CES01222 ST GEORGE HOSPITAL

TRAFFIC & TRANSPORT ASSESSMENT

Prepared for
Health Infrastructure
July 2012

Document Information

Prepared for	Health Infrastructure
Project Name	St George Hospital
File Reference	CES01222
Job Reference	Traffic and Transport Assessment
Date	July 2012

Document Control

Version	Date	Author	Author Initials	Reviewer	Reviewer Initials
1.0	7/11/2011	Kieron Hendicott	KH	Kieron Hendicott	KH
2.0	27/03/2012	Kieron Hendicott	KH	Kieron Hendicott	KH
3.0	24/04/2012	Kieron Hendicott	KH	Kieron Hendicott	KH
4.0	2/05/2012	Kieron Hendicott	KH	Kieron Hendicott	KH
5.0	1/06/2012	Kieron Hendicott	KH	Kieron Hendicott	KH
6.0	18/07/2012	Clement Lim	CL	Clement Lim	CL
7.0	03/08/2012	Clement Lim	CL	Clement Lim	CL

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1 INTRODUCTION

Cardno has been engaged by NSW Health Infrastructure to prepare a traffic and transport assessment that considers the impacts of changes proposed to the St George Hospital at Gray Street, Kogarah.

Key elements of the proposed changes that relate to traffic and transportation and are considered in the assessment include:

> Relocation of the Emergency Department (ED) and reconfiguration of the drop off and parking area accessed via Gray Street.
> Ambulance access and circulation routes from Gray Street to the ED.
> Reconfiguration of the northern ED carpark.
> Maintenance of access for hearses and other deliveries.
> Access to the electrical infrastructure in this carpark.

The assessment has considered the impacts of these changes as follows:

> Identify the impacts on parking.
> Consider the public transport accessibility in the area to identify ways for users to access the site.
> Identify the impact on pedestrian desire lines to/from the new facilities.
> Identify the impacts of these changes on surrounding traffic network.
> Compliance of the access, parking and servicing arrangements with the relevant Australian Standards as well considering operation of the servicing arrangements.

2 IMPACTS ON PARKING

The development proposal includes several changes to the parking arrangements on-site, namely:

> Reconfiguration of the northern carpark accessed via Kensington Street/Gray Street and the adjacent loading/service zone.
> Reconfiguration of the drop off zone and short term carpark at the main hospital/new ED access facility.

Consideration of the impact of each of these elements is discussed below.

2.1 Kensington Street/Gray Street Parking Area

As part of the relocation of the ED, it is proposed to reconfigure the carpark in the north western corner of the site accessed via Gray Street and Kensington Street.

The existing carpark in the north western corner of the site is shown in **Figure 2.1** below and caters for between 23-25 car spaces for clinical services as well as 2-4 spaces for Griffith House (shown in yellow in the figure), as well an assortment of informal parking for engineering department and service/delivery vehicles (shown in red) and is a restricted parking facility.

The proposed reconfigurations to the carpark in this location caters for revised yield of 30 spaces, comprising 9 spaces created in a new carpark adjacent Gray Street, and a further 21 within the site behind the ED building. This reflects an increase in capacity of between 1-5 spaces.

Figure 2.1 Kensington Street/Gray Street Carparks

2.2 Gray Street ED/Main Hospital Drop Off Carpark

As part of works at the ED drop off in the area shown in **Figure 2.2**, it is proposed to reconfigure the drop off arrangements increasing capacity from approximately 3 spaces to approximately 10 spaces and an increase in short term parking from 16 to 21 spaces (5 total).

Figure 2.2 Gray Street Drop Off Area

2.3 Summary

The changes to the parking arrangements on site result in a net increase in parking supply for long term, short term and drop off spaces as outlined in Table 2.1.

Table 2.1 Summary of Parking Impacts

Parking Component	Existing	Proposed
Northern Carpark	2-4 spaces (Griffith House) 23-25 spaces (Clinical Services)	9 spaces (Gray Street carpark) 21 spaces (Main carpark)
ED Drop Off	3 drop off spaces 16 short term	10 drop off spaces 21 short term spaces
Engineering/Service/Delivery	A number of formal and informal service bays and parking spaces	All service/delivery and engineering functions relocated to Belgrave Street
Total	**25-29 long term spaces** **16 short term spaces** **3 drop off spaces**	**30 long term spaces** **21 short term spaces** **10 drop off spaces**

3 PUBLIC TRANSPORT ACCESSIBILITY

St George Hospital is located within Kogarah approximately 350m south from Kogarah rail station and bus interchange and therefore located in close proximity to the main public transport facilities in the area. Access to the interchange from the hospital is most directly achieved via Belgrave Street.

3.1 Rail Services

Kogarah rail station is on the Eastern Suburbs and Illawarra line which runs from Bondi Junction to Waterfall/Cronulla through the Sydney CBD.

This is a high capacity, high frequency service which operates as shown in **Table 3.1** below in the AM and PM peak hours:

Table 3.1 Eastern Suburbs & Illawarra Rail Line Frequency of Service

Time Period	Services to City/Bondi Junction	Services from City/Bondi Junction
AM Peak Hour	13	9
PM Peak Hour	13	13

In the AM and PM peak hours, services in the peak direction occur at a frequency of greater than 1 service every 5 minutes, which is regarded as very high frequency and this, combined with the short walking distance, as well as the quality of the walking experience means St George Hospital can be considered to have very high accessibility to rail services.

