

A photograph of a modern, multi-story hospital building with a mix of concrete, dark cladding, and large glass windows. The building is set against a blue sky with light clouds. In the foreground, there is a semi-transparent grey banner containing the title text.

TRAFFIC & PARKING ASSESSMENT

**NEWCASTLE PRIVATE HOSPITAL EXPANSION
MODIFICATION TO CONSENT**

**LOT 2 DP 1080386, LOTS 401 & 402
DP 1197237 & SP 60845**

**158 CROUDACE STREET & 14 & 20 LOOKOUT ROAD
NEW LAMBTON HEIGHTS**

PREPARED FOR: HEALTHSCOPE OPERATIONS PTY LTD

REVISED OCTOBER 2015

15/015

**TRAFFIC & PARKING ASSESSMENT
HEALTHSCOPE OPERATIONS PTY LTD****NEWCASTLE PRIVATE HOSPITAL EXPANSION - MODIFICATION
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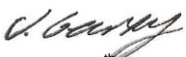
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Issue	Date	Description	By
A	06/03/15	Draft	JG
B	23/3/15	Edit	TB
C	19/08/15	Plan Amendments	JG
D	19/08/15	Final Proof	JG
E	04/09/15	Amendments	JG
F	08/09/15	Approved	JG
G	24/10/15	Revised Plans	JG

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Date 26th October 2015**Disclaimer**

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EXECUTIVE SUMMARY

Intersect Traffic Pty Ltd has been engaged by Healthscope Operations Pty Ltd to prepare a Traffic and Parking Assessment for a proposed S75W modification to consent for its approved expansion under approval MP 08_0170 of the Newcastle Private Hospital at 158 Croudace Street and 14 & 20 Lookout Road, New Lambton Heights. The proposed modification seeks to provide an additional level and internal alterations to the approved new building (yet to be constructed), a new pedestrian linkway between the existing Kingston and Croudace buildings as well as internal alterations and additions to the existing hospital building (Kingston building). Concept development plans are provided in **Appendix A**.

In summary the modification results in the following changes to services and facilities;

- ◆ Deletion of 3 parking spaces (one each on B3, B2 and B1 to improve sight lines near the access ramps), for an overall reduction of 2 car parking spaces (382 to 380 total spaces).
- ◆ A net gain of 15 hospital beds (182 beds up to 197 beds).
- ◆ An additional operating theatre (9 theatres up to 10 theatres).including new Catheter Procedure Lab;
- ◆ Relocated CSSD with clean lift access to the theatre floor;
- ◆ Expanded radiology (MRI & external entrance).
- ◆ Expanded recovery area
- ◆ New elevated pedestrian connection from the Kingston Building to the Croudace Building.

This report is required to support a S75W modification to consent application to NSW Department of Planning and Environment.

The report has concluded the following;

- ◆ It is expected that the additional traffic generated by the modification to the hospital expansion project in the AM and PM peak period is likely to be up to 4 vtpm and 21 vtpm respectively.
- ◆ The local and state road network has sufficient spare capacity to cater for the additional development traffic without adversely impacting on current levels of service (LoS) experienced by motorists on the road network particularly given that current LoS are expected to improve significantly when the SH23 link from Jesmond to Rankin Park is constructed within 10 years.
- ◆ The additional traffic generated by the proposed development is less than 1 % of the current peak hour traffic volumes through the major intersections on the local road network. This is within the normal seasonal, weekly and daily peak hour variations on the road network therefore there will be little or no noticeable impact on the level of service currently experienced by motorists travelling through these the intersections within the local road network.
- ◆ No changes are proposed to the approved access arrangements off Jacaranda Drive.
- ◆ Sidra modelling of the Lookout Road / Jacaranda Drive has shown that this intersection will continue to operate satisfactorily post development with good levels of service, little delay and small queue lengths that do not exceed the sheltered turn bay length on Lookout Road.
- ◆ The development plans for the expansion of the hospital shows that on completion the hospital campus provides a total of 437 car parks, 25 motorbike spaces and in excess of 33 bicycle spaces. The proposed development complies with the requirements of the Newcastle DCP (2012) and sufficient and suitable on-site car parking is provided.
- ◆ The proposed parking supply exceeds the requirement of 244 car parks and 25 motorbike parks required within the Statement of Commitments under MP 08_0170, which includes the 200 spaces agreed to by the hospital when the land on which the development is to be located was purchased from Hunter New England Health.
- ◆ Servicing of the site will remain as per the approved hospital expansion.

- ◆ The modification to the expansion of the Newcastle Private Hospital does not alter the construction traffic impacts that the development will have on the local road network except that the additional floor level of construction will increase the construction period slightly. No further analysis is considered necessary as this has already been addressed in the original application.
- ◆ Existing pedestrian facilities in the vicinity of the site are satisfactory and no nexus exists for additional pedestrian facilities.
- ◆ The existing public transport services and infrastructure in the vicinity of the site is considered excellent and suitable for the development. Changes to the existing public transport system or additional infrastructure are therefore not required.
- ◆ Whilst the development is expected to generate some additional bicycle traffic the level of the increase will not be enough to warrant the provision of additional cycle ways in the vicinity of the site.

Having carried out this traffic and parking assessment for the proposed modifications to the Newcastle Private Hospital Expansion it is recommended that the proposal can be supported from a traffic perspective as it will not adversely impact on the local road network and complies with all relevant Newcastle City Council, Australian Standard and NSW Roads and Maritime Services requirements.

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1.0 INTRODUCTION

Intersect Traffic Pty Ltd has been engaged by Healthscope Operations Pty Ltd to prepare a Traffic and Parking Assessment for a proposed S75W modification to consent for its approved expansion under approval MP 08_0170 of the Newcastle Private Hospital at 158 Croudace Street and 14 & 20 Lookout Road, New Lambton Heights. The proposed modification seeks to provide an additional level and internal alterations to the approved new building (yet to be constructed), a new pedestrian linkway between the existing Kingston and Croudace buildings as well as internal alterations and additions to the existing hospital building (Kingston building). Concept development plans are provided in **Appendix A**.

In summary the modification results in the following changes to services and facilities;

- ◆ Deletion of 3 parking spaces (one each on B3, B2 and B1 to improve sight lines near the access ramps), for an overall reduction of 2 car parking spaces (382 to 380 total spaces).
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- ◆ Relocated CSSD with clean lift access to the theatre floor;
- ◆ Expanded radiology (MRI & external entrance);
- ◆ Expanded recovery area; and
- ◆ New elevated pedestrian connection from the Kingston Building to the Croudace Building.

This report is required to support a S75W modification to consent application to NSW Department of Planning and Environment and presents the findings of the traffic and parking assessment. It includes the following;

1. An outline of the existing situation in the vicinity of the site.
2. An assessment of the traffic impacts of the proposed development including the predicted traffic generation and its impact on existing road and intersection capacities.
3. Reviews parking, access, public transport, pedestrian and cycle way requirements for the proposed development, including assessment against Council, Australian Standards and the NSW Roads and Maritime Services (RMS) standards and requirements as required.
4. Presentation of conclusions and recommendations.



2.0 SITE DESCRIPTION

The subject site is shown in **Figure 1** below. It is located on the north-western corner of the Lookout Road and Jacaranda Drive signalised T-intersection at New Lambton Heights.

The site has frontage to both Lookout Road and Jacaranda Drive however access to the existing buildings is provided via Tea House Road which runs off Jacaranda Drive. Access to the new car park to be constructed as part of the expansion will also be off Jacaranda Drive. The Lookout Road / Jacaranda Drive intersection has been constructed as a signalised T-intersection with no left turn in off Croudace Road as no left turn deceleration lane has been provided.

Photograph 1 shows the existing site conditions while **Photograph 2** shows Jacaranda Drive in the vicinity of the approved car park access to the new building. **Photograph 3** shows the Lookout Road / Jacaranda Drive signalised T-intersection.



Figure 1 – Site Location



Photograph 1 – Development Site



Photograph 2 – Jacaranda Drive near proposed car park access



Photograph 3 – Lookout Road / Jacaranda Drive intersection

3.0 EXISTING ROAD NETWORK

3.1 – Lookout Road

Lookout Road is a classified main road (MR23) under the care and control of the NSW Roads and Maritime Services (RMS) and is a major arterial road in the region. It connects the Newcastle Inner City bypass to Newcastle Road and represents a major transport route for many commuters.

In the vicinity of the site it is essentially a four lane two-way sealed road with some adjacent parking lanes. Lane widths are in the vicinity of 3.5 metres and kerb and gutter and longitudinal drainage are located in various places along its edges. A 60 km/h speed limit applies to this section of road and at the time of inspection the Lookout Road was observed to be in good condition.

Photograph 4 shows Lookout Road in the vicinity of the site.



Photograph 4 – Lookout Road in the vicinity of the site

3.2 – Jacaranda Drive

Under a functional road hierarchy Jacaranda Drive would be considered a local internal collector road whose main function is to collect and convey traffic from the John Hunter Hospital Precinct to the arterial/sub-arterial road network at Lookout Road. The road is under the care and control of Hunter New England Health.

In the vicinity of the site it is essentially a two lane two-way sealed road with a 7 metre wide carriageway and kerb and gutter along its edges. There is no on-street parking permitted along the length of Jacaranda Drive which is also marked as an on-road cycleway.

A 40 km/h speed limit applies to this section of road as a high pedestrian and cycle activity zone and at the time of inspection Jacaranda Drive was observed to be in good condition. **Photograph 5** shows Jacaranda Drive in the vicinity of the site.



Photograph 5 – Jacaranda Drive in the vicinity of the site

4.0 ROAD NETWORK IMPROVEMENTS

Concept design and environmental assessment work is currently being undertaken for the extension of SH23 from Jesmond to the commencement of the Newcastle inner-city bypass at Rankin Park. This represents the missing link in the inner city bypass project and would improve traffic flow conditions and travel times for traffic from Bennett's Green to Sandgate. It would also provide traffic relief for Lookout Road by reducing traffic volumes particularly during peak periods. Recent advice from RMS is that traffic volumes are expected to reduce from 50,000 vpd to 30,000 to 35,000 vpd a reduction of between 30 % and 40 %. This would provide additional spare capacity within the local road network.

Based on the current program it would not be unreasonable to expect this new part of the road network to be constructed and opened within a 5 – 10 year timeframe.



5.0 TRAFFIC VOLUMES

The traffic report prepared by Better Transport Futures (May 2009) for the Newcastle Private Hospital Expansion determined the following internal traffic flows within the hospital in July 2008 as shown in **Table 1** below;

Table 1 – Hospital traffic volumes July 2008 - source Better Transport Futures (May 2009).

Road	Location	AM peak (vph)	PM peak (vph)
Kookaburra Circuit	west of Lookout Rd	1,012	1,046
Jacaranda Drive	west of Lookout Rd	220	181
Jacaranda Drive	south of Teahouse Rd	390	400

Northern Transport Planning and Engineering Services undertook a manual traffic count at the Lookout Road / Jacaranda Drive signalised intersection on Thursday 5th March 2015 so that Sidra modelling of this intersection could be carried out within this assessment. The count sheets are provided within **Appendix B**. This count has identified the following 2015 peak hour traffic volumes on the road network;

- ◆ Lookout Road – AM - 3,787 vph & PM – 3,502 vph; and
- ◆ Jacaranda Drive – AM – 239 vph & PM – 208 vph.

This count indicates background traffic growth on Jacaranda Drive west of Lookout Road as approximately 2 % per annum when comparing data from the two sources discussed above.

6.0 ROAD CAPACITY

The capacity of urban roads is generally determined by the capacity of intersections. However, Tables 4.3 and 4.4 of the RTA's *Guide to Traffic Generating Developments* provides some guidance on mid block capacities for urban roads and likely levels of service. These tables are reproduced below.

Table 4.3
Typical mid-block capacities for urban roads with interrupted flow

Type of Road	One-Way Mid-block Lane Capacity (pcu/hr)	
Median or inner lane:	Divided Road	1,000
	Undivided Road	900
Outer or kerb lane:	With Adjacent Parking Lane	900
	Clearway Conditions	900
	Occasional Parked Cars	600
4 lane undivided:	Occasional Parked Cars	1,500
	Clearway Conditions	1,800
4 lane divided:	Clearway Conditions	1,900

Table 4.4
Urban road peak hour flows per direction

Level of Service	One Lane (veh/hr)	Two Lanes (veh/hr)
A	200	900
B	380	1400
C	600	1800
D	900	2200
E	1400	2800

Based on these tables it is considered that the local road network around the site has a two way road capacity as follows if it is assumed in an urban area a LoS D is satisfactory;

- ◆ New England Highway (4 lane divided) – 5,600 vph: and
- ◆ Chisholm Road (2 lane undivided) – 2,800 vph.

From the traffic data collected in **Section 5** and noting the likely technical road capacity of the local road network (5,600 vph and 1,800 vph) is in excess of the existing traffic volumes on the network (peak 3,787 vph and 239 vph) it is considered that the adjacent road network is operating within its technical capacity and has scope to cater for additional traffic generated by new development.

7.0 ALTERNATE TRANSPORT MODES

Newcastle Buses and Ferries runs public transport (bus) services in the area. A review of the route maps and timetables for the service indicates that the site is well serviced by public transport with a number of routes passing the site.

