



Forest Park Planning Proposal Review

Traffic Impact Assessment Report

Prepared for Parramatta City Council | 23 February 2018

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Final

Report J17056 RPT3 | Prepared for City of Parramatta Council | 23 February 2018

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Date 23 February 2018

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1 Introduction

1.1 Overview

This traffic impact assessment report (TIA) has been prepared by EMM Consulting Pty Limited (EMM) for City of Parramatta Council to review the transport and access impacts of potential residential development under the current zoning for approximately 234 dwellings at the Forest Park development plus a proposed zoning uplift for 350 additional dwellings. This would give a future total of 584 additional dwellings in a mixture of one bedroom, two bedroom and three bedroom units to be developed by 2026. In the period up to 2017, Council has currently approved 4,854 additional dwellings to be developed in the Epping town centre. The Forest Park development would raise this to a total of 5,438 dwellings by 2026.

While the site is located within the City of Parramatta local government area (LGA), due to a recent boundary change for local councils, Hornsby Shire Council planning instruments still apply. The development uplift will be greater than the development permitted for the site under the Hornsby Local Environment Plan 2013 (HLEP 2013). These dwellings will be above commercial floor-space (1,384 m²) which is effectively a replacement activity for existing commercial uses at the site and the commercial component of the Forest Park development is therefore not considered in this report. The addresses which make up the site are: 2-18 Epping Road, 2-4 Forest Grove and 725 Blaxland Road, as shown below in Figure 1.1.

This TIA report considers the impacts of traffic generated by the maximum potential development (approximately 600 dwellings total), and also considers the future base traffic volumes which would be generated as a result of the existing recently approved backlog of new residential developments on sites within and surrounding the Epping town centre, which involves an additional 4,854 dwellings in the Epping town centre by 2026.

A TIA was included in a previous planning proposal for the Forest Park development. This was prepared for Austino Property Group by GTA consultants in December 2015 (GTA 2015). This TIA reviews the information and conclusions of the GTA report and updates these with regard to the most recent changes in the RMS approved road upgrades for the major road network, which are now under construction along Epping Road and the other major traffic routes through the Epping town centre.

Figure 1.1 **Site locality**

1.2 Details of the development traffic impacts considered

This TIA reviews the likely future effect of the traffic generated by the Forest Park development on weekdays during the main morning and afternoon commuter peak traffic hours on Epping Road, Blaxland Road, Forest Grove, Essex Street and Smith Street, in combination with other development traffic in the locality. The following three scenarios are considered in the analysis of traffic volumes:

- scenario 1 – the current base traffic volumes (using 2017 surveyed traffic flows);
- scenario 2 – the future base traffic volumes for 2026 (considering an additional 4,854 dwellings in the Epping Town Centre); and
- scenario 3 – the future total traffic volumes for 2026 (including the additional 4,854 dwellings plus an extra 584 dwellings at the site, totalling 5,438 dwellings).

This report also reviews the future pedestrian, cycleway and public transport access requirements for the potential 584 dwellings at the Forest Park development by considering:

- the site's pedestrian and cycleway access; and
- the use of the local bus routes and train line as the primary public transport routes serving the area.

2 Existing traffic conditions

2.1 Location

The site (see Figure 1.1 above), known as Forest Park, is located at the addresses: 2-18 Epping Road, 2-4 Forest Grove and 725 Blaxland Road, in the Epping town centre. The site is currently comprised of five properties fronting onto Epping Road, Blaxland Road and Forest Grove: a small block of flats, an automotive workshop, and three small residential dwellings. The remainder of the site has been cleared in preparation for development.

The site is approximately 20,040 m² and is currently zoned R4 High Density Residential and RE1 Public Recreation in the HLEP 2013. It is bounded by Epping Road to the north, Forest Grove to the east and Blaxland Road to the west and is located within an easy walking distance of Epping Railway Station (260 m).

2.2 Site access and local road network

The site is directly accessible from Epping Road, Blaxland Road and Forest Grove. Other key roads in the vicinity include Essex Street, Smith Street and Maida Road. Particulars concerning all these roads are detailed below:

- Epping Road – a state declared road under the jurisdiction of the RMS. It is generally a four-lane, two-way road running in an east-west direction between Epping and Lane Cove. It is signposted with a speed limit of 60 km/hr. Both sides of Epping Road are clearways during peak hours and are ‘no stopping’ at other times. It should be noted that RMS is currently widening Epping Road between Essex Street and Blaxland Road to accommodate an additional westbound lane, and adding a raised median strip.
- Blaxland Road – a state declared road under the jurisdiction of the RMS. It is generally a four-lane, two-way road running in a north-south direction between Epping and Ryde. It is signposted with a speed limit of 60 km/hr. In the 70 m section of Blaxland Road approaching the intersection with Epping Road, a ‘no stopping’ restriction applies on both sides of the road, and elsewhere on the western side. On most sections, however, kerbside parking is permitted on the eastern side outside of peak hours.
- Forest Grove – a local road under council jurisdiction. It is a two-lane, two-way road running in a north-south direction between Epping Road and Maida Road. It is signposted with a speed limit of 50 km/hr. Both sides of Forest Grove permit unrestricted parking.
- Essex Street – a local street under council jurisdiction. It is a two-lane, two-way street running in a north-south direction. It is signposted with a speed limit of 50 km/hr. Both sides of Essex Street permit unrestricted parking.
- Smith Street – a local street under council jurisdiction. It is a two-lane, two-way street running in a north-south direction between Pembroke Street and Epping Road. It is signposted with a speed limit of 50 km/hr. Both sides of Smith Street permit unrestricted parking.
- Maida Road – a local road under council jurisdiction. It is a two-lane, two-way street running in an east-west direction between Blaxland Road and Essex Street. It is signposted with a speed limit of 50 km/hr. Both sides of Maida Road permit unrestricted parking.

