

# Adequacy of car parking policies for flats, units and apartments in the Sydney region

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## Abstract

Parking policy which sets the quantity of parking provided in new developments is widely regarded as influential in the transport outcomes of an area and most stakeholders have their own notions on what the right level of parking supply should be. Nonetheless, it is controversial, especially in community consultation and deviations from these quantitative regulations do provide grounds for refusal of development applications. With detailed information from the Census, this study examines a notional policy-based parking supply and parking demand for the Sydney region for flats, units and apartments. This dwelling type has been the main source of net residential dwelling unit increase for about 15 years and is set to remain key if current land use policy targets are to be met. This analysis examined all local government areas within the Sydney metropolitan region to compare their over- or under-supply of parking for flats units and apartments. A key finding is that almost all parking codes require substantially more parking than would be required to meet demand. Further, the variations in this mis-match are quite surprising. The work suggests that there is a need for a re-think of the general approach to setting this type of policy, with greater use of good quality, detailed data a key ingredient.

## 1. Introduction

This paper examines current non-visitor parking provision policies for flats, units and apartments (FUA) in the context of an estimate of current home-based demand for car parking within the Sydney Metropolitan Region (Sydney Statistical Division). The aims of the paper are to:

- Assess the appropriateness of parking provision policies – do they result in too little or too much parking, relative to existing demand?
- Compare outcomes in the forty-three LGAs - are there features that relate to better or worse performance of policy?

Like many standards and regulations, there are implications for economic efficiency if the policy results in market distortions, such as over- or under-supply. Ideally, somehow, these controls would regulate the supply of off street parking so that it is 'optimal': not too much, avoiding scarce resources being tied-up in under-utilised facilities, and, on the other hand, to make sure there is not too little, which would result in an under-supply, with associated inefficiencies of parking and traffic congestion and access costs that are higher than they would otherwise be.

The focus of this paper is on FUA for several reasons. The importance of FUAs in contemporary Sydney's efforts to house its population is clearly demonstrated by the net increase in FUA dwellings, which accounted for 51% of the net increase in total dwellings built in Sydney Metropolitan Region between 2001 and 2006. Over the ten-year period to 2006, the net increase in FUA dwellings was 17% greater than that for separate dwellings, which had been Sydney's characteristic housing type for several generations. More

importantly, car parking is typically more costly to provide in FUA, especially in high rise apartment blocks on constrained sites, where deep excavations are often required.

These construction costs would be in the range of \$25,000 to \$50,000 per basement space, even without the use of mechanical car stackers. In addition to capital costs, there is the on-going cost of ventilation, fire protection, lighting and vertical transport, which must be met year in year out. Therefore, over-provision of off street car parking for FUA may impose substantial additional costs on occupants of this type of dwelling, and, because of its increasing dominance of new dwelling construction, on the broader community.

Sources used in this investigation include the relevant planning instruments regulating parking provision in each of Sydney's forty-three local government areas (LGAs) and interrogation of Census (2006) information from the Australian Bureau of Statistics (ABS, 2009). Preliminary work, using Census data at LGA level indicated substantial notional oversupply of parking was evident; consequently, we explored more detailed Census data at collection district (CD) level (ABS, 2010).

## 2. Background

### 2.1 Purpose of Parking Controls

There are several rationales for parking controls evident in practice. Initially, the concern of authorities was to ensure that parking demand from a development did not overspill onto the surrounding road network, creating safety and functional issues, the loss of 'public' on-street parking and adversely affecting amenity. Typically these types of standards are minima.

Objectives from a selection of existing parking policies seeking this outcome are summarised below:

*"To provide sufficient parking that is convenient for the use of residents, employees and visitors of the development"* – The Hills Shire Council

*"To ensure the provision of off-street car parking facilities to satisfy the parking requirements generated by development."* – Camden Council

*"To ensure that adequate and convenient off-street parking facilities are provided for all vehicles generated by the various types of development."* – Holroyd Council

*"ensure that adequate parking is provided for developments in Ku-ring-gai, firstly to minimise the overflow of parking onto surrounding streets, and secondly to ensure that a high standard of parking and access to commercial developments is provided, to support their viability"*– Ku-ring-gai Council

Emerging more recently, and still with considerable influence, is the objective of seeking to restrict the availability of parking, and thereby, somehow, influence travel choices away from the car toward other modes that the policy makers consider more suitable. These types of parking controls tend to set maxima.

As a comparison, some of the objectives from these types of parking policies are summarised below:

*"Establish parking policies that encourage walking, cycling, and public transport usage thereby reducing car dependency."* – Waverley Council

*"To ensure the provision of off-street parking satisfies the needs of occupants, residents and visitors, including people with disabilities, and provides an appropriate balance between public and private transport having regard to the capacity of the*

*local road network and the proximity of the site to public transport facilities” – Burwood Council*

*“Increase the choice of available transport and reducing dependence on cars. The staff parking rates are based on the principle of providing parking supply up to 20% lower than observed or calculated demand to discourage car usage for journey to work travel.” – Leichardt Council*

*“Reduce on-site car parking due to the proximity of public transport. Contain traffic congestion and facilitate use of public and alternative transport modes including walking and cycling” – North Sydney Council*

Clearly these two objectives, of either accommodating or constraining parking demand, are in considerable tension.

In addition, many of these policies are ‘blanket’ controls and assume all FUAs developed within the LGA have the same parking demand per unit: in other words, they imply that the factors influencing parking demand (e.g., access to transit and services) lead to an homogenous level of parking requirements across the LGA.