A check of the Newcastle Buses and Ferries Route Maps shows the following routes pass the site;

- ◆ Route 100 – Charlestown to Newcastle;
- ◆ Route 222 – Wallsend to Newcastle East;
- ◆ Route 224 – Wallsend to Newcastle; and
- ◆ Route 363 – Wallsend to Newcastle.

These provide regular and frequent services to the site suitable for use by staff, patients and visitors. Bus stops are located on Lookout Road in close vicinity to the site as shown below in **Photograph 6**.

The Hospital precinct is also serviced by a regular shuttle bus service from Hunter Stadium at Broadmeadow to the Hospital as part of a park and ride system available for staff, patients and visitors. It is understood this service is popular with Newcastle Private Hospital staff however recent advice is that this service may end in the near future as the John Hunter Hospital opens a new multi-storey car park.

A network of concrete pedestrian footpaths exists in the area along the frontage of the hospital on Lookout Road and Jacaranda Drive. **Photographs 7 & 8** shows the existing pedestrian footpaths along Lookout Road and Jacaranda Drive respectively. Pedestrian crossing facilities are available at both signalised accesses to the Hospital precinct at Kookaburra Circuit to the south and at Jacaranda Drive.

Cyclists in the vicinity of the site are required to utilise the parking lanes or share travel lanes on the local road network. Jacaranda Drive is line marked as an on-road cycleway but is also shared with motor vehicles. On the whole existing cycle facilities are limited and bicycle travel to and from the site would only be suited to experienced cyclists.



Photograph 6 – Lookout Road bus stop in the vicinity of the site



Photograph 7 – Concrete Footpath – Lookout Road



Photograph 8 – Concrete Footpath – Jacaranda Drive

8.0 DEVELOPMENT PROPOSAL

The proposed modification seeks to provide an additional level and internal alterations to the approved new building (yet to be constructed), a new pedestrian linkage between the existing Kingston Building and Croudace Building as well as internal alterations and additions to the existing hospital building (Kingston Building). Concept development plans are provided in **Appendix A**. The detailed list of modifications is contained in **Table 2** below;

Table 2 Comparison Table outlining Modifications

KINGSTON BUILDING & NEW BUILDING		
	EXISTING & 2010 APPROVAL (incorporating 2014 mods to Kingston building as well)	PROPOSED MOD 2015
Basement B3	73 carpark	71 car parks [includes two disabled parking spaces], 6 motorcycle spaces
Basement B2	134 carpark (51 new + 83 exist) loading dock, stores and existing laundry	135 car parks (50 new + 85 exist), 5 motorcycle spaces, loading dock stores and CSSD relocated into existing laundry area.
Basement B1	113 carpark (70 new + 43 exist) & other (general stores etc).	111 car parks (72 new + 39 exist), 15 motorcycle spaces & other (general stores etc)
Ground	62 carpark (31 new & 18 new on-grade and 13 existing on-grade)	62 carpark (31 new includes 1 disabled space & 18 new built on-grade at entrance, 13 existing on-grade)
		Medical suites (1310 m ² GFA – within footprint of 2010 approval area)
	62 beds (30 new + 32 exist beds)	29 beds (29 exist)
	Radiology, pathology, oncology, rehab, clinic & general support areas	Expanded radiology, No change to pathology, oncology, rehab, clinic & general support areas
First	60 beds (30 new + 30 exist)	48 beds (16 new CCU with 15 existing ICU beds and 17 existing HDU beds)
	9 theatres [7 exist + 2 new]	10 theatres [7 exist + 2 new theatres plus a Catheter procedure Lab with holding + recovery]
		Expanded sterile stock store with clean lift access to the CSSD at basement level B2
	ICU, cardiac, CCU, day procedure, expanded recovery area to address the additional 2 theatres & general support areas	ICU, cardiac, CCU, day procedure, expanded recovery areas to address the additional 2 theatres and general support areas. A new elevated connection link to the Croudace Building with replanning to achieve connections
Second	60 beds (60 exist with general support areas)	90 beds (60 existing + 30 new with general support areas within the footprint of the 2010 approved area)
	medical suites (1310m ² GFA)	
Third	n/a	30 beds (30 new following the ward footprint layout of the second floor.)

Summary

	382 carparks	380 car parks (-2) – includes the 244 new spaces and 25 motorcycle spaces as per the Statement of Commitments under MP 08_0170.
Total Carparks		
Total Beds	182 beds	197 beds (+15)
Total Theatres	9 theatres	10 theatres (includes the Cath Lab))
Total Suites	medical suites (1310m ² GFA)	medical suites 1310m² GFA (no change)
Inclusions		Expanded Radiology (MRI & external entrance), expanded recovery area, relocated CSSD with clean lift access to the theatre floor + elevated connection link to the Croudace Building.

Note: Modifications also proposed to lifts, circulation and other minor alterations and additions not included in summary above

A more detailed explanation is provided below:

Basement Level B3

The layout is the current approved development plan:

- Jacaranda Drive car park entry and exit,
- provides for 71 car parking spaces of which two spaces are designated for disabled parking. 1 space deleted due to sight line issues,
- provides for 6 motorcycle parking bays,
- is a part raked floor to enable the lower area to be set-out below the loading dock,
- includes for two lifts positioned to suit the layouts of the clinical floors.

Basement Level B2

The layout is the current approved development plan with minor modifications:

- provides the service yard and loading zone area with access from Jacaranda Drive, the loading area is for all incoming goods and stores. The waste removal functions will remain with the existing dock,
- provides for 50 new car parking spaces [amendment to change car park connection ramp to existing car park + removal of 1 space due to sight line issues],
- provides for 5 motorcycle parking bays,
- includes for two lifts positioned to suit the layouts of the clinical floors,
- the existing laundry altered to house the new CSSD area,
- a new lift included to connect the CSSD area to the theatre floor [sterile access route], the existing goods lift will provide the dirty route from the theatre floor to the new CSSD,
- the existing Kingston Building provides for 85 car parking spaces on two part levels.

Basement Level B1

The layout is the current development approved plan with minor adjustments:

- provides for 72 car parking spaces [amendment to change car park connection ramp to existing car park to lower level + removal of 1 space due to sight line issues],
- provides for one way ramp connection between the existing car park entry and the new car park for parking control,
- provides for 7 motorcycle parking bays,
- includes for two lifts positioned to suit the layouts of the clinical floors,
- a new lift has been included to connect the CSSD area to the theatre floor [sterile access route],
- the existing Kingston Building provides for 39 car parking spaces including four disabled parking positions.

Ground Floor

The layout is the current development approved plan with minor amendments:

- provides for 31 car parking spaces with one designated disabled car park plus the 18 on-grade car park spaces at the hospital entrance,
- provides for 3 motorcycle parking bays,
- the DA approved layout was for a 30 bed ward, the modification is for an internal change of use to medical consulting suites,
- includes for two lifts positioned to suit the layouts of the clinical floors,
- a new lift has been included to connect the CSSD area to the theatre floor [sterile access route],
- the existing area occupied by radiology to be re-furbished and re-arranged for:
 - pre-admissions clinic,
 - pre-op admissions,
 - education meeting spaces,
- the existing pre-admissions clinic area can address for expansion of pathology or for other uses,
- the ground floor entry area and car park amended to address the structural requirements for the new first floor link between the Kingston and Croudace Buildings.

First Floor

The layout is the current development approved plan with minor amendments:

- the DA approved layout was for a 30 bed ward, the modifications is for an internal change of use to incorporate a Catheter Lab Procedure Suite and a 16 bed CCU with support areas,
- the DA approved layout included for 2 additional theatres in the eastern extension over the service dock, the modifications is for the area to house one theatre and sterile stock store,
- includes for two lifts positioned to suit the layouts of the clinical floors,
- the existing CSSD area to be re-organised for a new theatre and support spaces,
- a new lift has been included to connect the CSSD area to the theatre floor [sterile access route],
- the existing recovery area to the south to be extended to house the additional recovery bays associated with the additional two theatres as well as the connection link across to the Croudace Building.

Second Floor

The layout is the current development approved plan with a change of use modification:

- the DA approved layout was for medical consulting suites, the modification is for an internal change of use to a 30 bed ward,
- includes for two lifts positioned to suit the layouts of the clinical floors.

Third Floor

The layout is an extension to the current development approved plan:

- the modification is for an additional floor of the same area/perimeter footprint as the floors below,
- the extension layout is for relocating 30 bed ward from the ground floor to the third floor.

Roof Plan

The layout is an extension to the current development approved plan:

- the extension layout is for relocating the roof from over the second floor to over the fourth floor.

The modifications to the new building are primarily accommodated by:

- ◆ internal rearrangement;
- ◆ an additional floor to the approved footprint (1,310m²); and

- ◆ additional floor space at first floor level only (340m²), as part of an infill link at first floor level only between the approved building and the existing Kingston Building (to enable the integration of medical uses across the combined first floor of the existing, approved and proposed additional floor area).

The modifications to the Kingston Building are primarily accommodated by:

- ◆ internal rearrangements;
- ◆ additional floor space at first floor level (170m²) integrated with an additional elevated building link (180m²) between the existing Kingston and Croudace buildings (also owned by NPH and sited to the south-west); and
- ◆ Minor additional floor space for new lift associated with new central sterile supply department (combined 28m² across four levels).

Combined, the additional floor space to the new building and to the Kingston Building combined may be approximately 1,990m² (including the new pedestrian link to Croudace Building) and modifies the new building by an additional storey (from three storeys of hospital uses to four storeys of hospital uses, plus parking as approved).



9.0 TRAFFIC GENERATION

The previous traffic assessment for the hospital expansion (Better Transport Futures 2009) determined that;

The proposed development would generate in the order of 520 additional trips per day spread over the operating hours of 6.00 am to 6.00 pm, resulting in approximately 45 additional trips per hour. This traffic generation is based on the following expected operation of facilities being provided:

- *The 2 theatre suites will carry out approximately 10 operation per day each, this will generate 20 additional patients entering and leaving the hospital, equating to 80 vehicle trips per day. This number will be an average over a number of days as some patients will stay in hospital overnight and use the new in patients' beds.*
- *The 8 medical suites have the potential to generate 3 patients per hour, over an 8 hr day, resulting in an additional 192 patients visiting the hospital, generating 382 vehicle trips. Not all medical suites will operate every day or all day.*
- *In addition to this 60 additional staff trips will be generated.*

For the purpose of the original analysis an average peak hour trip generation of 45 vph in the AM peak was adopted while an increased PM peak of 55 vph was adopted to accommodate has been used. This was increased to 55 vehicles during the afternoon to account for administration staff trips.

In considering the impacts of the modification the following changes are likely to generate additional traffic;

- ◆ The additional 15 hospital beds;
- ◆ The additional operating theatre; and
- ◆ Additional 39 staff for hospital / laboratories.

The RMS' *RTA's Guide to Traffic Generating Developments* (the Guide) provides guidance on traffic generation rates for different land uses. The following advice is provided in the Guide in regard to the most relevant land-use of private hospitals for this development;

Peak Period Traffic Generation

Models

$$\begin{aligned} PVT &= -14.69 + 0.69 B + 0.31 ASDS & (R_2 = 0.74) \\ MVT &= -10.21 + 0.47 B + 0.06 ASDS & (R_2 = 0.64) \\ EVT &= -2.84 + 0.25 B + 0.40 ASDS & (R_2 = 0.69) \end{aligned}$$

Where

- PVT = Peak vehicle trips;
- MVT = Morning commuter peak hour;
- EVT = Evening commuter peak hour;
- B = No. Beds;
- ASDS = Average number of staff per weekday day shift;

For the purposes of this assessment, based on the methodology previously approved for the medical suites, the likely traffic generation increase from the modifications is considered to be;

Hospital beds and additional staff (RMS rates)

$$\text{MVT (AM)} = -10.21 + 0.47 \times 15 + 0.06 \times 39 = -0.82 \text{ say } 0 \text{ vtpd}$$

$$\text{EVT (PM)} = -2.84 + 0.25 \times 15 + 0.4 \times 39 = 16.51 \text{ say } 17 \text{ vtpd}$$

Operating theatre

10 operations per day resulting in 40 vtpd which equates to 4 vtpd based on a 10 hour day.

Therefore the additional traffic from the modifications is considered to be;

$$\text{AM peak hour} = 0 \text{ vtpd} + 4 \text{ vtpd} = \mathbf{4 \text{ vtpd}}$$

$$\text{PM peak hour} = 17 \text{ vtpd} + 4 \text{ vtpd} = \mathbf{21 \text{ vtpd}}$$

This additional traffic has been distributed onto the local road network as per the distribution pattern adopted in the traffic assessment for the original approval (Better Transport Futures 2009).

The assumptions made are;

- ◆ 60 % of traffic will access the site from Jacaranda Drive;
- ◆ Due to delays using the Lookout Road / Kookaburra Circuit signals vehicles accessing the site from Jacaranda Drive will use the internal roundabouts to undertake a U-turn movement and exit via Jacaranda Drive;
- ◆ In the AM peak 60 % of traffic will be inbound and in the PM peak 60 % of traffic will be outbound.
- ◆ Vehicles entering via Kookaburra Circuit are likely to utilise Tea House Road to access the existing car park rather than the new car park. This additional traffic will be offset by some existing users of the existing car park using the new car park as they currently access via Jacaranda Drive.