2.3 Traffic volumes

The existing peak hourly traffic volumes (scenario 1) for the local road network were determined by peak hourly intersection counts undertaken in March 2017.

These morning and afternoon peak hour traffic counts are shown below in Table 2.1:

Table 2.1 Traffic volumes on local roads

Road	Morning peak volume	Afternoon peak volume	Average daily volume ¹
Epping Road between Blaxland Road and Smith Street	2,730	2,431	30,966
Epping Road between Smith Street and Forest Grove	2,735	2,463	31,188
Epping Road between Forest Grove and Essex Street	2,700	2,156	29,136
Blaxland Road between Epping Road and Maida Road	1,120	919	12,234
Forest Grove	58	360	2,508
Essex Street between Epping Road and Maida Road	413	515	5,568
Smith Street	17	35	312
Maida Road	88	362	2,700

Notes: 1. Daily average volume is estimated as 12x the average peak traffic volume.

2.4 Existing Intersection Performance

The performances of the following intersections in the immediate vicinity of the site were analysed using a SIDRA-linked intersection model:

- Epping Road/Blaxland Road;
- Epping Road/Smith Street;
- Epping Road/Forest Grove; and
- Epping Road/Essex Street.

The RMS SIDRA intersection level of service (LoS) vs. delay standards for traffic signal controlled intersections which are specified in the RTA-RMS Guide to Traffic Generating Developments (RTA 2002) are summarised below. In addition to LoS, the existing operation of the intersection is also described in terms of the following factors:

- Degree of Saturation (DoS) which is the ratio of the traffic volume to the capacity of the intersection;
- the Average Vehicle Delay (AVD) in seconds per vehicle for all traffic movements at the intersection; and
- the length of the maximum traffic queue (95th percentile traffic queue) for any traffic movement at the intersection.

Description	LoS (RMS definition)	Average Vehicle Delay (s)
Very Good	A	<14.5
Good	B	14.5 to ≤28.5
Satisfactory	C	28.5 to ≤42.5
Near Capacity	D	42.5 to ≤56.5
At Capacity	E	56.5 to ≤70.5
Over Capacity	F	≥70.5

Table 2.2 Epping Road/Blaxland Road intersection - 2017 AM performance

Approach	Average delay (seconds)	Queue length (metres)	Level of service	Degree of saturation
South: Blaxland Road				
Left turn	17.3	33.7	B	0.358
Through	53.8	40.4	D	0.860
East: Epping Road				
Left turn	48.8	138.8	D	0.859
Through	43.3	139.0	D	0.859
North: Langston Place				
Left turn	58.4	51.6	E	0.867
Through	52.9	51.6	D	0.867
Right turn	58.6	51.6	E	0.867
West: Bridge Street				
Left turn	5.6	14.7	A	0.248
Through	27.3	97.9	B	0.895
Right turn	44.8	97.9	D	0.861

The existing Epping Road/Blaxland Road intersection morning operation shows a mixed performance. During the morning peak hour, the eastern and northern approaches have the worst levels of service, with the northern approach largely at capacity (LoS E). This shows that the intersection has a small amount of spare traffic capacity in the morning to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

Table 2.3 Epping Road/Blaxland Road intersection - 2017 PM performance

Approach	Average delay (seconds)	Queue length (metres)	Level of service	Degree of saturation
South: Blaxland Road				
Left turn	74.6	133.8	F	0.894
Through	73.6	22.1	F	0.402
East: Epping Road				
Left turn	72.8	326.4	F	0.962
Through	67.0	326.4	E	0.962
North: Langston Place				
Left turn	98.0	75.4	F	0.926
Through	92.5	75.4	F	0.926
Right turn	98.1	75.4	F	0.926
West: Bridge Street				
Left turn	4.9	11.9	A	0.243
Through	8.6	97.9	A	0.379
Right turn	39.8	97.9	C	0.832

The existing Epping Road/Blaxland Road intersection afternoon operation shows a low performance. During the afternoon peak hour, the southern, eastern and northern approaches are all generally over-capacity (LoS F). This shows that the intersection has practically no spare traffic capacity in the afternoon to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

Table 2.4 Epping Road/Smith Street intersection - 2017 AM performance

Approach	Average delay (seconds)	Queue length (metres)	Level of service	Degree of saturation
East: Epping Road				
Through	0.4	2.4	A	0.227
Right turn	31.6	2.4	C	0.227
North: Smith Street				
Left turn	11.2	0.1	A	0.005
Right turn	414.5	9.3	F	0.514
West: Epping Road				
Left turn	5.6	201.3	A	0.456
Through	0.0	201.3	A	0.456

The existing Epping Road/Smith Street intersection morning operation shows a generally satisfactory performance. During the morning peak hour, most approaches are acceptable (Los A-C). The major issue with this intersection is the right turn from Smith Street onto Epping Road. Due to the RMS' intention to

add a median strip on Epping Road, this turn will not be permitted in future. Apart from this issue, the intersection has significant spare traffic capacity in the morning to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

Table 2.5 Epping Road/Smith Street intersection - 2017 PM performance

Approach	Average delay (seconds)	Queue length (metres)	Level of service	Degree of saturation
East: Epping Road				
Through	0.0	81.6	A	0.471
Right turn	11.4	81.6	A	0.471
North: Smith Street				
Left turn	7.3	0.1	A	0.003
Right turn	1957.9	46.9	F	2.560
West: Epping Road				
Left turn	5.5	0.0	A	0.223
Through	0.0	0.0	A	0.223

Similarly to the morning peak, the afternoon peak for the existing Epping Road/Smith Street intersection has significant capacity and a very good LoS (A). Again, the only exception is the right turn from Smith Street which is well over capacity. However this turn will not be permitted in RMS' new plans for Epping Road, where a median strip will prevent right turns.

