance during the peak hours. In addition, the general minimum reaction time of 2 seconds was adopted for the drivers of the heavy vehicles.

The following table outlines the values used in the formula presented in **Figure 8-1** above, in order to determine the SISD for the subject intersection.

Table 7-1 Values Used in SISD Calculation

Coefficient	Description	Value Used
D _T	Decision Time (seconds) = Observation Time + Reaction Time	The Decision Time was established to be 5 seconds using an Observation Time of 3 seconds and a Reaction Time of 2 seconds.
V	Operating Speed (km/hr)	70 km/hr – The posted speed limit on Northern Road.
d	Coefficient of deceleration	0.24 (as recommended in Table 3.3 in AustRoads Guide Part 4A)
a	Longitudinal Grade in %	0% grade as the terrain is generally flat.

Using the above values, a SISD of 177.6 metres was calculated for the subject intersection. Investigation of the surrounding areas of the proposed Haul road 001 / Northern Road intersection indicates that there is sufficient clearance to accommodate the 177.6 metre sight distance.

The **Figure 7.2** outlines the SISD sight Triangle which represents the area to be clear of any permanent visual obstructions so that a driver exiting the haul road onto the Northern Road can obtain sufficient sight distance during construction period.

Figure 7-2 Sight Triangle for Trucks Exiting the Haul Road



7.2 Signage Requirement

Temporary works signage will be provided as required to warn traffic travelling in south direction on Northern Road to the potential hazards associated with construction vehicles operating nearby.

The construction contractor should implement the necessary traffic control signage during works as per Australian Standard 1742.3 and in accordance with any requirements imposed by the highway authority. All traffic controls will be undertaken by the authorised traffic control service provider.

It is proposed that the “TRUCKS TURNING” sign, consisting of a truck warning symbol should be provided on Northern Road on south approaches to the intersection with the proposed site access. Relevant signage, such as “GIVE WAY” and Speed Limit signs are to be installed at the site access during the material importation and construction phases.

An indicative plan showing the signage requirements for the works are presented in **Figure 7-3** below. It is the requirement of the traffic control contractor commissioned during construction to implement the traffic control plans in accordance with AS1742. The plan below is indicative and should only be used for guidance purposes.

Figure 7-3 Proposed Temporary Signage Plan for Jubilee Drive / Haul Road 001 Intersection (Indicative)



8 Jubilee Drive / Haul Road 002 Intersection

This section will investigate the suitability of the proposed Jubilee Drive / Haul Road 002 intersection location. As a part of this investigation, consideration has been given to the sight distance and signage requirements at the proposed Jubilee Drive / Haul Road 002 intersection.

8.1 Sight Distance Assessment

It is understood that access to the haul road construction area will be obtained via the proposed future Haul Road 002 / Jubilee Drive intersection. As such, sight Distance was assessed for the proposed haul road with Jubilee Drive to determine the minimum safe sight distance required at proposed haul Road 002 exits. The assessment is based on Australian Standards (AS 2890.1:2004).

Using the Figure 3.2 of AS 2890.1:2004, a SSD of 45 metres is required based on the frontage road speed of 50km/h, for the proposed haul Road 002 exits. Investigation of the surrounding areas of the proposed haul road 002 / Jubilee Drive intersection indicates that there is sufficient clearance to accommodate the 45 metre sight distance.

The figure below outlines the SISD sight Triangle which represents the area to be clear of any permanent visual obstructions so that a driver exiting the haul road onto the Jubilee Drive can obtain sufficient sight distance during construction period.

Figure 8-1 Sight Triangle for Trucks Exiting the Haul Road



8.2 Signage Requirement

Temporary works signage will be provided as required to warn traffic travelling in both directions on Jubilee Drive to the potential hazards associated with construction vehicles operating nearby.

The construction contractor should implement the necessary traffic control signage during works as per Australian Standard 1742.3 and in accordance with any requirements imposed by the highway authority. All traffic controls will be undertaken by the authorised traffic control service provider.

It is proposed that the "TRUCKS TURNING" sign, consisting of a truck warning symbol should be provided on Jubilee Drive on both approaches to the intersection with the proposed site access. Relevant signage, such as "GIVE WAY" and Speed Limit signs are to be installed at the site access during the material importation and construction phases.

An indicative plan showing the signage requirements for the works are presented in **Figure 7-2** below. It is the requirement of the traffic control contractor commissioned during construction to implement the traffic control plans in accordance with AS1742. The plan below is indicative and should only be used for guidance purposes.

Figure 8-2 Proposed Temporary Signage Plan for Jubilee Drive / Haul Road 002 Intersection (Indicative)



9 Conclusion

This assessment considered the traffic impacts arising from the construction of Basin I stage of the Central Precinct.

The following findings can be concluded from this study;

- Construction vehicle access to Basin I bulk earthworks site is provided directly via a proposed temporary Site Access off Northern Road and Jubilee Drive;
- Heavy vehicle routes shall be restricted as much as practical to the main arterial road network and approved B-Double road network in order to minimise any detrimental impact on the surrounding road network and the local amenity for residents;
- The proposed heavy vehicle route for construction vehicles is contained within the RMS designated heavy vehicle routes for all road sections, as identified in Option 1
- Routes, identified in Option 2 and 3, are anticipated for Light construction vehicles only, in order to access the site;
- A heavy and light vehicle parking and layover area shall be provided on-site, on a hard stand area, to accommodate construction vehicles and the parking requirements of labour force;
- Due to the relatively low volume of traffic generated, the traffic impacts during the bulk earthworks stage of construction and operation are anticipated to be minimal and are unlikely to generate significant adverse impacts on the road network operation;
- All movements by the largest anticipated vehicle (19m long Truck and Dog trailer) can be sufficiently accommodated within the constraints of the key external intersections, as they are part of the approved B-Double routes.
- The Safe Intersection Sight Distance assessment undertaken at the proposed Northern Road / Haul Road 001 intersection identifies that sufficient sight distance is achievable for a truck exiting the site. However, it is advisable to clear any low trees or any large signage north of the proposed intersection in order to maintain satisfactory sight distance.
- Northern Road currently has a posted speed limit of 70km/h. As the proposed haul road Access has sufficient sight distance in northern direction, low traffic volumes and the provision of temporary works signage, a reduction in the speed limit during the construction period is not deemed necessary on Northern Road.
- The Safe Intersection Sight Distance assessment undertaken at the proposed Jubilee Drive / Haul Road 002 intersection identifies that sufficient sight distance is achievable for a truck exiting the site.
- Jubilee drive currently has a posted speed limit of 50km/h. As the proposed haul road Access has sufficient sight distance in each direction, low traffic volumes and the provision of temporary works signage, a reduction in the speed limit during the construction period is not deemed necessary on Jubilee Drive.
- Temporary works signage shall be provided as required to warn traffic travelling in both directions on both Northern Road and Jubilee Drive to the potential hazards associated with the proposed construction vehicle movements. Indicative plans showing the signage requirements during the period of construction works have been provided within this report.
- It is recommended that the proposed Northern Road / Haul Road 001 intersection be designed to accommodate the swept path of a 19m Truck and Dog Trailer combination.
- It is recommended that the proposed Jubilee Drive / Haul road 002 intersection be designed to accommodate the swept path of a Light vehicle.