

Working Paper:
Towards Strategic Planning for Car Parking

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INTRODUCTION

Australian planners have largely ignored the potential for parking to be one of urban and regional planning's fundamental control mechanisms. This is the result of many factors, not least of which is parking's relative lack of glamour, combined with the difficulties of ascribing causality in complex urban systems of which parking only one part, and a lack of coordination between agencies. This paper argues that a fundamental shift from static to strategic planning for car parking provision is required to achieve a number of wider Australian planning goals. To do this, current knowledge surrounding the provision of car parking via urban planning mechanisms, and the impacts of parking upon human settlements, are examined. Comparison of this emergent knowledge with current Australian planning practices suggests that a fundamental shift to strategic planning for parking is required.

Parking space, whether on public or private land, is simply provision 'for the storage of ... vehicle[s]' {Dolnick, 1999 #760: 165}. Car parking can be provided in conjunction with a variety of land uses ranging from dwellings to shopping centres. Parking can be provided for free or for payment, by the private sector or by public agencies. It can be provided in purpose-built multi-deck or underground structures, on streets, or even informally on unused vacant land. However, parking is far from neutral in its effects upon urban and regional systems. Choice of destination and mode of transport chosen to reach a destination are inextricably linked with parking provision. The behaviour of cars upon reaching a destination is influenced by the type, pricing and regulation of parking. The built form of destinations is inextricably influenced by the provision of parking. People's behaviour, and the manner in which streets function, once people park, is influenced by the location, type and connectivity of parking to the destinations they seek. Car parks themselves can have a serious impact upon aesthetics, whether the parking is on-street, at grade, or in multi-deck aboveground or underground structures. Car spaces consume land and resources that might be better put to other uses, whether it is in the public realm, or in private homes. Further, the very morphology of land use and development is influenced by the manner in which parking is provided.

Paradoxically, the ubiquity of parking in settlements appears to have somehow rendered it invisible to the strategic consideration of urban planners in most cases. Indeed, it is still taken for granted that ever-greater provision of car parking is critical to the ongoing maintenance of urban and regional functions. Even while it is often intuitively accepted that parking type and number is deeply intertwined with the qualities of urban and regional places,

few planning agencies actively include it within strategic planning processes. This paper examines issues surrounding parking provision under three headings: an audit of what we 'know' regarding parking within settlements and the wider impacts parking has; the processes currently used in Australia; and it considers how we might make a start on changing to a *strategic* approach. The section below begins by setting out a working understanding of strategic planning.

A PRELIMINARY TO STRATEGIC PARKING PROVISION

To begin, it is instructive to recall the primary characteristics of urban and regional planning, despite any theoretical difficulties (Campbell & Fainstein, 1996: 2) this might present. Firstly, the core domain of planning's activity: concern with the ways land and natural environments are valued, used, conserved, developed, or organised using *spatial* understandings (Hall, 1992: 3-6). Secondly, planning must always be orientated to the future (Bolan, 1974: 15; Drucker, 1959). Thirdly, on this basis, planning seeks to modify the way future activities are distributed in space (CEC, 1997) as an ongoing process of decisions. Fourthly, *strategic* planning seeks to influence the future spatial arrangements of places to accrue the benefits and avoid the disbenefits of particular arrangements of housing, industry, agriculture, conservation, social equity, transport and the like (Albrechts, 2004: 745; Healey, 1997: 4).

It follows that, to achieve desirable spatial arrangements of land use, planning must establish and reiterate goals, rules, standards, designs, and decision systems as necessary. In this sense, planning is ensuring that ongoing *decisions* (Steiner, 1979: Ch2), often by many diverse actors, are made advantageously. Accordingly, the great challenge of strategic planning is two fold: *deciding* what course of action is in fact advantageous, and then actually being able to cause this to occur via influencing a range of individual *decisions*.

In the case of parking, it stands to reason that an appropriate planning process would firstly *determine* the future parking arrangements associated with the range of other desirable planning outcomes. Secondly, that planning system would *cause* those desired parking arrangements to come about, as part of the way wider desirable outcomes are achieved. Put another way, a strategic approach to parking would connect the separate decisions regarding parking provision at individual sites with the achievement of wider planning goals. Accordingly, the following section examines existing understandings of parking, as a first step to then considering the manner in which collective action might be taken on the basis of this knowledge.