Table 2.6 Epping Road/Forest Grove intersection - 2017 AM performance

Approach	Average delay (seconds)	Queue length (metres)	Level of service	Degree of saturation
South: Forest Grove				
Left turn	7.4	0.9	A	0.031
Right turn	538.4	2.4	F	0.270
East: Epping Road				
Left turn	5.5	0.0	A	0.216
Through	0.0	0.0	A	0.216
West: Epping Road				
Through	0.8	13.1	A	0.886
Right turn	12.9	13.1	A	0.886

The existing Epping Road/Forest Grove intersection morning operation shows a mixed performance. During the morning peak hour, most approaches have a very good LoS (A). The major issue with this intersection is the right turn from Forest Grove onto Epping Road. Due to the RMS' intention to add a median strip on Epping Road, this turn will not be permitted in future. Apart from this issue, the intersection has significant spare traffic capacity in the morning to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

Table 2.7 Epping Road/Forest Grove intersection - 2017 PM performance

Approach	Average delay (seconds)	Queue length (metres)	Level of service	Degree of saturation
South: Forest Grove				
Left turn	23.5	34.4	B	0.801
Right turn	87.5	1.5	F	0.076
East: Epping Road				
Left turn	5.5	115.5	A	0.377
Through	0.0	164.0	A	0.377
West: Epping Road				
Through	2.3	18.0	A	0.286
Right turn	16.6	18.0	B	0.286

Similarly to the morning peak, the afternoon peak for the existing Epping Road/Forest Grove intersection has significant capacity and a good LoS (A-B). Again, the only exception is the right turn from Smith Street which is over capacity. However this turn will not be permitted in RMS' new plans for Epping Road, where a median strip will prevent right turns.

Table 2.8 Epping Road/Essex Street intersection - 2017 AM performance

Approach	Average delay (seconds)	Queue length (metres)	Level of service	Degree of saturation
South: Essex Street				
Left turn	66.6	60.9	E	0.841
Through	61.1	60.9	E	0.841
Right turn	66.8	59.3	E	0.841
East: Epping Road				
Left turn	13.7	39.7	A	0.314
Through	8.2	39.7	A	0.314
Right turn	13.7	39.1	A	0.314
North: Essex Street				
Left turn	49.0	21.5	D	0.206
Through	53.5	114.7	D	0.889
Right turn	66.0	114.7	E	0.889
West: Epping Road				
Left turn	23.0	193.1	B	0.859
Through	17.6	193.1	B	0.859
Right turn	23.3	190.5	B	0.859

The existing Epping Road/Essex Street intersection morning operation shows a mixed performance. During this peak hour, the southern and northern approaches have the worst levels of service, with the southern approach at or nearing capacity (LoS D-E). The Epping Road components of the intersection have good levels of service (A-B). This shows that the intersection has some spare traffic capacity to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

Table 2.9 Epping Road/Essex Street intersection - 2017 PM performance

Approach	Average delay (seconds)	Queue length (metres)	Level of service	Degree of saturation
South: Essex Street				
Left turn	91.6	110.3	F	0.891
Through	77.8	123.7	F	0.891
Right turn	82.1	123.7	F	0.891
East: Epping Road				
Left turn	241.6	544.3	F	1.194
Through	236.3	544.3	F	1.194
Right turn	242.0	534.8	F	1.194
North: Essex Street				
Left turn	62.7	41.9	E	0.270
Through	57.1	41.9	E	0.270
Right turn	254.3	210.9	F	1.178
West: Epping Road				
Left turn	22.1	102.7	B	0.560
Through	20.5	102.7	B	0.560
Right turn	33.5	79.2	C	0.560

The existing Epping Road/Essex Street intersection afternoon operation shows a low performance. During this peak hour, the southern, eastern and northern approaches are at or over capacity (LoS E-F). The western approach has an acceptable LoS (B-C). Overall, the intersection has no spare traffic capacity to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

2.5 Car parking

As mentioned in Section 2.2, kerbside parking is not permitted on Epping Road, however it is permitted on the eastern side of Blaxland Road outside of peak hours. Unrestricted kerbside parking is permitted on both sides of Essex Street, Forest Grove, Smith Street and Maida Road.

2.6 Pedestrian and cycling access

The vicinity of the site is well suited for pedestrian travel. There are concrete footpaths on both sides of Epping Road and the eastern side of Blaxland Road and Forest Grove. There are also concrete footpaths on the western side of Essex Street and on the northern side of Maida Road. Signalised pedestrian crossings at the Epping Road/Blaxland Road intersection allows for easy and safe crossing of the busier roads in the area.

There is a designated cycle route on Pembroke Street, approximately 200 m north of the site. This is connected to the local cycling network.

2.7 Public transport access and services

The site has good access to a range of public transport options. The T1 North Shore, Northern and Western Line of the Sydney railway network is accessible at Epping station, approximately 260 m from the Forest Park site. The railway provides access to a range of areas throughout the Sydney metropolitan

region including Hornsby, Chatswood, North Sydney and the CBD. Intercity services also stop at Epping, including services to the Central Coast and Newcastle.

A number of bus routes operate within a 300 m radius of the site, providing transport to the CBD, Macquarie Park and Parramatta. These services run along Pembroke Street, Beecroft Road and Epping Road. There is a bus stop located along the site's Epping Road frontage.

