

Technical Direction

For traffic, safety and transport practitioners

OPERATIONAL POLICY – GUIDELINES – ADVICE



Transport
Roads & Maritime
Services

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Guide to Traffic Generating Developments

Updated traffic surveys

Introduction

The *Guide to Traffic Generating Developments* was first released in 1991. It was revised in 2001 and is in the process of being further revised. It provides guidance on a number of matters related to the traffic impacts of land use developments, most notably on matters relating to traffic generation and parking. Its audience extends beyond that of traffic authorities (RMS and Councils) and is widely used throughout Australia.

Over the past few years a number of surveys have been undertaken to update trip generation and parking information as part of the *Guide*. This Technical Direction provides a summary of the updated information. The information herein should be used to supplement the current *Guide* and replace those sections of the *Guide* indicated. The information is provided in two parts; (i) a very brief summary below and (ii) more extended summaries in Appendices A-H. More detailed information may be obtained by referral to the RMS Library where reports on each land use may be found.

Summaries of land use traffic generation

Low density residential dwellings

Eleven surveys were conducted in 2010, six within the Sydney urban area and five within regional NSW. The results of the surveys were as follows:

Rates

Daily vehicle trips = 10.7 per dwelling in Sydney, 7.4 per dwelling in regional areas

Weekday average evening peak hour vehicle trips = 0.99 per dwelling in Sydney (maximum 1.39), 0.78 per dwelling in regional areas (maximum 0.90).

Weekday average morning peak hour vehicle trips = 0.95 per dwelling in Sydney (maximum 1.32), 0.71 per dwelling in regional areas (maximum 0.85).

(The above rates do **not** include trips made internal to the subdivision, which may add up to an additional 25%).

Distribution List:

Director, Infrastructure Development; RMS Development Managers; RMS Land use/Planning Officers; Councils; Land & Environment Court Officers and Consultants.

For further enquiries

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Approved: R O'Keefe, Mgr Traffic Policy, Guidelines & Legislation

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High density residential flat dwellings

Ten surveys were conducted in 2012, eight within Sydney, and one each in the Hunter and Illawarra. All developments were (i) close to public transport, (ii) greater than six storeys and (iii) almost exclusively residential in nature. The weekday trip generation rates were as follows:

Weekday Rates	Sydney Average	Sydney Range	Regional Average	Regional Range
AM peak (1 hour) vehicle trips per unit	0.19	0.07-0.32	0.53	0.39-0.67
AM peak (1 hour) vehicle trips per car space	0.15	0.09-0.29	0.35	0.32-0.37
AM peak (1 hour) vehicle trips per bedroom	0.09	0.03-0.13	0.21	0.20-0.22
PM peak (1 hour) vehicle trips per unit	0.15	0.06-0.41	0.32	0.22-0.42
PM peak (1 hour) vehicle trips per car space	0.12	0.05-0.28	0.26	0.11-0.40
PM peak (1 hour) vehicle trips per bedroom	0.07	0.03-0.17	0.15	0.07-0.22
Daily vehicle trips per unit	1.52	0.77-3.14	4.58	4.37-4.78
Daily vehicle trips per car space	1.34	0.56-2.16	3.22	2.26-4.18
Daily vehicle trips per bedroom	0.72	0.35-1.29	1.93	1.59-2.26

Housing for seniors

Ten surveys were conducted in 2009, five within the Sydney urban area and five in regional New South Wales. Summary trip generation rates were as follows:

Weekday daily vehicle trips = 2.1 per dwelling
 Weekday peak hour vehicle trips = 0.4 per dwelling
 (Note that morning site peak hour does not generally coincide with the network peak hour)

Office blocks

Ten surveys were conducted in 2010. Eight of the surveys were conducted within the Sydney urban area and one each in Newcastle and Wollongong. The Sydney sites provided a range of locations with two inner ring sites, four middle ring sites and two outer ring sites. Most had access to the rail network. Summary trip generation rates were as follows:

Daily vehicle trips = 11 per 100 m² gross floor area
 Morning peak hour vehicle trips = 1.6 per 100 m² gross floor area.
 Evening peak hour vehicle trips = 1.2 per 100 m² gross floor area.

Business parks and industrial estates

In 2012 eleven of these two types of sites were surveyed, four within the Sydney urban area, four within the Lower Hunter, one in the Illawarra and one in Dubbo. Summary vehicle trip generation rates were as follows:

Weekday Rates	Sydney Average	Sydney Range	Regional Average	Regional Range
AM peak (1 hour) vehicle trips per 100 m ² of GFA.	0.52	0.15-1.31	0.70	0.32-1.20
PM peak (1 hour) vehicle trips per 100 m ² of GFA.	0.56	0.16-1.50	0.78	0.39-1.30
Daily total vehicle trips	4.60	1.89-10.47	7.83	3.78-11.99

Shopping Centres

Extensive surveys of shopping centres were conducted in 1978, 1990 and again in 2011. The latter survey involved ten larger shopping centres, seven in the Sydney metropolitan area and one each at Mittagong, Shellharbour and Tuggerah. Peak hour trip generation rates are as follows:

Range in Total Floor Area (GLFA – m ²)	Peak Hour Generation Rate (vehicles per 100m ² GLFA)			
	Thursday (V(P)/A)	Friday (V(P)/A)	Saturday PVT (A)	Sunday
0 – 10,000	12.3	12.5	16.3	
10,000 – 20,000	7.6 (6.2)	6.2 (6.7)	7.5 (7.5)	(6.6)
20,000 – 30,000	5.9 (6.0)	5.6 (5.9)	7.5 (7.0)	(6.3)
30,000 – 40,000	4.6	3.7	6.1	
40,000 – 70,000	(4.4)	(4.4)	(5.5)	(4.6)
70,000+	(3.1)	(4.0)	(3.6)	(3.2)

* Figures in brackets refer to 2011 surveys. Other figures are as per 1978 and 1990 surveys. Caution should be used in comparing the data in that they reflect changes in shopping behaviours. Seasonally adjusted rates appear to be in the order of 3-5% higher than the quoted 2011 rates.

Bulky goods retail stores

Six surveys were conducted in 2009. Two of the surveys were conducted within the Sydney urban area (one electrical goods and one furniture) and four within regional New South Wales (two electrical goods and two furniture). Summary vehicle trip rates are as follows:

Weekday daily vehicle trips = 17 (including 1 heavy) vehicles per 100 m² of gross floor area
 Weekday peak hour vehicle trips = 2.7 vehicles per 100 m² of gross floor area. (note that the morning site peak hour during weekdays does not generally coincide with the network peak hour.)
 Weekend day daily vehicle trips = 19 vehicles per 100 m² of gross floor area (minimal heavy vehicles)
 Weekend day peak hour vehicle trips = 3.9 vehicles per 100 m² of gross floor area.

Major hardware and building supplies stores

Nine surveys were conducted in 2009. Five of the surveys were conducted within the Sydney urban area and four within regional New South Wales. Summary vehicle trip rates are as follows:

Weekday daily vehicle trips = 33 vehicles per 100 m² of gross floor area (includes 2 heavy vehicles)
 Weekday peak hour vehicle trips = 4.2 vehicles per 100 m² of gross floor area. (Note that higher trip rates are observed in the PM network peak with commensurately higher traffic impacts at that time.)
 Weekend day daily vehicle trips = 35 vehicles per 100 m² of gross floor area (minimal heavy vehicles)
 Weekend day peak hour vehicle trips = 5.6 vehicles per 100 m² of gross floor area.

Action

This *Technical Direction* must be followed when RMS is undertaking trip generation and/or parking demand assessments.

Updates

To ensure that this *Technical Direction* and any related guidelines remain current and relevant, minor updates may be made from time to time. Any updates may be obtained from the RMS website using the Traffic & Transport Policies & Guidelines Register which can be found at:

www.rta.nsw.gov.au/doingbusinesswithus/guidelines/documentregister/index.html

Printed copies of this *Technical Direction* are uncontrolled, therefore the Register should always be checked prior to using this *Technical Direction* or any related guidelines.