PARKING HIDDEN IN PLAIN VIEW: THE 'CURRENT KNOWLEDGE'

Urban and regional planning faces many challenges justifying and taking action. To name but two reasons of relevance to car parking, determining causality in complex urban systems is often highly difficult (Hopkins, 2001; Rittel & Webber, 1973); combined with the multiple goals and responsibilities associated with planning being located *within* governance mechanisms. Accordingly, even while planners generally and intuitively accept that parking provision may affect a wide range of urban functions, it is difficult to justify *ex ante* changes to the way parking is provided. Reinforcing this, are 'the fact' of existing statutory processes for parking provision that tend to militate against change and indeed the development of challenges to current approaches (Habermas, 1996: 29-30; March & Low, 2004).

To examine Australian planning's apparent disregard for parking, it is useful to first understand the origins of current parking standards as a symptomatic response. Emergence of the 'parking evil' soon followed in the wake of mass production of motor cars in the US, as did its most obvious solution – provision of sufficient numbers of parking spaces (Simpson, 1927). Accordingly, the establishment via ordinance and regulation of parking minima became the locally 'logical' solution to a range of interrelated parking issues. Increasing inner city vehicle congestion was combined with a perception that automobiles provided a valuable service to be supported. Shop owners wished to cater to drivers' convenience, alongside increased land prices requiring many businesses to be coerced into providing spaces. A view existed that drivers and those catering to them should bear some of the burden of providing parking, to complement support of other street transport modes, such as trolley cars (Buttenheim, 1927) suggesting off-street parking standards.

In the context of an ongoing surge of post second world war car ownership, Edward Mogren and Wilbur Smith's influential *Zoning and Traffic* (1952) strongly encouraged minimum parking standards based on floorspace *via* zoning mechanisms. Further, they recommended that standards be set upon peak potential building and automobile usage (Mogren & Smith, 1952: 37). This reflected the dominant view that 'all traffic demands should be met' (Plowden, 1972: 12). The result - numeric standards premised upon 'predict and provide' approaches to solving perceived parking shortages. Currently, a wide range of numeric minimum parking standards exist. These minima are primarily based on floor space, or peak numbers of people expected to occupy premises (see Davidson & Dolnick, 2002; Hill, 2005; Urban Land Institute: National Parking Association, 2000). Perhaps unintentionally using mixed theological metaphors, Donald Shoup describes the 'genesis' of parking minima in planning ordinances as a kind of false 'immaculate conception'. With almost spiritual faith, minimum standards are accepted without question of their origins, or of their implications, as a pseudo-science in which the links between land and transportation are largely unstudied and ignored (D. Shoup, 2006: 21-65, 111).

To go beyond minima, to examine the actual impacts of parking upon urban settlements, the remainder of this section provides a review of the current state of knowledge and practice regarding parking. From this review, an argument for a strategic planning approach to parking is developed. Understandings of the impacts of parking in settlements are examined under four main categories:

1. *Travel Behaviour and Urban Function*
2. *Land Use Patterns*
3. *Direct Consumption of Land and Resources*
4. *Aesthetics, Site Design and Street Life*

Travel Behaviour and Urban Function

Conclusive literature regarding the influences of parking upon travel behaviour, and in particular upon transport mode choice, is limited (Kuzmyak, Weinberger, Pratt, & Levinson, 2003). However, it *is* clear that the levels and types of parking provided *do* influence travel behaviour (Feeney, 1989; Mildner, Stratham, & Bianco, 1998). Further, it is likely that parking measures are *the* single most influential mechanism in modifying transport mode choice away from motor cars, aside from direct taxing and licensing programmes (Rye, Cowan, & Ison, 2006). At one end of the spectrum, high levels of free, easily accessed, parking provision do facilitate and encourage greater levels of car travel to destinations, including increased solo driving (Wilson & Shoup, 1990; R. W. Wilson, 1995). In Munich, the introduction of central area parking restrictions increased public transport share from 40% to 47%, while reducing car trips from 44% to 32% (Topp, 1993). Modelling based upon user surveys in Edinburgh found that greater restrictions upon on-street commuter parking in the central area could be expected to reduce car use for journey-to-work by 21%, allied with 13.2% increase in bus use, train use by 12.7% and walking by 14.3% (Rye et al., 2006).

