CITY OF MELBOURNE

TECHNICAL NOTE NUMBER:	#5
DATE:	1 September 2017
LOCATION:	**Port, CityLink and City Connections**
EES/MAP BOOK REFERENCE:	N/A
SUBJECT:	**Traffic network capacity in North Melbourne**
NOTE:	1. This Technical Note has been prepared in response to Project Note 47.
REQUEST:	2. Request #7 of the IAC's Preliminary Matters and Further Information Request document requested: *Data and analysis to support the statement that there is sufficient spare network capacity in North Melbourne to accommodate the increase in traffic in peak hours, inter peak and daily, noting the growth predicted without the project*
WDA RESPONSE:	The WDA responded to this information request in Project Note 47.
CITY OF MELBOURNE REPLY	The City of Melbourne carried out a screen line capacity analysis of four key east/west streets in North Melbourne using traffic counts and on site observations. This analysis shows that the West Gate Tunnel Project, in conjunction with the reduction of Grattan Street to one lane in each direction as a result of the Melbourne Metro Rail Project, will generate traffic volumes that result in these streets being at capacity for more than 12 hours a day.
CORRESPONDENCE:	N/A
ATTACHMENTS:	Further detailed analysis is attached.

1. Traffic volumes analysis – North Melbourne

City of Melbourne analysis shows that the West Gate Tunnel Project will cause east/west local streets in North Melbourne to operate at capacity in both directions for more than 12 hours a day in 2031.

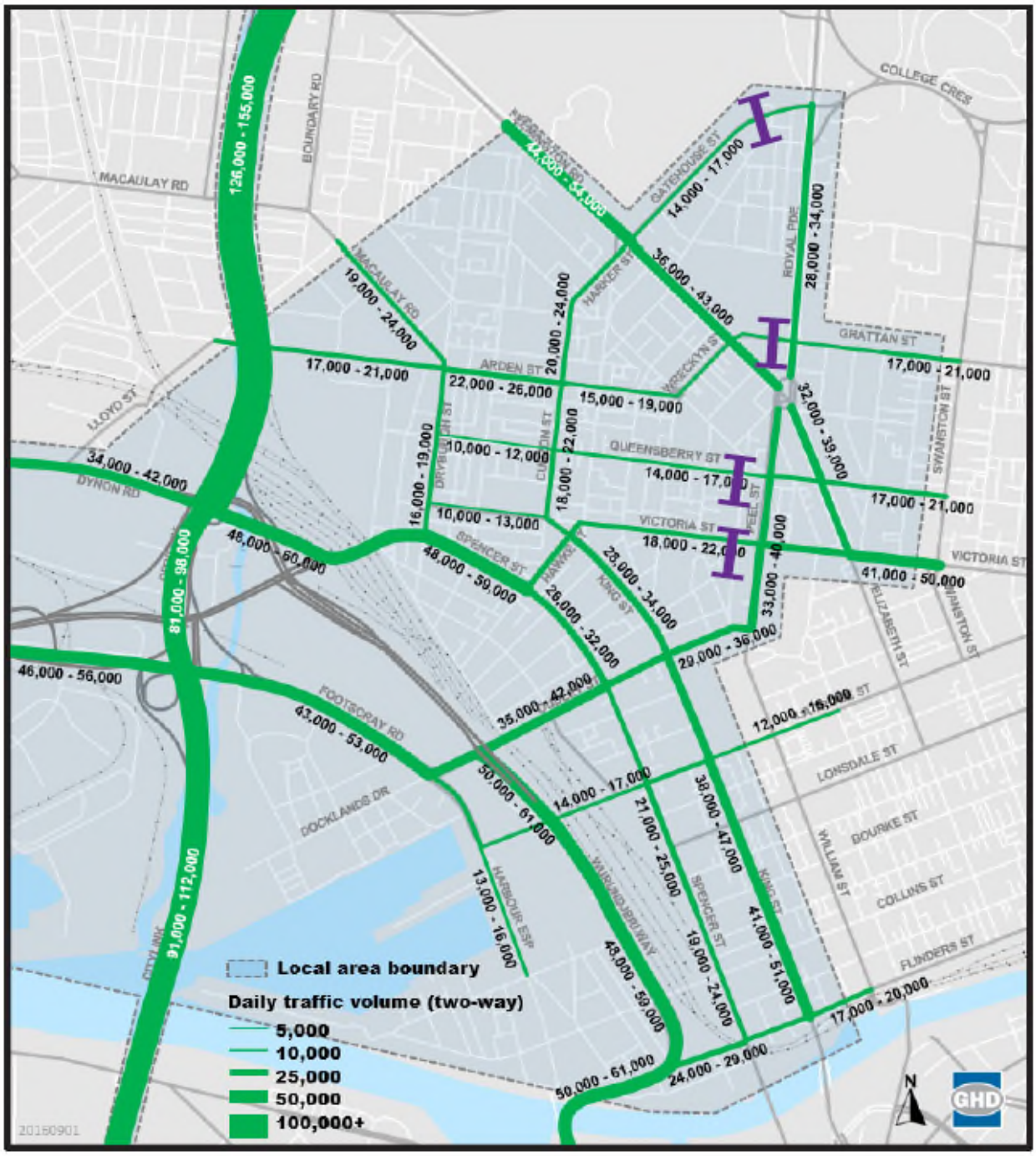
A screen line analysis was undertaken so that the impacts on four streets could be considered together. This is appropriate because drivers of motor vehicles choose between the four streets when moving east-west through the area. The locations which were analysed are:

- Victoria Street between Chetwynd Street and Peel Street.
- Queensberry Street between Chetwynd Street and Peel Street.
- Grattan Street between Flemington Road and Royal Parade.
- Gatehouse Street between Flemington Road and Royal Parade.

These locations are shown in Figure 1 below. They represent the four main east/west routes through North Melbourne and South Parkville.

Figure 1: Local area 2031 project case traffic volumes – North Melbourne and West Melbourne (two-way, 24-hour weekday volumes)

Locations used in City of Melbourne analysis are indicated in purple



Source: Locations annotated onto Figure 161 from Technical Report A

1.1. Network changes resulting from the Melbourne Metro Rail Project

Permanent changes resulting from Melbourne Metro are identified in the Melbourne Metro EES. 'The narrowing of Grattan Street to one lane in each direction' is identified as a permanent change (Chapter 6, page 21).

Also, Grattan Street will be temporarily closed between Royal Parade and Leicester Street during the construction of Parkville Station. The Melbourne Metro website identifies that 'Queensberry Street will be widened to two traffic lanes between Elizabeth and Rathdowne streets' to facilitate the temporary closure of Grattan Street. The WDA's Project Note 37 notes that 'after completion of Melbourne Metro, final arrangements will be determined by the relevant road authority'. It is City of Melbourne's understanding that Queensberry Street is only required to be widened to two lanes on a temporary basis while Grattan Street is closed (ie it will be reinstated to one mid-block lane in each direction by 2031).

The City of Melbourne understands that when forecasting future traffic volumes, the WDA assumed that, by 2031, Queensberry Street would be reinstated to one mid-block lane in each direction, and Grattan Street would be reduced to one mid-block lane in each direction. These assumptions therefore accord with City of Melbourne's understanding of the longer term implications of the Melbourne Metro Rail Project.

Notwithstanding the fact that Queensberry Streets is expected to be reinstated to one mid-block traffic lane in each direction by 2031, the City of Melbourne capacity analysis is based on measuring capacity on Queensberry Street at a point to the west of the section which has recently been converted to two lanes (see Figure 1). This means that the traffic going from and to the Dynon connection would only be able to use one lane on Queensberry Street west of Elizabeth Street, west of Peel Street, regardless of whether traffic capacity is one lane or two lanes in either direction between Elizabeth and Rathdowne Streets.