The resulting additional traffic distribution from the proposed amendment to the approved expansion of Newcastle Private Hospital will be as shown in **Figure 2** below;

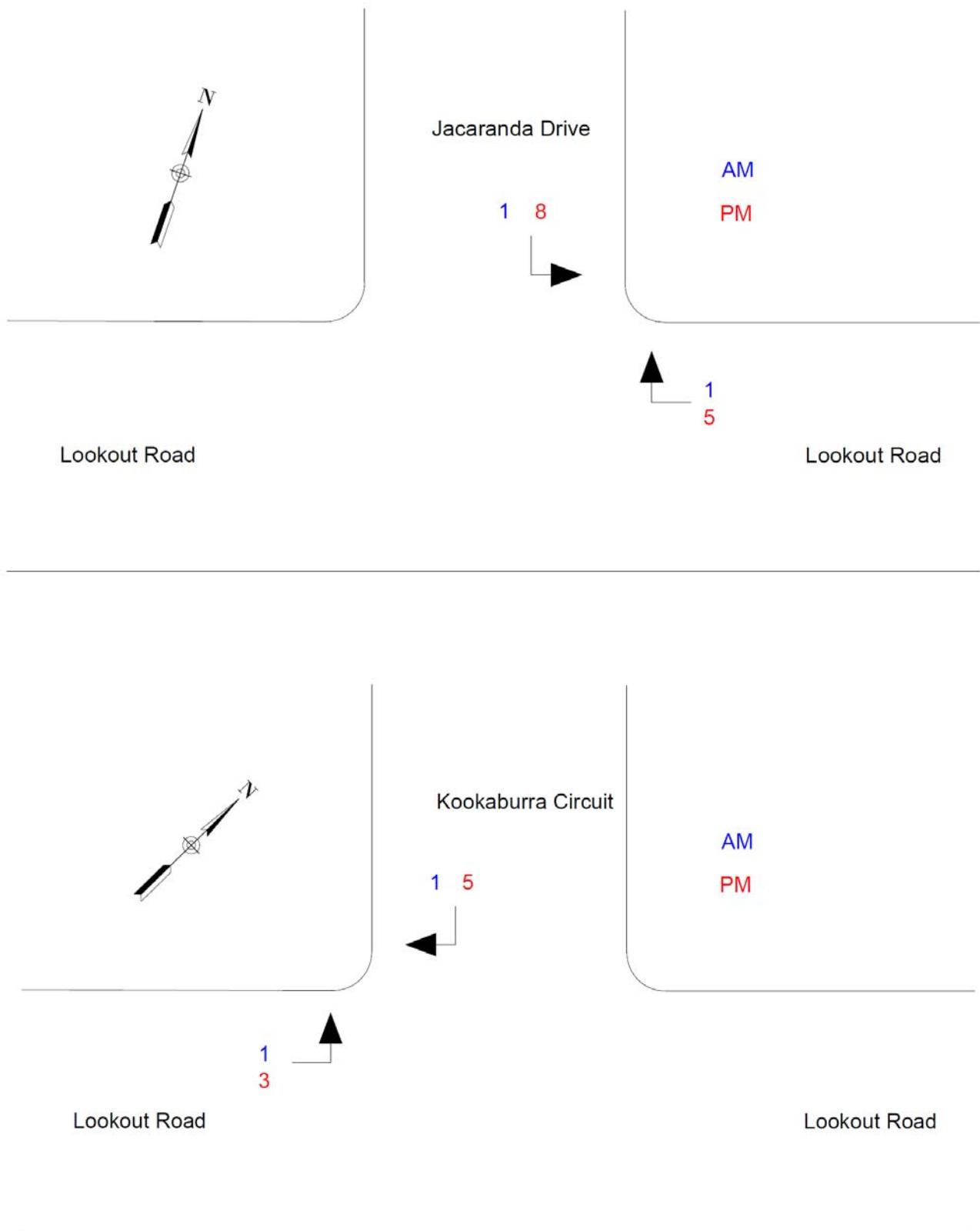


Figure 2 – Development Traffic trip distribution

10.0 TRAFFIC IMPACTS OF DEVELOPMENT

The traffic impacts that the development will have on the local road network include;

- ◆ The impact of the additional traffic generated by the development on the capacity of the road network;
- ◆ The road safety issues associated with the proposed access to the development; and
- ◆ The parking demand generated by the development.

10.1 – Road Network Capacity

It has previously been shown in **Section 6** of this report that the local road network is currently operating well within its technical capacity and the addition of up to 2 vehicle trips in the AM peak hour and 13 vehicle trips in the PM peak hours within the road sections (see **Figure 2**), resulting from this development, will not result in the technical two way mid-block road capacity thresholds being reached. Therefore this additional traffic will not result in any noticeable impact on traffic flows and the proposed development will not increase traffic congestion on the local road network.

The proposed construction of the State Highway 23 link from Jesmond to Rankin Park is likely within the next 10 years to reduce through traffic volumes on Lookout Road by up to 40 %. This will provide additional capacity within the road network therefore needs to be considered in this assessment. It is concluded there is sufficient spare capacity within the local road network to cater for the development through to at least 2025.

The additional traffic generated by the development also represents less than 1 % of existing traffic volumes on the major road network intersections during peak traffic periods. This is within the normal daily, weekly and seasonal variations associated with peak hour volumes. Therefore the additional traffic will not have any noticeable impact on nearby intersection performance on the road network during peak traffic periods.

To demonstrate this, the Lookout Road / Jacaranda Drive signalised intersection has been modelled using the Sidra 6 intersection modelling program. This software package predicts likely delays, queue lengths and thus levels of service that will occur at intersections. Assessment is then based on the level of service requirements of the RMS shown below;

Table 4.2
Level of service criteria for intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode

In carrying out this modelling the following assumptions have been made;

- ◆ Traffic count data collected by Northern Transport Planning and Engineering on Thursday 5th March 2015 was used.
- ◆ Signals are phased to minimise delay for the through travel lanes on Lookout Road;

- ◆ Development traffic from the approved modification was added, distributed as per assumptions made in Section 9;
- ◆ Development traffic from the proposed amendments to the modification were distributed as per **Figure 2**; and
- ◆ 2025 traffic volumes based on 2% per annum background traffic growth on Jacaranda Drive and 30% decrease in through traffic on Lookout Road due to construction of State Highway 23 link from Jesmond to Rankin Park.

The results of the modelling for the 'all vehicles' case are shown below in **Table 3** while the Sidra Movement Summary Sheets are provided in **Appendix C**.

Table 3 Sidra Movement Summary results – Lookout Road / Jacaranda Drive traffic signals

Modelled Peak	Degree of Saturation (v/c)	Average Delay (s)	Level of Service	95% back of queue length (cars)
2015 AM	0.735	11	A	33.8
2015 PM	0.678	9.9	A	31.7
2015 AM + expansion	0.753	11.8	A	33.9
2015 PM + expansion	0.703	10.8	A	32.1
2025 AM	0.870	19.6	B	23.2
2025 PM	0.866	19.6	B	21.4

This modelling shows that the intersection continues to operate satisfactorily post development with the development only increasing delays and queue lengths by less than 2 seconds and less than 1 vehicle respectively. The degree of saturation, average delay and queue lengths remain within the RMS criteria for satisfactory performance. With a drop in the through traffic volumes on Lookout Road expected with the construction of the SH23 link from Jesmond to Rankin Park the intersection operation improves with significant improvement in delay and queue lengths for Jacaranda Drive traffic. A similar impact would be expected on the Lookout Road / Kookaburra Circuit traffic signals.

Overall it is concluded that the modifications to the proposed Newcastle Hospital Expansion project will not adversely impact on the operation of the nearby intersections.

10.2 – Vehicular Access

The proposed modification to the approved expansion of Newcastle Private Hospital does not change the access conditions proposed. A left in and left out only access to the car park and access to the loading dock off Jacaranda Drive are proposed. These were previously assessed in the Better Transport Futures report (2009) and deemed to be suitable and appropriate. There is no need to further assess these accesses within this assessment.

10.3 – Off-Street Parking

Under Newcastle City Council's DCP (2012) the proposal is required to provide the following car parking requirements;

<i>Hospital</i>	<i>1 car space per 2 staff plus 1 car space per 3 beds; 1 bike space per 10 staff (Class 2) and 1 bike space per 10 staff (Class 3); and 1 motorbike park per 10 car parking spaces.</i>
<i>Health Consulting Rooms</i>	<i>1 car space per practitioner plus 1 space per 2 additional staff plus 2 spaces per practitioner for visitors; 1 bike space per 10 practitioners (Class 2) plus 1 bike space per 10 staff (Class 3); and 1 motorbike space per 20 car spaces.</i>

It is difficult to estimate the parking requirement for the medical suites because;

- ◆ The number of practitioners and other staff are not known; and
- ◆ The opening hours of each suite is not known. Most professional medical suites will not be open every day or parts of every day as the practitioner's attend to their hospital commitments and other practice locations. It is common within medical facilities such as this that only 75 % occupancy occurs at any one time.

Therefore as a conservative approach, the calculation of the medical suites parking requirements has been undertaken on the assumption that each medical suite contains 1 practitioner and 2 additional staff.

The total car parking requirement for the Newcastle Private Hospital campus including the existing Kingston and Croudace buildings is then determined using the following information provided by the applicant which indicates that upon completion of this expansion the Newcastle Private Hospital campus will have a total of;

- ◆ 10 medical consulting suites
- ◆ 237 beds; and
- ◆ Maximum of 148 staff (including doctors) per shift.

The resulting Newcastle DCP (2012) parking requirement for the overall Newcastle Private Hospital development on completion of the expansion can then be calculated as shown in **Table 4** below.

Table 4 *Newcastle DCP (2012) Parking requirements*

Land-Use	Component	Quantity	Car Spaces	Bike Spaces	Motorbike Spaces
Hospital	Beds	237	79	15 (Class 2)	7.9
	Staff	148	74	15 (Class 3)	7.4
Medical Suites	Practitioners	10	10	1 (Class 2)	0.5
	Staff	20	10	2 (Class 3)	0.5
	Visitors		20		1.0
		Total	193	16 (Class 2)	17
				17 (Class 3)	

Therefore the Newcastle Private Hospital campus under the Newcastle DCP (2012) is required to provide 193 car spaces, 33 bicycle spaces (Class 2 and 3) and 17 motorbike parks. The amended development plans for the expansion of the hospital shows that on completion the hospital expansion provides a total of 380 car parks, 25 motorbike spaces and in excess of 33 bicycle spaces. There are also approximately 57 on-site car parks currently servicing the Croudace building bringing the total car parking supply for the campus to 437 car parks.

Therefore the proposed development more than complies with the requirements of the Newcastle DCP (2012). It is also noted that the parking supply exceeds the requirement of 244 car parks and 25 motorbike parks required within the Statement of Commitments under MP 08_0170, which includes the 200 spaces agreed to by the hospital when the land was bought from Hunter New England Health.

It is also proposed to secure 180 spaces for staff use only therefore leaving around 200 spaces for use by the medical suite staff and visitors to the hospital and medical suites. The Newcastle DCP (2012) requirement for the visitors to the hospital and the medical suites is 99 spaces therefore sufficient visitor parking would be available within the car park even with the securing of 180 staff car parks.

The plans for the car park have been reviewed and they are considered to be compliant with Australian Standards AS2890.1-2004 *Parking Facilities – Part 1 – Off-street car parking*.

Overall it is concluded that the modified Newcastle Private Hospital expansion building provides sufficient and suitable car parking to meet the expected peak parking demand for the site.

10.4 – Construction Traffic

The modification to the expansion of the Newcastle Private Hospital does not alter the construction traffic impacts that the development will have on the local road network except that the additional floor level of construction will increase the construction period slightly. No further analysis is considered necessary as this has been addressed in the original application.

Construction traffic impacts are generally short term and can be managed through the preparation and implementation of a construction traffic management plan during construction. Such plans would detail strategies to minimise the construction impacts such as;

1. Temporary signage and line marking;
2. Regulated construction and delivery times and periods;
3. Designated construction parking areas on or off site;
4. Provision of suitably qualified traffic marshals;
5. Dust and noise mitigation measures;
6. Temporary works e.g. shoulder sealing, construction accesses etc.

These plans are best prepared by the construction contractor prior to commencement of construction i.e. at construction certificate stage. It would be expected that a requirement to prepare a construction traffic management plan prior to commencement of work would be contained within any conditions of approval for the project.



11.0 PEDESTRIAN FACILITIES

The proposed development will generate additional pedestrian traffic as visitors seek to utilise the services provided not only from the on-site car parking but from nearby bus stops. However a suitable concrete footpath network already exists around the site therefore it is concluded that no nexus exists for additional pedestrian facilities.