3 Proposed development

3.1 Currently permitted development

The HLEP 2013 zones the majority of the site as R4 high density residential. Within this zone, residential unit blocks, childcare centres and shop-top housing are permitted with consent. A maximum building height of 26.5 m is permitted where the site fronts on to Epping Road. A maximum building height of 17.5 m is permitted where the site fronts on to Forest Grove.

Under the HLEP 2013, high density residential development on the site may accommodate approximately 327 residential units along with approximately 200 m² of non-residential uses.

3.2 Proposed uplift

The planning proposal seeks to develop an uplift of the already existing proposal to incorporate an additional 327 units and 1,184 m² of non-residential floor-space. This would bring the total number of proposed units to 584, and a total of 1,384 m² of non-residential floor-space.

As yet, the exact mix of unit sizes and the use of the non-residential spaces are undetermined. However, for the purposes of this TIA, an indicative mix of unit sizes has been adopted, following the proportions of the mix quoted in GTA 2015:

- 1-bedroom units – 134;
- 2-bedroom units – 327;
- 3-bedroom units – 123;
- total – 584 units.

It is assumed that the non-residential space would be developed for commercial purposes. These commercial spaces would have a greater rate of traffic generation than the residential spaces but, as noted previously, commercial traffic is not considered in this report's analysis as it is assumed that the current volumes of commercial traffic generated by the site will be similar to those in the future.

4 Traffic impact assessment

4.1 Traffic generation and distribution

The methodology used to calculate traffic generation is based on a development's distance to the train station. Four concentric zones (see Figure 4.1 below) were defined based on the distance to the train station, with each zone assigned traffic generation rates. The Forest Park development is within zone 2 (200 – 400 m to the train station).

The future residential traffic volumes generated by the Forest Park development have been determined as summarised below:

- Morning traffic generation: 107 vehicle movements; and
- Afternoon traffic generation: 54 vehicle movements.

Figure 4.1 **Traffic generation zones**



4.2 Traffic volumes

The future peak hourly traffic volumes for scenario 2 (+4,854 additional dwellings in the Epping town centre) and scenario 3 (+5,438 additional dwellings in the Epping town centre) are shown below in Table 4.1:

Table 4.1 Future traffic volumes on local roads

Road	Morning peak volume (scen. 2/scen. 3)	Afternoon peak volume (scen. 2/scen. 3)	Average daily volume¹ (scen. 2/scen. 3)
Epping Road between Blaxland Road and Smith Street	3,949 / 3,920	3,197 / 3,198	42,876 / 42,708
Epping Road between Smith Street and Forest Grove	3,826 / 3,793	3,201 / 3,206	42,162 / 41,994
Epping Road between Forest Grove and Essex Street	3,885 / 3,827	3,271 / 3,291	42,936 / 42,708
Blaxland Road between Epping Road and Maida Road	3,257 / 3,286	3,888 / 3,949	42,870 / 43,410
Forest Grove	323 / 368	296 / 379	3,714 / 4,482
Essex Street between Epping Road and Maida Road	537 / 637	914 / 936	8,706 / 9,438
Smith Street	127 / 140	14 / 25	846 / 990

Notes: 1. Daily average volume is estimated as 12x the average peak traffic volume.

As shown above in Table 4.1, in terms of the volume of vehicles on the roads in the vicinity of the site, there is very little difference between scenario 2 and scenario 3. Interestingly, some of the scenario 3 volumes, as calculated by the model, are actually lower than the scenario 2 volumes. The main roads affected by the development will be Blaxland Road, Forest Grove, Essex Street and Smith Street. The increases in daily traffic on Forest Grove are the most significant – an extra 768 daily vehicle movements, approximately, as a result of the development. Overall however, there will be a minimal effect on the traffic volumes of the local network as a result of the Forest Park development.

4.3 Impacts at intersections

The future operating performance of the four intersections considered in this report has been assessed using the SIDRA linked intersection model with a 90 second cycle time for all intersections.

The primary modified feature of the future intersection design is the presence of a median strip along Epping Road adjacent to the site's frontage, and an additional west-bound lane.

The two future traffic generation scenarios (scenarios 2 and 3) for the locality which have been assessed are defined in Section 1.2. Scenario 2 assesses the future adjusted baseline traffic volumes for the locality incorporating the range of other developments totalling +4,854 new dwellings in the Epping town centre. Scenario 3 represents a cumulative analysis of the surrounding developments' traffic generation with the uplifted proposed Forest Park residential development, involving a total of +5,438 new dwellings in the Epping town centre. The future SIDRA intersection output results for the two future traffic generation scenarios considered are included for in Appendices B and C.

4.3.1 Epping Road/Blaxland Road intersection

The intersection analysis results for the Epping Road and Blaxland Road intersection for the two future traffic generation scenarios considered are presented in Table 4.2 and 4.3.

Table 4.2 Epping Road/Blaxland Road intersection - 2026 AM performance

Approach	Average delay (seconds) (scen. 2/scen. 3)	Queue length (metres) (scen. 2/scen. 3)	Level of service (scen. 2/scen. 3)	Degree of saturation (scen. 2/scen. 3)
South: Blaxland Road				
Left turn	76.6 / 77.1	195.8 / 195.8	F / F	0.926 / 0.926
Through	695.3 / 701.2	195.8 / 195.8	F / F	1.709 / 1.716
East: Epping Road				
Left turn	38.1 / 38.1	0.3 / 0.3	C / C	0.001 / 0.001
Through	773.5 / 813.2	326.4 / 326.4	F / F	1.787 / 1.831
North: Langston Place				
Left turn	64.9 / 64.4	6.5 / 3.2	E / E	0.060 / 0.030
Through	746.8 / 772.0	821.4 / 846.4	F / F	1.767 / 1.795
West: Bridge Street				
Left turn	5.6 / 5.5	21.5 / 20.8	A / A	0.275 / 0.280
Through	13.6 / 12.9	97.9 / 97.9	A / A	0.647 / 0.628
Right turn	798.4 / 791.8	97.9 / 97.9	F / F	1.817 / 1.809