1.2. Method

The capacity of Victoria, Queensberry, Grattan and Gatehouse Streets at the screen line was assessed by undertaking automatic traffic counts in November 2016 and carrying out on-site observations during peak conditions to assess the spare capacity at these locations. The on-site observations to assess spare capacity are considered more appropriate than using SIDRA traffic modelling analysis because the on-site observations assessed downstream queues and congestion which impact the spare capacity of each route. SIDRA does not necessarily analyse downstream congestion.

Hourly breakdowns of the November 2016 traffic counts are shown below in Table 1 in Appendix 1.

Spare capacity was assessed for the eastbound direction in the AM peak (8-9am) and for the westbound direction in the PM peak (5-6pm). The spare capacity is based on the amount of "unused" green time for eastbound vehicles measured at the relevant location which would not have been obstructed by downstream congestion. Only Victoria and Queensberry Streets were assessed to have spare capacity. The total spare capacity across both streets was estimated at approximately 170 eastbound vehicles during the AM peak hour and 100 westbound vehicles during the PM peak hour.

The 12 hour capacity of Victoria, Queensberry, Grattan and Gatehouse Streets at the screen line was calculated in the following way. The number of vehicles in the busiest single hour of the AM peak (8-

9am) travelling eastbound was added to the observed spare capacity eastbound in the AM peak. This provides the total eastbound hourly maximum capacity. The same calculation was done for westbound vehicles in the PM peak (5-6pm). Adding the total eastbound and westbound hourly maximum capacity figures gives the total two-way hourly maximum capacity. This scenario assumes that all four roadways would operate at capacity in both directions at the same time. Multiplying this scenario by 12 gives the total 12 hour, two-way maximum capacity of the current street layout.

Two scenarios were considered:

- Grattan Street reduced to one lane in each direction reflecting the network changes resulting from the Melbourne Metro Rail Project. In this scenario, an hourly capacity for Grattan Street of 450 vehicles per hour in each direction was assumed.
- No changes to Grattan Street.

For both scenarios it was assumed that there were no changes to Queensberry Street in this location.

The maximum traffic volumes which could be accommodated in 12 hours for the two scenarios above were then compared to the 12 hour traffic volume forecast for 2031 with Project by the VLC strategic model.

For the four screen line locations, the WDA provided estimates of no-Project and Project related increases in traffic volumes for a 24 hour period. This was provided in November 2016 following discussions at a Technical Reference Group meeting for the project. These estimates are more precise than the ranges included in the EES. Using the more precise estimates for this analysis is appropriate because the four locations are being considered together as a system in which drivers can choose one of the four routes.

To calculate the 12 hour traffic volumes from the 24 hour traffic volumes provided by the WDA from the VLC strategic model, the City of Melbourne determined from the hourly traffic counts shown in Table 1 of Appendix 1, that 77 per cent of current daily traffic volumes occur in the 12 hour period from 7am to 7pm. The City of Melbourne assumed that this pattern would continue for both background growth and project related traffic volumes.

The 2031 project case 12 hour traffic volume was calculated as the current 12 hour traffic volumes plus the 12-hour expected background traffic growth (which is unrelated to the project) and the 12-hour project related traffic growth.

1.3. Capacity of roads in North Melbourne

As noted above, the City of Melbourne calculated the 12 hour traffic capacity of the four key roads in North Melbourne at the screen line under the two scenarios.