The success of these approaches is varied. Some areas of lower parking provision have significant problems with on-street parking availability and many Councils have had to introduce ‘resident’ parking schemes to accommodate ‘resident’ parking demand on public streets. Of course, some of these issues are the legacy of pre-car development, and these locations are not necessarily dominated by FUA type dwellings. Nevertheless, it does highlight the interplay between on-street and off-street parking.

## **2.2 How are parking controls established?**

Historically, many of the council policies which provide parking provision rates were prepared giving consideration to the rates listed in the various versions of the RTA Guide to Traffic Generating Developments (RTA, 2002). The surveys undertaken to prepare RTA (2002) began in the 1970s (e.g., Traffic Authority, 1981). There has been limited work since to update this information, ostensibly due to the high costs involved in obtaining good survey data. Yet, over the intervening period there have been changes in just about every facet of society, including socio-economics, car ownership rates, population structure, household formation, per capita income, technology, housing policy, shopping hours, working hours, to name but a few.

There is no universal formula to determine the appropriate level of parking provision (as seen above, there is no universally accepted objective for these policies either). Typical methods include:

- Review of information relating to demand and supply of parking, sometimes with reference to existing parking demand and supply within the particular LGA or other LGAs with similar characteristics, as well as examination of revealed demand at a sample of developments.
- Some standards make reference to the availability of public transport services in establishing estimates of need and hence levels of supply related to availability of substitutes for car (e.g. DCP11 [South Sydney City Council, 1996])
- With reference to existing rates (such as the rates to be replaced, or rates for areas with similar characteristics.

## **2.3 A link between car parking provision and travel behaviour?**

As noted above, a number of existing parking policies seek to reduce the level of car parking provision for residential uses so as to influence travel behaviour. This is a common element

of parking controls for commercial premises in locations with high levels of accessibility by public transport, such as the Sydney CBD. However, it is not clear how effectively this type of parking-restraint policy might transmit through the system for residential uses, either in terms of vehicle ownership, mode choice or housing affordability.

At one level, if there is no car parking provided in a development and no alternative parking spaces available within the neighbourhood, then it is likely to reduce overall traffic generation in that locality, although this may have unintended consequences, in terms of the resultant population mix in the area.

Past exploration of 2001 census data indicated that in locations with good public transport and a degree of parking restraint, there was no clear correlation between car ownership and travel choices, at least for the journey to work. In fact, small areas subject to similar planning controls produced varying car use for the commute, and this variability seemed to be largely associated with the distribution of the trips (i.e., the locations of the CD's population's workplaces) – clearly not something that can be laid down in local (or, possibly, in any) planning controls.

### 3. Existing situation

Remarkably, Sydney has 43 LGAs, all of which set their own parking regulations, and in some locations other agencies have a hand in setting policy as well. These regulations relating to FUAs are tabulated in Appendix A and a summary is provided in the following table.

**Table 1: Average parking provision rates by dwelling size for Sydney LGAs**

<b>Dwelling size</b>	<b>Arithmetic average (spaces per dwelling)</b>	<b>Standard deviation</b>
Studio Dwelling	0.96 spaces / dwelling	0.21
One Bedroom Dwelling	1.00 spaces / dwelling	0.12
Two Bedroom Dwelling	1.28 spaces / dwelling	0.32
Three Bedroom Dwelling	1.81 spaces / dwelling	0.32
Three + Bedroom Dwelling	1.83 spaces / dwelling	0.38
<b>Overall average</b>	<b>1.37 spaces per dwelling</b>	

From Table 1 it can be seen that, in general, all Councils in the Sydney Metropolitan Region require at least one space per dwelling (0.96 spaces for studio sized dwellings) irrespective of dwelling size. Although application of all the existing 'standard' parking policies would require, on average, 1.37 spaces per dwelling, when weighted by the existing bedroom size distribution at an LGA level, the adjusted average is 1.26 spaces per unit, which reflects a higher proportion of smaller units than larger units.

It was noted that almost all Councils required one space per studio / one bedroom dwelling except Sydney City Council, Burwood, Leichhardt, Randwick and Waverley, which require less than one; and, Sutherland Council, which requires more than one (1.5 spaces per studio / one bedroom dwelling in a designated zone [Area 3]).

In addition to these standard rates, twelve LGAs include in their policies lower parking rates for residential developments in designated locations, such as town centres, close to public transport (whether rail or bus), or close to facilities which are expected to reduce the need for private vehicle usage. That is, these Councils apply a lower rate of parking provision in the expectation that locational factors, such as better access to transit and local services, will reduce the reliance on private vehicle use and, therefore, parking rates should reflect this. These policies cover some 2% of Sydney's current stock of FUAs, and due to space limitations, are not dealt with further in this paper.

### **3. Method**

In order to examine how parking demand relates to regulation based parking supply, we wanted a broad scale measure of parking demand at FUAs that could be disaggregated to a relatively fine level of spatial detail and a data source that would permit estimates of policy-based supply. The Census provides both – firstly, using the number of vehicles at the dwelling on census night question, provides a snapshot of demand, and, secondly, using dwelling structure and number of bedroom variables, in combination with current parking policy, yields a measure of notional parking supply. This information is available down to collection district (CD) level, and was first explored at LGA level, with subsequent analysis at CD, using a recently released ABS online data product, *TableBuilder*.

This approach has been used previously for high density residential buildings for the RTA (1993), using 1991 Census data for selected small areas within a selection of sub-regional centres.