Approved by:

Authorised by:

SIGNED

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APPENDIX A - LOW DENSITY RESIDENTIAL – SURVEY DETAILS

Source: Trip Generation Surveys, Low Density Residential, TEF Consulting, in association with Gennaoui Consulting Pty Ltd, for the NSW Roads and Traffic Authority, June 2010, p6

	Survey area ID										
	LDR1	LDR2	LDR3	LDR4	LDR5	LDR6	LDR7	LDR8	LDR9	LDR10	LDR11
Area Characteristics:											
Suburb	Beaumont Hills	Longueville	North Epping	Werrington Downs	West Hoxton	Westleigh	Coffs Harbour	Goonellabah	Calare	Glenfield Park	Farmborough Heights
Local Government Area	Baulkham Hills	Lane Cove	Hornsby	Penrith	Liverpool	Hornsby	Coffs Harbour	Lismore	Orange	Wagga Wagga	Wollongong
Typical housing type	two-storey	two-storey	one - & two-storey	one-storey	large two-storey	one-storey	one-storey	one - & two-storey	one-storey	one-storey	one - & two-storey
Indicative Public Transport Accessibility Score	6	30	11	8	5	6	3	2	2	3	2
Traffic generating developments within the area	1 School, 2 Childcare centres	1 Private Hospital	1 School, 2 Childcare centres, 1 Shopping Village, 1 Local shop, 1 Retirement Village	1 Childcare centre	1 School, 3 Childcares, 1 Medical Centre	1 School, 1 Childcare, 1 Shopping centre	None	1 Function Centre	2 Childcare centres, 1 Aged Care facility	None	None
No. of dwellings	956	676	1495	669	1235	1335	509	556	697	554	905
Population	3,346	2,084	4,295	2,095	4,552	4,024	1,250	1,378	2,037	1,391	2,685
Date of survey	4 04-May-10	3 28-Apr-10	3 28-Apr-10	3 04-May-10	4 06-May-10	3 28-Apr-10	2 13-May-10	2 12-May-10	3 06-May-10	3 05-May-10	3 06-May-10
Day of survey	Tuesday	Wednesday	Wednesday	Tuesday	Thursday	Wednesday	Thursday	Wednesday	Thursday	Wednesday	Thursday
Duration of survey	06:00-19:00 (13 hours) - All survey areas										
Weather	Fine	Fine	Fine	Fine	Fine	Fine	Fine	Fine	Fine	Overcast, light morning showers	Fine
Surrounding roads - AM peak period	08:00-09:00	08:00-09:00	06:00-07:00	08:00-09:00	08:00-09:00	07:00-08:00	08:00-09:00	08:00-09:00	08:00-09:00	08:00-09:00	08:00-09:00
Surrounding roads - PM peak period	17:00-18:00	17:00-18:00	15:00-16:00	15:30-16:30	17:00-18:00	16:00-17:00	15:00-16:00	17:00-18:00	16:00-17:00	16:00-17:00	15:00-16:00
Person Trips:											
o Peak 1-hour person-trips	2170	1083	1390	1286	2807	1207	735	631	1018	733	892
o Time of peak 1-hour person-trips	15:00-16:00	07:15-08:15	07:30-08:30	16:30-17:30	08:00-09:00	17:00-18:00	15:15-16:15	15:30-16:30	08:00-09:00	15:30-16:30	07:45-08:45
o Peak person-trips per dwelling	2.27	1.60	0.93	1.92	2.27	0.90	1.44	1.13	1.46	1.32	0.99
o Peak person-trips per resident	0.65	0.52	0.32	0.61	0.62	0.30	0.59	0.46	0.50	0.53	0.33
o Total daily person-trips	14389	9699	11276	9753	17668	11489	4955	5099	7356	4878	6672
o Total daily person-trips per dwelling	15.05	14.35	7.54	14.58	14.31	8.61	9.73	9.17	10.55	8.81	7.37
o Total daily person-trips per resident	4.30	4.65	2.63	4.65	3.88	2.86	3.96	3.70	3.61	3.51	2.49
o Person-trips in network AM peak	1880	917	401	1046	2807	1042	639	629	1018	569	851
o Person-trips in network PM peak	1517	939	1169	1068	1732	1085	675	557	896	655	854
Vehicle Trips:											
o Peak 1-hour vehicle-trips	1170	710	875	932	1625	944	384	446	627	480	555
o Time of peak 1-hour vehicle-trips	08:00-09:00	17:30-18:30	07:30-08:30	17:00-18:00	08:00-09:00	17:00-18:00	08:00-09:00	17:00-18:00	16:45-17:45	17:15-18:15	07:45-08:45
o Peak vehicle-trips per dwelling	1.22	1.05	0.59	1.39	1.32	0.71	0.75	0.80	0.90	0.87	0.61
o Peak vehicle-trips per resident	0.35	0.34	0.20	0.44	0.36	0.23	0.31	0.32	0.31	0.35	0.21
o Total daily vehicle-trips	9237	6962	7816	6914	11983	8888	3325	3635	4962	3521	4670
o Total daily vehicle-trips per dwelling	9.66	10.30	5.23	10.33	9.70	6.66	6.53	6.54	7.12	6.36	5.16
o Total daily vehicle-trips per resident	2.76	3.34	1.82	3.30	2.63	2.21	2.66	2.64	2.44	2.53	1.74
o Vehicle-trips in network AM peak	1170	598	297	649	1625	790	384	368	591	372	543
o Vehicle-trips in network PM peak	1070	709	653	744	1271	808	334	446	552	460	485
o Car Occupancy (average over survey period)	1.25	1.24	1.30	1.28	1.38	1.21	1.35	1.28	1.42	1.32	1.33
% of total trips by mode:											
o % Car (as driver)	61.2%	68.7%	67.7%	68.6%	65.3%	75.2%	65.6%	68.2%	66.7%	70.2%	67.1%
o % Car (as passenger)	15.2%	16.8%	20.5%	18.9%	25.0%	16.1%	23.2%	19.0%	27.9%	22.1%	21.9%
o % Train	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
o % Bus	16.9%	4.5%	5.2%	5.6%	4.0%	3.5%	4.3%	7.0%	2.9%	5.9%	6.2%
o % Cycle	0.3%	0.4%	0.7%	0.7%	0.2%	0.3%	1.3%	0.5%	0.3%	0.1%	0.3%
o % On foot	5.4%	6.8%	4.3%	4.9%	3.5%	3.0%	4.4%	3.6%	1.8%	1.0%	2.6%
o % Other	1.0%	2.9%	1.6%	1.3%	2.0%	1.8%	1.3%	1.7%	0.4%	0.6%	1.8%

APPENDIX B1 – HIGH DENSITY RESIDENTIAL – WEEKDAYS

Site No.	Sydney Metropolitan Area					Regional Area				
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 10	Site 8	Site 9
Location	St Leonards	Chatswood	Cronulla	Rockdale	Parramatta	Liberty Grove	Strathfield	Pyrmont	Charlestown	Wollongong
Total Units	70	129	28	234	83	64	31	131	108	9
1 Bed	15	8	0	4	9	0	0	70	31	0
2 Bed	24	96	14	214	57	36	31	54	53	0
3+ Bed	31	25	14	16	17	28	0	7	24	9
Parking Spaces	97	206	18	260	108	93	30	199	113	19
Parking Ratio	1.39	1.60	0.64	1.11	1.30	1.45	0.97	1.52	1.05	2.11
Person Based Trips										
Daily Person Based Trips*										
- Car Based	65	245	27	720	177	284	40	160	527	53
- Other	179	445	56	535	239	132	89	240	124	25
- Total	244	690	83	1255	416	416	129	400	651	78
Average Person Trips Per hour*	19	53	6	97	32	32	10	31	50	6
Peak Person Trips	47	129	18	194	104	73	28	91	79	14
Peak Vehicle-Hour Person Trips	47	129	16	194	104	66	28	91	86	10
Peak Network Hour Person Trips										
- AM Peak	45	83	9	189	79	46	16	91	57	8
- PM Peak	38	106	4	123	54	58	13	60	70	10
% Mode Split										
Car Driver	22%	23%	31%	42%	33%	48%	28%	34%	73%	55%
Car Passenger	5%	12%	1%	15%	9%	20%	3%	6%	8%	13%
Non-Car	73%	64%	67%	43%	57%	32%	69%	60%	19%	32%
Vehicle-Based Trips										
Daily Vehicle Trips*	54	159	26	527	139	201	36	135	472	43
Peak Vehicle Trips	13	25	7	76	22	38	5	23	67	8
Peak Network Hour Vehicle Trips										
- AM Peak	10	18	2	76	22	18	3	23	42	6
- PM Peak	5	15	3	43	10	26	2	13	45	2
- % Car Parking Occupancy	62%	62%	-*	75%	77%	73%	73%	50%	78%	74%
Average Vehicle Occupancy										
- AM Peak	1.5	1.4	1.0	1.3	1.3	1.1	1.0	1.1	1.0	1.2
- PM Peak	1.4	1.6	1.0	1.4	1.5	1.4	1.0	1.1	1.2	1.0
- Average Over the Day*	1.2	1.5	1.0	1.4	1.3	1.4	1.1	1.2	1.1	1.2