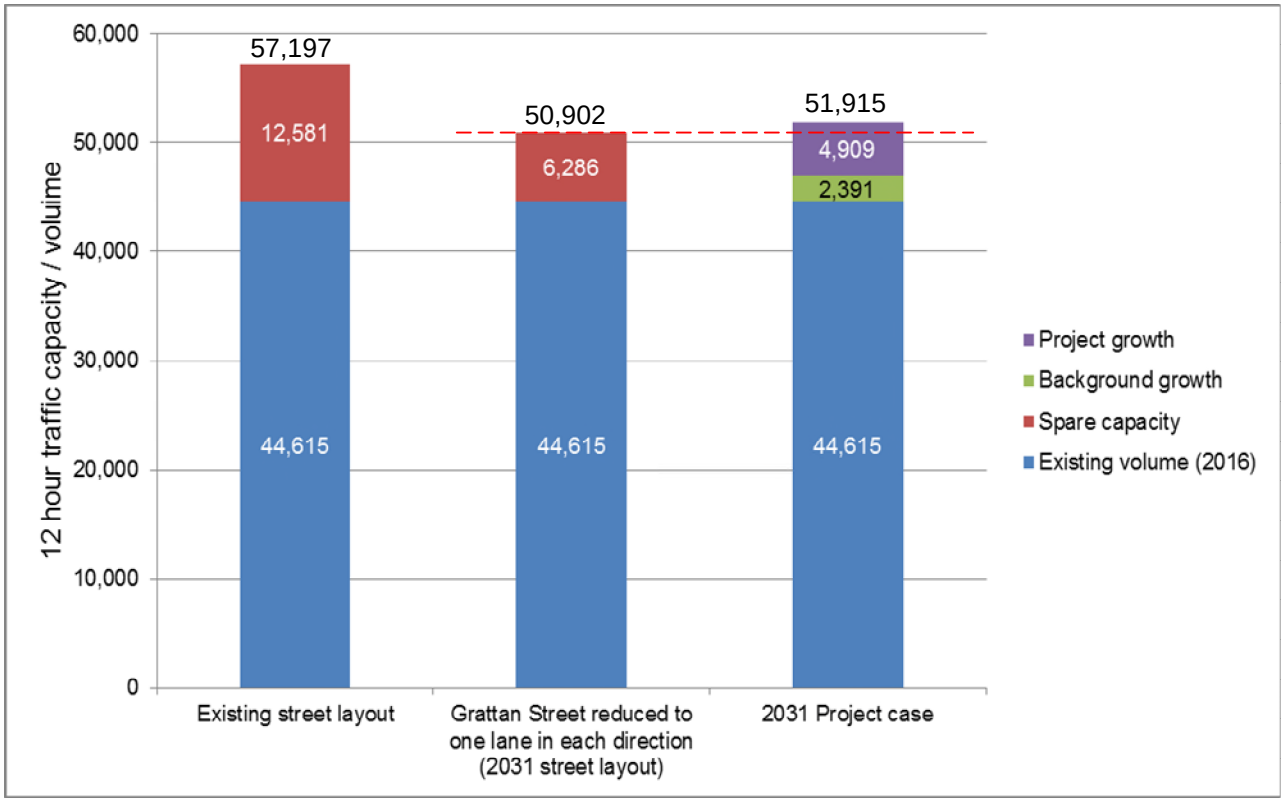
- **Existing street layout:** The total two-way capacity of the existing layout of these four streets from 7am to 7pm is calculated to be 57,196 vehicles.
- **Grattan Street reduced to one lane in each direction**: When Grattan Street is reduced to one lane in each direction the total two-way capacity of these four streets from 7am to 7pm is calculated to be 50,901 vehicles, a reduction of 6,295 vehicles.

1.4. West Gate Tunnel Project impacts on traffic in North Melbourne

- **2031 Project case:** The 12 hour traffic volume for the Project case in 2031 is 51,915 vehicles. This is derived from the existing 12 hour traffic counts on each of the four east/west routes, plus the VLC strategic model forecast of background growth of 2,391 vehicles and project related growth of 4,909 vehicles (which are for the 12 hour period).

Figure 2 demonstrates that the West Gate Tunnel Project, in conjunction with the reduction of Grattan Street to one lane in each direction, will result in traffic volumes at the screen line points on Victoria, Queensberry, Grattan and Gatehouse Streets being at or above the capacity of these streets for more than 12 hours.