## **4. Findings**

### **4.1 Vehicle demand**

An estimate of overnight parking demand at FUAs for LGAs is in the following table, which is sorted by average vehicles per FUA, from lowest levels of vehicle demand per unit to the highest.

**Table 2: Vehicles per dwelling, total vehicles, total FUAs and average vehicles per FUA for Sydney LGAs (count of dwellings)**

LGA	Vehicles per dwelling					Total Vehicles at FUAs	Total FUA Dwellings	Vehicles /Dwelling
	0	1	2	3	4			
Blue Mountains (C)	356	253	50	16	7	428	681	0.63
Sydney (C)	18,686	18,883	4,323	377	204	29,475	42,473	0.69
Blacktown (C)	1,538	1,630	305	29	34	2,465	3,536	0.70
Penrith (C)	1,313	1,584	314	44	44	2,521	3,299	0.76
Burwood (A)	1,360	1,631	379	40	43	2,681	3,453	0.78
Campbelltown (C)	451	594	99	24	18	937	1,186	0.79
Camden (A)	81	117	28	3	0	182	229	0.79
Marrickville (A)	3,467	5,028	1,163	95	64	7,896	9,817	0.80
Wyong (A)	888	1,333	240	39	29	2,045	2,529	0.81
Ashfield (A)	2,259	3,640	734	65	51	5,506	6,749	0.82
Fairfield (C)	2,235	3,039	777	82	60	5,079	6,193	0.82
Liverpool (C)	2,091	2,687	718	85	65	4,638	5,646	0.82
Parramatta (C)	4,534	7,959	1,969	168	124	12,896	14,754	0.87
Gosford (C)	1,484	2,362	573	102	56	4,037	4,577	0.88
Canterbury (C)	4,784	8,070	1,946	212	230	13,517	15,242	0.89
Hawkesbury (C)	245	404	103	19	6	691	777	0.89
Ryde (C)	2,724	5,711	1,374	116	81	9,132	10,007	0.91
Randwick (C)	6,920	11,443	3,493	428	216	20,580	22,501	0.91
Hornsby (A)	2,141	4,571	1,097	118	47	7,308	7,974	0.92
Strathfield (A)	1,143	2,240	634	54	28	3,780	4,098	0.92
Holroyd (C)	1,916	4,035	947	74	93	6,523	7,065	0.92
Leichhardt (A)	1,497	2,739	838	85	32	4,798	5,191	0.92
Bankstown (C)	2,057	3,310	1,096	118	78	6,170	6,660	0.93
Waverley (A)	3,835	6,780	2,201	253	65	12,202	13,134	0.93
Botany Bay (C)	1,634	2,732	849	90	77	5,005	5,381	0.93
Willoughby (C)	2,369	5,326	1,366	133	54	8,673	9,248	0.94
Hurstville (C)	1,710	3,627	961	126	53	6,136	6,476	0.95
Hunters Hill (A)	284	486	169	11	15	917	965	0.95
Mosman (A)	1,140	2,924	856	56	30	4,920	5,005	0.98
North Sydney (A)	4,287	10,564	3,161	310	106	18,241	18,428	0.99
Auburn (A)	1,612	3,175	1,052	142	75	6,003	6,056	0.99
Rockdale (C)	2,709	6,466	1,971	215	94	11,430	11,455	1.00
Kogarah (A)	1,350	3,445	1,071	111	55	6,140	6,032	1.02
Lane Cove (A)	949	2,890	911	56	20	4,959	4,826	1.03
Ku-ring-gai (A)	746	2,178	665	61	40	3,852	3,690	1.04
Woollahra (A)	2,451	5,245	2,149	264	93	10,705	10,201	1.05
Manly (A)	1,510	3,384	1,311	194	59	6,822	6,457	1.06
Wollondilly (A)	24	68	19	2	3	123	115	1.07
Sutherland Shire (A)	2,842	7,835	3,379	382	165	16,399	14,603	1.12
Warringah (A)	2,554	8,106	3,555	368	152	16,926	14,734	1.15
Baulkham Hills (A)	336	1,065	511	57	6	2,283	1,976	1.16
Pittwater (A)	334	1,130	645	62	17	2,675	2,189	1.22
Canada Bay (A)	1,199	4,493	2,587	344	80	11,019	8,703	1.27
Grand Total	98,044	175,180	52,591	5,629	2,867	308,716	334,311	0.92

The five LGAs with the lowest average vehicle ownership rates for FUAs include the Blue Mountains, Sydney, Blacktown, Penrith and Burwood, respectively. The LGAs of Blue Mountains, Blacktown and Penrith are all located some distance from the Sydney CBD and have varied levels of transit access; that they have among the lowest rates of vehicle ownership is a genuine surprise. Burwood LGA has good rail and bus transit access and, of course, Sydney LGA contains the central hubs of most of the metropolitan transit systems.

At the other end of the scale, the five LGAs with the highest levels of average vehicle ownership for FUAs were Canada Bay, Pittwater, Baulkham Hills, Warringah and Wollondilly. These LGAs are located at all points of the compass. This initial analysis indicates that there are a number of factors which may influence car ownership levels within each LGA, other than typical geo-transport stereotypes, such as proximity to Sydney CBD.

A small proportion of LGAs (12 out of 43) had an average of more than one vehicle per dwelling; yet almost all policies require at least one parking space per unit.

A further attribute of vehicle parking demand is the distribution of FUAs with different levels of vehicles parked overnight. The above table indicates a substantial number (nearly 100,000 dwellings) of FUAs had *no* vehicles parked overnight on Census night. The following table provides the proportions of dwellings with different levels of vehicles on Census night.