APPENDIX B2 – HIGH DENSITY RESIDENTIAL - SATURDAYS

	Sydney Metropolitan Area								Regional Area	
Site No.	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 10	Site 8	Site 9
Location	St Leonards	Chatswood	Cronulla	Rockdale	Parramatta	Liberty Grove	Strathfield	Pymont	Charlestown	Wollongong
Total Units	70	129	28	234	83	64	31	131	108	9
1 Beds	15	8	0	4	9	0	0	70	31	0
2 Beds	24	96	14	214	57	36	31	54	53	0
3+ Bed	31	25	14	16	17	28	0	7	24	9
Parking Spaces	97	206	18	260	108	93	30	199	113	19
Person Based Trips										
Daily Person Based Trips*										
- Car Based	220	288	26	589	181	252	75	217	304	55
- Other	494	501	90	683	306	175	158	420	205	40
- Total	714	789	116	1272	487	427	233	637	509	95
Average Person Trips*	55	61	9	98	37	33	18	49	39	7
Peak Person Trips	217	132	23	181	70	64	31	104	66	17
Peak Vehicle-Hour Person Trips	106	92	23	154	70	59	27	63	63	16
Peak Network Hour Person Trips	44	92	15	154	34	50	26	93	55	8
% Mode Split										
Car Driver	18%	23%	15%	31%	24%	30%	22%	23%	50%	35%
Car Passenger	12%	13%	8%	15%	14%	29%	10%	11%	10%	23%
Other	69%	63%	78%	54%	63%	41%	68%	66%	40%	42%
Vehicle-Based Trips										
Daily Vehicle Trips*	132	182	17	394	115	129	51	145	252	33
Peak Vehicle Trips	22	27	5	54	18	20	10	25	42	7
Peak Network Hour Vehicle Trips	17	21	3	54	9	14	6	21	35	2
Peak Parking Accumulation										
- % Car Parking Occupancy	56%	58%	-*	77%	68%	69%	63%	44%	65%	79%
Average Vehicle Occupancy										
- Peak Hour	1.5	1.6	1.7	1.3	1.9	2.0	1.8	1.4	1.1	2.0
- Average Over the Day*	1.7	1.6	1.5	1.5	1.6	2.0	1.5	1.5	1.2	1.7

*Parking accumulation for the Cronulla site could not be determined accurately as some car spaces were enclosed

APPENDIX B3 – HIGH DENSITY RESIDENTIAL – GENERATION RATES

Site No.	Sydney Metropolitan Area								Regional Area	
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 10	Site 8	Site 9
Location	St Leonards	Chatswood	Cronulla	Rockdale	Parramatta	Liberty Grove	Strathfield	Pymont	Charlestown	Wollongong
Weekday										
AM Peak Person Trips per Unit	0.64	0.64	0.32	0.81	0.95	0.72	0.52	0.69	0.53	0.89
AM Peak Person Trips per Car Space	0.39	0.51	0.22	0.47	0.50	0.62	0.43	0.30	0.62	0.53
AM Peak Person Trips per Bedroom	0.29	0.30	0.13	0.39	0.45	0.29	0.26	0.46	0.27	0.30
PM Peak Person Trips per Unit	0.54	0.82	0.14	0.53	0.65	0.91	0.42	0.46	0.65	1.11
PM Peak Person Trips per Car Space	0.54	0.82	0.14	0.53	0.65	0.91	0.42	0.46	0.65	1.11
PM Peak Person Trips per Bedroom	0.24	0.39	0.06	0.26	0.31	0.37	0.21	0.30	0.33	0.37
Daily Person Trips per Unit	3.49	5.35	2.96	5.36	5.01	6.50	4.16	3.05	6.03	8.67
Daily Person Trips per Car Space	2.52	3.35	4.61	4.83	3.85	4.47	4.30	2.01	5.76	4.11
Daily Person Trips per Bedroom	1.56	2.51	1.19	2.61	2.39	2.67	2.08	2.01	3.11	2.89
AM Peak Vehicle Trips per Unit	0.14	0.14	0.07	0.32	0.27	0.28	0.10	0.18	0.39	0.67
AM Peak Vehicle Trips per Car Space	0.10	0.09	0.11	0.29	0.20	0.19	0.10	0.12	0.37	0.32
AM Peak Vehicle Trips per Bedroom	0.06	0.07	0.03	0.16	0.13	0.12	0.05	0.12	0.20	0.22
PM Peak Vehicle Trips per Unit	0.07	0.12	0.11	0.18	0.12	0.41	0.06	0.10	0.42	0.22
PM Peak Vehicle Trips per Car Space	0.05	0.07	0.17	0.17	0.09	0.28	0.07	0.07	0.40	0.11
PM Peak Vehicle Trips per Bedroom	0.03	0.05	0.04	0.09	0.06	0.17	0.03	0.07	0.22	0.07
Daily Vehicle Trips per Unit	0.77	1.23	0.93	2.25	1.67	3.14	1.16	1.03	4.37	4.78
Daily Vehicle Trips per Car Space	0.56	0.77	1.44	2.03	1.29	2.16	1.20	0.68	4.18	2.26
Daily Vehicle Trips per Bedroom	0.35	0.58	0.37	1.10	0.80	1.29	0.58	0.68	2.26	1.59
Saturday										
Peak Hour Person Trips per Unit	3.10	1.02	0.82	0.77	0.84	1.00	1.00	0.79	0.61	1.89
Peak Hour Person Trips per Car Space	2.24	0.64	1.28	0.70	0.65	0.69	1.03	0.52	0.58	0.89
Peak Hour Person Trips per Bedroom	0.68	0.33	0.33	0.32	0.40	0.38	0.44	0.32	0.30	0.59
Daily Person Trips per Unit	10.20	6.12	4.14	5.44	5.87	6.67	7.52	4.86	4.71	10.56
Daily Person Trips per Car Space	7.36	3.83	6.44	4.89	4.51	4.59	7.77	3.20	4.50	5.00
Daily Person Trips per Bedroom	4.58	2.87	1.66	2.65	2.80	2.74	3.76	3.20	2.44	3.52
Peak Hour Vehicle Trips per Unit	0.31	0.21	0.18	0.23	0.22	0.31	0.32	0.19	0.39	0.78
Peak Hour Vehicle Trips per Car Space	0.23	0.13	0.28	0.21	0.17	0.22	0.33	0.13	0.37	0.37
Peak Hour Vehicle Trips per Bedroom	0.14	0.10	0.07	0.11	0.10	0.13	0.16	0.13	0.20	0.26
Daily Vehicle Trips per Unit	1.89	1.41	0.61	1.68	1.39	2.02	1.65	1.11	2.33	3.67
Daily Vehicle Trips per Car Space	1.36	0.88	0.94	1.52	1.06	1.39	1.70	0.73	2.23	1.74
Daily Vehicle Trips per Bedroom	0.85	0.66	0.24	0.82	0.66	0.83	0.82	0.73	1.21	1.22

APPENDIX C1 – SENIORS LIVING – SITE DETAILS

Site ID	SH1 Dee Why 2099	SH2 Allambie Heights 2100	SH3 North Parramatta 2151	SH4 Richmond 2753	SH5 Prestons 2170	SH6 Bonnells Bay 2264	SH7 Wamberal 2260	SH8 Kincumber 2251	SH9 Tahmoor 2573	SH10 Bowral 2576
Suburb										
Network Peak Hours										
Year of Network Survey Dates	2005	2009	2005	2009	2009	2009	2004	2009	2009	2006
		21/3-27/3		23/3-29/3	6/4-12/4	21/3-1/4		21/03-25/3	19/3-25/3	
AM Peak - Weekdays	0800-0900	0800-0900	0800-0900	0800-0900	0900-1000	0900-1000	0800-0900	1100-1200	0900-1000	0800-0900
PM Peak - Weekdays	1700-1800	1700-1800	1700-1800	1500-1600	1600-1700	1500-1600	1500-1600	1600-1700	1700-1800	1500-1600
Peak - Weekends	1200-1300	1200-1300	1200-1300	1100-1200	1200-1300	1100-1200	1200-1300	1100-1200	1100-1200	1100-1200
Site Details - Senior Housing										
Accommodation Type	S + H	S + H	S + H + A	S + H + A	S + H	S	S	S	S	S + H
Funded (Resident / Government)	Resident	Resident	Resident	Resident	Both	Resident	Resident	Resident	Resident	Resident
Original Unit Cost	200k-250k	200k-480k	180k-220k	Unknown	135k-175k	300k-400k	90k-95k	365k-520k	95K	385k-645k
Year Constructed	1988-2000	1966-2009	1994-2001	1983-2005	1999-2003	1996	1983-1986	2002-2007	1997	1986
Village Bus	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
Village Bus Frequency per week	9	2	10	2	4	4	No	3	No	No
No. of Units Provided (Total)	272	83	276	174	214	250	62	76	42	86
No. of Occupied Units (Self)	180	40	116	43	147	240	51	70	38	68
No. of Residents (Self)	226	48	157	43	217	350	51	92	50	100-110
No. of Occupied Units (Low-care)	25	38	50	61	67	N/A	N/A	N/A	N/A	13
No. of Residents (Low-care)	25	39	50	61	67	N/A	N/A	N/A	N/A	
No. of Occupied beds (High-care)	N/A	N/A	98	70	N/A	N/A	N/A	N/A	N/A	N/A
No. of Residents (High-care)	N/A	N/A	98	70	N/A	N/A	N/A	N/A	N/A	N/A
No. of employee (Total)	15	32	160	130	30	8	3	10	1	19
No. of employee (at one time)	N/A	12	45	30-40	<30	8	2	1	1	19
Accessibility Score	<79	<79	<79	<79	<79	0.5	32	32	6.5	8
Parking Spaces										
Residents	110	17	82	26	155	500	62	111	42	80
Staff	as Visitor	16	25	as Visitor	11	4	as Visitor	as Visitor	1	as Visitor
Visitors / Loading bays	32	11	32	52	28	75	11	28	16	10
Total	142	44	139	78	194	579	73	139	59	90
Cars Ownership										
No Car	Unknown		54		83	0	16	4	16	
1 Car	Unknown	17	59	15	83	230	37	39	22	60
2 Cars	Unknown		5		0	10	0	10	0	
No. of Cars (Total)	Unknown	17	69	15	83	250	37	59	22	60