The analysis of the future Epping Road/Blaxland Road intersection morning peak operation shows a low level of performance. During the morning peak hour, some lanes in all four approaches are above capacity (LoS F). There is no significant difference between scenario 2 and scenario 3. As such, the proposed development will have only a marginal impact on this intersection. Overall, the intersection has very little spare traffic capacity in the morning to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

Table 4.3 Epping Road/Blaxland Road intersection - 2026 PM performance

Approach	Average delay (seconds) (scen. 2/scen. 3)	Queue length (metres) (scen. 2/scen. 3)	Level of service (scen. 2/scen. 3)	Degree of saturation (scen. 2/scen. 3)
South: Blaxland Road				
Left turn	1060.2 / 1118.7	195.8 / 195.8	F / F	2.122 / 2.187
Through	1191.6 / 1233.9	195.8 / 195.8	F / F	2.270 / 2.318
East: Epping Road				
Left turn	35.4 / 35.4	0.3 / 0.3	C / C	0.001 / 0.001
Through	1325.2 / 1313.2	326.4 / 326.4	F / F	2.399 / 2.386
North: Langston Place				
Left turn	68.6 / 67.5	3.3 / 3.3	E / E	0.037 / 0.035
Through	1182.4 / 1106.4	1023.9 / 1016.1	F / F	2.259 / 2.173
West: Bridge Street				
Left turn	6.2 / 6.2	27.0 / 25.4	A / A	0.282 / 0.268

Table 4.3 Epping Road/Blaxland Road intersection - 2026 PM performance

Approach	Average delay (seconds) (scen. 2/scen. 3)	Queue length (metres) (scen. 2/scen. 3)	Level of service (scen. 2/scen. 3)	Degree of saturation (scen. 2/scen. 3)
Through	11.3 / 11.6	97.9 / 97.9	A / A	0.439 / 0.422
Right turn	1269.6 / 1277.1	97.9 / 97.9	F / F	2.344 / 2.353

The analysis of the future Epping Road/Blaxland Road intersection afternoon peak operation shows a low level of performance. During the afternoon peak hour, some lanes in all four approaches are above capacity (LoS F). There is no significant difference between scenario 2 and scenario 3. As such, the proposed development will have only a marginal impact on this intersection. Overall, the intersection has very little spare traffic capacity in the afternoon to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

4.3.2 Epping Road/Smith Street intersection

The intersection analysis results for the Epping Road and Smith Street intersection for the two future traffic generation scenarios considered are presented in Table 4.4 and 4.5.

Table 4.4 Epping Road/Smith Street intersection - 2026 AM performance

Approach	Average delay (seconds) (scen. 2/scen. 3)	Queue length (metres) (scen. 2/scen. 3)	Level of service (scen. 2/scen. 3)	Degree of saturation (scen. 2/scen. 3)
East: Epping Road				
Through	0.0 / 0.0	81.6 / 81.6	A / A	0.212 / 0.216
North: Smith Street				
Left turn	8.8 / 8.6	0.2 / 0.2	A / A	0.006 / 0.008
West: Epping Road				
Left turn	5.6 / 5.6	0.0 / 0.0	A / A	0.294 / 0.286
Through	0.0 / 0.0	326.4 / 326.4	A / A	0.294 / 0.286

The analysis of the future Epping Road/Smith Street intersection morning operation shows a very good level of performance. During the morning peak hour, all approaches are very good (LoS A). There are no differences between scenario 2 and scenario 3. As such the proposed development will have only a marginal effect on this intersection. Overall, the intersection has significant spare traffic capacity in the morning to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

Table 4.5 Epping Road/Smith Street intersection - 2026 PM performance

Approach	Average delay (seconds) (scen. 2/scen. 3)	Queue length (metres) (scen. 2/scen. 3)	Level of service (scen. 2/scen. 3)	Degree of saturation (scen. 2/scen. 3)
East: Epping Road				
Through	0.0 / 0.0	81.6 / 81.6	A / A	0.304 / 0.302
North: Smith Street				
Left turn	7.9 / 7.9	0.1 / 0.3	A / A	0.004 / 0.011
West: Epping Road				
Left turn	5.5 / 5.5	0.0 / 0.0	A / A	0.199 / 0.195
Through	0.0 / 0.0	0.0 / 0.0	A / A	0.199 / 0.195

The analysis of the future Epping Road/Smith Street intersection afternoon operation shows a very good level of performance. During the afternoon peak hour, all approaches are very good (LoS A). There are no significant differences between scenario 2 and scenario 3. As such the proposed development will have only a marginal effect on this intersection. Overall, the intersection has significant spare traffic capacity in the afternoon to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

4.3.3 Epping Road/Forest Grove intersection

The intersection analysis results for the Epping Road and Forest Grove intersection for the two future traffic generation scenarios considered are presented in Table 4.6 and 4.7.