**Table 3: Proportion of FUAs by number of vehicles for LGAs**

LGA	Vehicles per dwelling				
	0	1	2	3	4
Blue Mountains (C)	52%	37%	7%	2%	1%
Sydney (C)	44%	44%	10%	1%	0%
Blacktown (C)	43%	46%	9%	1%	1%
Penrith (C)	40%	48%	10%	1%	1%
Burwood (A)	39%	47%	11%	1%	1%
Campbelltown (C)	38%	50%	8%	2%	2%
Liverpool (C)	37%	48%	13%	2%	1%
Fairfield (C)	36%	49%	13%	1%	1%
Camden (A)	35%	51%	12%	1%	0%
Marrickville (A)	35%	51%	12%	1%	1%
Wyong (A)	35%	53%	9%	2%	1%
Ashfield (A)	33%	54%	11%	1%	1%
Gosford (C)	32%	52%	13%	2%	1%
Hawkesbury (C)	32%	52%	13%	2%	1%
Canterbury (C)	31%	53%	13%	1%	2%
Bankstown (C)	31%	50%	16%	2%	1%
Randwick (C)	31%	51%	16%	2%	1%
Parramatta (C)	31%	54%	13%	1%	1%
Botany Bay (C)	30%	51%	16%	2%	1%
Hunter's Hill (A)	29%	50%	17%	1%	2%
Waverley (A)	29%	52%	17%	2%	0%
Leichhardt (A)	29%	53%	16%	2%	1%
Strathfield (A)	28%	55%	15%	1%	1%
Ryde (C)	27%	57%	14%	1%	1%
Holroyd (C)	27%	57%	13%	1%	1%
Hornsby (A)	27%	57%	14%	1%	1%
Auburn (A)	27%	52%	17%	2%	1%
Hurstville (C)	26%	56%	15%	2%	1%
Willoughby (C)	26%	58%	15%	1%	1%
Woollahra (A)	24%	51%	21%	3%	1%
Rockdale (C)	24%	56%	17%	2%	1%
Manly (A)	23%	52%	20%	3%	1%
North Sydney (A)	23%	57%	17%	2%	1%
Mosman (A)	23%	58%	17%	1%	1%
Kogarah (A)	22%	57%	18%	2%	1%
Wollondilly (A)	21%	59%	16%	1%	3%
Ku-ring-gai (A)	20%	59%	18%	2%	1%
Lane Cove (A)	20%	60%	19%	1%	0%
Sutherland Shire (A)	19%	54%	23%	3%	1%
Warringah (A)	17%	55%	24%	2%	1%
Baulkham Hills (A)	17%	54%	26%	3%	0%
Pittwater (A)	15%	52%	29%	3%	1%
Canada Bay (A)	14%	52%	30%	4%	1%
<b>Grand Total</b>	<b>29%</b>	<b>52%</b>	<b>16%</b>	<b>2%</b>	<b>1%</b>

An important finding is that just under a third of FUAs on Census night had no vehicles parked overnight.



## 4.2 Comparison of demand and notional supply

The following table compares policy based supply, demand and a measure of parking over/under supply, which is the number of spaces per 100 vehicles of demand. A score greater than 100 indicates more parking spaces than vehicles and a score less than 100 indicates more vehicles than parking spaces.

**Table 3: Notional parking supply, vehicles, notional spaces less vehicles and notional spaces per 100 vehicles of demand for FUAs in Sydney LGAs**