Source: Trip Generation and Parking Generation Surveys, Housing for Seniors, Analysis Report, Hyder for the NSW Roads and Traffic Authority, June 2009, p7

APPENDIX C2 – SENIORS LIVING, TRIPS PER OCCUPIED UNIT - WEEKDAY

	Sydney Metropolitan Area					Non-Metropolitan Area				
Site ID	SH1	SH2	SH3	SH4	SH5	SH6	SH7	SH8	SH9	SH10
No. of Occupied Units (Total)	205	78	264	174	214	240	71	70	38	81
Weekdays										
Person-based Trips										
- Site Peak Hour	126	31	110	80	91	149	31	39	34	44
Trips/ Unit	0.61	0.40	0.42	0.46	0.43	0.62	0.61	0.56	0.89	0.54
- Vehicle Network AM Peak	Network AM peak is outside of survey periods									
Trips/ Unit										
- Vehicle Network PM Peak	116	8	23	56	44	86	26	22	1	43
Trips/ Unit	0.57	0.10	0.09	0.32	0.21	0.36	0.51	0.31	0.03	0.53
Daily Total Person Trips	854	163	653	481	528	1,037	182	225	139	269
Trips/ Units	4.17	2.09	2.47	2.76	2.47	4.32	3.57	3.21	3.66	3.32
Vehicle-based Trips										
- Site Peak Hour	87	20	62	55	54	105	20	27	21	37
Trips/ Unit	0.42	0.26	0.23	0.32	0.25	0.44	0.39	0.39	0.55	0.46
- Network AM Peak	Network AM peak is outside of survey periods									
Trips/ Unit										
- Network PM Peak	74	5	12	41	36	54	16	16	1	27
Trips/ Unit	0.36	0.06	0.05	0.24	0.17	0.23	0.31	0.23	0.03	0.33
Daily Total Car Trips	584	95	351	285	294	685	100	146	63	204
Trips/ Unit	2.85	1.22	1.33	1.64	1.37	2.85	1.96	2.09	1.66	2.52
Daily Total CV Trips	9	10	30	26	38	59	9	6	12	5
Trips/ Unit	0.04	0.13	0.11	0.15	0.18	0.25	0.18	0.09	0.32	0.06
Daily Total Vehicle Trips	593	105	381	311	332	744	109	152	75	209
Trips/ Unit	2.89	1.35	1.44	1.79	1.55	3.10	2.14	2.17	1.97	2.58
% CV	1.5%	9.5%	7.9%	8.4%	11.4%	7.9%	8.3%	3.9%	16.0%	2.4%

* CV – Commercial Vehicle

Source: Trip Generation and Parking Generation Surveys, Housing for Seniors, Analysis Report, Hyder for the NSW Roads and Traffic Authority, June 2009, p14

APPENDIX C3 –SENIORS LIVING, TRIPS PER OCCUPIED UNIT - WEEKENDS

	Sydney Metropolitan Area					Non-Metropolitan Area				
Site ID	SH1	SH2	SH3	SH4	SH5	SH6	SH7	SH8	SH9	SH10
No. of Occupied Units (Total)	205	78	264	174	214	240	71	70	38	81
Weekend										
Person-based Trips										
- Site Peak Hour	31	29	95	73	89	123	28	35	22	46
Trips/ Unit	0.15	0.37	0.36	0.42	0.42	0.51	0.55	0.50	0.58	0.57
- Vehicle Network Peak	13	16	76	44	47	123	6	35	15	37
Trips/ Unit	0.06	0.21	0.29	0.25	0.22	0.51	0.12	0.50	0.39	0.46
Daily Total Person Trips	163	151	620	373	483	452	119	111	114	182
Trips/ Units	0.80	1.94	2.35	2.14	2.26	1.88	2.33	1.59	3.00	2.25
Vehicle-based Trips										
- Site Peak Hour	20	15	56	46	50	85	15	20	11	33
Trips/ Unit	0.10	0.19	0.21	0.26	0.23	0.35	0.29	0.29	0.29	0.41
- Network Peak	9	11	45	30	31	79	3	18	6	27
Trips/ Unit	0.04	0.14	0.17	0.17	0.14	0.33	0.06	0.26	0.16	0.33
Daily Total Car Trips	95	95	334	241	268	312	56	65	58	131
Trips/ Unit	0.46	1.22	1.27	1.39	1.25	1.30	1.10	0.93	1.53	1.62
Daily Total CV Trips	10	2	22	7	16	3	0	0	2	3
Trips/ Unit	0.05	0.03	0.08	0.04	0.07	0.01	0.00	0.00	0.05	0.04
Daily Total Vehicle Trips	105	97	356	248	284	315	56	65	60	134
Trips/ Unit	0.51	1.24	1.35	1.43	1.33	1.31	1.10	0.93	1.58	1.65
% CV	9.5%	2.1%	6.2%	2.8%	5.6%	1.0%	0.0%	0.0%	3.3%	2.2%

* CV – Commercial Vehicle

Source: Trip Generation and Parking Generation Surveys, Housing for Seniors, Analysis Report, Hyder for the NSW Roads and Traffic Authority, June 2009, p14

APPENDIX D1 – OFFICE BLOCKS – SITE DETAILS

	OB1 North Sydney	OB2 Chatswood	OB3 Sydney Olympic Park	OB4 Hurstville	OB5 Macquarie Park	OB6 Parramatta	OB7 Liverpool	OB8 Norwest	OB9 Newcastle	OB10 Wollongong
Total Staff	1,136 (1,129)	397 (347)	2,400 (2,053)	95 (85)	240 (240)	1,400 (1,225)	99 (88)	34 (31)	490 (490)	380 (300)
Size	31,400	10,214	34,131	3,254	5,748	27,000	2,817	1,200	12,182	12,921
Car and Bicycle Parking spaces	136	150	902	66	269	402	28	83	220	133
Loading Bays	1	6	7	0	3	3	0	1	0	1
Accessibility Score	0.9	0.9	0.4	0.9	0.9	0.9	0.9	0.6	0.9	0.9

Source: Trip Generation and Parking Generation Surveys (Office Blocks), GTA Consultants for the NSW Roads and Traffic Authority, September 2010, p113

APPENDIX D2 – OFFICE BLOCKS – VEHICLE-BASED TRIP RATES

	OB1 North Sydney	OB2 Chatswood	OB3 Sydney Olympic Park	OB4 Hurstville	OB5 Macquarie Park	OB6 Parramatta	OB7 Liverpool	OB8 Norwest	OB9 Newcastle	OB10 Wollongong	Average
AM Peak Hour											
Trips	52	105	505	93	119	185	70	33	126	123	141
Trips/100m ² GFA	0.17	1.03	1.48	2.86	2.07	0.69	2.49	2.75	1.03	0.95	1.55
PM Peak Hour											
Trips	44	86	481	60	106	166	48	14	139	100	124
Trips/100m ² GFA	0.14	0.84	1.41	1.84	1.84	0.61	1.70	1.17	1.14	0.77	1.15
Daily											
Trips	387	710		623	906	1636	518	138	1615	838	819
Trips/100m ² GFA	1.23	6.95		19.15	15.76	6.06	18.39	11.50	13.26	6.49	10.98
Road Network AM Peak Hour											
Trips	51	47	-	65	119	185	57	30	126	123	89
Trips/100m ² GFA	0.16	0.46	-	2.00	2.07	0.69	2.02	2.50	1.03	0.95	1.19
Road Network PM Peak Hour											
Trips	44	36	-	60	72	75	46	10	137	100	64
Trips/100m ² GFA	0.14	0.35	-	1.84	1.25	0.28	1.63	0.83	1.12	0.77	0.82

Source: Trip Generation and Parking Generation Surveys (Office Blocks), GTA Consultants for the NSW Roads and Traffic Authority, September 2010, p114