Pucher (1994) notes the much higher rates of public transit use in Canada than comparable US cities. Government subsidies of Canadian public transport per passenger trip are about half of that in the US, with no federal funds allocated to Canadian public transport (Pucher, 1994: 70-71). Yet, in the post Second World War take up of automobile travel, US public transport systems have lost 54% of riders between 1950 and 1970, while Canada lost only 30% (Pucher, 1994). Pucher argues that the most important factor in the relative success of Canadian public transport is the coordination of land use planning and transportation. A key element of Canadian transport policy is the restriction of car parking in Canadian cities. For example, 198 parking spaces were provided per 1000 Toronto central city workers in 1980, compared with a US average of 380 per 1000 in US cities (Pucher, 1994: 74).

Wilson (1995) undertook detailed case studies of travel behaviour related to offices in Southern California, where almost all buildings are required to be provided with high levels of on-site parking, via zoning regulation. As in much of the US, the resulting oversupply effectively causes parking to be

considered free by many businesses and drivers, or alternatively, it is subsidized via tax concessions (D. C. Shoup, 1995). A range of minimum parking standards applied in these cases, on the basis of zoning requirements, averaging 4.0 spaces per 1000 square feet (or ~90 square metres). The study found that at peak periods, only 56% of parking provided at this rate was utilised, at 95% building occupancy. This oversupplied and effectively 'free' parking strongly encouraged solo car travel. In one case, the introduction of a \$30 per month parking fee by an employer decreased solo driving by 49%, in a location where transit availability was limited (R. Wilson, 1995). These findings are supported by modelling in Portland which found that marginally increased parking costs could significantly reduce solo commuter driving, if transit opportunities were available (Hess, 2001: 19).

At the other extreme of the spectrum, an 'undersupply' of parking in a particular place, whether overall, or of a particular type (possibly including high pricing), can significantly impact upon the functioning of urban places. The very term 'undersupply' reveals a common expectation that many urban cannot occur without car parking. The underlying assumption is that parking demand *ought* to be met and managed, even in thinking conceived as a paradigm shift (cf Litman, 2006: 3-6). This assumption is often unquestioned to the point that it would appear almost inconceivable that parking *not* be supplied, reflected in almost universal minimum parking requirements, changeable only in exceptional circumstances (D. Shoup, 1999). There may be an argument that, within conventional car based transport systems, the economic vitality of centres depends upon good parking supply. Yet, even while attitudinal surveys (typically of businesses) support this view, aggregate statistical studies find only weak relationships between parking supply and business prosperity (Still & Simmonds, 2000: 313). More importantly, it is also argued that limiting parking is a significant component of 'planned congestion', necessary to encourage mode shift (Giuliano, 1992). At a local scale, it is common for residents and businesses to believe that parking in close proximity is integrally connected to their use of land (Still & Simmonds, 2000). Even when residents do not own cars, it is common that they maintain a strong desire for parking spaces out of concern for resale values. In retail settings, evidence shows that modifying unrestricted parking, ranging from installing metering through to full pedestrianisation, usually modestly improves patronage and profits (Hass-Klau, 1993; Kolozsvari & Shoup, 2003).

Importantly, parking functions are not spatially homogenous, but reflect the differing functions and needs of places, suggesting that place-based, rather than homogeneous planning approaches are required. If motorists maintain a general expectation that they can drive cars to a given destination, kerb cruising can significantly congest streets while motorists seek on-street spaces, and preferably free or cheap spaces (Kolozsvari & Shoup, 2003; Manville & Shoup, 2004: 4). Overflow or overspill parking occurs when parking demand exceeds supply in a place or from certain function/s, and motorists seek parking in nearby areas (D. C. Shoup, 1995: 18). This overspill can be assessed in various ways. It is common for overspill to be seen as an unfair and negative impact upon the functioning of nearby places, such as quiet residential streets or retail strips, normally used to reliance upon

on-street parking to meet their own demand. Another view is that unused spaces are part of a wider public resource that ought to be shared, with any spare capacity available being taken up to fully utilise it. Overspill might be understood as a non-planning local law issue to be dealt with by parking agencies. Finally, it might also be argued that overspill parking is a component of 'planned congestion', as mentioned above (Davis, 1992).

From this review it is clear that sophisticated understandings of the influence of parking upon travel behaviour and urban functioning are far from complete. Notwithstanding, it is indisputable that high levels of cheap or free parking encourage car travel and undermine the potential for greater take-up of public transport systems. Simply put, any planning system concerned with providing a sustainable transport system must reduce car parking levels. Strategic plans must set gross parking maxima, and focus these upon areas with (or with planned) sufficient alternative transportation to complement reduced car use. To achieve strategic goals, local planning provisions must reflect these overall strategic parking maxima in site by site decision making. Accordingly, the establishment of parking maxima as part of wider transport plans must stem from the development of strategic plans particular to the specific and desired characteristics of places and regions.