Table 4.6 Epping Road/Forest Grove intersection - 2026 AM performance

Approach	Average delay (seconds) (scen. 2/scen. 3)	Queue length (metres) (scen. 2/scen. 3)	Level of service (scen. 2/scen. 3)	Degree of saturation (scen. 2/scen. 3)
South: Forest Grove				
Left turn	7.4 / 7.5	3.1 / 4.1	A / A	0.096 / 0.123
East: Epping Road				
Left turn	5.5 / 5.5	0.0 / 0.0	A / A	0.220 / 0.220
Through	0.0 / 0.0	195.8 / 195.8	A / A	0.220 / 0.220
West: Epping Road				
Through	0.0 / 0.0	81.6 / 81.6	A / A	0.281 / 0.273

The analysis of the future Epping Road/Forest Grove intersection morning operation shows a very good level of performance. During the morning peak hour, all approaches are very good (LoS A). There are no significant differences between scenario 2 and scenario 3. As such the proposed development will have only a marginal effect on this intersection. Overall, the intersection has significant spare traffic capacity in the morning to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

Table 4.7 Epping Road/Forest Grove intersection - 2026 PM performance

Approach	Average delay (seconds) (scen. 2/scen. 3)	Queue length (metres) (scen. 2/scen. 3)	Level of service (scen. 2/scen. 3)	Degree of saturation (scen. 2/scen. 3)
South: Forest Grove				
Left turn	9.0 / 8.8	3.4 / 4.4	A / A	0.107 / 0.135
East: Epping Road				
Left turn	5.5 / 5.5	0.0 / 0.0	A / A	0.311 / 0.310
Through	0.0 / 0.0	195.8 / 195.8	A / A	0.311 / 0.310
West: Epping Road				
Through	0.0 / 0.0	0.0 / 0.0	A / A	0.200 / 0.200

The analysis of the future Epping Road/Forest Grove intersection afternoon operation shows a very good level of performance. During the afternoon peak hour, all approaches are very good (LoS A). There are no significant differences between scenario 2 and scenario 3. As such the proposed development will have only a marginal effect on this intersection. Overall, the intersection has significant spare traffic capacity in the afternoon to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

4.3.4 Epping Road/Essex Street intersection

The intersection analysis results for the Epping Road and Essex Street intersection for the two future traffic generation scenarios considered are presented in Table 4.8 and 4.9.

Table 4.8 Epping Road/Essex Street intersection - 2026 AM performance

Approach	Average delay (seconds) (scen. 2/scen. 3)	Queue length (metres) (scen. 2/scen. 3)	Level of service (scen. 2/scen. 3)	Degree of saturation (scen. 2/scen. 3)
South: Essex Street				
Left turn	64.3 / 60.3	9.3 / 8.9	E / E	0.082 / 0.070
Through	247.0 / 294.1	318.8 / 435.3	F / F	1.185 / 1.243
Right turn	71.9 / 68.2	86.3 / 97.5	F / E	0.678 / 0.668
East: Epping Road				
Left turn	44.6 / 56.8	195.9 / 230.9	D / E	0.819 / 0.881
Through	41.6 / 54.9	195.9 / 230.9	C / D	0.819 / 0.881
North: Essex Street				
Left turn	37.4 / 38.0	7.1 / 6.4	C / C	0.031 / 0.029
Through	31.9 / 32.5	7.1 / 6.4	C / C	0.031 / 0.029
Right turn	292.9 / 300.1	374.1 / 376.3	F / F	1.223 / 1.232
West: Epping Road				
Left turn	30.9 / 35.2	98.2 / 102.2	C / C	0.567 / 0.586
Through	165.3 / 190.8	195.8 / 195.8	F / F	1.193 / 1.235

The analysis of the future Epping Road/Essex Street intersection morning operation shows a low level of performance. During this peak hour, the southern, northern and western approaches have the worst levels of service, each with lanes over capacity (LoS F). The main effect of the proposed development is on

the eastern approach of Epping Road, which reaches capacity (LoS E) for the left turn, and approaches capacity (LoS D) as a result of the extra 600 units. Overall, the intersection has limited spare traffic capacity to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

Table 4.9 Epping Road/Essex Street intersection - 2026 PM performance

Approach	Average delay (seconds) (scen. 2/scen. 3)	Queue length (metres) (scen. 2/scen. 3)	Level of service (scen. 2/scen. 3)	Degree of saturation (scen. 2/scen. 3)
South: Essex Street				
Left turn	74.6 / 74.6	1.0 / 1.0	F / F	0.016 / 0.016
Through	295.2 / 282.8	198.1 / 191.2	F / F	1.243 / 1.228
Right turn	155.4 / 206.6	110.5 / 138.9	F / F	1.055 / 1.126
East: Epping Road				
Left turn	274.2 / 284.4	1724.9 / 1771.7	F / F	1.250 / 1.261
Through	274.2 / 284.9	1724.9 / 1771.7	F / F	1.250 / 1.261
North: Essex Street				
Left turn	289.5 / 296.6	285.2 / 291.1	F / F	1.231 / 1.240
Through	284.1 / 291.1	285.2 / 291.1	F / F	1.231 / 1.240
Right turn	297.3 / 320.6	142.9 / 149.8	F / F	1.231 / 1.259
West: Epping Road				
Left turn	11.2 / 11.2	27.4 / 26.2	A / A	0.202 / 0.195
Through	6.5 / 6.5	70.3 / 66.6	A / A	0.426 / 0.410

The analysis of the future Epping Road/Essex Street intersection afternoon operation shows a low level of performance. During this peak hour, the southern, eastern and northern approaches are fully over capacity (LoS F). The proposed development has a small effect on the expected situation. Only the western approach has a very good LoS (A). Overall, the intersection has no spare traffic capacity to accommodate additional peak hour traffic growth from the new residential and other developments in the Epping town centre locality assessed in this report.