APPENDIX D3 – OFFICE BLOCKS – PERSON-BASED TRIP RATES

	OB1 North Sydney	OB2 Chatswood	OB3 Sydney Olympic Park	OB4 Hurstville	OB5 Macquarie Park	OB6 Parramatta	OB7 Liverpool	OB8 Norwest	OB9 Newcastle	OB10 Wollongong	Average
AM Peak Hour											
Trips	397	249	842	119	142	387	95	34	172	158	260
Trips/100m ² GFA	1.26	2.44	2.47	3.66	2.47	1.43	3.37	2.83	1.41	1.22	2.26
PM Peak Hour											
Trips	338	205	801	77	126	349	65	14	191	128	229
Trips/100m ² GFA	1.08	2.01	2.35	2.37	2.19	1.29	2.31	1.17	1.57	0.99	1.73
Daily											
Trips	2,975	1,691	-	802	1,079	5,114	700	142	2,213	1,074	1754
Trips/100m ² GFA	9.47	16.56	-	24.65	18.77	18.94	24.85	11.83	18.17	8.31	16.84
Road Network AM Peak Hour											
Trips	391	111	-	104	142	266	58	31	172	158	159
Trips/100m ² GFA	1.25	1.09	-	3.20	2.47	0.99	2.06	2.58	1.41	1.22	1.81
Road Network PM Peak Hour											
Trips	338	90	-	67	86	298	48	10	190	128	139
Trips/100m ² GFA	1.08	0.88	-	2.06	1.50	1.10	1.70	0.83	1.56	0.99	1.30

Source: Trip Generation and Parking Generation Surveys (Office Blocks), GTA Consultants for the NSW Roads and Traffic Authority, September 2010, p116

APPENDIX E – BUSINESS PARKS AND INDUSTRIAL ESTATES – SITE DETAILS AND TRIP GENERATION

Traffic results summary												
Survey area ID	Sydney areas				Non-Sydney areas							
	Site 1 Erskine Park Industrial Estate, Erskine	Site 2 Helensburgh Business Park, Helensburgh	Site 3 Wonderland Business Park, Eastern Creek	Site 4 Riverwood Business Park, Riverwood	Site 5 Tuggerah Business Park, Tuggerah	Site 6 Central Business Park, Albion Park Rail	Site 7 Anambah Business Park, Rutherford	Site 8 Freeway Business Park, Beresfield	Site 9 Shearwater Business Park, Taylors Beach	Site 10 Port Stephens Industrial Estate, Taylors	Site 11 Johnson Street Business Park, Dubbo	
Date of survey	29/03/2012	28/03/2012	27/03/2012	28/03/2012	1/05/2012	8/05/2012	2/05/2012	1/05/2012	2/05/2012	2/05/2012	10/05/2012	
Day of survey	Thursday	Wednesday	Wednesday	Wednesday	Tuesday	Tuesday	Wednesday	Tuesday	Wednesday	Wednesday	Thursday	
Duration of survey	06:00-19:00	07:00-19:00	07:00-19:00	07:00-19:00	07:00-19:00	07:00-19:00	06:00-19:00	07:00-19:00	06:00-19:00	06:00-19:00	06:00-19:00	
Surrounding area characteristics:	Commercial Residential Residential Residential Commercial Residential Open space Commercial Open space Open space Residential											
Indicative Public Transport Accessibility Score	2	2	4	8	48	10	0	0.5	0.5	0.5	0	
Principal adjacent road- AM peak period (weekday)	8.00 to 9.00 am	8.30 to 9.30 am	7.30 to 8.30 am	8.15 to 9.15 am	8.00 to 9.00 am	8.00 to 9.00 am	8.00 to 9.00 am	7.00 to 8.00 am	8.00 to 9.00 am	8.00 to 9.00 am	8.00 to 9.00 am	
Principal adjacent road - PM peak period (weekday)	3.30 to 4.30pm	4.30 to 5.30pm	4.15 to 5.15pm	5.00 to 6.00pm	3.00 to 4.00pm	4.00 to 5.00pm	4.00 to 5.00pm	5.00 to 6.00pm	4.00 to 5.00pm	4.00 to 5.00pm	3.00 to 4.00pm	
Principal adjacent road – daily peak period (weekend)	1.00 to 2.00 pm	11.00 am to 12.00 pm	12.15 to 1.15 pm	1.15 to 2.15 pm	11.00 am to 12.00 pm	11.00 am to 12.00 pm	2.00 to 3.00 pm	12.00 to 1.00 pm	11.00 am to 12.00 pm	11.00 am to 12.00 pm	10.0 to 11.00 am	
Estate characteristics:												
Year opened	2003	2011	2007	2004	2006	2000-2005	2008-2010	2005	2003-2005	2001-2005	Late 1960s	
Total site area (hectares)	326.9	0.6	114.6	4.7	52.2	14.6	17.5	32.5	10.3	5.9	6.3	
No. of units/lots (including vacant units/lots)	38	21	26	16	229	79	18	58	93	42	14	
No. of occupied units/lots	36	13	22	16	184	66	18	52	44	27	14	
Predominant business types within estate:												
no. of factories	5	0	0	0	6	0	1	5	0	0	1	
no. of factories/warehouses	2	0	0	0	2	0	0	2	0	0	0	
no. of warehouses	27	0	20	15	41	13	5	23	5	3	11	
no. of offices	1	9	0	1	93	4	3	7	7	1	1	
no. of retailers	0	0	0	0	16	25	1	2	12	6	0	
no. of workshops	1	0	0	0	0	9	3	7	6	1	0	
no. of manufacturers	0	3	2	0	2	0	0	2	2	10	0	
no. of others commercial businesses	0	1	0	0	23	15	5	2	12	5	1	
Gross Floor Area in estate m ² (occupied)	693,605	1,605	406,600	29,983	136,737	42,899	29,766	89,291	16,022	19,881	14,419	
No. of employees	incomplete data from businesses				incomplete data from businesses			incomplete data from businesses				
Person Trips:												
Peak 1-hour person-trips	1294	29	927	173	1458	519	204	575	285	97	149	
Time of peak 1-hour person-trips	14:45-15:45	14:45-15:45	14:00-15:00	08:15-09:15	16:30-17:30	16:15-17:15	15:00-16:00	07:00-08:00	16:15-17:15	15:00-16:00	16:15-17:15	
Peak person-trips per business	35.9	2.2	42.1	10.8	8	7.9	11.3	11.1	6.5	3.6	10.6	
Peak person-trips per hectare	4	49.4	0.1	37.0	28	35.6	11.6	17.7	27.7	16.5	23.6	
Peak person-trips per 100 m ² of GFA	0.187	1.807	0.228	0.577	1.066	1.210	0.685	0.644	1.779	0.488	1.033	
Peak person-trips per employee	incomplete data from businesses				incomplete data from businesses			incomplete data from businesses				
Total daily person-trips	14056	168	9929	1749	12066	4205	2064	6399	2389	975	1316	
Total daily person-trips per business	390.4	13.0	451.3	88	65.6	63.7	114.6	123.1	54.3	36.1	94.0	
Total daily person-trips per hectare	43.0	287.0	86.6	301.5	231.4	288.7	117.6	197.1	232.0	165.5	208.8	
Total daily person-trips per 100 m ² of GFA	2.026	10.492	2.442	4.703	8.824	9.802	6.933	7.167	14.910	4.904	9.129	
Total daily person-trips per employee	incomplete data from businesses				incomplete data from businesses			incomplete data from businesses				
Person-trips during adjacent road AM peak	976	24	789	173	1408	270	123	575	176	93	120	
Person-trips during adjacent road PM peak	1073	7	858	94	1060	478	160	396	258	54	136	
Vehicle Trips:												
Peak 1-hour vehicle-trips	1128	24	820	129	1256	418	173	504	209	78	118	
Time of peak 1-hour vehicle-trips	14:45-15:45	14:45-15:45	08:00-09:00	08:15-09:15	08:00-09:00	16:15-17:15	15:00-16:00	07:15-08:15	16:15-17:15	15:00-16:00	15:00-16:00	
Peak vehicle-trips per business	31	1.8	37.3	8.1	6.8	6.3	9.6	9.7	4.8	2.9	8.3	
Peak vehicle-trips per hectare	3.5	40.9	7.2	27.6	24.1	28.7	9.9	15.5	20.3	13.2	18.4	
Peak vehicle-trips per 100 m ² of GFA	0.163	1.495	0.202	0.430	0.919	0.974	0.581	0.564	1.304	0.392	0.905	
Peak vehicle-trips per employee	incomplete data from businesses				incomplete data from businesses			incomplete data from businesses				
Total daily vehicle-trips	13125	168	9384	1116	10383	4619	1793	5876	1921	751	1246	
Total daily vehicle-trips per business	364.6	12.9	426.5	69.75	56.4	70.0	99.6	113.0	43.7	27.8	89.0	
Total daily vehicle-trips per hectare	40.1	286.3	81.9	238.6	199.1	317.2	102.2	181.0	186.5	127.5	197.7	
Total daily vehicle-trips per 100 m ² of GFA	1.892	10.467	2.308	3.722	7.593	10.767	6.024	6.581	11.990	3.777	8.642	
Total daily vehicle-trips per employee	incomplete data from businesses				incomplete data from businesses			incomplete data from businesses				
Vehicle-trips in adjacent road AM peak (Average)	1165	126	2749	1608	2594	1131	112	1645	670	670	315	
Vehicle-trips in adjacent road PM peak (Average)	972	149	2593	1613	2844	1281	150	1789	805	805	341	
Vehicle-trips during adjacent road AM peak	929	19	724	129	1256	246	111	495	147	64	108	
Vehicle-trips during adjacent road PM peak	965	5	714	69	794	382	127	354	187	42	116	
Average vehicle occupancy	1.10	1.10	1.12	1.16	1.17	1.16	1.17	1.17	1.26	1.19	1.15	
% of total trips by principal mode:												
% Car (as driver)	62.5%	81.9%	63.2%	68.8%	79.1%	78.5%	70.0%	69.1%	74.3%	71.1%	66.1%	
% Car (as passenger)	8.0%	8.3%	8.3%	12.3%	11.2%	13.4%	13.4%	9.6%	19.5%	14.1%	10.9%	
% Commercial Vehicles	28.3%	4.2%	25.9%	12.6%	4.9%	6.2%	15.5%	18.3%	4.3%	8.9%	21.8%	
% Bus	0.8%	0.0%	2.1%	0.5%	3.2%	0.0%	0.0%	2.2%	0.0%	0.0%	0.2%	
% Cycle	0.1%	0.0%	0.3%	0.1%	0.3%	0.6%	0.3%	0.4%	0.8%	1.3%	0.1%	
% Motorbike	0.1%	0.0%	0.0%	0.0%	0.3%	0.4%	0.6%	0.3%	0.9%	3.8%	0.2%	
% On foot	0.1%	5.8%	0.2%	5.7%	1.1%	0.8%	0.8%	0.8%	0.3%	0.3%	0.4%	
% Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.4%	