Land Use and Development Patterns

The ability to influence overall land use and development patterns is integral to planning's ability to achieve many fundamental goals (Hall, 1992). The manner in which parking is provided appears to strongly influence key facets of use and development. A 1964 study in the U.S. by Brian Bertha documents the changes to apartment project densities that occurred when minimum car space requirements were introduced in 1961. A reduction in density of 30%, an increase in housing cost per dwelling of 19%, and a fall in land value of 33% occurred (cited in D. Shoup, 1997). The reason – to achieve the desired housing densities would have required underground parking – so the developers simply went to lower housing densities to allow provision of cheaper at-grade parking (Bertha, 1964). This represents the costs of car ownership being transferred to the costs of dwellings (D. Shoup, 1997: 10) and further, the facilitation of sprawl. In 1995 Wilson found that, in Californian office buildings, the overall site size of average office properties could be reduced by 29% if off-street parking were provided at the rate actually required, rather than oversupplied, as is typical in that setting (R. Wilson, 1995). Accordingly, the imposition of minimum parking requirements may act as limits upon higher density development, while encouraging sprawl.

Going beyond the individual site to the form of wider areas reveals deeper issues. Parking standards based on minima strongly encourage the suburbanisation and dispersal of employment to places which allow for parking to be provided more cheaply (R. Wilson, 1995). Analysis of Los Angeles undertaken by Manville and Shoup (2005) suggests that the distribution and nature of parking plays a key role in city form. Firstly, LA imposes minimum parking requirements in its CBD, whereas cities such as

New York and San Francisco have the reverse - parking limitations or maxima. The ratio parking spaces to jobs in LA's CBD is 1.9. This compares to 7.3 in San Francisco's and 16.6 in New York's CBDs. Manville and Shoup contest that, while acknowledging that multiple factors influence urban form over time, minimum parking standards have strongly influenced the overall form of LA and in particular, the relationship of the CBD with the rest of the urban area. LA's CBD, by imposing minimum parking standards, has less appeal as a centre, requiring expensive parking alongside other functions, and reducing the ability for proximate location via high density: the very point of a CBD. Accordingly, many firms and businesses seek locations other than the CBD that allow the provision of required parking at significantly lower cost and at lower density (Still & Simmonds, 2000: 293). The result of this is that the *overall* urbanised area of LA is actually much more dense than either San Francisco or New York, while the CBD is much less dense. Put another way, people are not as concentrated in particular areas in LA. LA's suburbs are 74% as dense as the CBD, while the suburbs of New York and San Francisco are only 12% and 35% as dense (Manville & Shoup, 2005: 238). This finding has profound implications for cities seeking to concentrate growth in certain locations at the metropolitan scale.

LA's infamous traffic congestion, then, is not in fact the result of 'sprawl', when LA's overall high density is understood. Manville and Shoup suggest that in fact, it is the result of higher density *combined* with reliance upon car based transport – more people trying to use the scarce but unpriced resource of road space, supported by excessive amounts of free parking. This translates to LA's high Vehicle Miles Travelled (VMT) per urban square mile of 128,000. In comparison, New York and San Francisco have VMTs of 68,000 and 73,000 respectively. This is best understood in the context that even while denser cities have more land in total devoted to streets, they have less land devoted to streets per person. In contrast, minimum off-street parking standards are typically maintained, regardless of density. Accordingly, even while denser areas have less vehicle travel per person, they have greater levels of congestion, since more cars are seeking to use streets with limited capacity (Manville & Shoup, 2005).

The above review suggests that car parking plays a central role in affecting land use and development patterns. Any strategic planning system seeking to improve the spatial distribution and functioning of development and land use, particularly in market-driven development systems, must control the provision of car parking.