12.0 ALTERNATE TRANSPORT MODE FACILITIES

The proposed development may generate increased patronage of the existing public transport system (buses) however the site is already well serviced by public transport. There are also a number of nearby bus stops with seats and shelters in close proximity to the site and pedestrian facilities are considered suitable. Therefore it is concluded that the existing public transport services and infrastructure in the vicinity of the site is suitable for the development and no changes to the existing public transport system or additional infrastructure are required.

Similarly whilst the development is expected to generate some additional bicycle traffic the level of the increase will not be enough to warrant the provision of additional cycle ways in the vicinity of the site though end of trip facilities such as bike racks and amenities should be encouraged.

13.0 CONCLUSIONS

This traffic impact assessment for the proposed modification to the Newcastle Private Hospital expansion at 158 Croudace Street and 14 & 20 Lookout Road, New Lambton Heights has determined the following;

- ◆ It is expected that the additional traffic generated by the modification to the hospital expansion project in the AM and PM peak period is likely to be up to 4 vtp/h and 21 vtp/h respectively.
- ◆ The local and state road network has sufficient spare capacity to cater for the additional development traffic without adversely impacting on current levels of service (LoS) experienced by motorists on the road network particularly given that current LoS are expected to improve significantly when the SH23 link from Jesmond to Rankin Park is constructed within 10 years.
- ◆ The additional traffic generated by the proposed development is less than 1 % of the current peak hour traffic volumes through the major intersections on the local road network. This is within the normal seasonal, weekly and daily peak hour variations on the road network therefore there will be little or no noticeable impact on the level of service currently experienced by motorists travelling through these the intersections within the local road network.
- ◆ No changes are proposed to the approved access arrangements off Jacaranda Drive.
- ◆ Sidra modelling of the Lookout Road / Jacaranda Drive has shown that this intersection will continue to operate satisfactorily post development with good levels of service, little delay and small queue lengths that do not exceed the sheltered turn bay length on Lookout Road.
- ◆ The development plans for the expansion of the hospital shows that on completion the hospital campus provides a total of 437 car parks, 25 motorbike spaces and in excess of 33 bicycle spaces. The proposed development more than complies with the requirements of the Newcastle DCP (2012) and sufficient and suitable on-site car parking is provided.
- ◆ The proposed parking supply exceeds the requirement of 244 car parks and 25 motorbike parks required within the Statement of Commitments under MP 08_0170, which includes the 200 spaces agreed to by the hospital when the land on which the development is to be located was purchased from Hunter New England Health.
- ◆ Servicing of the site will remain as per the approved hospital expansion.
- ◆ The modification to the expansion of the Newcastle Private Hospital does not alter the construction traffic impacts that the development will have on the local road network except that the additional floor level of construction will increase the construction period slightly. No further analysis is considered necessary as this has already been addressed in the original application.
- ◆ Existing pedestrian facilities in the vicinity of the site are satisfactory and no nexus exists for additional pedestrian facilities.
- ◆ The existing public transport services and infrastructure in the vicinity of the site is considered excellent and suitable for the development. Changes to the existing public transport system or additional infrastructure are therefore not required.
- ◆ Whilst the development is expected to generate some additional bicycle traffic the level of the increase will not be enough to warrant the provision of additional cycle ways in the vicinity of the site.

14.0 RECOMMENDATION

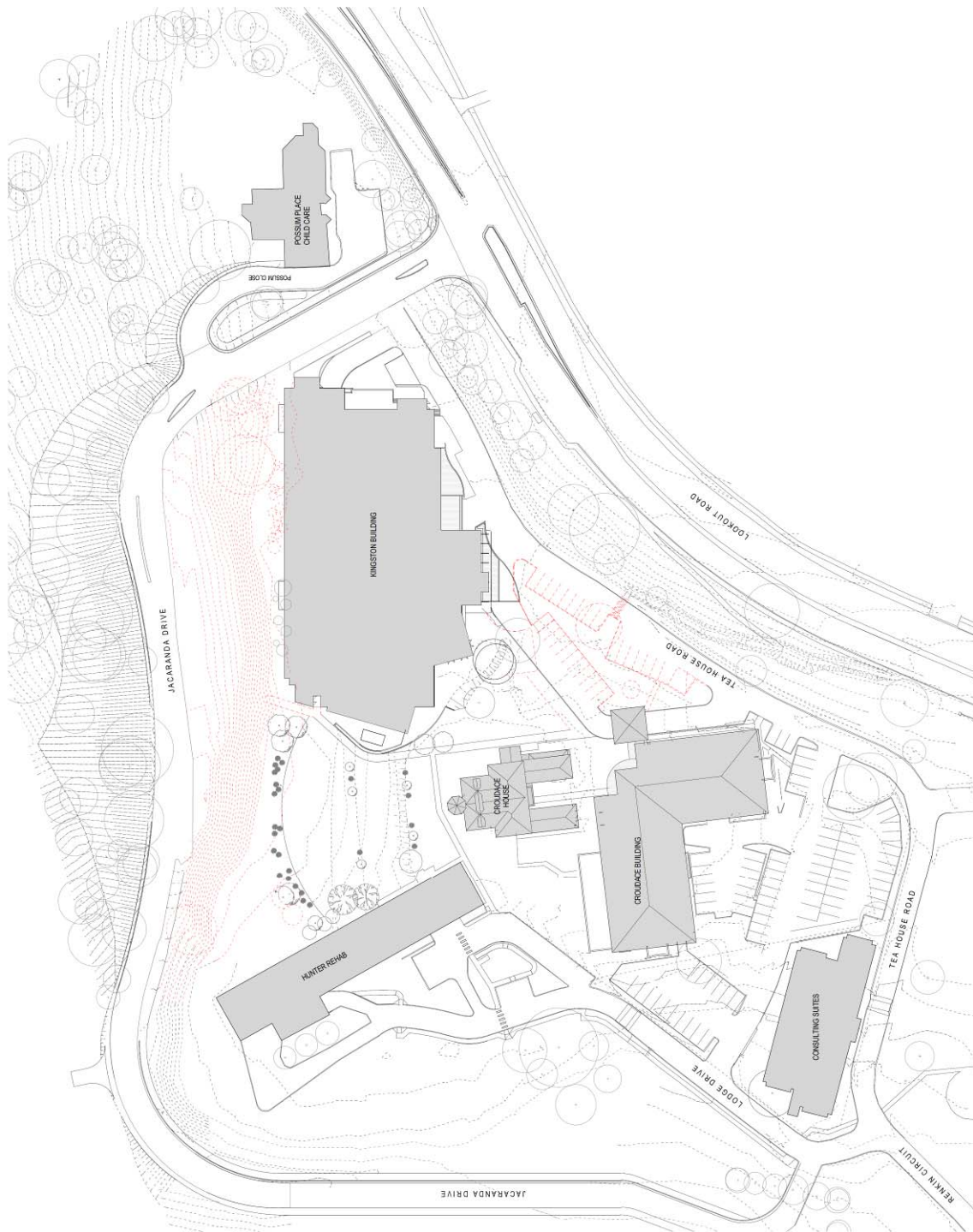
Having carried out this traffic and parking assessment for the proposed modification to the approved Newcastle Private Hospital expansion it is recommended that the proposal can be supported from a traffic perspective as it will not adversely impact on the local road network and complies with all relevant Newcastle City Council, Australian Standard and NSW Roads and Maritime Services requirements.