3.2 Bus Services

A bus/rail interchange is located at Railway Parade approximately 350m on Belgrave Street. This interchange is the focal point for the four bus routes that service the area around St George Hospital.

Table 3.2 outlines the routes that service the area and their respective frequency.

Table 3.2 Bus Routes and Services in Kogarah Area

Bus Route	AM Peak Frequency	PM Peak Frequency
Route 422 (Sydney Buses) Kogarah to City via Newtown	2 services per hour per direction	2 services per hour per direction
Route 476 (Sydney Buses) Dolls Point to Rockdale	3 services per hour to Rockdale/Kogarah from Dolls Point 2 services per hour from Rockdale/Kogarah to Dolls Point	5 services per hour to Rockdale/Kogarah from Dolls Point 7 services per hour from Rockdale/Kogarah to Dolls Point
Route 477 (Sydney Buses) Miranda to Rockdale	3 services per hour per direction	3 services per hour to Rockdale/Kogarah 2 services per hour from Rockdale/Kogarah to Dolls Point
Route 455 (Veolia Transport) Kingsgrove to Rockdale Plaza	2 services per hour per direction	2 services per hour per direction

The routes and stops in the surrounding area, as well as the rail infrastructure are shown in **Figure 3.1** below, and the following locations are of note:

> Four stops on Gray Street along the hospital frontage serving routes 476/477.
> Two stops on Kensington Street serving route 455.
> Main rail/bus interchange stops on Railway Parade, Railway Street and Regent Street approximately 350m away from the hospital.

3.3 Summary

The provision of the public transport infrastructure as shown in **Figure 3.1** below represent high levels of accessibility to public transport in close proximity to the site, and these provide options for users to make sustainable choices with respect to public transport use to get to/from the hospital.

With the redevelopment proposed, and increase in staff or patient numbers will be associated with an increase in demand for these services, however any increase will not be to a level to warrant any additional infrastructure or services as these elements are currently high capacity services.

