

# Technical Design Note

**Project:** Proposed Kings Hill development

**Subject:** Traffic review for internal roads

**Date:** 5<sup>th</sup> October 2016

**Attention:** Jason Wasiak

We have now completed our assessment work for the internal road network for the Kings Hill development site and provide the following summary and advice for the internal roads associated with the development.

This assessment has been based upon the following information provided:

- Copy of the Master planning layout net developable area prepared by Northrop dated 13/9/16
- Copy of GHD Kings Hill Traffic Study provided by JWP
- Copy of Collector Road Cost Estimate (email of 5<sup>th</sup> October from Jason Wasiak)
- Extract of Kings Hill VPA (email of 27/9/16 from Jason Wasiak)
- Design concept plans prepared by Northrop Engineering for access to Newline Road (CSK108 and 109)
- Email from Jason Wasiak dated 28/9/16 re: Newline Speed Zone Review
- Copy of Kings Hill Urban Release Area Traffic Assessment prepared by The Transport Planning Partnership dated 20/06/2016.

## Internal road carriageway design requirements

Based on the lot numbers provided and allowing for the current traffic generation rates provided by the Roads and Maritime Service (RMS) for residential development, for the external traffic, we have calculated a potential peak one-way flow of 1,345 vehicles per hour which is close to capacity for the one travel lane over the Pacific Highway. Austroads provides advice on the capacity of roads and indicates under ideal conditions the traffic flow can be up to 1,400 (maximum) and 1,200 desirable maximum whilst 900-1,000 per hour is typical.

When determining the peak hour flows for the development, the peak number is derived by applying all the peak hour movements in one hour. It would be reasonable to argue that this is not valid for Kings Hill as for example, the distribution allows for 12% of trips to Tomago and 9% to Williamstown whilst at the same time allowing for 18.2% to Raymond Terrace CBD. Businesses in the industrial area in Tomago generally starts at around 6.30am and work through to 2.30pm whilst Williamstown also have an early start, but the peak hour traffic to Raymond Terrace will not be until 8.30am. Therefore, these peak trips will not occur at the same time and effectively you will have peak hour spread from Kings Hill. Whilst the predicted traffic flows will be realised, they may occur over a 1.5 to 2-hour period and be less peaky.

Applying this argument, peak flows could be reduced by 20% giving around 1,076 vehicles in one direction in a single travel lane, which is within the limits applied by the RMS and Austroads. This value is for the critical PM peak for inbound traffic with the AM peak outbound traffic volume being less. Based on this, the single lane of travel across the Pacific Highway is considered valid for the development.



For the internal link flows, we have calculated the numbers at a point between the lots developments at zone 1a/1b and zone 4a, which is approximately the centre location for the internal east-west road. We have determined that:

- the internal traffic flow within the development during the morning peak is 301 vehicles and external traffic flows are 689.
- This gives total two-way flows of 990 vehicles during the morning peak.
- Allowing for the directional split of 80:20 (worst case) this gives a potential peak flow in the morning period of 792 in one-direction.
- Allowing for the ideal lane upper capacity of 900 vehicles this indicates that a single lane of travel is adequate in the AM peak.

Applying the same principals and in the same location on the road network, during the PM peak the internal flows are:

- 334 and external traffic flows are 755, giving a total of 1089 vehicles two-way.
- Allowing for the worst case directional peak flow of 80% this gives a peak flow of 871 which is below the ideal threshold for a single lane (900 vehicles).

Based on the above data, a single lane of travel in both directions is considered appropriate for the length of the east-west link road through the site.

With regard to the design of this road, a number of options have been put forward for consideration. Council's Kings Hill DCP provides advice as well as the Council Design Specification. The Kings Hill DCP design for a 2 way one lane configuration is considered appropriate, although the requirement for parking to both sides of the road should be reviewed, especially as for the majority of the length there is only development to one side. It is noted however that this design allows for a 3.5 metres wide carriageway which is not suitable for buses, instead a lane width of 4.0 metres is required. A 4.0 m wide lane would also cater for on-street cycling.

A 3.0 m wide median lane also allow for a vehicle to prop in the median when turning right off the east-west link road without blocking the through traffic movements, which would be of benefit for various minor intersections along its length.

The provision of high quality off road footway / cycleways also needs to be considered. Providing a quality path along the southern side of the east-west link road would be advantageous, to provide a connection to the sport fields and commercial centre. There are also less side roads to cross along this side of the road.

### Intersection of East-West link road and the North-South link road

Design flows based on the information provided have been determined for the morning and afternoon peak hour movements at the intersection of the East-West and the North-South link roads and the traffic volumes modelled using Sidra. Two options have been reviewed for this intersection:

- Roundabout control
- Traffic signal control

A summary of the results of the Sidra assessment, for the full development flows are provided below.