JR Garry BE (Civil), Masters of Traffic
Director
Intersect Traffic Pty Ltd

APPENDIX A

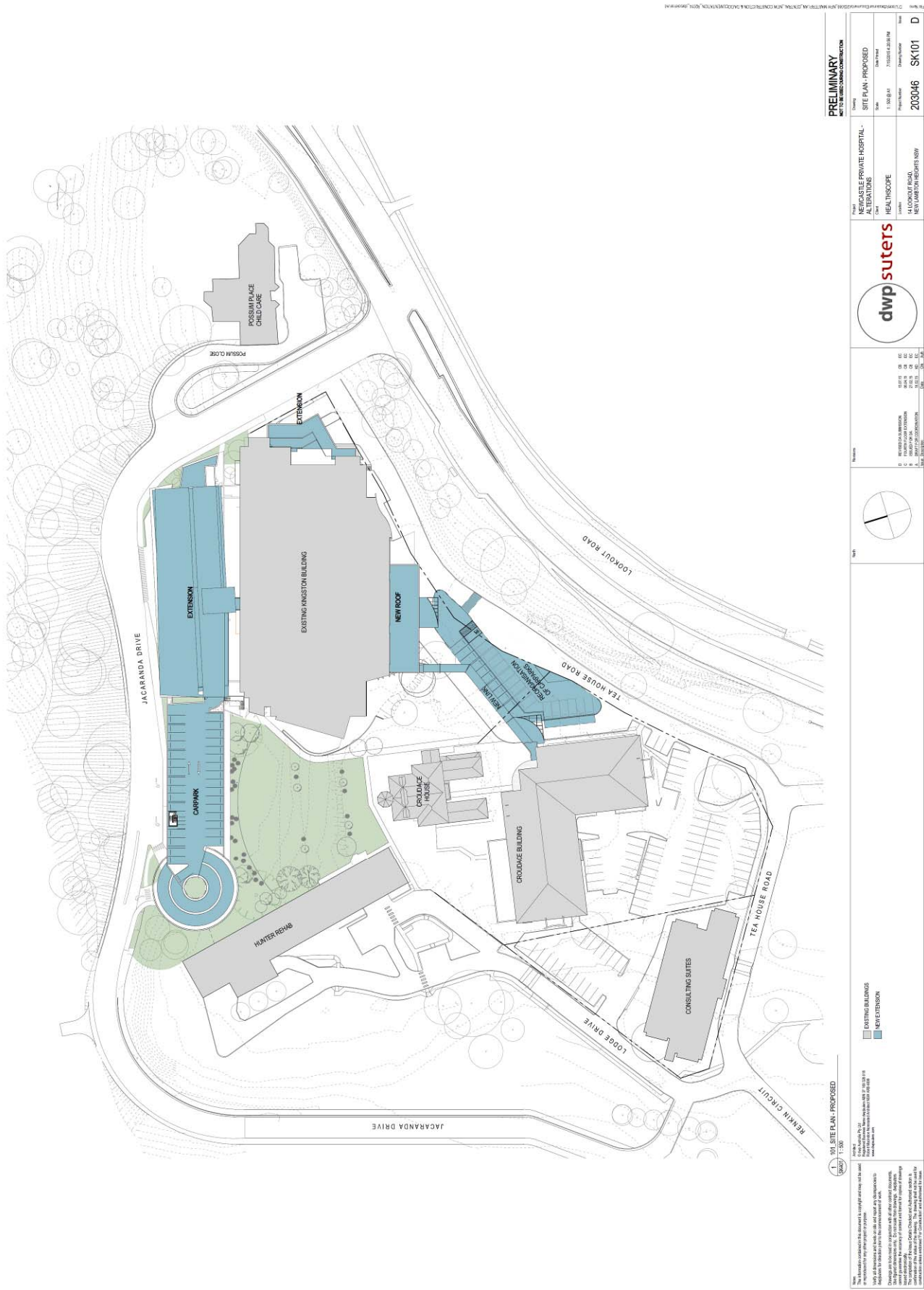
Development Plans

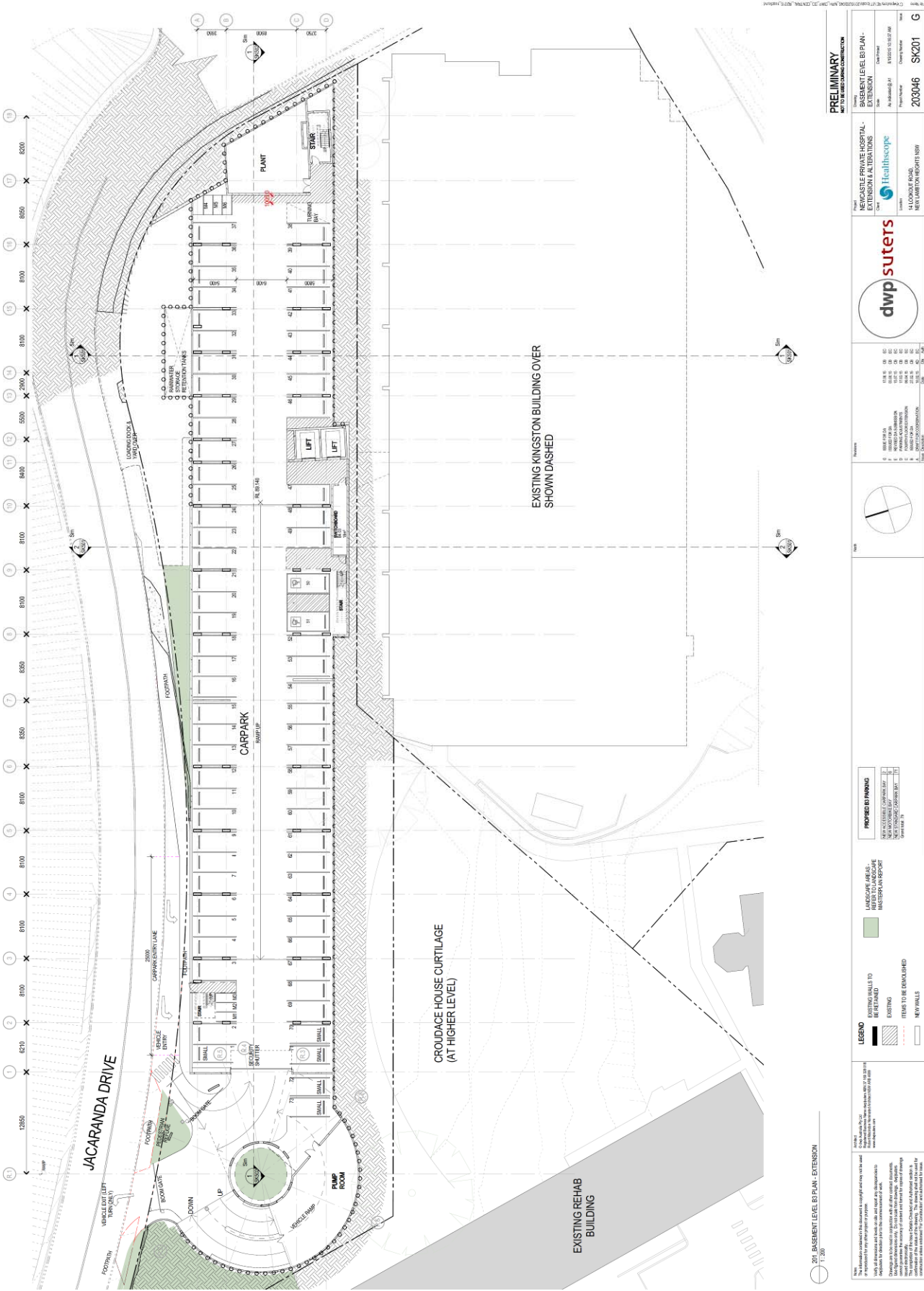


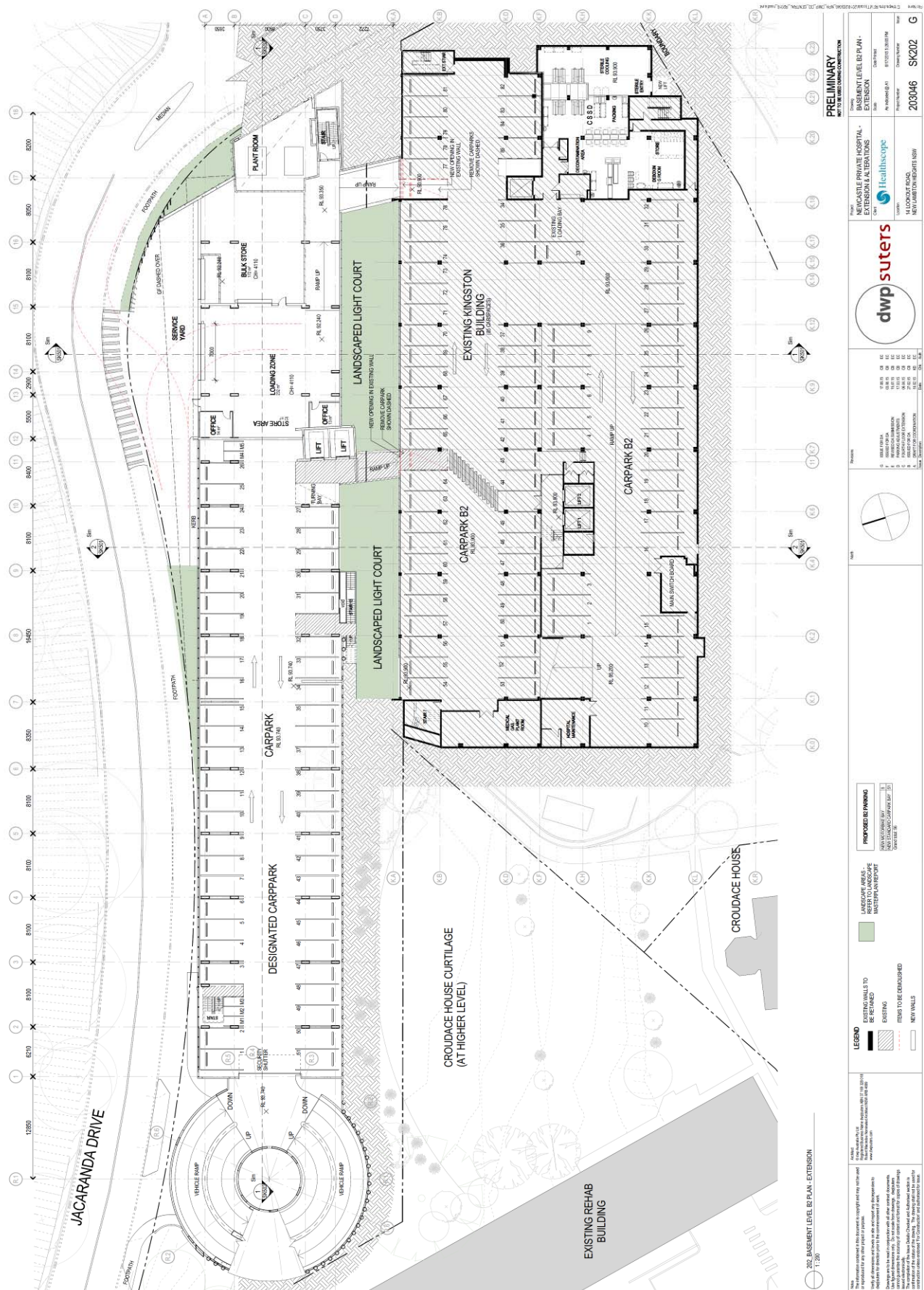
1 EXISTING SITE PLAN
SK401 1:500

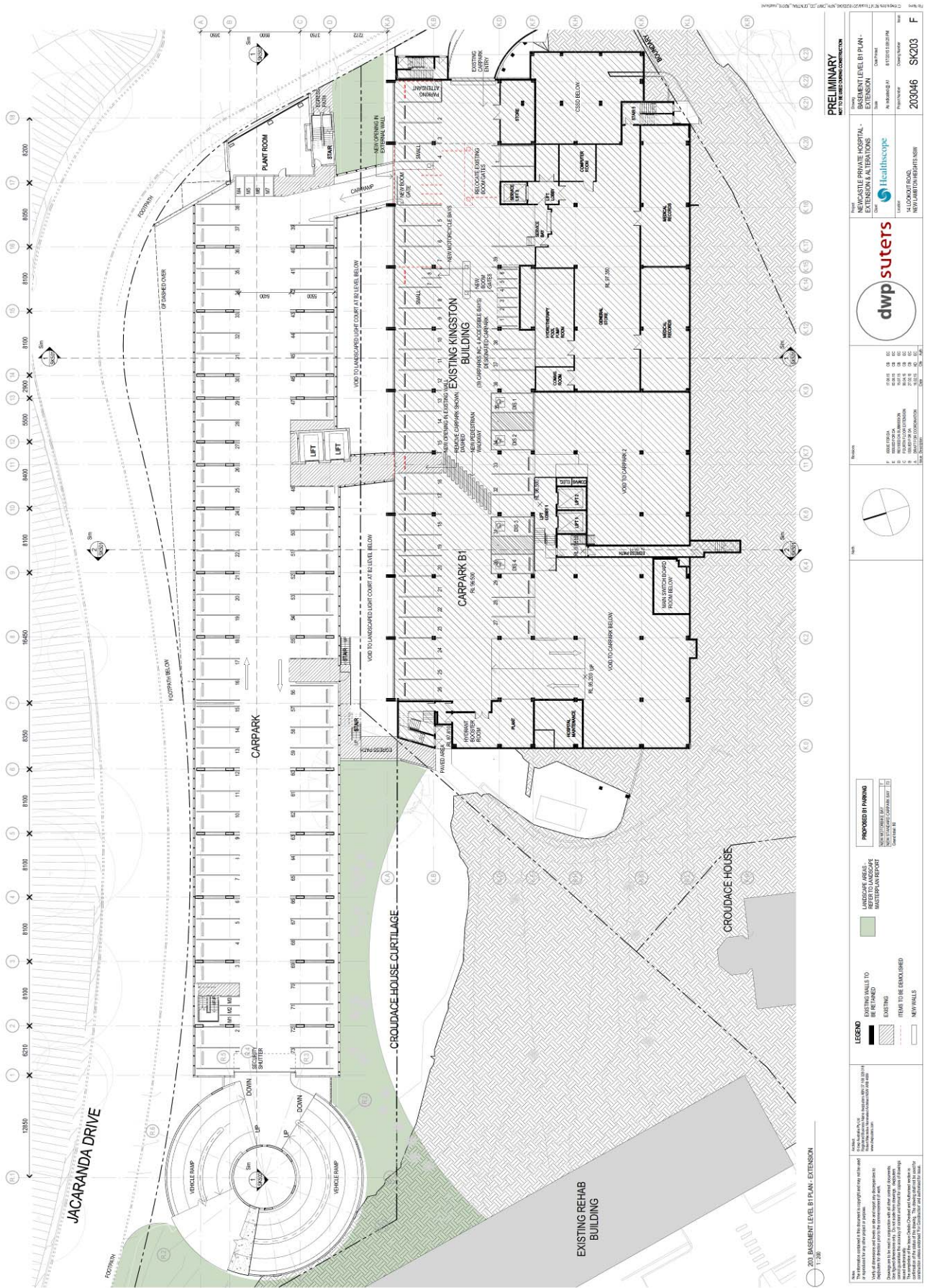
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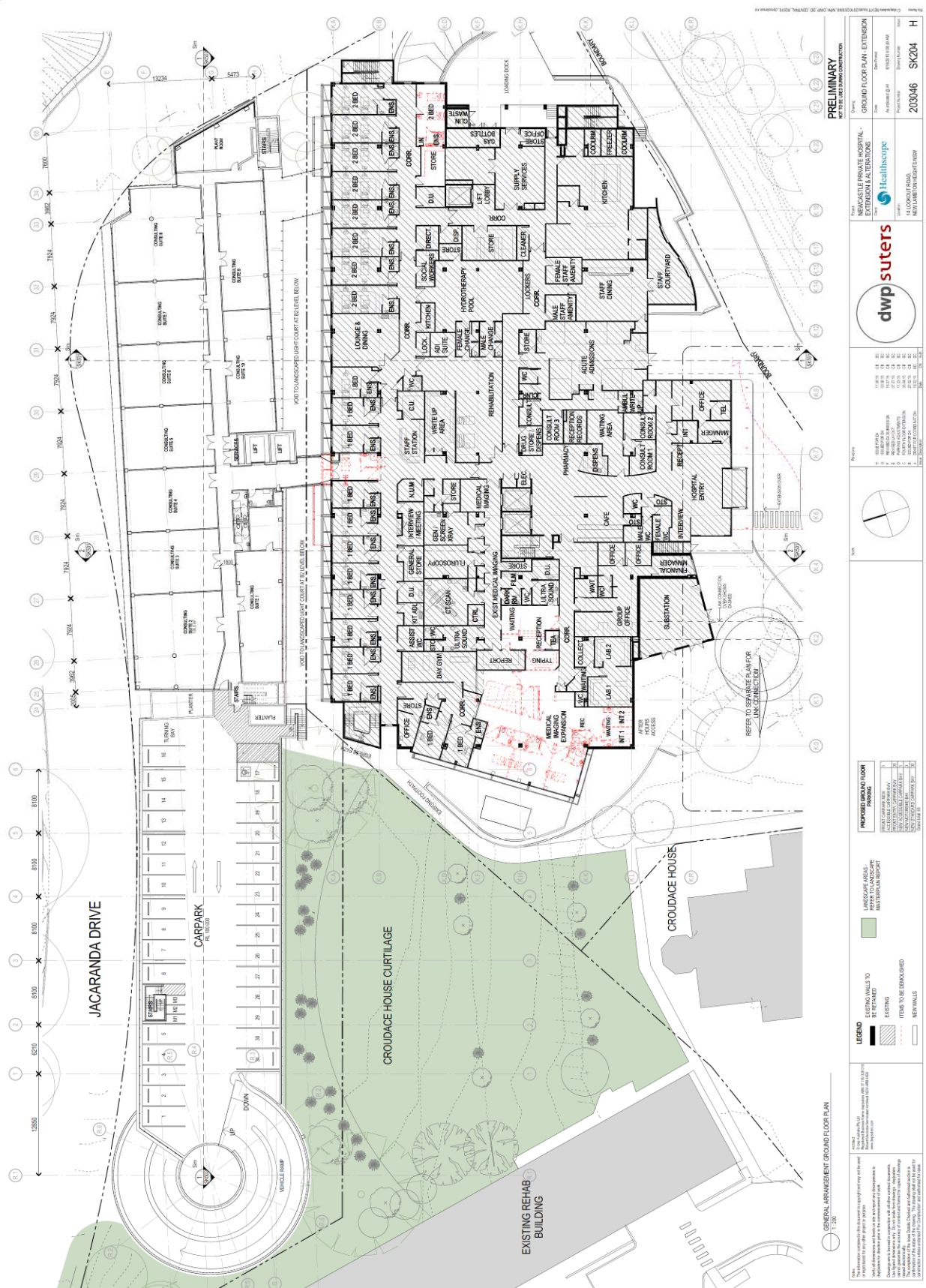