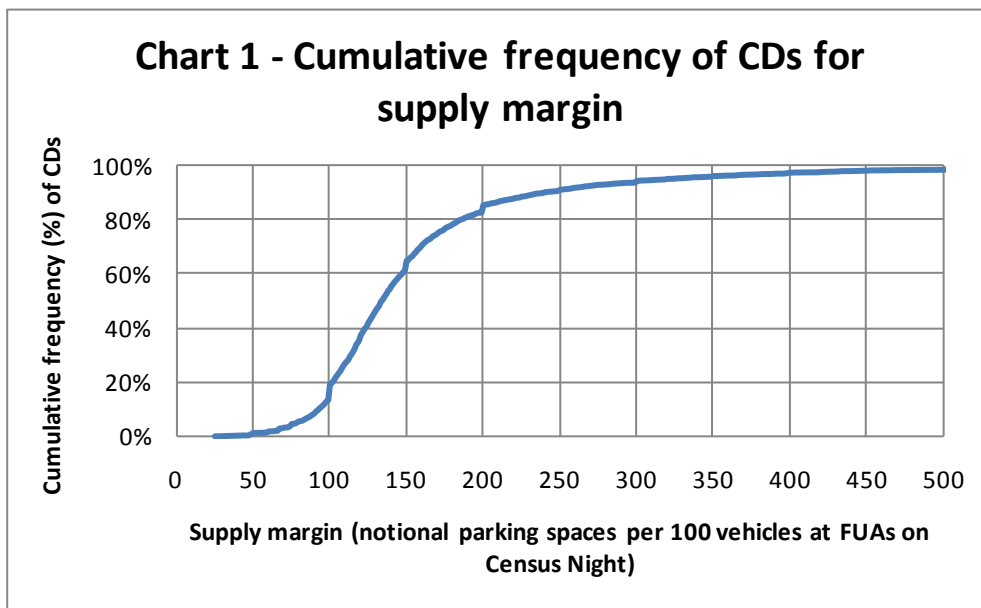
LGA	Notional Parking Spaces	Vehicles	Notional spaces less vehicles	Notional Spaces per 100 vehicles of demand
Ashfield (A)	7,985	5,506	2,479	145
Auburn (A)	7,449	6,003	1,446	124
Blue Mountains (C)	799	428	371	187
Botany Bay (C)	5,387	5,005	382	108
Burwood (A)	4,743	2,681	2,062	177
Camden (A)	371	182	189	204
Canterbury (C)	19,163	13,517	5,645	142
Hawkesbury (C)	958	691	267	139
Holroyd (C)	7,789	6,523	1,266	119
Hunter's Hill (A)	965	917	48	105
Hurstville (C)	7,660	6,136	1,524	125
Kogarah (A)	9,643	6,140	3,502	157
Ku-ring-gai (A)	4,797	3,852	945	125
Lane Cove (A)	7,293	4,959	2,334	147
Leichhardt (A)	7,250	4,798	2,452	151
Manly (A)	7,948	6,822	1,126	117
Marrickville (A)	9,817	7,896	1,921	124
Mosman (A)	7,114	4,920	2,193	145
North Sydney (A)	20,063	18,241	1,822	110
Pittwater (A)	2,614	2,675	-61	98
Randwick (C)	28,674	20,580	8,094	139
Rockdale (C)	12,770	11,430	1,340	112
Ryde (C)	13,245	9,132	4,113	145
Strathfield (A)	6,162	3,780	2,382	163
Warringah (A)	17,347	16,926	421	102
Waverley (A)	16,285	12,202	4,083	133
Willoughby (C)	11,127	8,673	2,453	128
Wollondilly (A)	159	123	36	129
Woollahra (A)	18,289	10,705	7,584	171
Wyong (A)	4,015	2,045	1,969	196
Gosford (C)	6,888	4,037	2,851	171
Hornsby (A)	14,400	7,308	7,092	197
Baulkham Hills (A)	3,725	2,283	1,442	163
Blacktown (C)	3,925	2,465	1,460	159
Penrith (C)	3,650	2,521	1,129	145
Liverpool (C)	8,433	4,638	3,794	182
Campbelltown (C)	1,192	937	255	127
Sutherland Shire (A)	22,932	16,399	6,533	140
Fairfield (C)	7,178	5,079	2,099	141
Parramatta (C)	18,424	12,896	5,527	143
Bankstown (C)	8,087	6,170	1,917	131
Sydney (C)	40,269	29,475	10,794	137
Canada Bay (A)	13,926	11,019	2,907	126
<b>Grand Total</b>	<b>420,906</b>	<b>308,716</b>	<b>112,190</b>	<b>136</b>

The above comparison indicates that all LGAs, apart from Pittwater, have more notional parking supply than vehicle demand for FUAs. Across Sydney, this represents some 136 notional spaces for every 100 vehicles of demand. Bearing in mind that an important motivation for parking regulation was/is to minimise overspill of parked vehicles onto the surrounding road network, one would expect some margin of supply over demand; something of the order of 15% to 20% of excess supply. The above table indicates that 35 LGAs had an excess supply margin of more than 20% and 27 LGAs had an excess supply margin of more than 30%.

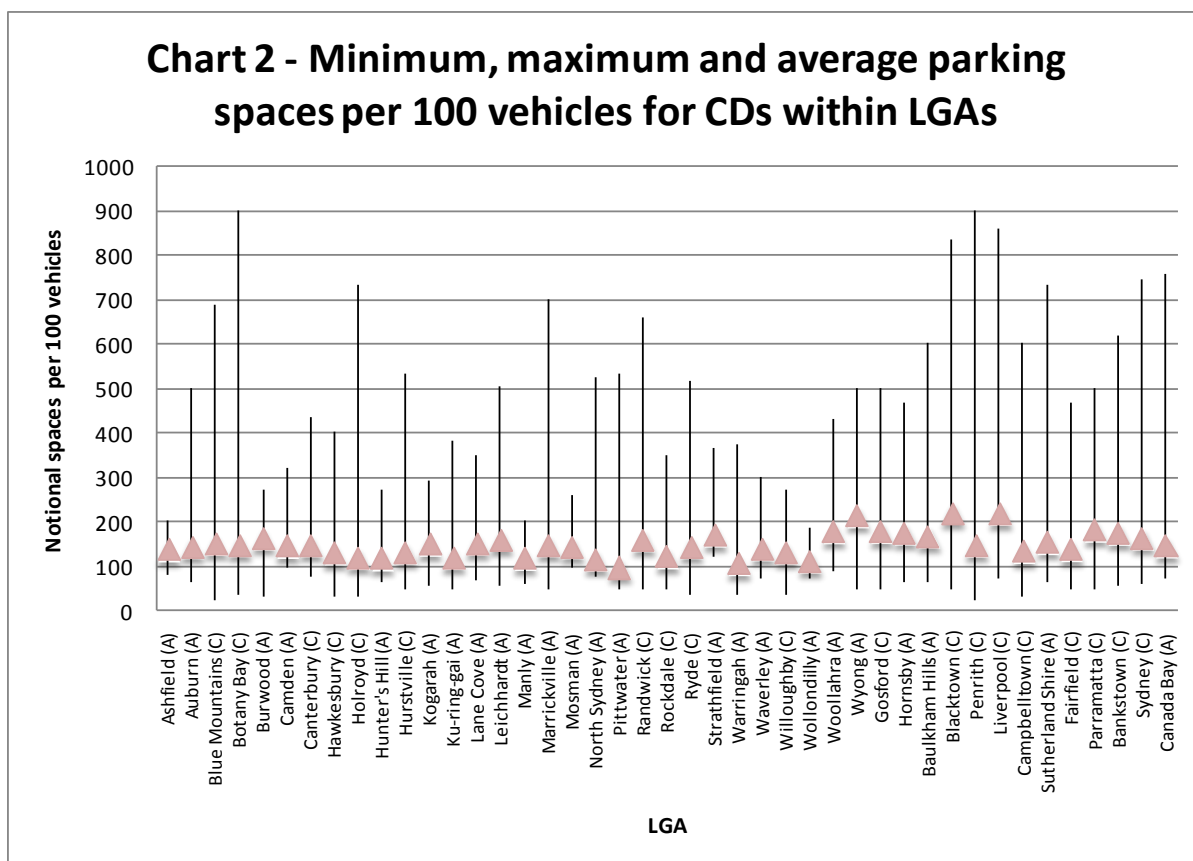
At a Sydney-wide level, the excess margin is substantial and reflects that the average number of spaces per dwelling required by regulation is 1.26 (weighted by bedroom size distribution) and that average vehicles per dwelling was 0.92.