Figure 3.1 Public Transport Facilities in the vicinity of St George Hospital

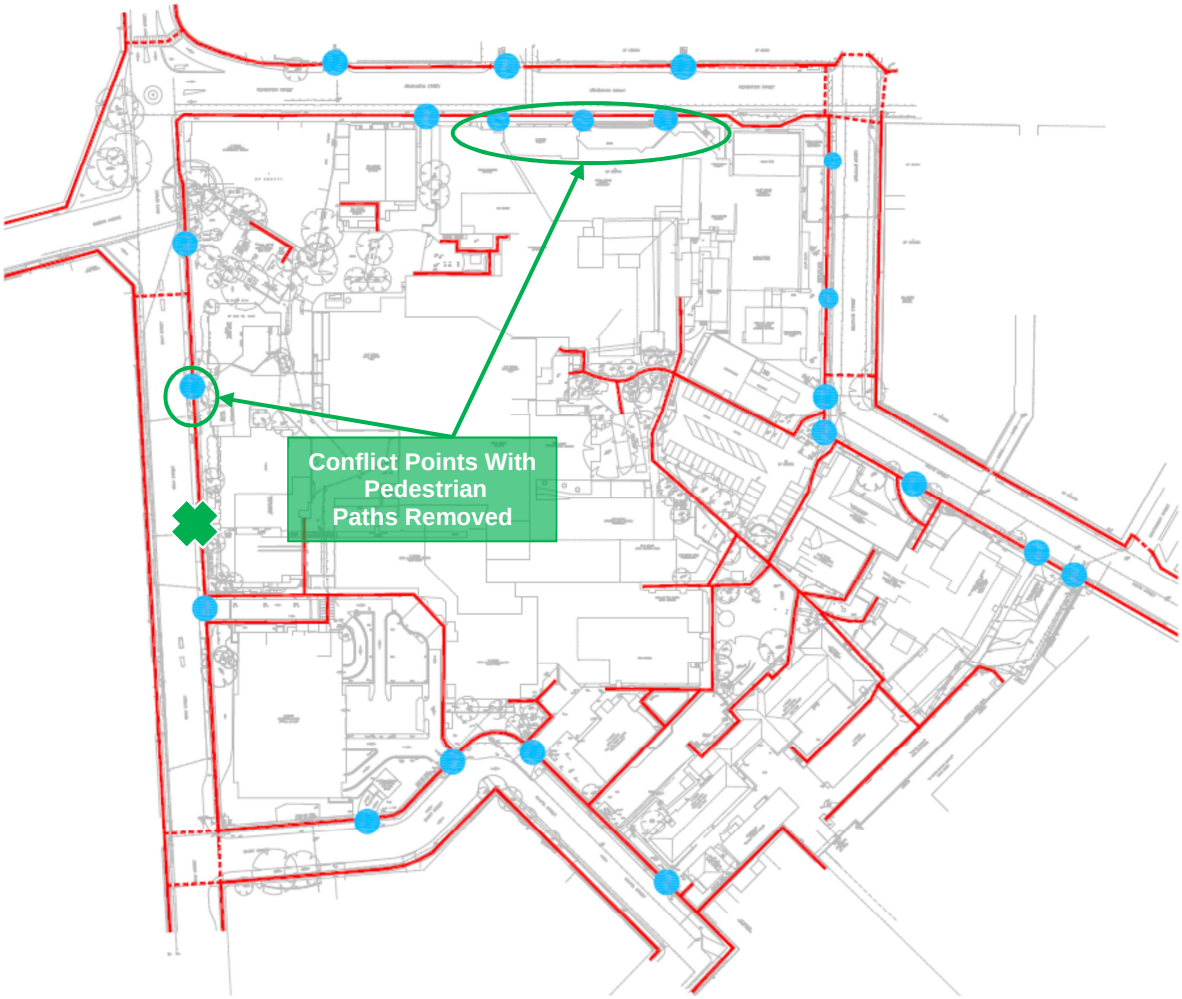
4 PEDESTRIAN NETWORK ASSESSMENT

4.1 Existing Pedestrian Network

Figure 2.1 below identifies the existing pedestrian network and existing desire lines through and around the site and to key attractions/destinations such as building entries, crossing points, parking locations and driveways. The figure shows that good connections exist surrounding the site, and links exist through the south-eastern section of the site, as well as at the hospital entry at Gray Street.

Conflict locations with driveways and intersections are represented by the blue dots (note the green cross indicates a new conflict created by access to the ambulance bay).

Figure 4.1 Existing Pedestrian Network



4.2 Future Pedestrian Network Considerations

Essentially, as part of the redevelopment, the pedestrian network remains largely unchanged, with some conflict points being removed at Kensington Street where the existing ED is located, and all key connections to hospital components are retained.

Gray Street/Kensington Street/Queens Avenue/ED Pedestrian Movements

Considering the pedestrian volumes in the areas of Gray Street/Kensington Street/Queens Avenue, the survey results indicate that lunchtime is also typically the peak time for pedestrians, with up to 45 pedestrians crossing Gray Street and 78 pedestrians crossing Kensington Street at the midblock crossing and the existing ED facility respectively.

The emergency department access itself also generates the most pedestrian movements during the lunchtime with 106 movements during this peak period. The majority of these movements will displace to Gray Street, and pedestrian volumes on Gray Street are likely to grow to approximately 200 movements per hour on the eastern verge (site frontage), approximately 100 movements per hour on the western verge and crossing movements are also likely to increase to be in the order of 50-80 vehicles per hour at the pedestrian refuge near the intersection of Gray Street and Queens Avenue.

This increase doesn't warrant any further pedestrian treatment beyond the existing pedestrian refuge at this location; however a new pedestrian refuge island should be incorporated at the Kensington Avenue approach of the Gray Street/Kensington Street roundabout as pedestrian crossing demand at this location is expected to increase.

5 SERVICE VEHICLE FACILITY DESIGN

The design and capacity of each new component has been assessed with respect compliance to with the relevant Australian Standard and their intended function. Each component is addressed below.

5.1 Emergency Department Ambulance Facility

The new ambulance facility proposed as part of the emergency department is proposed to be accessed via a new driveway from Gray Street approximately 80m south of the Gray Street/Queen Street intersection.

The access has been designed to allow two vehicles to operate independently (i.e. vehicles can enter and leave without impacting on other vehicles entering and leaving at the same time) and is located in accordance with the provisions of the Australian Standard. The access to Gray Street should be designed with a “Keep Clear” zone on the frontage to ensure that vehicles do not queue past and block the access to this component.

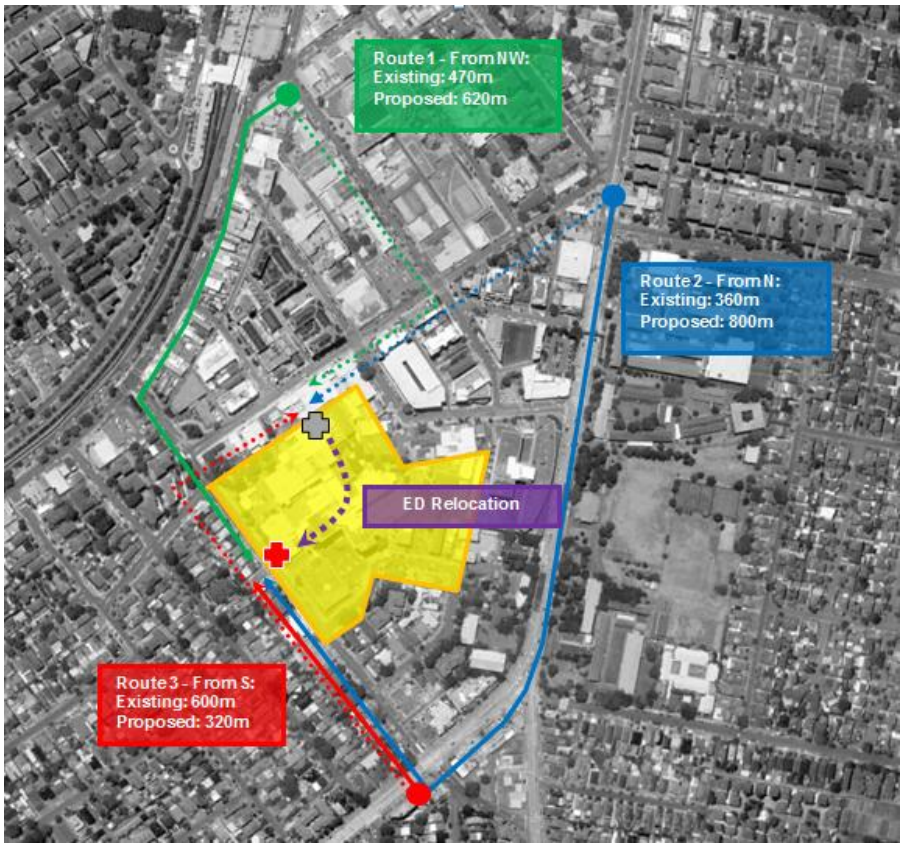
The ambulance facility itself has been designed to accommodate eight ambulances including a bariatric ambulance and swept path assessment has been undertaken and is shown in Appendix A.