Figure 2: 12 hour traffic capacities and volumes for the Victoria, Queensberry, Grattan and Gatehouse streets screen line



2. Review of Project Note 47 analysis

Project Note 47 provides estimates of "Existing", "2031 Baseline" and "2031 with Project" traffic volume profiles at a range of locations, but not necessarily at the same screen line locations as used by the City of Melbourne on the four east/west streets:

- Victoria Street between Chetwynd Street and Swanston Street.
- Queensberry Street between Peel Street and Swanston Street.
- Grattan Street between Flemington Road and Leister Square.
- Harker Street/Gate House Street between Arden Street and Royal Parade.

2.1. Traffic volume forecasts

Project Note 47 does not adequately assess traffic impacts in North Melbourne that result from the Project. Project Note 47 does not:

- Account for the change in street layout of Grattan Street to one lane in each direction.
- Meaningfully assess spare capacity at these locations either using on-site observations or SIDRA traffic modelling analysis.

Project Note 47 shows theoretical 2031 hourly traffic volumes that are significantly higher than 2016 conditions for extended time frames during the day, in the peak and inter-peak periods. For example, Curzon/Harker Street between Arden Street and Flemington Road in both directions is shown as having in the order of 200 more vehicles an hour for the 2031 project case from 7am to 6pm. Project Note 47 contains no analysis to show that the traffic network will accommodate these increases.

Both the City of Melbourne analysis and the WDA's Project Note 47 are based on the 2031 forecasts in the EES from the VLC strategic model which produces outputs for four time periods. Project Note 47 states that "during the remaining periods [all periods except off-peak], forecast volumes have been distributed evenly to reflect potential peak spreading". City of Melbourne understands this to mean that the existing profile has generally been used and applied to determine the shape of the 2031 profiles and that some of the peak traffic volume has been manually reassigned to surrounding time periods to reflect peak spreading. This has been done in a theoretical way, without an assessment of actual capacity.

Appendix 1: Table used in the City of Melbourne analysis

Table 1: Traffic counts, 24 hour volumes, November 2016

Table 1: Existing - Average Weekday - 24 Hour Volumes

	Victoria Street		Queensberry Street		Grattan Street		Gatehouse Street		TOTAL ACROSS 4 STREETS	
	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound
0:00	67	115	13	31	81	84	33	48	195	279
1:00	46	76	8	14	52	47	15	32	120	168
2:00	41	46	11	13	33	25	13	21	98	106
3:00	32	47	6	14	32	28	20	20	90	109
4:00	69	57	10	13	44	55	39	17	162	143
5:00	143	98	24	30	123	105	135	52	424	284
6:00	342	219	118	120	418	351	312	228	1,191	918
7:00	518	388	351	292	625	682	329	455	1,823	1,817
8:00	477	500	594	481	706	781	217	480	1,994	2,242
9:00	404	433	467	400	660	626	293	434	1,823	1,894
10:00	342	406	313	304	628	540	320	413	1,603	1,664
11:00	343	409	274	333	628	538	298	419	1,543	1,699
12:00	356	456	257	334	594	575	284	449	1,491	1,814
13:00	343	451	257	320	586	568	303	420	1,488	1,760
14:00	370	494	279	343	596	612	294	474	1,539	1,923
15:00	383	563	398	419	673	642	252	561	1,706	2,184
16:00	529	635	409	452	704	686	307	531	1,949	2,303
17:00	595	673	477	546	665	718	284	565	2,021	2,502
18:00	475	585	351	375	640	570	280	558	1,746	2,088
19:00	309	386	148	200	487	416	208	387	1,151	1,389
20:00	256	333	94	145	388	354	196	241	934	1,073
21:00	236	357	77	138	350	368	175	224	838	1,087
22:00	187	319	60	104	246	280	134	187	627	891
23:00	142	217	32	61	167	167	79	104	420	550
TOTAL	**7,005**	**8,265**	**5,029**	**5,483**	**10125**	**9819**	**4,817**	**7,319**	**26,976**	**30,886**