### 4.3 Spatially disaggregate comparison of notional supply and demand

These findings raised a number of questions which required further investigation. Using more spatially disaggregate data we explored how these supply margins varied within LGAs. The dataset had 6,788 CDs in the Sydney SD, of which 2,819 had no FUAs. For CDs with FUAs, the cumulative frequency distribution by supply margin is plotted on Chart 1.



This indicates that substantial parking pressures due to insufficient notional supply would exist in few CDs (less than 15%); there would be little parking pressure in more than 60% of CDs with FUAs. To gauge the variability of notional supply to demand within LGAs, the following chart was prepared, which plots the minimum non-zero CD parking supply per 100 vehicles, the maximum CD parking supply per 100 vehicles and the average. In several cases, the maximum supply index was capped at 500 notional spaces per 100 vehicles of demand to avoid making the chart too difficult to read.

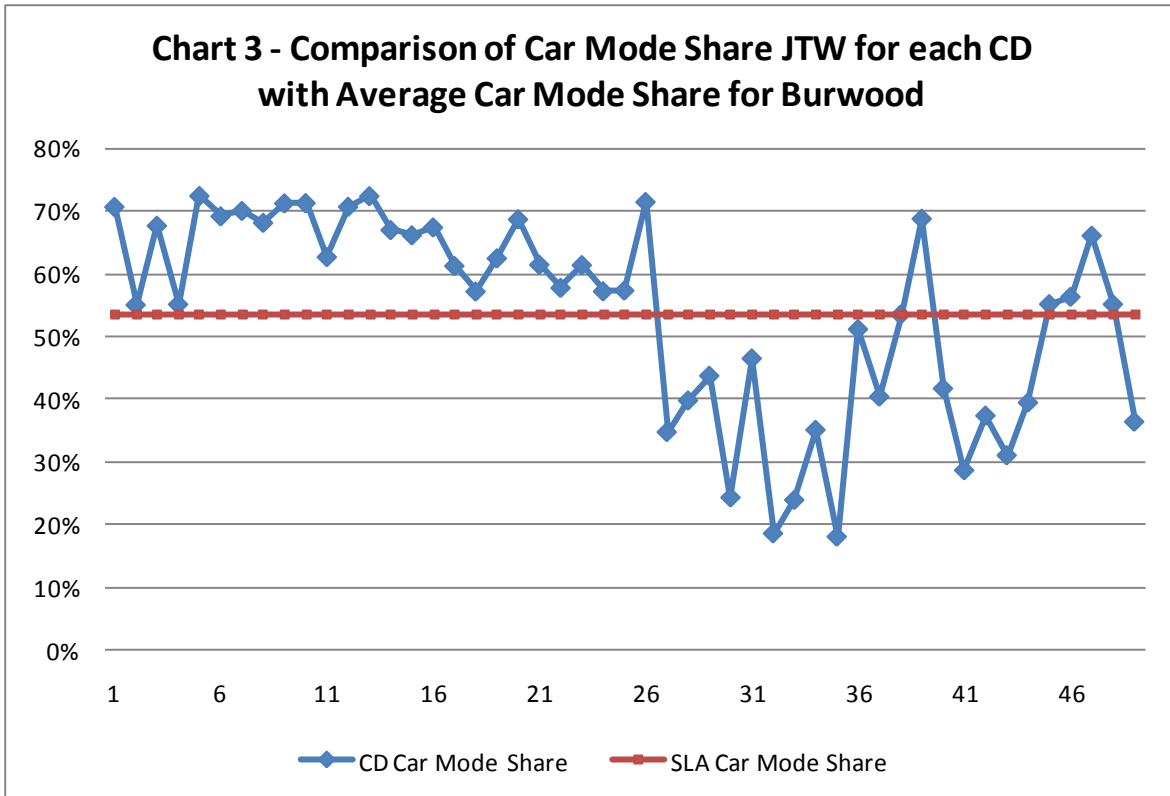


This analysis indicates considerable variability of the relatively of supply and demand within LGAs.

## 5. Discussion

The degree of apparent over supply inherent in current parking regulations suggests that there is room to improve current policy and the way it is set. Given that FUA's are an increasingly important dwelling form in Sydney, and that this importance is likely to increase, and given that parking spaces in this type of development are relatively expensive to construct and operate, there is clearly a justification to consider this problem further. If 6,000 FUA's are built each year (recent trends in a very flat market) and a quarter to a third of their parking spaces are un-used/under-used, then at \$35,000 per space (an industry rule of thumb), this represents about \$70 million of capital being spent each year with little justification. Over a decade of buoyant construction conditions this could easily accumulate to over \$1 billion.