The location of the ambulance facility on Gray Street (as opposed to Kensington Street) is not expected to have a significant impact on ambulance circulation patterns or trip lengths as shown in **Figure 5.1** below.

The trip lengths increase when travelling from the north via the Princes Highway and the northwest on the opposite side of the rail corridor via Railway Parade (by 440m and 150m respectively), however the trips from the north have the opportunity to travel on the arterial road network at a higher speed which may offset some of the extra time required to cover the longer distance.

Trip lengths decrease when approaching from the south via Gray Street by approximately 280m.

Figure 5.1 Ambulance Circulation Patterns



5.2 Gray Street Northern ED Carpark

The Gray Street northern ED carpark caters for servicing arrangements for the following uses:

> Mortuary.
> Seals deliveries/blood collection.
> Animal House deliveries.
> Ausgrid substation access for maintenance/breakdown.

Circulation in this carpark has been designed in a one-way direction with entry via Gray Street, and exit via Kensington Street.

The circulation pattern has been designed for Ausgrid vehicles (cranes, heavy equipment trucks) to be able to also exit via Gray Street in a breakdown situation if required.

Swept path assessment of this area has been undertaken for this area and shown in Appendix A.

6 DESIGN OF PARKING AREAS

6.1 Gray Street ED Drop Off Reconfiguration

The existing main drop off area accessed via Gray Street has been reconfigured to cater for drop offs for ED visitors as well as general hospital inpatients. Key features of the scheme include:

> Construction of three drop off spaces upon entry via Gray Street. Note these are located a minimum of 6m from the property boundary to ensure that no conflicts with entering vehicles occur.
> Provision of a passing lane throughout the drop off area to ensure satisfactory operation of the drop off
> Increased drop off space at the main hospital access.
> Increased pedestrian widths at all locations.
> Relocation of the pedestrian crossings internal to the site to correspond to entry locations of building and desire lines.
> Reconfiguration of the short term drop off carpark to increase spaces.

The carpark and drop off area has been designed in accordance with AS2890.1.

6.2 Gray Street Northern ED Carpark

The existing northern carpark accessed via Gray Street and Kensington Street has been reconfigured to provide additional spaces in a layout designed in accordance with AS2890.1. Key features of the scheme include:

> Construction of ten spaces access via Gray Street and operating in a two way arrangement.
> One-way circulation through the site beyond this point with traffic entering via Gray Street and exiting via Kensington Street.
> Provision of additional carparking.
> Retention/creation of some loading space to cater for specialised hospital uses and electricity substation maintenance/breakdowns.

The carpark and drop off area has been designed in accordance with AS2890.1.

7 TRAFFIC IMPACTS

7.1 Existing ED Traffic Generation

Traffic surveys were undertaken to help identify the potential impacts of the proposed redevelopment on the surrounding road network. Traffic surveys were undertaken on Thursday 1st September at the following locations:

> Kensington Street / Emergency Access.

The results of the surveys are outlined in Appendix B, and a summary of the findings are outlined below:

Table 7.1 Kensington Street / Emergency Access Traffic Generation

	IN				OUT				
Time Period	**Cars**	**Emergency Vehicles**	**Service Vehicles**	**Total**	**Cars**	**Emergency Vehicles**	**Service Vehicles**	**Total**	**Grand Total**
AM Peak 8:15 to 9:15	0	2	0	**2**	0	2	0	**2**	**4**
Noon Peak 12:00 to 13:00	1	2	0	**3**	1	3	0	**4**	**7**
PM Peak 17:00 to 18:00	0	7	0	**7**	0	8	0	**8**	**15**

Table 7.1 indicates that in the worst case, the emergency department generates 15 vehicles in the peak hour and these were all identified as emergency vehicles. These volumes have been used to inform the design of the new emergency vehicle access facility.

7.2 Existing Intersection Operation

The following traffic surveys were undertaken:

1st September 2011

> Gray Street/Queen Street.

20th February 2012

> Princes Highway / South Street.
> Belgrave Street / Kensington Street.