Direct Consumption of Land and Resources

The consumption of land by car parking has long been an issue, although early accounts were dominated by concerns regarding on-street parking as an impediment to traffic flow and access to properties. These debates were conceived as a clash of rights between those seeking to 'stand' and those seeking to use streets for travel (Buttenheim, 1927). Now we provide so much parking it is clear that parking and associated accessways, however

provided, consume considerable space and resources, although accurate figures do not exist. In the US setting, the number of parking spaces per car has been estimated at one space per driver per residence, plus another three to four spaces elsewhere (Gruen, 1973; D. Shoup, 1999). If applied in Australia at four spaces in total per vehicle, for the 10.9 million passenger vehicles registered in 2005 (Australian Bureau of Statistics, 2005), this amounts to over 33 million car parking spaces. If a standard parking space is 2.6 metres by 4.9 metres, (discounting the considerable areas used for aisles and accessways), a conservative estimate of the area directly consumed by parking spaces in Australia amounts to 420 square kilometres, or approximately 31 square metres per licensed driver.

While it is clear that parking consumes considerable space and can represent significant construction costs, the wider 'real cost' of parking spaces is difficult to determine, since the provision of a parking space has many dimensions. A parking space might be argued to facilitate economic production if it is associated with work and commerce, although this relationship may be weaker than many intuitively believe (Still & Simmonds, 2000: 299). The cost of providing spaces ranges from leaving land vacant in low density areas, through to construction of expensive multi-deck parking in high density centres. Finally, a parking space represents a significant opportunity cost in terms of the use of land, and of the money and resources spent upon it, considering that most parking spaces are vacant for considerable periods of time.

Aesthetics, Safety, Function and Street Life

Most people simply accept parking as essential to urban life, as an adjunct to car based transport (Jakle & Sculle, 2004). Yet, even while plentiful parking is usually considered desirable by individual businesses and land users, it is equally common that parking itself detracts from a place's aesthetics and other functions. Regulatory requirements to provide parking via predetermined ratios (typically based upon floorspace) have encouraged planners, engineers and designers to understand parking as an issue of numbers alone (see Davidson & Dolnick, 2002; Hill, 2005; Urban Land Institute: National Parking Association, 2000). Accordingly, many engineers see parking as a technical problem and seek to provide solutions via specifications and structural innovations (Dunphy, 2001; Hunnicutt, 1982). This numeric approach tends to produce undesirable human, ecological and place-based parking impacts. These impacts are resolved by two main categories of action: improved design, and improved management.

The visual impacts alone of parking can be dramatic, particularly at higher building and population densities. The physical presence of cars parked on-street profoundly modifies streets' aesthetics, particularly from the pedestrian's viewpoint, as a dominating eyesore (Miller, 1988: 1), as dangerous, smelly and space consuming (Caliandro, 1978: 154). Further, on-street parking reduces the capacity of roads to be used for other purposes such as walking, socialising, childrens' play, landscaping, or street furniture,

and for that matter driving (Jakle & Sculle, 2004: 3). However, it is possible for appropriate design of kerbing, street trees, and furniture to significantly improve the appearance and pedestrian functions of streets that contain parked cars (Childs, 1999: 95-101).

Off-street at-grade parking, a response to the fact that far greater amounts of parking are typically required in car-based urban systems than can be provided on-street, renders large areas of land unusable for other, more productive, purposes. The desire for obvious and easily accessed parking has tended to push building envelopes back from streets, to leave shops as islands within seas of parking (Jakle & Sculle, 2004:93,96), and for residential streets to be dominated by garage doors and driveways. Driveways to off-street carparking areas can create multiple points of conflict along sidewalks between pedestrians, cyclists and cars, as well as reducing the numbers of on-street parking along kerblines (Mukhija & Shoup, 2006).

Off-street asphalt parking lots increase summer temperatures between 2 and 8 degrees (Litman, 2006:194). Further, they act as heat islands considerably reducing the potential for nearby buildings to utilise passive cooling techniques (Kolokotroni & Watkins, 2004), while contributing to overall urban warming effects. Cars standing for long periods in hot parking lots can contribute up to 20% of overall vehicle carbon emissions from evaporation and leakage (McPherson, Simpson, & Scott, 1997). Stormwater runoff is often tainted with high levels of contaminants from car leakage (eg radiator coolant, oils, fuels) and from materials used in sealing parking lots (Mahler, Metre, & Wilson, 2003). Personal security issues are of concern in isolated or large at-grade car parks, and can be compounded by attempts to screen unattractive car parks from view (Childs, 1999: 177). While multi-level parking structures are a considerably more efficient use of land, they are in the order of 4 to 5 times more expensive to construct (above ground) per parking space than at-grade facilities (Victoria Transport Policy Institute, 2007: 5.4-2). Further, unsympathetically designed multi-level parking structures can be a significant blight upon visual aesthetics (Banfield, 1997).