Source: Trip Generation Surveys, Business Parks and Industrial Estates, TEF Consulting, in consultation with Gennaoui Consulting Pty Ltd, for the NSW RMS, December 2012, p5

APPENDIX F1 – SHOPPING CENTRES – DETAILS OF SELECTED SITES

Site ID	Sydney Metropolitan Area							Regional Area		
	SC1 Roselands	SC2 Burwood	SC3 Liverpool	SC4 Penrith	SC5 Parramatta	SC6 Rouse Hill	SC7 Warriewood	SC8 Mittagong	SC9 Shellharbour	SC10 Tuggerah
Network Peak Hours										
Year	2008	2011	2008	2009	2011	2008	2008	2008	2000	2004
AM Peak - Weekdays	7-8AM	8-9AM	8-9AM	8-9AM	8-9AM	8-9AM	8-9AM	9-10AM	8-9AM	8-9AM
PM Peak - Weekdays	5-6PM	3-4PM	4-5PM	4-5PM	5-6PM	5-6PM	5-6PM	4-5PM	3-4PM	3-4PM
Peak - Weekends	1-2PM	10-11AM	1-2PM	12-1PM	12-1PM	12-1PM	12-1PM	1-2PM	11AM-12PM	11AM-12PM
Site Details - Shopping Centre										
Gross Leasable Floor Area (m ²)	61,424	63,404	91,115	100,134	49,898	69,000	22,143	15,552	41,040	87,162
Year Constructed	1965	1966	1972	1971	1983	2008	1980	2007	1982	1995
Busy Peak Period	Saturday Midday	Saturday PM	Saturday Midday	Saturday Midday	Saturday Midday	Sunday Midday	Saturday Midday	Saturday Midday	Saturday Midday	Saturday Midday
Accessibility Score	40	233	268	200	96	184	64	22	67	105
Opening Hours										
Mon, Tue, Wed & Fri	9AM - 5:30PM	9AM - 5:30PM	9AM - 5:30PM	9AM - 5:30PM	9AM - 5:30PM	9AM - 5:30PM	9AM - 5:30PM	9AM - 5:30PM	9AM - 5:30PM	9AM - 5:30PM
Thu	9AM - 9PM	9AM - 9PM	9AM - 9PM	9AM - 9PM	9AM - 9PM	9AM - 9PM	9AM - 9PM	9AM - 9PM	9AM - 9PM	9AM - 9PM
Sat	9AM - 4PM	9AM - 5PM	9AM - 5PM	9AM - 5PM	9AM - 5PM	9AM - 5PM	9AM - 4PM	9AM - 5PM	9AM - 4PM	9AM - 5PM
Sun	10AM - 4PM	10AM - 5PM	10AM - 5PM	10AM - 4PM	10AM - 4PM	10AM - 5PM	10AM - 4PM	10AM - 4PM	10AM - 4PM	10AM - 4PM
Parking Spaces										
Customer	2,539	2,972	2,893	3,382	1,467	2,470	986	727	1,668	3,187
Disabled	67	38	78	60	35	75	18	16	44	66
Staff	140	-	514	-	369	553	-	5	-	-
Loading Bay/Reserved	90	23	29	110	15	38	20	16	12	4
Total	2,836	3,033	3,514	3,552	1,886	3,136	1,024	764	1,724	3,257
Survey Information										
Date of survey - Weekdays	25 & 26/11/10	24 & 25/03/11	19 & 20/05/11	7 & 8/04/11	28 & 29/04/11	17 & 18/03/11	3 & 4/03/11	10 & 11/03/11	5 & 6/05/11	12 & 13/05/11
- Weather	-	Sunny	Sunny	Sunny	Cloudy/Rain	Sunny/Cloudy	Sunny	Cloudy	Sunny	Sunny
Date of survey - Weekends	27 & 28/11/10	26 & 27/03/11	21 & 22/05/11	9 & 10/04/11	30/04 & 1/05/11	19 & 20/03/11	5 & 6/03/11	12 & 13/03/11	7 & 8/05/11	14 & 15/05/11
- Weather	-	Cloudy/Shower	Sunny	Sunny	Cloudy/Rain	Cloudy/Rain	Sunny	Cloudy/Rain	Sunny	Sunny

Source: Trip Generation and Parking Demand of Shopping Centres, Analysis Report, Halcrow for the NSW Roads and Traffic Authority, September 2011, p7

APPENDIX F2 – SHOPPING CENTRES – PERSON TRIP RATES

Trips/100m ² GLFA	Sydney Metropolitan Area							Regional Area		
	SC1 Roselands	SC2 Burwood	SC3 Liverpool	SC4 Penrith	SC5 Prairiewood	SC6 Rouse Hill	SC7 Warriewood	SC8 Mittagong	SC9 Shellharbour	SC10 Tuggerah
Total GLFA (m2)	61,424	63,404	91,115	100,134	49,898	69,000	22,143	15,552	41,040	87,162
Thursday										
Daily Person Trips	71.00	105.78	95.73	93.45	95.94	67.41	83.83	91.51	89.96	61.06
Peak Person Trips (per Hour)	6.65	9.96	8.50	8.70	8.29	7.58	8.89	9.81	8.40	5.51
Peak Network Hour Person Trips										
- AM Peak	2.75	3.05	3.97	5.63	4.38	2.13	3.11	5.81	5.92	2.59
- PM Peak	6.22	7.72	7.25	8.40	8.11	6.91	7.60	9.42	7.73	5.17
Friday										
Daily Person Trips	52.96	74.18	66.76	61.95	70.98	43.60	71.96	81.83	69.69	47.91
Peak Person Trips (per Hour)	6.47	9.93	8.94	8.81	9.53	5.72	8.68	10.42	8.78	5.39
Peak Network Hour Person Trips										
- AM Peak	2.58	3.49	3.39	4.50	3.52	2.02	3.25	6.53	3.62	2.35
- PM Peak	4.32	8.27	6.05	7.00	9.26	5.69	6.00	10.28	8.03	5.38
Saturday										
Daily Person Trips	67.75	93.11	77.39	69.01	80.97	69.92	83.35	92.28	86.43	55.01
Peak Person Trips (per Hour)	9.23	12.67	10.80	9.82	10.40	10.04	12.26	14.02	12.92	7.19
Peak Network Hour Person Trips	8.24	8.52	10.42	9.34	10.40	10.04	12.23	12.78	12.66	6.84
Sunday										
Daily Person Trips	54.88	84.27	61.68	48.95	63.71	65.34	67.77	73.86	47.76	46.26
Peak Person Trips (per Hour)	8.60	12.45	9.77	8.03	9.67	10.16	10.99	12.49	7.84	7.11
Peak Network Hour Person Trips	8.52	8.88	9.75	8.02	9.30	8.97	9.53	10.74	7.82	6.27