19th June 2012

> Gray Street/Princes Highway
> Gray Street/Railway Street

The traffic volumes were then assessed using the SIDRA intersection modelling software package to identify the operation of the intersection during each of the survey periods.

Table 7.2 below presents the findings of the operational assessment for the intersection of Gray Street / Queen Street and details are provided in Appendix C.

The results indicate that the intersection currently operates well within generally accepted operational performance threshold, with all metrics well below the accepted levels for warranting upgrades.

Total traffic volumes at the intersection currently are in the order of 1,150, 850 and 1,100 vehicles per hour in the AM, Noon and PM peak hours respectively.

Table 7.2 Gray Street / Queen Street Intersection Operation

	Degree of Saturation	Delay (seconds)	95th Percentile Queue (m)	Level Of Service
AM Peak Hour	0.612	12.8 seconds	20.5m	LOS A
Noon Peak Hour	0.242	10.9 seconds	10.9m	LOS A
PM Peak Hour	0.392	15.0 seconds	26.9m	LOS B

Table 7.3 below presents the findings of the operational assessment for the intersection of Kensington Street / Belgrave Street and details are provided in Appendix C.

The results indicate that the intersection currently operates well within generally accepted operational performance threshold, with all metrics well below the accepted levels for warranting upgrades.

Table 7.3 Kensington Street / Belgrave Street Intersection Operation

	Degree of Saturation	Delay (seconds)	95th Percentile Queue (m)	Level Of Service
AM Peak Hour	0.446	15.3 seconds	111.8m	B
PM Peak Hour	0.400	20.4 seconds	105.9m	B

Table 7.4 below presents the findings of the operational assessment for the intersection of Gray Street / Queen Street and details are provided in Appendix C.

The results indicate that the intersection currently operates well within generally accepted operational performance threshold, with all metrics well below the accepted levels for warranting upgrades

Table 7.4 South Street / Princes Highway Intersection Operation

	Degree of Saturation	Delay (seconds)	95th Percentile Queue (m)	Level Of Service
AM Peak Hour	0.862	12.9 seconds	356.3m	A
PM Peak Hour	0.784	13.9 seconds	282.2m	A

7.3 Redevelopment Traffic Generation/Reassignment & Network Performance

Following redevelopment, additional traffic is expected to be redeveloped or reassigned following the relocation of hospital components.

This is expected to occur as follows:

> Additional traffic is expected on Gray Street due to the additional drop off traffic at the ED and also ambulance traffic – **this is not expected to exceed 100vph.**

Sensitivity assessment has been undertaken to identify the performance of the intersections under future traffic demands and this indicates the following:

At **Gray Street / Queens Avenue**:

> For the AM Peak, LOS E (accepted threshold of failure) occurs when an additional 60% of traffic, or 700vph additional vehicles use this intersection.
> For the Noon Peak, LOS E occurs when an additional 134% of traffic, or 1,100vph additional vehicles use this intersection.
> For the PM Peak, LOS E occurs with an additional 66% traffic, or 750 vph using the intersection.

At **Belgrave Street / Kensington Avenue**:

> For the AM Peak, failure occurs when an additional 100% of traffic, or 1430vph additional vehicles use this intersection.
> For the PM Peak, failure occurs when an additional 110% of traffic, or 1280vph additional vehicles use this intersection.

At **South Street / Princes Highway**:

> For the AM Peak, failure occurs when an additional 16% of traffic, or 790vph additional vehicles use this intersection.
> For the PM Peak, failure occurs when an additional 26% of traffic, or 1420vph additional vehicles use this intersection.

At **Princes Highway / Gray Street**:

> For the AM Peak, failure occurs when an additional 8%, or 344vph additional vehicles use this intersection.
> For the PM Peak, the intersection is currently operating at a LoS F under existing conditions. A detail review of the operation and upgrade options of the intersection and Princes Highway is required to improve its performance.

At **Railway Parade / Gray Street**:

> For the AM Peak, LOS E (accepted threshold of failure) occurs when development traffic is added to the intersection. The intersection is capable of supporting an additional 90vph in the existing scenario.
> For the PM Peak, LOS E occurs in the existing scenario. The existing intersection is capable of supporting an additional 40vph with the optimisation of signals.

Given the low volumes expected with the redevelopment as outlined above, the additional reassigned traffic is not expected to have a significant impact on the operation of the intersections surveyed.

This assessment was further refined to model the impacts of an additional 100vph in each direction on Gray Street to represent potential traffic using Gray Street to access the ED and ambulance facility and the results shown in **Table 7.5** below indicates that the intersection will continue to operate satisfactorily with spare capacity.