The appropriate management and control of parking can yield considerable benefits in terms of aesthetics and street life at the local scale. However, it is also possible that reducing negative local impacts of parking provision, removes parking from consideration, allowing wider strategic implications to be ignored.

INADEQUATE TOOLS, BASED ON IMPERFECT KNOWLEDGE

The previous section reviewed extant knowledge surrounding the impacts of parking upon urban morphology and function. It found that, while imperfect, the balance of evidence strongly suggests that levels and type of parking significantly influence the achievement of wider planning goals. Successful strategic planning, once desired outcomes have been identified, turns upon the ability to influence individual decisions and actions so that these combine to achieve these outcomes. It would seem unwise, then, for any planning

system to ignore the wider impacts of parking. Indeed, parking would seem to have the potential to be a highly influential device, complementing other planning tools in the achievement of a range of urban and regional objectives. However, progressing beyond recognising parking as influential upon a range of urban functions (Banister, 1994; Cervero, 1989; Pucher & Lefevre, 1996; Vuchic, 2000), to using parking to reduce car use via land use controls (cf Banister, 2002: 214, 258; D. Shoup, 2006) is rarely made, particularly in strategic planning exercises. The following review of Australian parking approaches, however, suggests that while some acknowledgement of the wider strategic role of parking exists, that this is not uniform across Australia. Further, despite stated goals for greater public transport use, alternative parking approaches are not being implemented in any concerted manner in any Australian state, except in limited central city locations.

Car parking management in Australian planning still emphasises site-specific development control regulations based on minimum standards, disregarding wider transport and planning objectives. Despite the rhetoric regarding public transport usage, almost all current parking policies support and encourage motor car use. Current parking planning is still based upon *predict and provide* approaches. With limited exceptions, 'correct' parking levels are understood as each site providing *at least* the same number of parking spaces as the parking demand it 'generates'. Accordingly, the strategic implications of car parking, beyond individual sites, are ignored.

While most Australian local planning statutory controls pay little heed to the importance of parking to wider urban management, some policy shifts are occurring. In New South Wales, the latest Urban Transport Statement for Sydney acknowledges the need for metropolitan level parking management to influence travel behaviour (Iemma, 2006: 3, 59). This policy is currently focussed upon Park and Ride schemes. However, parallel policy statements indicate the intention that a Metropolitan Parking Strategy be developed and acknowledgement of the problems associated with excess parking (NSW Government, 2005: 159, 182) is a promising development. The Draft State Environmental Planning Policy No 66 — Integration of Land Use and Transport intends to require the setting of maximum parking standards for developments in areas with good public transport accessibility. This stems from the Integrated Land Use and Transport (ILUT) package released in 2001.

In Queensland, The Integrated Land Use and Transport Planning component of the South East Queensland Regional Plan seeks to 'manage car parking provision in regional activity centres and high capacity transport nodes to support walking, cycling and public transport accessibility' (Queensland Government, 2005: 8.7). However, effective translation of this policy to planning controls is yet to occur, and it is noted that the corresponding Transit Oriented Development Fact Sheet, intended to assist translation of policy in local planning, currently makes no mention of parking.

In Western Australia, the state-level Development Control Policy 1.6 (January 2006) notes that support of transit oriented policy requires modification of standard parking policy to support transit oriented design in precinct plans.

This supports the Greater Perth Integrating Land Use and Transport Discussion Paper 2003 which highlighted the need for parking to match wider transport policy. Western Australian planning policy, at least at a conceptual level, acknowledges the need to take a strategic approach to car parking as part of the balanced management of transport (Western Australian Planning Commission, 2003: 23). However, the August 2006 Transport Assessment Guidelines for Developments propose only the accurate measurement of parking demand (August 2006) Technical Appendix (WAPC), suggesting a potential lack of integration between stated policy and actual assessment and planning tools.

In Victoria, the strategic planning link between land use and transport planning is weaker. The latest metropolitan transport plan refers to parking only insofar as it promotes park and ride schemes for train travel (Department of Infrastructure, 2007: 59). Previous metropolitan transport plans have addressed parking insofar as kerbside supply affects flow rates on arterial roads (Department of Infrastructure, 2004: 27). The Activity Centres policy, a key component of the Melbourne 2030 Metropolitan Plan suggests making parking 'more compact' in activity centres, to reduce effects upon aesthetics and consumption of land. In this policy setting, the *potential* for standard parking minima to be modified by local governments via Parking Precinct Plans has had limited take-up.