Source: Trip Generation and Parking Demand of Shopping Centres, Analysis Report, Halcrow for the NSW Roads and Traffic Authority, September 2011, p21

APPENDIX F3 – SHOPPING CENTRES – VEHICLE TRIP RATES

Trips/100m ² GLFA	Sydney Metropolitan Area							Regional Area		
	SC1 Roselands	SC2 Burwood	SC3 Liverpool	SC4 Penrith	SC5 Prairiewood	SC6 Rouse Hill	SC7 Warriewood	SC8 Mittagong	SC9 Shellharbour	SC10 Tuggerah
Total GLFA (m2)	61,424	63,404	91,115	100,134	49,898	69,000	22,143	15,552	41,040	87,162
Thursday										
Daily Vehicle Trips	43.76	34.03	29.51	34.27	60.18	42.22	59.60	60.67	54.99	38.92
Peak Vehicle Trips (per Hour)	3.90	3.10	2.71	3.24	5.21	4.40	6.01	6.21	5.25	3.49
Peak Network Hour Vehicle Trips										
- AM Peak	1.84	0.96	1.01	2.12	2.88	1.43	2.24	4.08	4.06	1.87
- PM Peak	3.72	2.57	2.22	3.14	4.96	4.17	5.19	5.77	4.92	3.31
Friday										
Daily Vehicle Trips	33.46	23.73	21.37	23.80	45.19	28.96	50.92	55.48	46.05	32.05
Peak Vehicle Trips (per Hour)	4.01	3.08	2.84	3.26	5.71	3.63	5.90	6.71	5.75	3.53
Peak Network Hour Vehicle Trips										
- AM Peak	1.65	0.98	1.04	1.54	1.87	1.37	2.42	4.69	2.61	1.70
- PM Peak	2.69	2.66	1.95	2.73	5.49	3.61	4.00	6.41	5.21	3.53
Saturday										
Daily Vehicle Trips	37.20	29.08	23.98	26.09	46.87	39.37	49.61	50.18	48.59	30.32
Peak Vehicle Trips (per Hour)	5.06	3.77	3.16	3.56	5.83	5.60	7.00	7.48	7.04	3.85
Peak Network Hour Vehicle Trips	4.43	2.97	3.04	3.43	5.83	5.60	6.93	6.89	6.99	3.77
Sunday										
Daily Vehicle Trips	30.65	27.00	18.25	19.21	34.71	32.77	39.43	39.78	25.10	24.72
Peak Vehicle Trips (per Hour)	4.79	4.08	2.81	3.13	5.08	5.00	6.25	6.60	4.08	3.76
Peak Network Hour Vehicle Trips	4.79	3.03	2.77	3.04	4.97	4.30	5.58	5.63	4.08	3.31

Source: Trip Generation and Parking Demand of Shopping Centres, Analysis Report, Halcrow for the NSW Roads and Traffic Authority, September 2011, p22

APPENDIX G1 – BULKY GOOD RETAIL – SITE DETAILS

Site ID	BG1	BG2	BG3	BG4	BG5	BG6
Name	Freedom/	Harvey Norman	Retravision	Domayne	Bing Lee	Fantastic
Suburb	Balgowlah 2093	Auburn 2144	Springwood 2777	Kotara 2289	Warilla 2528	South Nowra 2541
Region	Sydney	Sydney	Blue Mountain	Newcastle	Southern	Southern
Network Peak Hours						
Year of Network Survey Dates	2005	2007	2005	2004	2007	2009 18/3-24/3
AM Peak - Weekdays	0800-0900	0800-0900	0800-0900	0800-0900	0800-0900	0800-0900
PM Peak - Weekdays	1700-1800	1700-1800	1700-1800	1600-1700	1500-1600	1500-1600
Peak - Weekends	1200-1300	1200-1300	1100-1200	1200-1300	1100-1200	1100-1200
Site Details - Bulky Goods/Hardware						
Area Dimension (m²)		Approx 9000	1,600			
Gross floor area (m²)	4,300	25,384 (including car park)	600	6,029	1,200	1,700
No. of Employee (Total)	29	220	5			9
No. of employee (at one time)	10	100	5	50	20	9
Year Constructed	Unknown	2001			2008	
Accessibility Score	80-139	<79	<79	78	26	0
Opening Hours						
Mon-Fri	0900-1800	0900-1730	0900-1730	0900-1730	0900-1730	0900-1730
Sat	0900-1700	0900-1730	0900-1600	0900-1700	0900-1700	0900-1700
Sun	1000-1700	0900-1730	1000-1600	1000-1700	1000-1700	1000-1700
Parking Spaces						
Customers	43	338	13	151	51	30
Disabled	0	12	0	2	4	4
Staff	3	0	0	0	33	9
Loading Bay	4		1	1	4	2
Total	50	350	14	154	92	45
Survey Results						
Date of Survey - Weekdays	19/03/09 (Thurs)	12/03/09 (Thurs)	12/03/09 (Thurs)	12/03/09 (Thurs)	19/03/09 (Thurs)	26/03/09 (Thurs)
Weather	Sunny	Sunny	Sunny	Sunny/Cloudy	Sunny/Cloudy	Sunny
Date of Survey - Weekend	21/03/09 (Sat)	14/03/09 (Sat)	14/03/09 (Sat)	14/03/09 (Sat)	21/03/09 (Sat)	28/03/09 (Sat)
Weather	Sunny/Shower	Sunny	Sunny	Sunny/Cloudy	Sunny/Cloudy	Sunny

Source: Trip Generation and Parking Generation Surveys, Bulky Goods/Hardware Stores, Analysis Report, Hyder Consulting for the NSW Roads and Traffic Authority, May 2009, p8

APPENDIX G2 – BULKY GOODS RETAIL –TRIP GENERATION

Trips/ 100m ² GFA	Sydney Metropolitan Area BG1 to BG3			Non-Metropolitan Area BG4 to BG6			All Survey Sites BG1 to BG6			Avg Non-metro / Metro %
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
Weekdays										
Person-based Trips										
- Site Peak Hour	2.42	7.00	4.33	2.64	7.83	4.69	2.42	7.83	4.51	108.2%
- Vehicle Network AM Peak	Network AM peak is outside of opening hours									
- Vehicle Network PM Peak	1.33	2.03	1.68	1.72	4.58	2.99	1.33	4.58	2.46	178.1%
Daily Total Person Trips	15.88	36.33	24.52	19.41	49.92	30.38	15.88	49.92	27.45	123.9%
Vehicle-based Trips										
- Site Peak Hour	1.42	4.33	2.44	1.96	4.75	2.92	1.42	4.75	2.68	119.8%
- Network AM Peak	Network AM peak is outside of opening hours									
- Network PM Peak	0.81	1.21	1.01	1.12	2.25	1.51	0.81	2.25	1.31	149.0%
Daily Total LV Trips	10.16	22.17	14.69	10.00	26.58	17.16	10.00	26.58	15.92	116.8%
Daily Total HV Trips	0.00	3.00	1.07	0.20	2.33	0.92	0.00	3.00	1.00	86.2%
Daily Total Vehicle Trips	10.37	25.17	15.76	10.24	28.92	18.08	10.24	28.92	16.92	114.7%
Peak Parking Accumulation	0.65	3.17	1.57	0.41	2.00	1.03	0.41	3.17	1.30	65.6%
Weekend										
Person-based Trips										
- Site Peak Hour	4.63	11.83	7.90	5.59	14.17	8.67	4.63	14.17	8.28	109.7%
- Vehicle Network Peak	3.81	4.92	4.36	3.12	8.33	5.49	3.12	8.33	4.92	125.9%
Daily Total Person Trips	25.09	39.40	33.72	23.94	70.83	42.37	23.94	70.83	38.05	125.7%
Vehicle-based Trips										
- Site Peak Hour	2.23	6.17	3.75	2.76	5.67	3.94	2.23	6.17	3.85	105.1%
- Vehicle Network Peak	1.70	2.83	2.24	1.35	4.00	2.72	1.35	4.00	2.48	121.4%
Daily Total LV Trips	11.42	19.83	16.05	10.47	33.67	20.81	10.47	33.67	18.43	129.6%
Daily Total HV Trips	0.00	0.33	0.11	0.03	0.50	0.22	0.00	0.50	0.16	195.2%
Daily Total Vehicle Trips	11.42	20.17	16.16	10.59	34.17	21.02	10.59	34.17	18.59	130.1%
Peak Parking Accumulation	0.91	2.17	1.57	0.35	2.25	1.15	0.35	2.25	1.36	73.2%
Weekend / Weekdays %										
Person-based Trips										
- Site Peak Hour	191.3%	242.9%	259.9%	180.7%	181.8%	183.8%	235.2%	181.8%	199.9%	
Daily Total Person Trips	158.0%	108.4%	137.5%	123.3%	141.9%	139.5%	150.7%	141.9%	138.6%	
Vehicle-based Trips										
- Site Peak Hour	157.4%	142.3%	154.0%	141.3%	119.3%	135.0%	157.4%	129.8%	143.6%	
Daily Total LV Trips	112.4%	89.5%	109.3%	104.7%	126.6%	121.2%	104.7%	126.6%	115.7%	
Daily Total HV Trips	0.0%	11.1%	10.4%	16.7%	21.4%	23.5%	0.0%	16.7%	16.5%	
Daily Total Vehicle Trips	110.1%	80.1%	102.6%	103.4%	118.2%	116.3%	103.4%	118.2%	109.9%	
Peak Parking Accumulation	139.3%	68.4%	99.9%	85.7%	112.5%	111.5%	85.7%	71.1%	104.5%	