One aspect of current policy, in many LGAs, that appears to be problematic is the blanket application of rates across the whole jurisdiction. As noted earlier, an implication of a blanket application of policy is that transport accessibility and outcomes are fairly homogenous. This is unlikely to be the case; examination of 2006 Census (ABS, 2008) journey to work mode share (an indicator of transport outcomes, however imperfect) across the CDs within a compact LGA (Burwood) in Sydney, with reasonably good transit conditions and fair walking conditions across the LGA, indicates considerable variability in transport conditions. Chart 3 provides an indication of how variable transport outcomes are across the CDs within Burwood LGA.



This suggests that policy needs to be able to deal with variations in parking need at a fine level of detail.

Excess parking supply has broader implications than simply over-investment in an under-utilised resource; it creates pools of parking supply that become available to people who commute into an area. This has the potential to undermine controls on commercial parking, which might be aimed at encouraging use of other modes, and increase congestion around nodes with a high proportion of FUAs.

## 6. Conclusion

This paper has reported on a study that examined parking demand characteristics of occupants of FUAs and compared these with notional supply dictated by parking regulations. The key finding is that policy levels of parking provision would result in considerable over-supply of spaces. These policies will apply to all future FUA developments and play an important role in housing affordability. This situation prevails in almost all of Sydney's 43 LGAs. Within the LGAs there is also considerable variation in the relativities of supply and demand.

This suggests that a rethink is needed with regard to establishing appropriate levels of parking provision. The Census dataset has proved to be a useful resource to explore this issue, permitting detailed examination at a fine level of spatial disaggregation.

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## APPENDIX A

### No of Studio / One Bedroom / Two Bedroom / Three Bedroom FUA's by LGA

LGA	No. Studios*	DCP Rate	No. 1 Beds	DCP Rate	No. 2 Beds	DCP Rate	No. 3 Beds	DCP Rate	No. 3+ Beds	DCP Rate	Total Parking Req'd
Ashfield	108	1 space / unit	1318	1 space / unit	4861	1 space / unit + 1 space / 5 x 2 bedroom units	515	1 space / unit + 1 space / 2 x 3 bedroom units	54	1 space / unit + 1 space / 2 x 3 bedroom units	8111
Auburn	82	1 space / unit	490	1 space / unit	4175	1 space / unit	1362	2 spaces / unit	75	2 spaces / unit	7621
Bankstown	196	1 space / unit	1171	1 space / unit	4351	1.2 spaces / unit	1114	1.5 spaces / unit	131	1.5 spaces / unit	8456
Baulkham Hills (The Hills)	6	1 space / unit	216	1 space / unit	1223	2 spaces / unit	518	2 spaces / unit	31	2 spaces / unit	3765
Blacktown	153	1 space / unit	775	1 space / unit	2401	1 space / unit	374	1 space / unit + 1 space / 3 bedroom unit	39	1 space / unit + 1 space / 3 bedroom unit	4155
Blue Mountains	32	1 space / unit <sup>(1)</sup>	223	1 space / unit <sup>(1)</sup>	333	1 space / unit <sup>(1)</sup>	105	2 spaces / unit <sup>(2)</sup>	17	2 spaces / unit <sup>(2)</sup>	832
Botany Bay	115	1 space / unit <sup>(3)</sup>	733	1 space / unit <sup>(3)</sup>	3665	1 space / unit <sup>(3)</sup>	974	2 spaces / unit <sup>(4)</sup>	33	2 spaces / unit <sup>(4)</sup>	5521
Burwood	58	0.5 spaces / unit	456	1 space / unit	2371	1.3 spaces / unit	599	2 spaces / unit	21	2 spaces / unit	4806
Camden	0	1 space / unit	96	1 space / unit	136	2 spaces / unit	10	2 spaces / unit	7	2 spaces / unit	404
Campbelltown	0	1 space / unit	213	1 space / unit	857	1 space / unit	160	1 space / unit	14	1 space / unit	1243
Canada Bay	69	1 space / unit	833	1 space / unit	5310	1.5 spaces / unit	2528	2 spaces / unit	87	2 spaces / unit	14098
Canterbury	256	1 space / unit	1374	1 space / unit	12549	1.2 spaces / unit	1398	2 spaces / unit	142	2 spaces / unit	19769
Fairfield	75	1 space / unit	898	1 space / unit	4510	1 space / unit	888	2 spaces / unit	75	2 spaces / unit	7407
Gosford	122	1 space / unit <sup>(5)</sup>	730	1 space / unit <sup>(5)</sup>	2463	1 space / unit <sup>(6)</sup>	1345	2 spaces / unit <sup>(7)</sup>	105	2 spaces / unit <sup>(7)</sup>	7148
Hawkesbury	0	1 space / unit	220	1 space / unit	380	2 spaces / unit	163	2 spaces / unit	20	2 spaces / unit	966
Holroyd	40	1 space /	482	1 space	5990	2 spaces / unit	692	2 spaces / unit	52	2 spaces / unit	7999