It is not surprising then, in the context of limited strategic guidance for parking, that local planning regulations are focussed upon micro-scale predict-and-provide approaches. In Victoria, the standard provisions for all planning schemes stipulate at Clause 52.06-5 a range of ratios for parking that establish minimum rates that must be met for various land uses. In NSW, Development Control Plans (DCP) stipulate minimum parking standards. Some DCPs do include maxima (eg see Leichhardt DCP A8.0), but these typically reflect the 'standard' rates already used in most Australian planning schemes, and only prevent gross oversupply. The Sydney Local Environment Plan (2005) - Central Sydney sets parking maxima, but these could hardly be described as onerous in the setting of a central city area (eg a maximum of 2 spaces per dwelling). In Queensland, the Brisbane Planning Scheme, at Table 12 of Appendix 2 sets a range of parking minima, only setting maxima for the central area. The Perth City Planning Scheme No.2 establishes maximum numbers of parking commercial land uses may provide at between 100 to 300 spaces per hectare. For residential land uses, requirements vary between no minima and a maximum of 1.5 bays per dwelling (for the central area), and more typically a minimum of 1 bay and maximum of two bays per dwelling. However, in the rest of Western Australia's planning schemes there are no common standards for parking, although almost all are based upon the provision of similar minima for new use and development (Western Australian Planning Commission, 2003: 51).

Within statutory processes, most Australian planning systems offer some sort of opportunity for the reduction of standard minimum parking rates in certain circumstances. Reductions may be allowed if sites are near to good public transport, if a site has parking 'credits' by virtue of pre-existing structures on

the land, or in situations where it has been established that on-street parking is a 'pool' shared between users of a locale. While these approaches *might* result in lower overall levels of parking being provided in particular locations, fundamental flaws exist in taking what amounts to a *laissez faire* planning approach. First, the types of reductions referred to above are almost always voluntary, and so rely on individual developers or land users finding the prospect of providing lower parking levels desirable. Second, if reductions are undertaken in situations where no maxima for overall parking are established, other parking provision such as paid facilities, might actually result in even higher overall parking provision. Third, in Australian cities, these cases of reduced parking provision are restricted to limited cases of higher density, typically older, inner city areas, rather than in the vast swathes of low density development characterising Australian regions, or indeed, in new areas. Fourth, if reductions are allowed without the context of an overall strategic transport and landuse plan, they are typically not tied in to the concerted and organised delivery of alternatives to motor car transport, resulting in a range of undesirable side-effects. Backlashes by traders and politicians can undermine efforts to reduce parking. Parking overspill into other areas can occur, turning residential streets into parking lots instead of places for community life. Development and activity might re-focus onto other areas where on-site parking can be provided cheaply.

Australian planning systems are lacking in the ability to appropriately manage parking controls. Despite nascent acceptance of the important links between parking and urban function and form, the lack of strategic 'framing' of parking renders current approaches ineffective and even contradictory to the achievement of wider planning goals. The problem, and its solution, has two layers. Firstly, since strategic planning does not currently take parking into account, the data necessary to understanding its effects upon wider transport and urban form are not gathered and analysed, for existing systems or for proposed scenarios. Secondly, the absence of knowledge about parking impacts precludes from plan-making the ability to determine just what levels and types of parking provision would be desirable to achieve a range of planning goals. Accordingly, it is hardly surprising in this knowledge vacuum that local parking standards commonly typically contradict the achievement of wider planning goals.

CONCLUSIONS - TOWARDS STRATEGIC CAR PARKING PLANNING

It is inevitable that urban planning will face challenges justifying actions in urban and regional systems where determining causality is difficult. It is not surprising then, that the use of parking minima has been a mainstay of statutory planning for so long – at face it seems intuitively sensible that individual sites should meet the demand for parking they generate by providing parking on-site. The use of predetermined ratios based on studies of similar land uses elsewhere (however remote in space or time) might seem a reasonable way of arriving at an site by site approximation for development control purposes. However, this paper argues that parking provision in

Australia requires new approaches, based upon strategic planning, rather than 'predict and provide' standards based upon parking minima alone.