Table 7.5 Gray Street / Queen Street Intersection Operation – With Development

	Degree of Saturation	Worst Movement Delay (seconds)	95th Percentile Queue (m)	Level Of Service
AM Peak Hour	0.662	16.4 seconds	29.5m	LOS B
Noon Peak Hour	0.304	13.6 seconds	22.6m	LOS B
PM Peak Hour	0.471	19.7 seconds	52.5m	LOS B

7.4 Gray Street Considerations

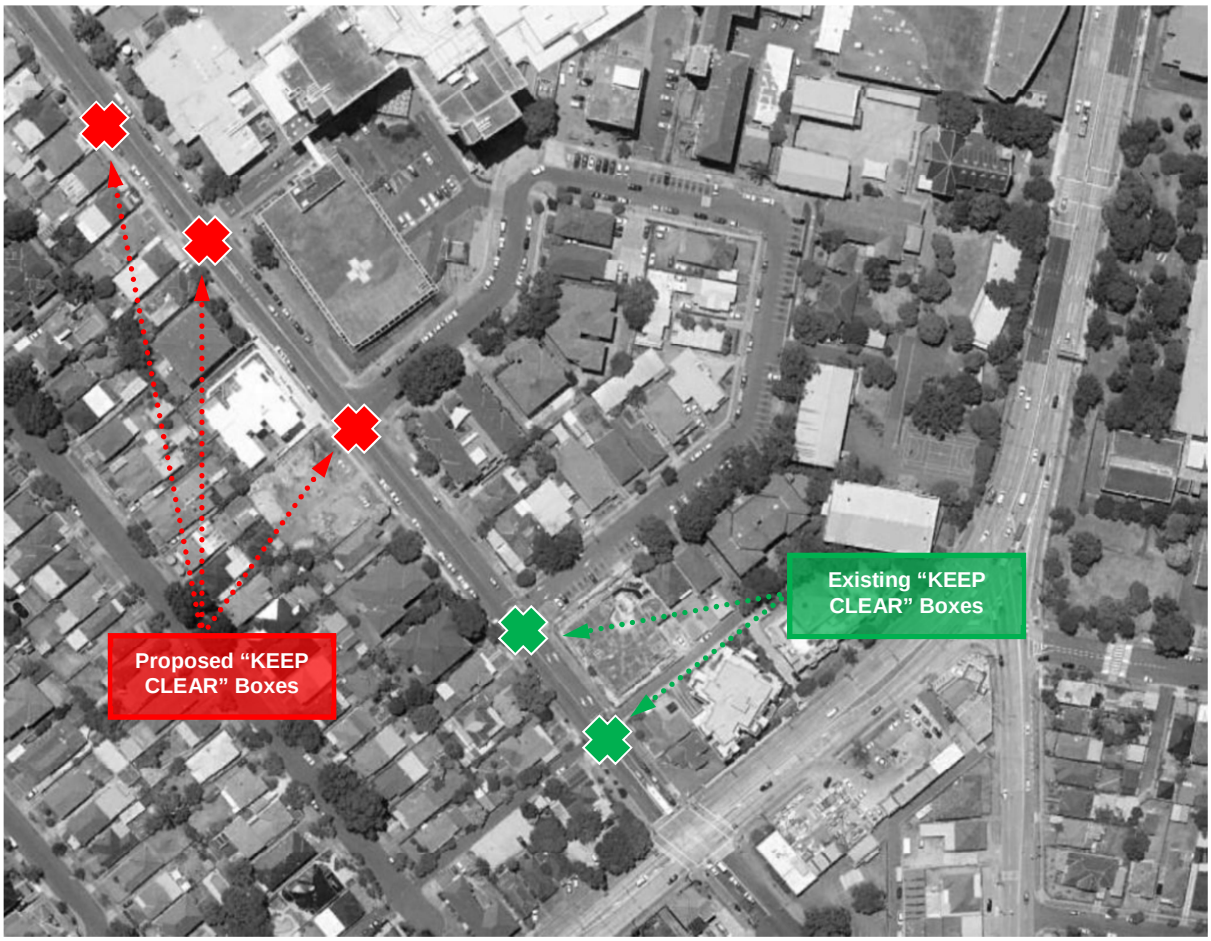
It is understood that concerns have been raised regarding congestion on Gray Street / Short Street / Chapel Street in the afternoon school peak and its potential impact on access to the components of ED.

It is understood that the perception is that the congestion stems from St Patrick's school traffic on Short Street and Chapel Street, and queues forming on Gray Street due the operation of the Gray Street / Princes Highway intersection.

Two approaches are recommended to ensure that this is mitigated, namely:

> Provide "Keep Clear" boxes at the access to the ambulance area, the ED/Main Hospital Access and at the intersection of Short Street / Gray Street as shown in **Figure 7.1** below. Note these are as per the existing "Keep Clear" boxes at the intersections of Gray Street / Chapel Street and Gray Street / Princess Lane to the south. These will provide the opportunity for traffic to enter and exit these streets while not opposed/blocked by queues on Gray Street.
> Engage with Roads & Maritime Services to monitor queues Gray Street (either dynamically or statically) and allow additional time to be given to the Gray Street approach of the Gray Street / Princes Highway intersection to ensure that queue do not build on this approach to the extent that they impact on access to the hospital.

Figure 7.1 Gray Street "KEEP CLEAR ZONES"



8 CONSTRUCTION TRAFFIC IMPACTS

The following section provides an assessment of the construction traffic impacts associated with the proposed upgrade works of St George Hospital. It is expected that a more detailed Traffic Management Plan will be formed prior to the commencement of works detailing specific methods of safely managing traffic within and surrounding the construction site.