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LGA	No. Studios*	DCP Rate	No. 1 Beds	DCP Rate	No. 2 Beds	DCP Rate	No. 3 Beds	DCP Rate	No. 3+ Beds	DCP Rate	Total Parking Req'd
		unit		/ unit							
Hornsby	172	1 space / unit	1413	1 space / unit	5420	1 space / unit	1060	1 space / unit	90	1 space / unit	14726
Hunters Hill	34	1 space / unit	261	1 space / unit	544	1 space / unit	173	2 spaces / unit	16	2 spaces / unit	1027
Hurstville	64	1 space / unit	622	1 space / unit	4710	1.5 spaces / unit	1094	2 spaces / unit	97	2 spaces / unit	7778
Kogarah	11	1 space / unit	373	1 space / unit	4199	1.25 spaces / unit	1531	1.5 spaces / unit	46	1.5 spaces / unit	9837
Ku-ring-gai	69	1 space / unit	437	1 space / unit	2017	1.5 spaces / unit	1165	2 spaces / unit	55	2 spaces / unit	4856
Lane Cove	101	0.5 spaces / unit	669	1 space / unit	3237	1.6 spaces / unit	837	2 spaces / unit	39	2 spaces / unit	7377
Leichhardt	280	1 space / unit	1687	1 space / unit	2609	1.5 spaces / unit	607	2 spaces / unit	54	2 spaces / unit	7325
Liverpool	231	1 space / unit	646	1 space / unit	4210	1 space / unit + 0.2 spaces / 2 bed unit	770	1 space / unit + 0.5 spaces / 3 bed unit	37	1 space / unit + 0.5 spaces / 3 bed unit	8806
Manly	130	1 space / unit	1242	1 space / unit	3469	1 space / unit	1517	1 space / unit	119	1 space / unit	7989
Marrickville	498	1 space / unit	2756	1 space / unit	5946	1.5 spaces / unit	709	2 spaces / unit	105	2 spaces / unit	10015
Mosman	72	1 space / unit	1478	1 space / unit	2724	1 space / unit	723	1.5 spaces / unit	57	1.5 spaces / unit	7198
North Sydney	665	1 space / unit	4979	1 space / unit	9398	1.25 spaces / unit	3105	1.5 spaces / unit	221	1.5 spaces / unit	20030
Parramatta	419	1 space / unit	1624	1 space / unit	10974	1 space / unit	1935	2 spaces / unit	83	2 spaces / unit	18787
Penrith	83	1 space / unit	513	1 space / unit	2475	1 space / unit	307	2 spaces / unit	27	2 spaces / unit	3739
Pittwater	49	0.5 spaces / unit	548	1 space / unit	1266	1.2 spaces / unit	390	2 spaces / unit	51	2 spaces / unit	2745
Randwick	357	1 space / unit	4317	1 space / unit	14486	1 space / unit	3326	2 spaces / unit	279	2 spaces / unit	29089
Rockdale	59	1 space / unit	1230	1 space / unit	9085	1.4 spaces / unit	1273	1.6 spaces / unit	76	1.6 spaces / unit	13072
Ryde	93	1 space /	2254	1 space	7045	1.5 spaces / unit	718	2 spaces / unit	54	2 spaces / unit	13444



Adequacy of car parking policies for flats, units and apartments in the Sydney region

LGA	No. Studios*	DCP Rate	No. 1 Beds	DCP Rate	No. 2 Beds	DCP Rate	No. 3 Beds	DCP Rate	No. 3+ Beds	DCP Rate	Total Parking Req'd
		unit		/ unit							
Strathfield	59	1.5 spaces / unit <sup>(8)</sup>	489	1.5 spaces / unit <sup>(8)</sup>	3051	1.5 spaces / unit <sup>(8)</sup>	584	2 spaces / unit <sup>(8)</sup>	39	2 spaces / unit <sup>(8)</sup>	6372
Sutherland Shire	94	0.25 spaces / unit	2390	0.5 spaces / unit	10356	1.2 spaces / unit	1967	2 spaces / unit	87	2 spaces / unit	23368
Sydney	3196	1 space / unit	15678	1 space / unit	18980	1.2 spaces / unit	4103	1.5 spaces / unit	430	1.5 spaces / unit	40479
Warringah	240	1 space / unit <sup>(9)</sup>	3422	1 space / unit <sup>(9)</sup>	10000	1.2 spaces / unit <sup>(9)</sup>	1169	1.8 spaces / unit <sup>(9)</sup>	165	1.8 spaces / unit <sup>(9)</sup>	17663
Waverley	375	1 space / unit	3038	1 space / unit	7816	1.2 spaces / unit	1844	1.5 spaces / unit	185	1.5 spaces / unit	16446
Willoughby	195	1 space / unit	1815	1 space / unit	5765	2 spaces / unit	1421	2 spaces / unit	70	2 spaces / unit	11164
Wollondilly	6	1 space / unit	35	1 space / unit	70	2 spaces / unit	19	2 spaces / unit	12	3 spaces / unit	208
Woollahra	334		2047		5168		2418		302		18125
Wyong	74		529		1535		392		54		3988
<b>Grand Total</b>	<b>9,277</b>		<b>66,809</b>		<b>212,016</b>		<b>47,924</b>		<b>3,751</b>		<b>427,954</b>

- (1) Units < 125m<sup>2</sup> GFA
- (2) Units >125m<sup>2</sup> GFA
- (3) Small to medium dwelling rate
- (4) Large dwelling rate
- (5) Small dwelling rate
- (6) Medium dwelling rate
- (7) Large dwelling rate
- (8) Higher end of rates chosen, rates dependent on location of individual developments
- (9) Higher end of rates chosen, rate dependant on proximity to bus routes