Source: Trip Generation and Parking Generation Surveys, Bulky Goods/Hardware Stores, Analysis Report, Hyder Consulting for the NSW Roads and Traffic Authority, May 2009, p20

APPENDIX H1 – HARDWARE AND BUILDING SUPPLIES – SITE DETAILS

Site ID	HW1	HW2	HW3	HW4	HW5	HW6	HW7	HW8	HW9
Name	Bunnings	Bunnings	Mitre10	Bunnings	Mitre10	Mitre10	Mitre10	Bunnings	Mitre10
Suburb	North Parramatta	Bankstown Airport	Windsor	Minchinbury	Narellan	Morisset	Picton	South Nowra	Orange
	2152	2200	2756	2770	2567	2264	2571	2541	2800
Region	Sydney	Sydney	Sydney	Sydney	Sydney	Northern	Northern	Northern	Southern
Network Peak Hours									
Year of Network Survey	2007	2005	2007	2007	2005	2004	2009	2009	2005
Dates							6/4-12/4	18/3-24/3	
AM Peak - Weekdays	0800-0900	0700-0800	0800-0900	0800-0900	0800-0900	0800-0900	0900-1000	0800-0900	0800-0900
PM Peak - Weekdays	1700-1800	1600-1700	1500-1600	1700-1800	1600-1700	1600-1700	1600-1700	1500-1600	1600-1700
Peak - Weekends	1200-1300	1200-1300	1100-1200	1100-1200	1100-1200	1100-1200	1200-1300	1100-1200	1100-1200
Site Details - Bulky Goods/Hardware									
Area Dimension (m²)			6,700		3,500		3,600		Unknown
Gross floor area (m²)	9,800	14,111	1,800	11,915	2,400	2,000	1,600	9,948	1,800
No. of Employee (Total)			42		20		12		23
No. of employee (at one time)			34		15	15	12		8
Year Constructed			1990		1991-1992		Unknown		1980
Accessibility Score	<79	<79	<79	<79	<79	0.5	1	0	2
Opening Hours									
Mon-Fri	0700-2100	0700-2100	0630-1700	0700-2100	0700-1730	0630-1730	0730-1700	0700-2100	0700-1730
Sat	0800-1800	0800-1800	0800-1600	0800-1800	0730-1600	0700-1600	0700-1600	0800-1800	0800-1600
Sun	0800-1800	0800-1800	0900-1500	0800-1800	0900-1600	0700-1600	0900-1400	0800-1800	0900-1600
Parking Spaces									
Customers	263	464	44	397	35	29	75	209	28
Disabled	2	8	0	6	2	1	0	4	2
Staff			0		0	0	0		10
Loading Bay			2		1	0	5		2
Total	265	472	46	403	38	30	80	213	42
Survey Results									
Date of Survey - Weekdays	12/03/09 (Thurs)	26/03/09 (Thurs)	19/03/09 (Thurs)	19/03/09 (Thurs)	19/03/09 (Thurs)	12/03/09 (Thurs)	26/03/09 (Thurs)	26/03/09 (Thurs)	19/03/09 (Thurs)
Weather	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny/ Rain Evening	Sunny
Date of Survey - Weekend	14/03/09 (Sat)	28/03/09 (Sat)	21/03/09 (Sat)	21/03/09 (Sat)	21/03/09 (Sat)	14/03/09 (Sat)	28/03/09 (Sat)	28/03/09 (Sat)	21/03/09 (Sat)
Weather	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny/ Rain Evening	Sunny	Sunny	Sunny

Source: Trip Generation and Parking Generation Surveys, Bulky Goods/Hardware Stores, Analysis Report, Hyder Consulting for the NSW Roads and Traffic Authority, May 2009, p7

APPENDIX H2 – HARDWARE AND BUILDING SUPPLIES – TRIP GENERATION

Trips/ 100m ² GFA	Sydney Metropolitan Area HW1 to HW5			Non-Metropolitan Area HW6 to HW9			All Survey Sites HW1 to HW9			Avg Non-metro / Metro %
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
Weekdays										
Person-based Trips										
- Site Peak Hour	4.00	5.77	5.06	3.95	6.40	5.49	3.95	6.40	5.25	108.6%
- Vehicle Network AM Peak	0.65	2.72	2.01	1.28	4.75	2.97	0.65	4.75	2.43	147.9%
- Vehicle Network PM Peak	2.48	4.89	3.50	2.79	4.65	3.78	2.48	4.89	3.63	108.0%
Daily Total Person Trips	32.88	53.26	42.42	29.22	43.40	38.34	29.22	53.26	40.61	90.4%
Vehicle-based Trips										
- Site Peak Hour	3.15	4.67	4.03	2.74	5.60	4.41	2.74	5.60	4.20	109.6%
- Network AM Peak	0.60	2.22	1.68	1.09	3.88	2.50	0.60	3.88	2.05	148.7%
- Network PM Peak	2.05	3.56	2.70	1.99	3.80	3.03	1.99	3.80	2.85	112.5%
Daily Total LV Trips	25.21	38.25	30.59	20.66	35.90	30.30	20.66	38.25	30.46	99.0%
Daily Total HV Trips	0.99	6.17	2.40	0.69	2.25	1.49	0.69	6.17	2.00	62.0%
Daily Total Vehicle Trips	26.80	39.75	32.99	21.35	38.15	31.79	21.35	39.75	32.46	96.4%
Peak Parking Accumulation	0.78	1.67	1.16	1.05	1.90	1.48	0.78	1.90	1.30	127.8%
Weekend										
Person-based Trips										
- Site Peak Hour	6.83	10.54	9.11	7.43	9.20	8.11	6.83	10.54	8.66	89.0%
- Vehicle Network Peak	6.00	10.44	8.59	6.67	8.70	7.53	6.00	10.44	8.12	87.6%
Daily Total Person Trips	36.94	74.39	59.25	40.17	49.90	44.66	36.94	74.39	52.76	75.4%
Vehicle-based Trips										
- Site Peak Hour	4.28	6.69	5.91	4.49	6.17	5.28	4.28	6.69	5.63	89.3%
- Vehicle Network Peak	3.61	6.33	5.33	4.28	5.33	4.92	3.61	6.33	5.15	92.3%
Daily Total LV Trips	22.00	48.78	38.42	28.24	32.20	30.68	22.00	48.78	34.98	79.9%
Daily Total HV Trips	0.13	0.89	0.52	0.00	0.25	0.13	0.00	0.89	0.35	24.5%
Daily Total Vehicle Trips	22.89	49.05	38.94	28.39	32.45	30.81	22.89	49.05	35.33	79.1%
Peak Parking Accumulation	1.50	2.59	2.00	1.45	2.81	1.82	1.45	2.81	1.92	91.3%
Weekend/Weekdays %										
Person-based Trips										
- Site Peak Hour	170.7%	213.6%	245.4%	238.6%	187.1%	199.1%	241.9%	213.6%	224.0%	
Daily Total Person Trips	112.4%	139.7%	139.7%	137.5%	115.0%	116.5%	126.4%	139.7%	129.9%	
Vehicle-based Trips										
- Site Peak Hour	136.0%	143.4%	146.9%	163.7%	110.1%	119.8%	155.9%	119.5%	134.2%	
Daily Total LV Trips	87.3%	127.5%	125.6%	136.7%	89.7%	101.3%	106.5%	127.5%	114.8%	
Daily Total HV Trips	12.7%	14.4%	21.7%	0.0%	11.1%	8.6%	0.0%	14.4%	17.4%	
Daily Total Vehicle Trips	85.4%	123.4%	118.0%	133.0%	85.1%	96.9%	107.2%	123.4%	108.8%	
Peak Parking Accumulation	192.9%	155.3%	171.9%	138.7%	148.0%	122.9%	186.4%	148.0%	147.2%	

Source: Trip Generation and Parking Generation Surveys, Bulky Goods/Hardware Stores, Analysis Report, Hyder Consulting for the NSW Roads and Traffic Authority, May 2009, p16