8.1 Hours of Construction

The hours of construction throughout the duration of the project are proposed as per below:

> Monday to Friday: 7:00AM to 6:00PM.
> Saturday: 7:00AM to 1:00PM.
> No work permitted on Sundays or Public Holidays.
> No deliveries or pick-ups shall occur outside of the standard construction hours of 7:00AM to 6:00PM, Monday to Friday and 7:00AM to1:00PM on Saturdays.
> Excavating works and the use of any noise generating machinery is strictly prohibited after 6:00PM on weekdays and 1:00PM on Saturdays.

8.2 Construction Program and Construction Traffic

Construction activities generating traffic around the site consists of working staff accessing the site, to heavy construction vehicles (HRV's – Heavy Rigid Vehicles and MRV's – Medium Rigid Vehicles) such as concrete trucks. It is estimated that at peak construction traffic activity could require up to 50 heavy vehicle movements per day, or at peak times up to 10 trips per hour between 7:00AM and 6:00PM based on the construction activity underway. Figure 8.1 presents the construction traffic routes available for vehicles accessing the site. It is envisaged that construction vehicles will access the site from Princes Highway, Gray Street and Kensington Street.

These routes have been selected to provide minimal impact to residential areas and allow for easiest access for heavy vehicle manoeuvres.

Figure 8.1 Construction Traffic Routing

8.3 Existing Traffic

St George Hospital is bounded by Gray Street to the west, Belgrave Street to the east and Kensington Street to the north. The intersection of Princes Highway/Gray Street provides the main access to the hospital with the greatest traffic levels occurring during the PM peak period.

8.4 Impact of Construction Traffic

The impact of construction traffic will be discussed once specific construction details are provided however volumes are expected to be low, in the order of 50 vehicles per day. With this low level of traffic, no impacts are expected. Sensitivity intersection analyses undertaken as part of the traffic and transport assessment have shown that the road network is capable of accommodating additional vehicles in the order of 50 – 100 vehicles per hour.

8.5 Parking Provision for Construction Purposes

Onsite parking will be provided for construction traffic, which is expected to be a mix of both workers and trucks. Off-street parking for workers is also available within the Kogarah CBD area at the following locations:

> Gray Street Car Park.
> Belgrave Street Car Park.
> Derby Street Car Park.

These traffic movements are not expected to have a significant effect on the external network as most movements will occur outside of peak periods.

8.6 Driver 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 maintain safety within the site:

> Utilisation of only the designated transport routes.
> Site parking guidelines will be developed as part of a final CTMP to ensure that construction traffic parks only in appropriate, designated locations.

8.7 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.
> Strict scheduling of vehicle movements is to occur to minimise vehicles waiting off the site.

The following issues will be considered in more detail in the completed TMP:

> Traffic Impact.
> Parking Impact.
> Pedestrian Activity at/near the Site.
> Impact of Adjacent Businesses/Properties.
> Construction Traffic Management, Signage and Devices.

9 DIRECTOR GENERAL'S REQUIREMENTS

Table 9.1 below outlines specific response to the Director General Requirements. Note that these are generally addressed within relevant sections of the report referred to in the table.

Table 9.1 Director General's Requirements

DGR	Proposed Response/Approach
Demonstrate how users of the development will be able to make travel choices that support the achievement of the relevant NSW 2010 targets	General comments are provided within Section 3.0 regarding this element.
Detail the existing pedestrian and cycle movements within the vicinity of the site and describe the measures to be implemented to promote sustainable transport and improve access/usage of public transport, pedestrian and bicycle linkages. Address future demand for increased public transport and pedestrian and cycle access	The pedestrian and cycle network surrounding the site and potential conflicts/impacts have been identified in Section 3.0 and 4.0.
Assess the implications of the proposed development for non-car travel modes (including public transport use, walking and cycling); the potential for implementing a location-specific sustainable travel plan (eg 'Travelsmart' or other travel behaviour change initiative); and the provision of facilities to increase the non-car mode share for travel to and from the site	The accessibility of the public transport network around the site including identification of routes, stops and service frequency has been identified in Section 3.0. Note no "Travelsmart" or "Work Place Travel Plan" type assessment or document has yet been prepared as part of the assessment.
Identify potential traffic impacts during the construction and operational stages of the project, and measures to mitigate these impacts, including the preparation of a Traffic Impact Study	The traffic impact assessment that has been outlined in Section 7.0 has considered the operational phases of the project. Section 8.0 has considered the potential traffic impacts during construction. A detailed construction traffic management plan will be prepared prior to the commencement of works.
Daily and peak traffic movements likely to be generated by the proposed development, including the impact on nearby intersections and the need/associated funding for upgrading or road improvement works (if required). The key intersections to be examined include: > Kensington Street and Belgrave/South Street > Princess Highway and South Street > Princess Highway and Gray Street > Gray Street and Railway Parade	The traffic assessment has considered the intersection of Gray Street/Queen Street, Princes Highway/Gray Street, and has recommended upgrades from a pedestrian safety perspective, as well as other traffic management devices on Gray Street.
The traffic impact assessment should consider base models with future traffic generated by the proposed redevelopment	The assessment identifies the spare capacity at the subject intersections, and assesses the impact with an additional 200vph generated by the development.
Identify and consider any environmental impacts associated with proposed road works, including the proposed closure of any roads associated with the redevelopment of the Hospital on existing vehicle access arrangements (e.g. taxis, community transport vehicles and other vehicles), and measures to mitigate these impacts	No road closures are proposed, however, comments regarding service vehicle access and impact are provided in Section 5.0.
Demonstrate how users of the development will be able to make travel choices that support the achievement of the relevant NSW 2010 targets	General comments are provided within Section 3.0 regarding this element.
Detail the existing pedestrian and cycle movements within the vicinity of the site and describe the measures to be implemented to promote sustainable transport and improve access/usage of public transport, pedestrian and bicycle	The pedestrian and cycle network surrounding the site and potential conflicts/impacts have been identified in Section 3.0 and 4.0.