Overall, the worst affected approaches are the north and south approaches to Epping Road at the Blaxland Road and Essex Street intersections. This is clearly shown in the Table 4.10 below, comparing average delay times across the three scenarios:

Table 4.10 Summary of significant average delay deteriorations

Approach	Scenario 1 (AM/PM)	Scenario 2 (AM/PM)	Scenario 3 (AM/PM)
Epping Road/Blaxland Road intersection			
Northern approach left turn	49.0 / 62.7	37.4 / 289.5	38.0 / 296.6
Northern approach through	53.5 / 57.1	31.9 / 284.1	32.5 / 291.1
Northern approach right turn	66.0 / 254.3	292.9 / 297.3	300.1 / 320.6
Southern approach left turn	66.6 / 91.6	64.3 / 74.6	60.3 / 74.6
Southern approach through	61.1 / 77.8	247.0 / 295.2	294.1 / 282.8
Southern approach right turn	66.8 / 82.1	71.9 / 155.4	68.2 / 206.6
Epping Road/Essex Street intersection			
Northern approach left turn	58.4 / 98.0	64.9 / 68.6	64.4 / 67.5
Northern approach through	52.9 / 92.5	746.8 / 1182.4	772.0 / 1106.4
Southern approach left turn	17.3 / 74.6	76.6 / 1060.2	77.1 / 1118.7
Southern approach through	53.8 / 73.6	695.3 / 1191.6	701.2 / 1233.9

As such, while the effect of the development is generally small, as at other intersections, the year 2026 base conditions are such that no further development is advisable in the site locality without further improvements to the local traffic access to Epping Road.

4.4 Car parking

4.4.1 Council parking requirements

The HDCP 2013 gives parking rates for various types of development. A breakdown of the parking required based on the HDCP 2013 guidelines is provided below in Table 4.11:

Table 4.11 Analysis of council parking requirements

Use	Units/floor area	Minimum parking rate ¹	Minimum parking requirement
1-bedroom units	134	0.75 space per dwelling	100.5
2-bedroom units	327	1.0 space per dwelling	327
3-bedroom units	123	1.5 spaces per dwelling	184.5
Visitors		1.0 space per 7 dwellings	83.4
Residential subtotal			695
Commercial	1,384 m ²	1 space per 29 m ²	47.7
Total			743

Notes: 1. Minimum parking rates according to the Hornsby development control plan 2013.

The HDCP 2013 guidelines require a minimum of 695 residential car parking spaces and 48 commercial car parking spaces. Specific requirements for accessible care parking for high density residential developments include a minimum of one accessible car space for each proposed accessible unit and a minimum of 10 percent of all units to be provided with an accessible car space. This entails that at least 58 of the 695 residential car spaces be accessible car parking spaces. Furthermore HDCP 2013 requires that at least one car share (eg GoGet, Greenshare, Flexicar) space should be provided for residential developments containing 50 or more dwellings. Any further requirements, relating to loading or service vehicle bays for example, will be assessed in the detailed development application.

4.4.2 RMS parking requirements

The SEPP 65 amendment states that a development application cannot be refused on car parking grounds

“if the car parking for the building be equal to, or greater than, the recommended minimum amount of car parking specified in Part 3J of the Apartment Design Guide”.

Part 3J of the Apartment Design Guide states:

“For development ... on sites that are within 800 metres of a railway station ... the minimum car parking requirement for residents and visitors is set out in the Guide to Traffic Generating Developments, or in the car parking requirement prescribed by the relevant council, whichever is less.”

The site is located approximately 260 m from Epping railway station. The parking requirements relevant to the proposed development prescribed in the *Guide to Traffic Generating Developments* (2002) are analysed below in Table 4.12.

Table 4.12 Analysis of RMS parking requirements

Use	Units/floor area	Minimum parking rate ¹	Minimum parking requirement
1-bedroom units	134	0.6 space per dwelling	80.4
2-bedroom units	327	0.9 space per dwelling	294.3
3-bedroom units	123	1.4 spaces per dwelling	172.2
Visitors		0.2 space per dwelling	116.8
Commercial	1,384 m ²	1 space per 29 m ²	47.7
Total			711

Notes: 1. Minimum parking rates according to the Guide to Traffic Generating Developments (2002), except for commercial floor-space which continues to follow council requirements.

Based on the SEPP 65 amendment and Part 3J of the Apartment Design Guide, it is permissible for the development to supply a minimum of 711 parking spaces rather than 743 as per the council requirements.

The preliminary design of the proposed development accommodates the required 711 car parking spaces.

4.5 Pedestrian, cycling and motorcycling requirements

Pedestrian access for the site is very good, with concrete paved footpaths, safe crossings and easy access to Epping train station provided (as discussed in Sections 2.6 and 2.7).

The HDCP 2013 requires the following cycling and motorcycling provisions in high density residential developments:

- Bicycle parking is required at a rate of one space per five units for residents, one space per 10 units for visitors and one space per 600 m² of commercial floor area. This entails 117 spaces for residents, 58 spaces for visitors and two spaces for commercial uses – a total of 177 spaces.
- Motorcycle parking is required at a rate of 1 space per 50 car parking spaces provided. This entails a minimum of 14 spaces.

The preliminary design of the proposed development accommodates the required 177 bicycle spaces and 14 motorcycle spaces.

4.6 Public transport services

The existing bus and rail transport services discussed in Section 2.7 will provide adequate public transport accessibility for the proposed residential development. This is reflected in the more recent (but lower) 2013 traffic generation rates in the addendum to *Traffic Generating Developments (2002)* which are now recommended by RMS for use with higher density residential developments in more urbanised areas.

5 Summary and conclusions

This traffic impact assessment report has analysed the traffic impacts of the proposed residential development (including uplift) known as Forest Park. The analysis has considered the surrounding approved projects in the locality, to be fully developed by 2026.

The analysis was carried out with reference to three development scenarios:

- Scenario 1 – the 2017 base-load traffic in the vicinity of the site.
- Scenario 2 – the 2026 base-load traffic, generated by the additional 4,854 dwellings currently approved to be developed within the Epping town centre.
- Scenario 3 – as above, plus the traffic generated by the uplifted proposed Forest Park residential development (total of +5,438 dwellings).