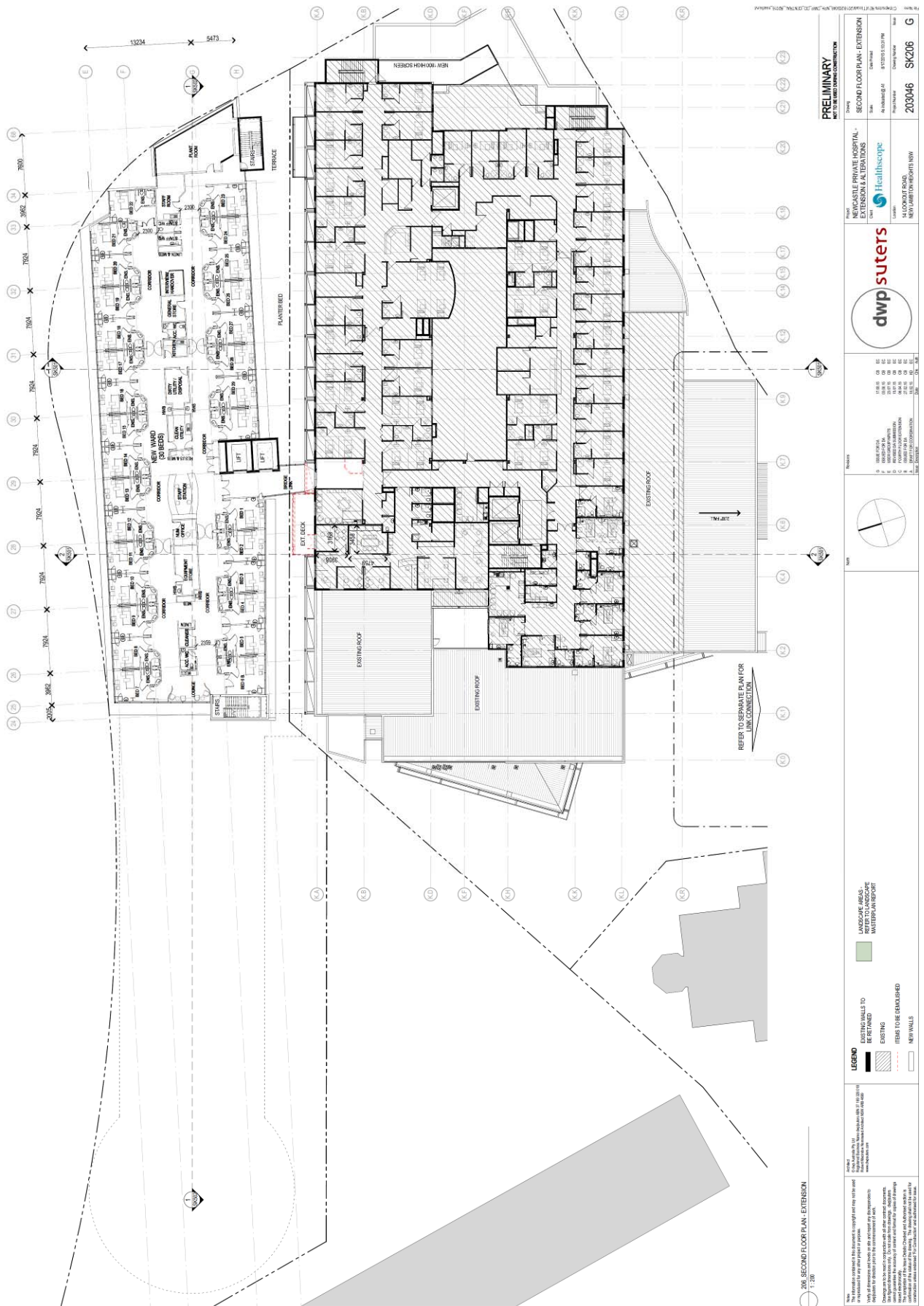


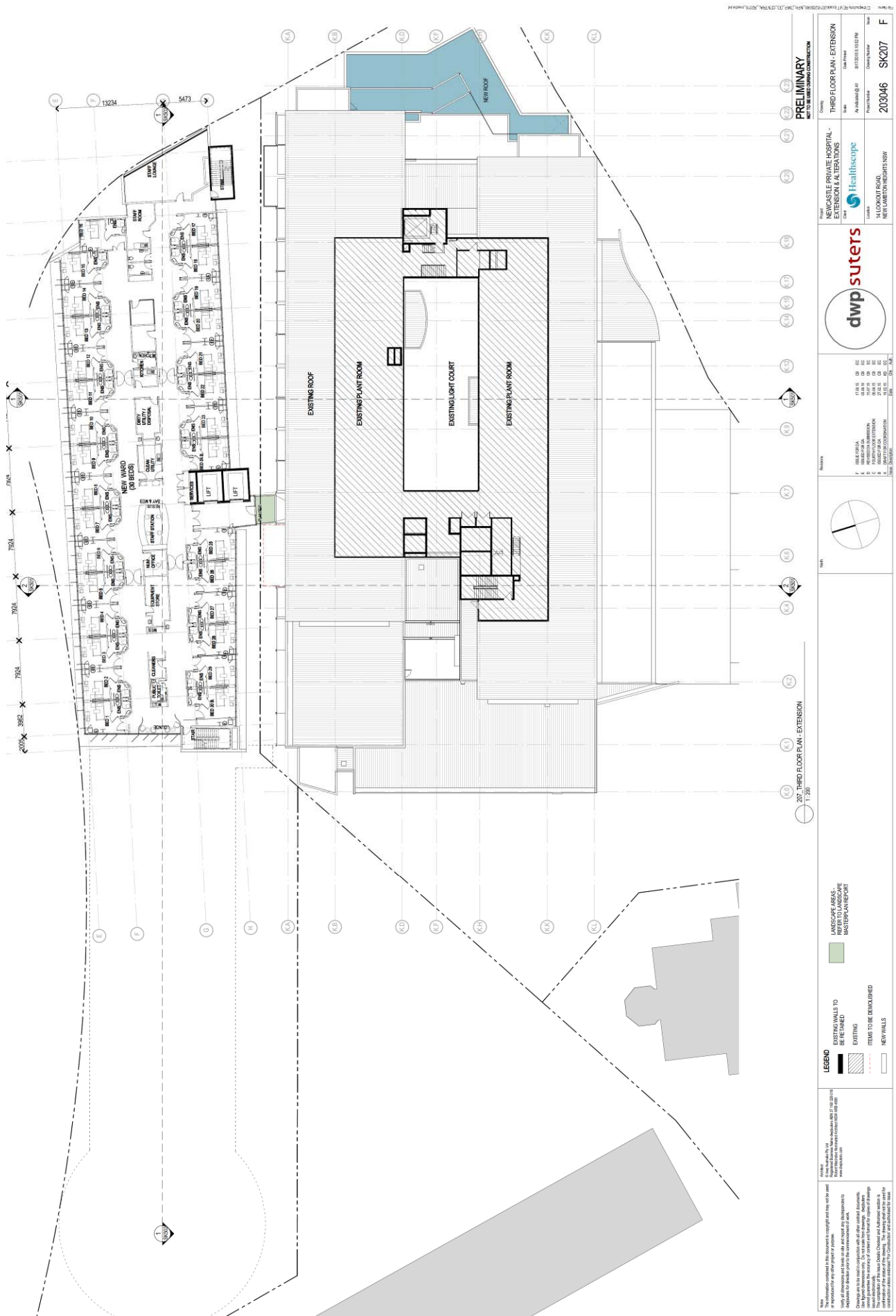


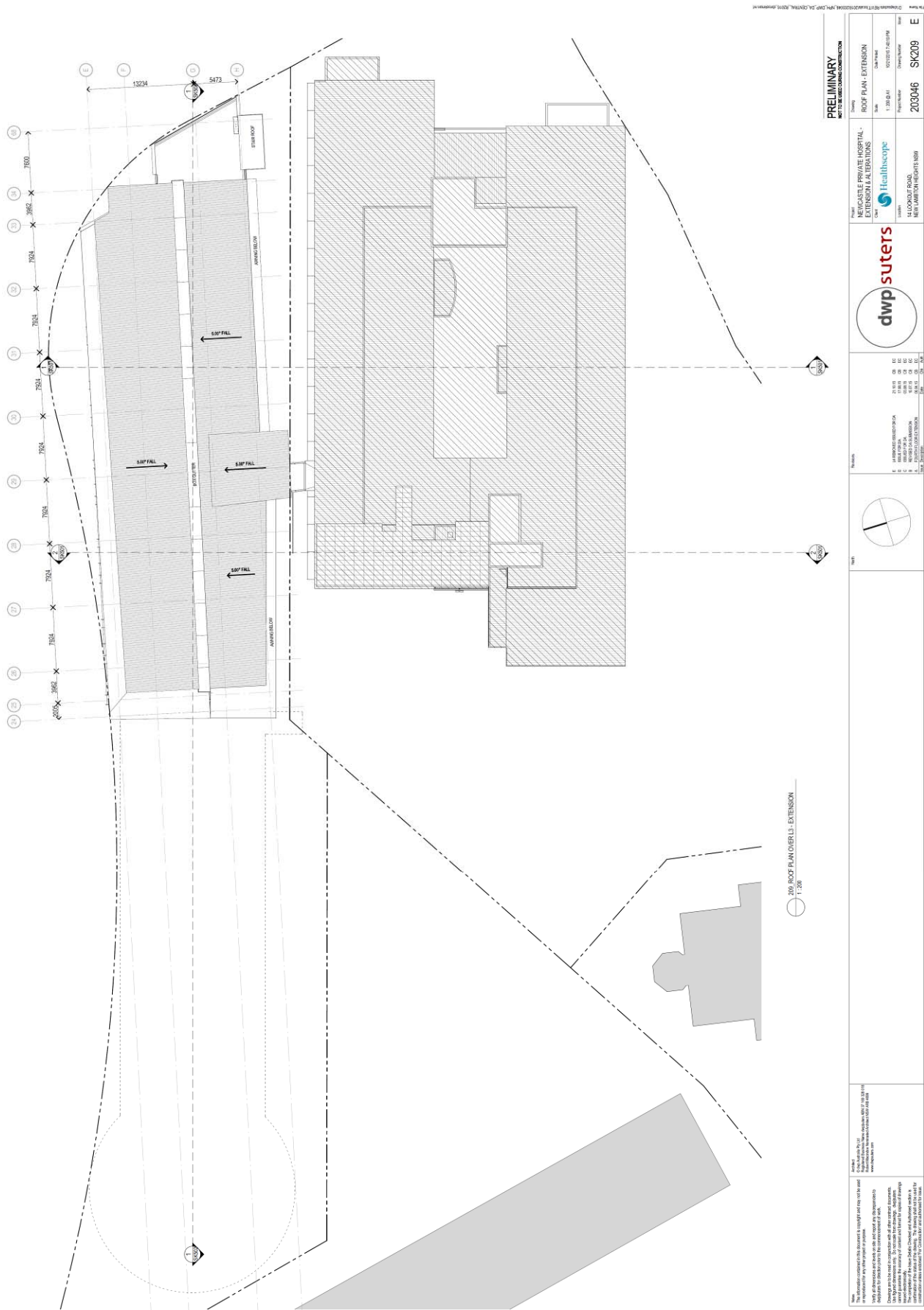


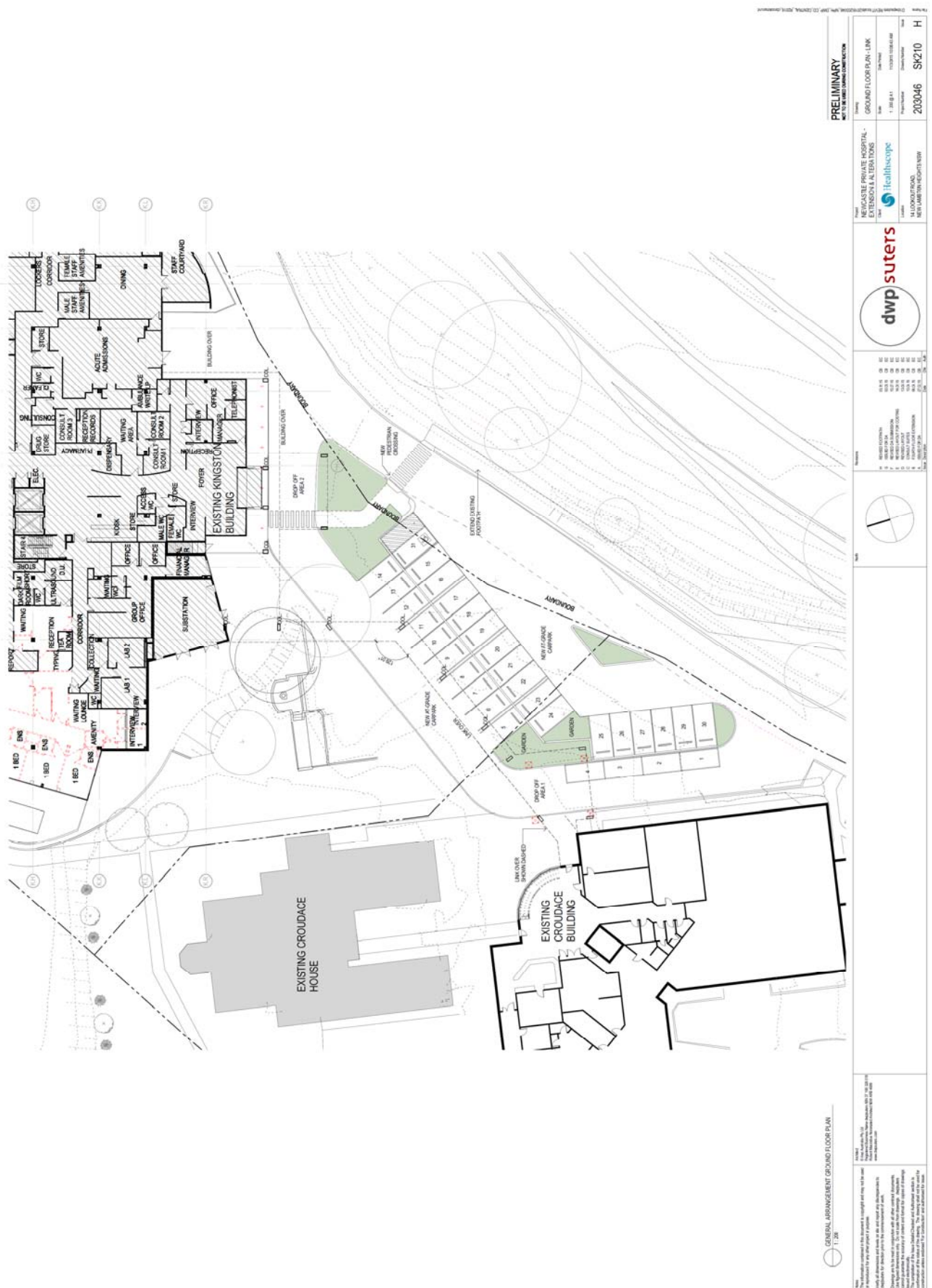


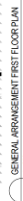




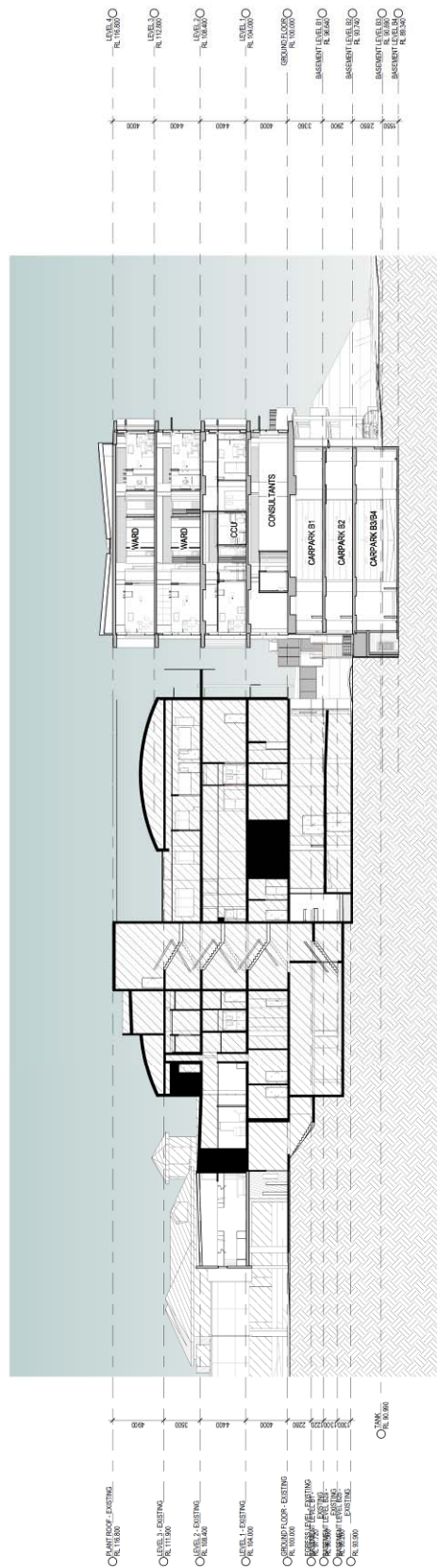
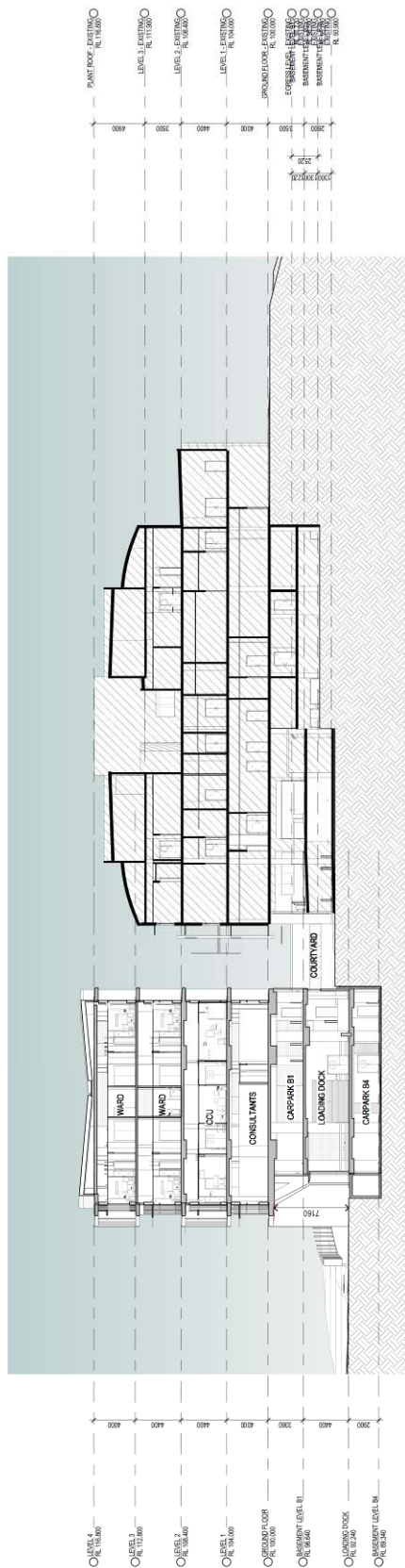


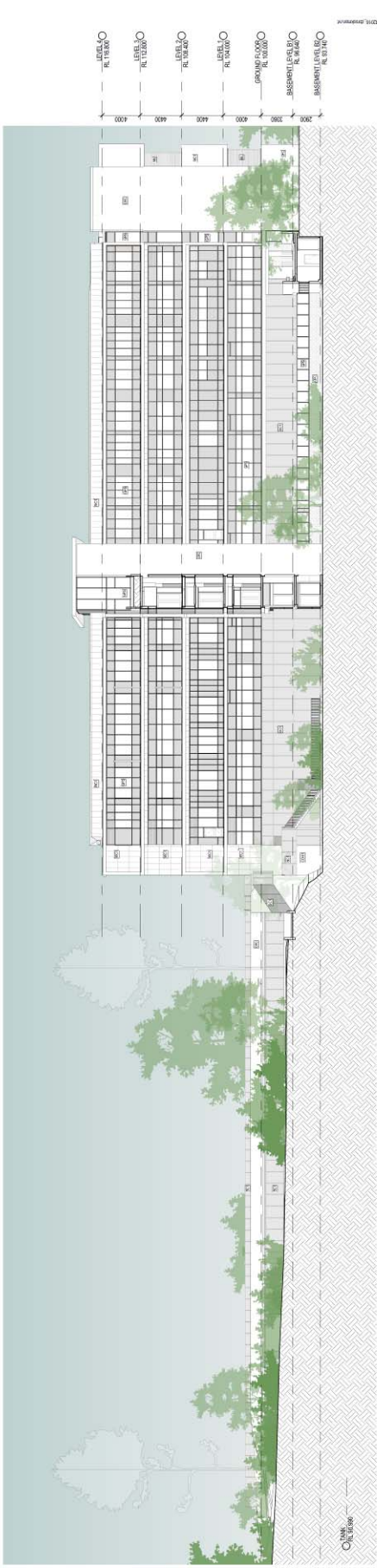
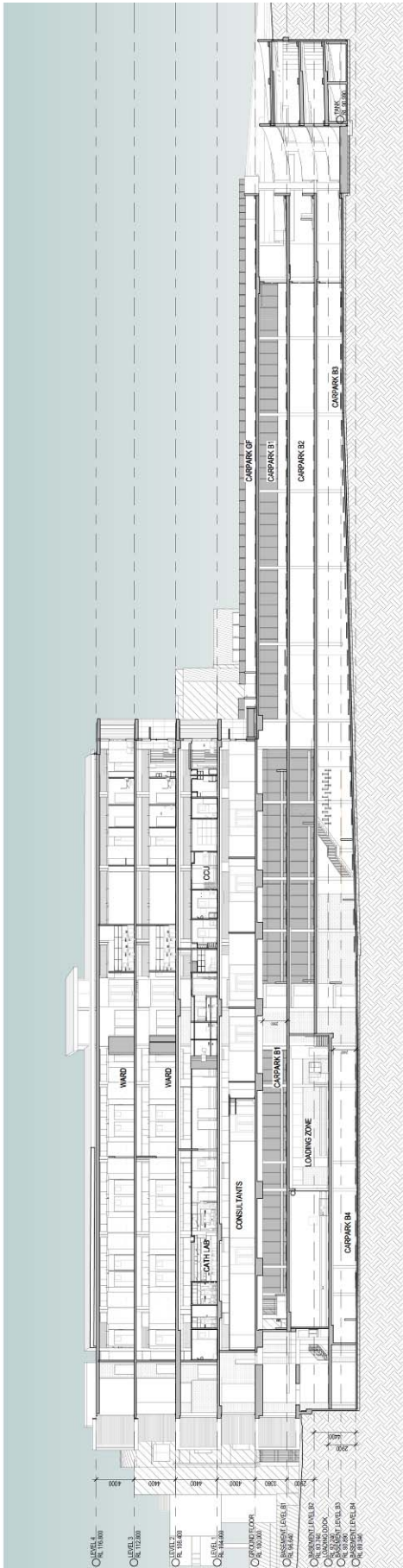




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PRELIMINARY		NOT FOR CONSTRUCTION	
Project	NEWCASTLE PRIVATE HOSPITAL - EXTENSION & ALTERATIONS	Client	HEALTHSCOPE
Drawn	1:200 (A1)	Date	1:200 (A1)
Checked	1:200 (A1)	Project Number	203046
Scale	1:200 (A1)	Drawing Number	SK502
Location	14 LODDOCK ROAD, NEWCASTLE NSW 1590	Sheet	F
dwpsuters			
REVISIONS			
NO.		DESCRIPTION	
1	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
2	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
3	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
4	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
5	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
6	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
7	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
8	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
9	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
10	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
11	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
12	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
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14	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
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17	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
18	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
19	20/01/20	ISSUED FOR PERMIT	1:200 (A1)
20	20/01/20	ISSUED FOR PERMIT	1:200 (A1)

APPENDIX B

Traffic Counts – Lookout Road / Jacaranda Drive.