DGR	Proposed Response/Approach
linkages. Address future demand for increased public transport and pedestrian and cycle access	
Assess the implications of the proposed development for non-car travel modes (including public transport use, walking and cycling); the potential for implementing a location-specific sustainable travel plan (eg 'Travelsmart' or other travel behaviour change initiative); and the provision of facilities to increase the non-car mode share for travel to and from the site	The accessibility of the public transport network around the site including identification of routes, stops and service frequency has been identified in Section 3.0. Note no "Travelsmart" or "Work Place Travel Plan" type assessment or document has yet been prepared as part of the assessment.
Identify potential traffic impacts during the construction and operational stages of the project, and measures to mitigate these impacts, including the preparation of a Traffic Impact Study	The traffic impact assessment that has been outlined in Section 7.0 has considered the operational phases of the project. Section 8.0 has considered the traffic impacts during construction.
Daily and peak traffic movements likely to be generated by the proposed development, including the impact on nearby intersections and the need/associated funding for upgrading or road improvement works (if required). The key intersections to be examined include: > Kensington Street and Belgrave/South Street > Princess Highway and South Street > Princess Highway and Gray Street > Gray Street and Railway Parade	The traffic assessment has considered the intersection of Gray Street / Queen Street, and has recommended upgrades from a pedestrian safety perspective, as well as other traffic management devices on Gray Street.
The traffic impact assessment should consider base models with future traffic generated by the proposed redevelopment	The assessment identifies the spare capacity at the subject intersections, and assesses the impact with an additional 200vph generated by the development.
Identify and consider any environmental impacts associated with proposed road works, including the proposed closure of any roads associated with the redevelopment of the Hospital on existing vehicle access arrangements (e.g. taxis, community transport vehicles and other vehicles), and measures to mitigate these impacts	No road closures are proposed, however, comments regarding service vehicle access and impact are provided in Section 5.0.
Details of the proposed access and service vehicle movements associated with the proposed development, including: > Details of service vehicle movements including vehicle type and likely arrival and departure times > Compliance with the requirements of the relevant Australian Standards (ie: turn paths, sight distance requirements, aisle widths, etc) (note: the new service and ambulance entry/exit should comply with Section 3.2.3 of AS 2890.1:2004)	This information is provided in Section 5.0 with swept path diagrams in Appendix A.
Details of the proposed car parking provisions including: > Proposed number of car parking spaces, opportunity for future parking to be provided within the hospital, provision of short stay off street parking for drop off and pick up patients (including taxis) and compliance with the appropriate parking codes should be addressed > Adequate levels of on-site car parking for the proposed development, having regard to the level of accessibility of the site to public transport, opportunities for car sharing, local planning controls and RTA guidelines (note: The Department supports reduced parking provisions, if adequate public transport is available to access the site).	Section 2.0 outlines that the changes in parking spaces across the site. Changes are detailed for each area of the site, for each parking type.

10 CONCLUSIONS

This assessment outlines the traffic and transportation related elements of the proposed redevelopment of St George Hospital, specifically the assessment considered:

> The potential impacts on pedestrian movements in the area.
> The potential impacts on parking with the changes proposed.
> The potential traffic impacts relating to driveway and intersection operation from the redevelopment.
> The service facilities at the ED have been appropriately located and designed in accordance with the relevant Australian Standards.
> The potential construction traffic impacts during upgrade works.

The proposed redevelopment generally has a positive impact on pedestrians by removing potential conflict points with driveways and the existing provisions cater for the pedestrian desire lines throughout the site, and implementation of the refuge island at the intersection of Kensington Street / Gray Street provides a benefit for pedestrian safety.

The changes to parking proposed as part of the works create a net increase in long term, short term and drop off parking.

The assessment considers the potential traffic impacts of the redevelopment on intersection capacity and the study intersections have sufficient capacity to accommodate the expected demands.

The impact of construction traffic will be discussed once specific construction details are provided however volumes are expected to be low, in the order of 50 vehicles per day. With this low level of traffic, no impacts are expected.

With respect to other traffic impacts, it is recommended that “Keep Clear” zones be implemented as shown in Figure 7.1 to improve access to and from Short Street / Chapel Street as well as the emergency department drop off and ambulance access. This should be complemented by liaison with RMS to ensure that an appropriate strategy is implemented to manage queuing on Gray Street to ensure access to these critical hospital components is not impacted.