*Table 1 – Roundabout control option with full development flows*

Approach	Level of Service	Delay (seconds)	Queue (metres)
Commercial centre	A / A	6.9 / 13.3	5.1 / 58.2
From Pacific Hwy	B / A	16.1 / 7.2	32.0 / 67.2
Northern leg	B / A	17.9 / 6.1	55.8 / 3.7
Western leg	A / A	7.0 / 9.9	29.9 / 12.6
Overall	A / A	11.1 / 9.5	55.8 / 67.2

Note- results given for AM / PM peak periods

Table 2 – Signal control option with full development flows

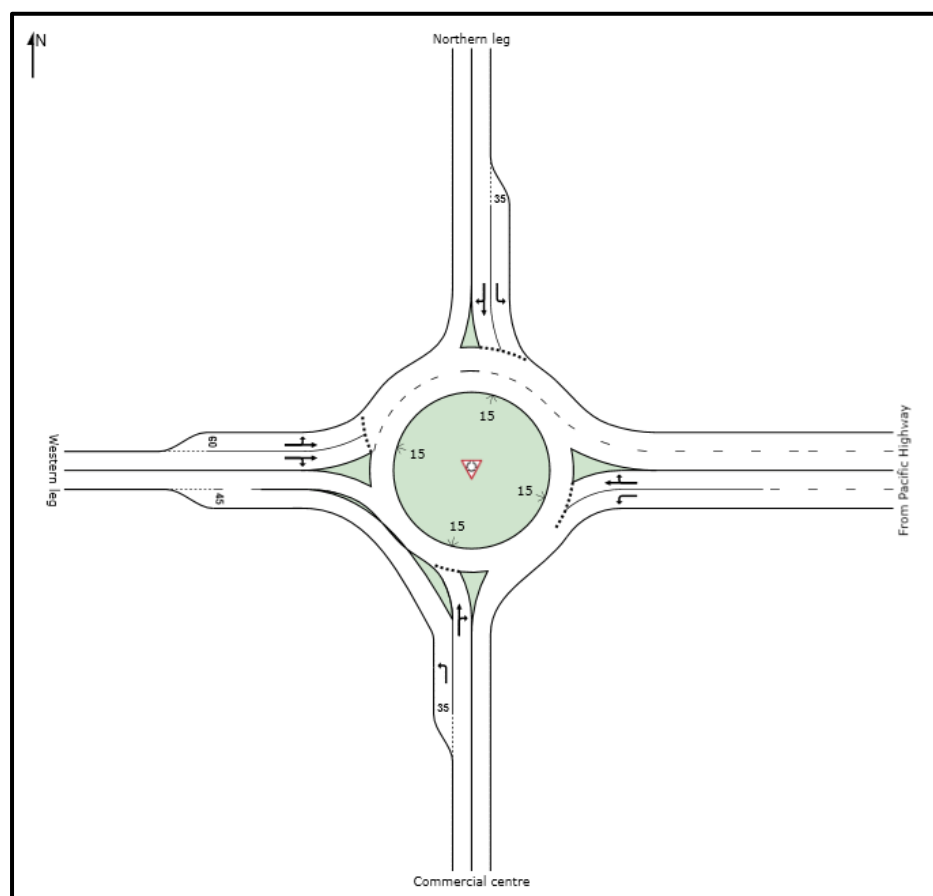
Approach	Level of Service	Delay (seconds)	Queue (metres)
Commercial centre	B / C	16.5 / 41.8	12.1 / 140.6
From Pacific Hwy	B / B	26.0 / 23.3	43.6 / 195.1
Northern leg	C / B	41.4 / 28.5	204.5 / 22.7
Western leg	C / A	41.2 / 13.4	147.3 / 20.6
Overall	C / B	37.4 / 27.9	204.5 / 195.1