5/3/2015 - LOOKOUT RD / JACARANDA DR, NEW LAMBTON

8:30 <<< HOUR ENDING

Thursday

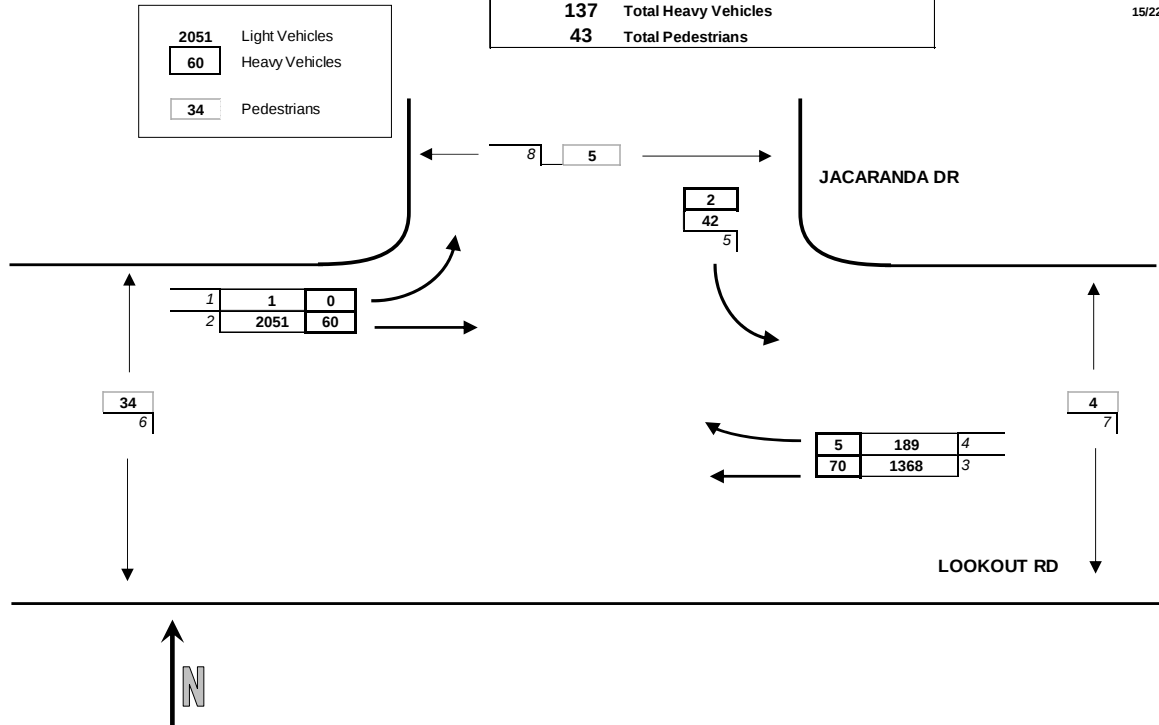
Summary:

LOOKOUT RD / JACARANDA DR

3651 Total Light Vehicles
137 Total Heavy Vehicles
43 Total Pedestrians



Quality Surveys
15/2292



5/3/2015 - LOOKOUT RD / JACARANDA DR, NEW LAMBTON

	Light Vehicles					Total Vehicles 15 MIN HOUR	Pedestrians		
	1	2	3	4	5		6	7	8
07:15	0	359	256	23	4	642	2	1	0
07:30	0	513	283	34	11	841	3	0	3
07:45	1	523	331	45	13	913	9	1	2
08:00	0 <	493	357	60	11	921 3317	14	2 <	2 <
08:15	0 <	530 <	360	41	7 <	938 3613	5	0	0 <
08:30	0 <	505	320 <	43 <	11 <	879 3651 <	6 <	1 <	1
08:45	0	491	320	35	7	853 3591	5	1 <	2
09:00	0	491	346	30	10	877 3547	1	0	1
	Heavy Vehicles					Total Vehicles 15 MIN HOUR			
	1	2	3	4	5				
07:15	0	8	13	0	1	22			
07:30	0	11	14	1	0	26			
07:45	0	13	14	1	0	28			
08:00	0	15	17	2	0	34 110			
08:15	0	20	12	1 <	2	35 123			
08:30	0	12 <	27 <	1 <	0	40 137 <			
08:45	0	10	13	0	1	24 133			
09:00	0	17	16	0	1 <	34 133			
	All Vehicles					Total Vehicles 15 MIN HOUR			
	1	2	3	4	5				
07:15	0	367	269	23	5	664			
07:30	0	524	297	35	11	867			
07:45	1	536	345	46	13	941			
08:00	0 <	508	374	62	11	955 3427			
08:15	0 <	550 <	372	42	9 <	973 3736			
08:30	0 <	517	347 <	44 <	11 <	919 3788 <			
08:45	0	501	333	35	8	877 3724			
09:00	0	508	362	30	11	911 3680			

Note: Arrows "<" indicate the end time for the peak hour for each turning movement.

5/3/2015 - LOOKOUT RD / JACARANDA DR, NEW LAMBTON

18:00 <<< HOUR ENDING

Thursday

Summary:

LOOKOUT RD / JACARANDA DR

3455 Total Light Vehicles

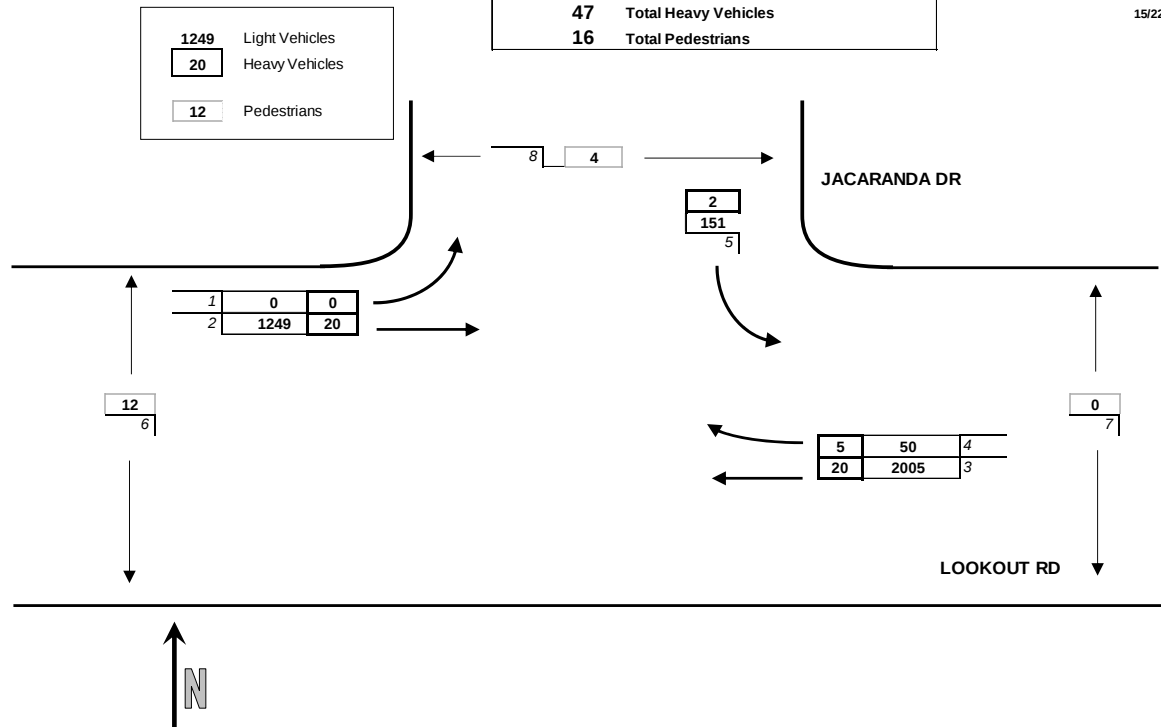
47 Total Heavy Vehicles

16 Total Pedestrians



Quality Surveys

15/2292



5/3/2015 - LOOKOUT RD / JACARANDA DR, NEW LAMBTON

Light Vehicles

1 2 3 4 5

Total Vehicles
15 MIN HOUR

Pedestrians

6 7 8

16:15	1	320	394	13	45	773
16:30	0	319	486	19	34	858
16:45	0	323	471	15	36	845
17:00	0 <	299 <	458	14	59	830 3306
17:15	0	310	496	16 <	40	862 3395
17:30	0	312	473	10	47	842 3379
17:45	0	310	455	11	45 <	821 3355
18:00	0	317	581 <	13	19	930 3455 <

2	1	0
4	0	0
16	0	1
4	0 <	1
6 <	0	1
3	0	2 <
1	0	0
2	0	1

Heavy Vehicles

1 2 3 4 5

Total Vehicles
15 MIN HOUR

16:15	0	8	12	3	2	25
16:30	0	9	12	1	0	22
16:45	0	8	10	1	1	20
17:00	0	2 <	6 <	0 <	0 <	8 75 <
17:15	0	4	6	2	2 <	14 64
17:30	0	7	3	0	0 <	10 52
17:45	0	5	6	2	0	13 45
18:00	0	4	5	1 <	0	10 47

All Vehicles

1 2 3 4 5

Total Vehicles
15 MIN HOUR

16:15	1	328	406	16	47	798
16:30	0	328	498	20	34	880
16:45	0	331	481	16	37	865
17:00	0 <	301 <	464	14	59	838 3381
17:15	0	314	502	18 <	42	876 3459
17:30	0	319	476	10	47	852 3431
17:45	0	315	461	13	45 <	834 3400
18:00	0	321	586 <	14	19	940 3502 <

Note: Arrows "<" indicate the end time for the peak hour for each turning movement.

APPENDIX C

Sidra Movement Summary Tables

MOVEMENT SUMMARY

Site: 2015 AM - amended expansion

Lookout Road / Jacaranda Drive signals

Signals - Fixed Time Cycle Time = 113 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Lookout Road											
5	T1	1438	5.0	0.518	6.8	LOS A	16.7	121.6	0.46	0.43	54.0
6	R2	218	3.0	0.753	58.0	LOS E	12.2	87.8	1.00	0.87	27.3
Approach		1656	4.7	0.753	13.5	LOS A	16.7	121.6	0.54	0.48	47.8
North: Jacaranda Drive											
7	L2	56	5.0	0.196	48.6	LOS D	2.7	19.9	0.91	0.73	28.8
Approach		56	5.0	0.196	48.6	LOS D	2.7	19.9	0.91	0.73	28.8
West: Lookout Road											
11	T1	2112	3.0	0.752	9.4	LOS A	33.9	243.3	0.65	0.61	51.9
Approach		2112	3.0	0.752	9.4	LOS A	33.9	243.3	0.65	0.61	51.9
All Vehicles		3824	3.8	0.753	11.8	LOS A	33.9	243.3	0.60	0.56	49.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P3	North Full Crossing	8	5.7	LOS A	0.0	0.0	0.32	0.32	
P4	West Full Crossing	38	50.7	LOS E	0.1	0.1	0.95	0.95	
All Pedestrians		46	42.9	LOS E			0.84	0.84	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 2025 AM - amended expansion

Lookout Road / Jacaranda Drive signals

Signals - Fixed Time Cycle Time = 54 seconds (Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Lookout Road											
5	T1	1000	5.0	0.596	12.5	LOS A	10.2	74.2	0.81	0.71	49.8
6	R2	262	3.0	0.432	21.1	LOS B	5.5	39.7	0.82	0.79	37.6
Approach		1262	4.6	0.596	14.2	LOS A	10.2	74.2	0.81	0.72	46.6
North: Jacaranda Drive											
7	L2	67	5.0	0.112	17.1	LOS B	1.2	9.1	0.72	0.68	38.3
Approach		67	5.0	0.112	17.1	LOS B	1.2	9.1	0.72	0.68	38.3
West: Lookout Road											
11	T1	1480	3.0	0.870	24.2	LOS B	23.2	166.8	0.97	1.08	42.9
Approach		1480	3.0	0.870	24.2	LOS B	23.2	166.8	0.97	1.08	42.9
All Vehicles		2809	3.8	0.870	19.6	LOS B	23.2	166.8	0.89	0.91	44.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P3	North Full Crossing	10	12.0	LOS B	0.0	0.0	0.67	0.67	
P4	West Full Crossing	46	21.4	LOS C	0.1	0.1	0.89	0.89	
All Pedestrians		55	19.7	LOS B			0.85	0.85	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 2015 PM - amended expansion

Lookout Road / Jacaranda Drive signals

Signals - Fixed Time Cycle Time = 129 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Lookout Road											
5	T1	2025	1.0	0.700	7.7	LOS A	32.1	226.9	0.53	0.50	53.2
6	R2	73	9.0	0.300	60.4	LOS E	4.2	31.8	0.94	0.77	26.8
Approach		2098	1.3	0.700	9.5	LOS A	32.1	226.9	0.55	0.51	51.5
North: Jacaranda Drive											
7	L2	181	1.0	0.703	63.0	LOS E	11.3	80.0	1.00	0.85	25.9
Approach		181	1.0	0.703	63.0	LOS E	11.3	80.0	1.00	0.85	25.9
West: Lookout Road											
11	T1	1269	2.0	0.429	5.5	LOS A	13.5	96.2	0.38	0.34	55.0
Approach		1269	2.0	0.429	5.5	LOS A	13.5	96.2	0.38	0.34	55.0
All Vehicles		3548	1.5	0.703	10.8	LOS A	32.1	226.9	0.51	0.47	50.1

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P3	North Full Crossing	4	5.0	LOS A	0.0	0.0	0.28	0.28	
P4	West Full Crossing	12	58.7	LOS E	0.0	0.0	0.95	0.95	
All Pedestrians		16	45.3	LOS E			0.79	0.79	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

 **Site: 2025 PM - amended expansion**

Lookout Road / Jacaranda Drive signals

Signals - Fixed Time Cycle Time = 52 seconds (Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Lookout Road											
5	T1	1420	1.0	0.866	23.7	LOS B	21.4	151.1	0.98	1.08	43.1
6	R2	88	9.0	0.145	18.5	LOS B	1.6	11.8	0.72	0.73	38.7
Approach		1508	1.5	0.866	23.4	LOS B	21.4	151.1	0.96	1.06	42.9
North: Jacaranda Drive											
7	L2	217	1.0	0.340	17.4	LOS B	4.2	29.6	0.78	0.75	38.3
Approach		217	1.0	0.340	17.4	LOS B	4.2	29.6	0.78	0.75	38.3
West: Lookout Road											
11	T1	1190	2.0	0.731	15.2	LOS B	13.6	97.1	0.89	0.83	48.0
Approach		1190	2.0	0.731	15.2	LOS B	13.6	97.1	0.89	0.83	48.0
All Vehicles		2915	1.6	0.866	19.6	LOS B	21.4	151.1	0.92	0.94	44.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P3	North Full Crossing	5	12.5	LOS B	0.0	0.0	0.69	0.69	
P4	West Full Crossing	14	20.4	LOS C	0.0	0.0	0.89	0.89	
All Pedestrians		19	18.4	LOS B			0.84	0.84	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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