With reference to these scenarios, this report includes:

- a detailed intersection traffic analysis of the four relevant intersections in the vicinity of the site;
- a cumulative analysis of the traffic volumes on the relevant roads;

This report also includes an assessment of the local public transport and pedestrian/cycleway access routes.

5.1 Site access and local network changes

The proposed vehicle access for the Forest Park residential development will be via Epping Road and Forest Grove. Significant other roads in the vicinity of the site include Blaxland Road, Essex Street, Smith Street and Maida Road. The RMS plans to carry out some road upgrades in the Epping town centre: most significantly for the site, the addition of a raised median strip on Epping Road. This will restrict right turns onto Epping Road from Forest Grove and Smith Street. Further, an additional west-bound lane on Epping Road along the site's frontage will be constructed.

5.2 Assessment of impacts on peak and daily traffic volumes

There will be significant increases in traffic volumes on the local network from the 2017 levels to the 2026 base-load levels. However, there will be a relatively small effect on 2026 volumes as a result of the Forest Park development. The most significant of these will be on Forest Grove, which will experience an additional 768 daily vehicle movements, approximately, as a result of the development. This was expected in that Forest Grove will be a primary access road to the development.

5.3 Assessment of traffic impacts on intersections

5.3.1 Existing intersection operations

The existing (2017) operations for the following intersections were assessed using SIDRA:

- Epping Road/Blaxland Road;

- Epping Road/Smith Street;
- Epping Road/Forest Grove; and
- Epping Road/Essex Street.

The existing operation of the Epping Road/Blaxland Road intersection is poor, with the northern approach at capacity (LoS E) during the morning peak hour. All approaches except for the western approach are over capacity (LoS F) during the afternoon peak hour.

The existing operations of the Epping Road/Smith Street and Epping Road/Forest Grove intersections are generally good. The level of service for all approaches is acceptable (LoS A-C) at both intersections for the morning and afternoon peak. The only exception is that the right turn from both Smith Street and Forest Grove is permanently over capacity (LoS F) due to the difficulty of turning right into Epping Road at an unsignalised intersection. However, RMS road upgrades will not permit these right turns in the near future.

The existing operation of the Epping Road/Essex Street is poor, with the northern and southern approaches at or near capacity (LoS D-E) during the morning peak hour. Furthermore, during the afternoon peak hour, all approaches except for the western approach are at or over capacity (LoS E-F).

5.3.2 Future intersection operations

The same four intersections were assessed again using SIDRA with consideration of scenario 2 (+4,854 new dwellings in the Epping town centre) and scenario 3 (+5,438 new dwellings plus Forest Park development) as cumulative traffic impacts on the local network. The road upgrades planned by RMS were incorporated into the predictive model used in this analysis.

The future operation of the Epping Road/Blaxland Road intersection is poor for both future scenarios, with the northern, southern and eastern approaches generally at or near capacity (LoS E-F) during the morning and afternoon peak hours. The differences between scenario 2 and scenario 3 are marginal and thus the effect of the Forest Park development on this intersection will not be significant.

The future operations of the Epping Road/Smith Street and Epping Road/Forest Grove intersections are very good for both future scenarios. The level of service for all approaches is acceptable (LoS A) at both intersections for the morning and afternoon peak. The differences between the two future scenarios are marginal and thus Forest Park's effect on these intersections will not be significant.

The future operation of the Epping Road/Essex Street is poor for both future scenarios. During the morning peak hour, all approaches exhibit a mixture of levels of service (LoS C-F), with these oscillating between scenarios 2 and 3. The net difference between the two scenarios is, however, minimal. During the evening peak hour, all approaches except the western approach are over capacity (LoS F) for both future scenarios with no practical difference between the scenarios. Overall, the effect of the Forest Park development on this intersection will not be significant.

While, in general, the development only has a minor effect on the traffic conditions at intersections, the increases in average vehicle delays (as shown in Table 4.10) from scenario 1 to scenario 2 are such that further development in the Epping town centre is unacceptable without further improvements to the local traffic access to Epping Road.

5.4 Assessment of car parking

Kerbside parking is currently permitted on various roads in the vicinity of the site including the eastern side of Blaxland Road (outside peak hours) and both sides of Essex Street, Forest Grove, Smith Street and Maida Road.

Based on a parking analysis (Section 4.4), a minimum of 711 car parking spaces will be required. These are accommodated in the preliminary design for the development.

5.5 Assessment of pedestrian and cycling access needs

The site is well placed for pedestrian and cycling access. Concrete footpaths are on at least one side of all the surrounding roads. A designated cycle route on Pembroke Street, 200 m north of the site is easily accessible.

A minimum of 177 bicycle and 14 motorcycle spaces are required by the HDCP 2013. These are accommodated in the preliminary design for the development.

5.6 Assessment of public transport access

Multiple public transport options are available. The T1 North Shore, Northern and Western Line of the Sydney railway network is accessible at Epping station, 260 m away on foot. Furthermore, several bus routes operate within a 300 m radius of the site – including a bus stop at the site's Epping Road frontage. Thus, public transport from the site to a range of areas throughout the Sydney metropolitan region is available. The existing public transport network will be sufficient for the needs of the Forest Park development.

References

GTA Consultants (2015), *Forest Park, Epping Planning Proposal Traffic Impact Assessment*, report prepared for Austino Property Group, December 2015.

Roads and Traffic Authority (2002), *Guide to Traffic Generating Developments*.

Appendix A

Scenario 1 Intersection SIDRA Analysis Results

Appendix B

Scenario 2 Intersection SIDRA Analysis Results

Appendix C

Scenario 3 Intersection SIDRA Analysis Results