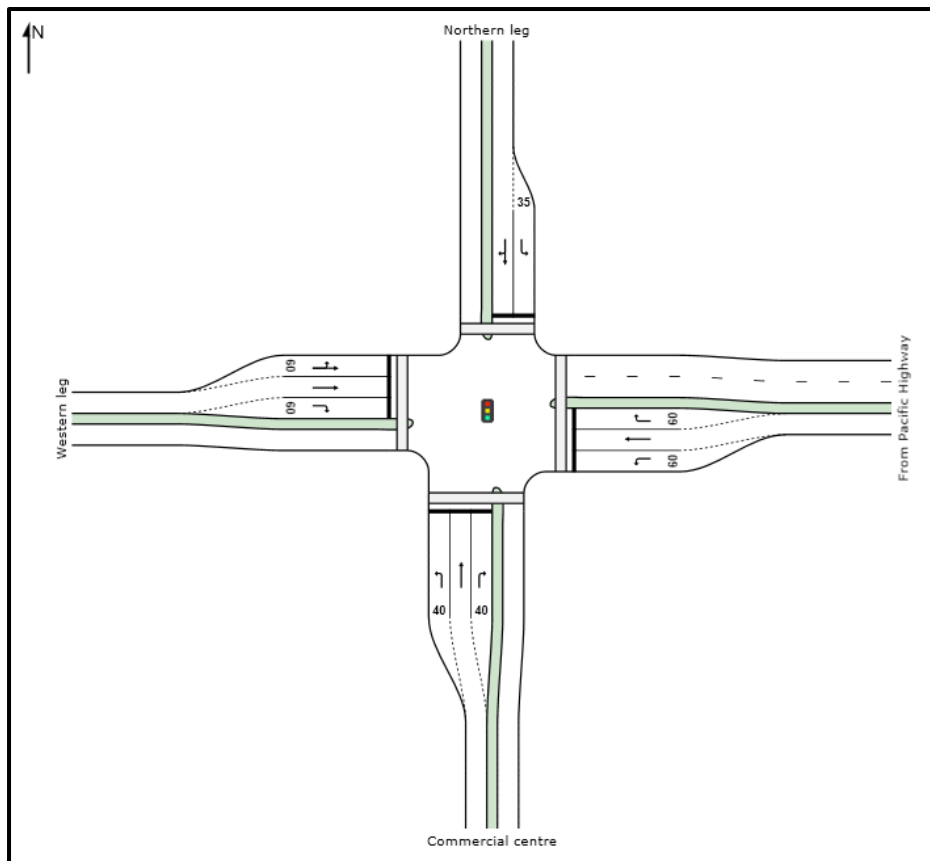
Note- results given for AM / PM peak periods

Based on the results above, it can be seen that the proposed roundabout offers a better operational environment, with reduced delays and queues. It is also noted that out of the peak hour, when the traffic flows are lower, the delays for road users for the roundabout option would be negligible, whilst there would be delays created by the traffic signals at this time, due to a driver potentially arriving at the signals just after a green phase and having to sit and wait for the signals to complete their cycle before getting a green signal.

However, a roundabout is not as safe or convenient for cyclists or pedestrians compared with traffic signals where a dedicated phase can be provided for both cyclists and pedestrians.

The layout of the two options tested is provided below:





### Access to Newline Road

The design for the site access to Newline Road has been previously assessed by Northrop and a roundabout option has been developed for the existing 100 km/h posted speed limit and an alternative design for a 60 km/h speed zone. Advice from the RMS has indicated that the speed zone at the site access should be reduced from the currently posted speed limit of 100 km/h to 80 km/h.

It is considered that the 80 km/h speed zone will remain the posted limit, even with the Kings Hill development occurring and that a further future reduction to 60 km/h will not be permitted. The Kings Hill development will only occur along the eastern side of, and will be set back from, Newline Road. The road character will not be urban and as such a further reduction to 60 km/h will not be warranted.

The off-set roundabout design put forward by Northrop should be adjusted to allow for the revised speed limit of 80 km/h which will be implemented by the RMS.

Based on the design flows determined as part of this assessment, the provision of a single lane roundabout with single lane approaches as per the current concept designs is supported.

### Access to Six Mile Road

Access to Six Mile Road will be required as part of the on-going development of the site, although it is noted that once the grade separated intersection is provided at the southern access point on the Pacific Highway, the intersection of Six Mile Road with the Pacific Highway will become restricted to left in and left out only with no right hand turns. As such the traffic movements associated with the Kings Hill development via this intersection will be relatively low being vehicles with a destination to the north or an origin from the south.

Through traffic volumes on Six Mile Road are low and with the future modifications to the intersection control on the Pacific Highway will decrease further. Traffic movements associated with the Kings Hill proposal will be left in and right turn out for the vast majority, with limited demand to the west along Six Mile Road.

Given the low traffic flows for this site access, a simple Give Way controlled intersection should be provided. It is noted however that this section of Six Mile Road is not sealed and it is expected that the road authority may require the proponent to upgrade Six Mile Road between the site access and the Pacific Highway, allowing for a sealed rural road construction to be provided.

Please feel free to contact me on 4925 7795, or 0499 196 100, should you have any further queries.

Yours sincerely

**Sean Morgan**

***Director***