Because the impacts of parking are now understood to go well beyond individual sites, it is clear that planners must develop more sophisticated approaches to parking. The literature indicates that parking amount, type and location influences many core facets of urban and regional systems. It is certain that parking provision can strongly influence travel mode choice. In fact, it is probable that parking measures are *the* most influential mechanism for discouraging car use outside of direct taxation or licensing. In particular, it must be acknowledged that excessive amounts of free and easily accessed parking encourages much greater levels of car travel. In terms of urban form, requiring high levels of parking discourages concentration in growth centres, decreasing density, and encouraging dispersal of employment to places which allow for parking to be provided more cheaply. Parking and associated accessways consume considerable space and resources, yet are often unoccupied for the majority of each day. Parking areas often have undesirable aesthetic and environmental impacts, are expensive, and prevent the use of public and private space for other more desirable purposes.

To meaningfully look beyond the individual site effects of parking requires that strategic planning practises account for the influences of parking on urban form and function, balancing these against a range of other planning goals and considerations. Analysis of Australian planning shows that, even in the limited cases where some acknowledgement of the need for alternative parking approaches exist, few possibilities exist for local planning to translate strategic parking ideals into actual regulation outside of CBD areas. This inability stems firstly from the presumption in local plan regulations to setting parking minima, and secondly from the lack of strategic frameworks requiring and facilitating alternative parking approaches to parking.

To move to a strategic parking approach five key principles must be embraced:

- Parking maxima as the primary control in all cases.
- All areas in a region must be covered by maxima, to prevent redirection of growth to 'soft' control areas.
- Homogeneous standard rates are not used. Rather, strategic justification is provided for parking maxima in every case of policy and regulation preparation.
- The burden of proof is upon local plan-makers, or proponents of development, to demonstrate that parking policies and regulations, or parking provision, for particular places will achieve wider transport and planning objectives.
- Strategic analysis forms the basis of balanced wider transport objectives and urban functions to complementing the desired characteristics and functions of individual places.

The adoption of these principles will require changes to the frameworks used to prepare and implement Australian plans. The principles form the basis of a

strategic approach in which parking would be considered alongside other matters such as overall transport objectives and desired intensity of use, in particular places. The transition to such an approach will not just require changes to strategic frameworks and regulation – sound reasons must be its basis.

A shift to the strategic provision of car parking will require that plan-making and decisions are based upon research. This required research extends across broader generalisable concerns, to specific and ongoing studies regarding particular places and scenarios. Wider questions regarding the role and impacts of parking require examination in a range of urban contexts. These questions revolve around understanding the relationship between parking and other urban functions including:

- transport mode in various urban form and public transport types.
- urban form.
- vehicle kilometres travelled, and congestion.
- economic and social vitality in various different development forms.
- the consumption of land and resources, production of emissions, and costs of construction.

More specific questions must deal with the range of issues particular to specific places, mindful of other transport and planning objectives. For example:

- How does parking currently contribute to the range of functions and achievement of planning objectives of a 'place', and the wider settlement it is part of?
- What is the optimum level of parking for a 'place' currently and for individual sites and land uses within it?
- What is the optimum level of parking for an overall 'place' in its wider setting in terms of its desired and planned for future and for individual sites and land uses within it?
- Do existing and proposed planning controls for parking complement the achievement of local and wider planning goals?
- Do the parking components of individual proposals for development and use complement the achievement of local and wider planning goals?

As any scholar of urban planning knows, the essence of our challenges is grounded in how we deal with change. In terms of planning for parking in better ways, innovative approaches, both regulatory and substantive, are needed as part of a transition to more strategic parking planning. In existing settlements, ways of actively changing over time from car-based transport to public transit systems are required. Self-fulfilling car dependency continues in many places, sustained in great part by high levels of parking, whether in new or existing settlements. While the need for ideas may seem obvious, the lack of alternatives in Australia suggest that parking is not typically taken seriously as a mechanism to actively shift transport modes. These innovations need to find ways of maintaining the functions and vitality of places during transitions. Transport planning must be joined with what in Australia has come to be

'conventional' land use planning. Strategic and regulatory planning must be given the ability to plan for and manage the range of parking types available: public; commercial; private; on street; and off street. A number of ideas drawn from other examples are proposed in the WA Discussion Paper – Integrating Land Use and Transport. Further, the non-temporal nature of current site-by-site parking regulation must be changed to facilitate the lowering of provision over time to complement the improvement and up-take of public transport.

Patrick Abercrombie characterised people as falling into two main categories: those who simply make do with things as they stand; and those who realise that things can be better and seek to bring improvements about. Abercrombie maintained that planners must fall into the second category, and it is with this sentiment in mind that a fundamental shift to the strategic provision of parking must be made (Abercrombie, 1943: 1:4).

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