Public Transport Access to Proposed Stadium Sites

Matthew BURKE Research Fellow Urban Research Program Griffith University 170 Kessels Road, Nathan, Queensland, 4111, Australia Fax: +61-7-3735-4026

E-mail: m.burke@griffith.edu.au

Rick EVANS
Senior Project Officer
Urban Research Program
Griffith University
170 Kessels Road, Nathan,
Queensland, 4111, Australia
Fax: +61-7-3735-4026

E-mail: rick.evans@griffith.edu.au

Abstract: Contemporary Australian stadium developments are transit-oriented, implementing extensive travel demand management measures to curtail car access and promote public transport use. Conventional catchment appraisal techniques are inadequate for exploring the likely performance of a stadium location under such terms. Accessibility modelling offers a more incisive view. This research investigates proposed locations for a football stadium on Australia's Gold Coast, exploring its accessibility via the public transport system for city residents. Ease of access is defined in terms of travel time, considering all the legs of the public transport journey. This also includes time spent either walking to and from public transport stops, or interchanging between services. The results of the accessibility modelling suggest a recent decision by the proponents to locate the stadium at Carrara will be deleterious to future stadium and football team viability.

Key Words: accessibility analysis, public transport, TDM, sports stadia,

1. INTRODUCTION

The property development imperative of 'location, location, location' shows how important geographical location is for the value of any proposed investment and its projected economic returns. This is particularly true for land uses reliant on the access of customers/patrons from a wide urban catchment, such as sports stadia. This paper reports the findings of a project examining one of the major questions for development on Australia's Gold Coast, namely, the preferred site for an Australian Football League (AFL) stadium. The paper provides methods and demonstrates how accessible a set of possible locations for an AFL stadium are to Gold Coast residents via the public transport system. The intent of this research was to assist in deliberations about a preferred stadium location. The paper first identifies the context, including the issue of travel demand management for major sports stadia in the present era. It then examines the use of accessibility analysis and describes the concepts and approach used in the study. The stadium locations proposed for the Gold Coast are defined and the results obtained shown in both mapping and tabular form. Finally, the implications of the study and the potential of these methods are discussed.

2. CONTEXT

2.1 Previous research on sports stadia and transportation

Past studies on sports stadium location within cities are mostly from a European and North American perspective (Lipsitz 1984, Thornley 2002). The majority of this literature considers issues such as returns on investment for stadium investors, and on the debate about the potential for stadia to revitalise depressed neighbourhoods in which they are located (see

Lertwachara and Cochran 2007, Nelson 2001, Wassmer 2001). Baim (1994) notes that since travel costs are borne by patrons once a stadium is built, there is a clear market-orientation for professional sports, influencing location decisions. Bale (2001) explored how such economics and planning underpin stadium location decisions in practice, sometimes at the expense of traditional fan bases. Siegfried and Zimbalist (2000) explored the role of state and local governments in influencing location decisions in part financing stadium developments for public-image enhancing, consumer surplus and external benefits; with these benefits to the city expanded if a high proportion of stadium patrons come from interstate. Stadium feasibility and transport catchment studies are often conducted by proponents, or by consultants, but little of this commercially-sensitive material makes its way to the academic or sports literature. Despite this, a number of authors have focused on location in terms of population or market catchments, including Leonard (1993) Bale (2001); and Buraimo et al. (2007). Of particular interest, Berry et al. (2007) used geographic information systems (GIS) to compare in-town and out-of-town locations for a proposed stadium site for Belfast. The study used GIS to appraise destination accessibility to a range of urban features via the transport system. Yet while they identified proximity of stadium locations to local public transport stops, they ignored the actual access of residents via that public transport system from the stops to their places of residence. As such, Berry et al.'s analysis of the transport potential of the proposed sites, and the public transport catchment each would easily service, was limited.

Another stream of research has explored the impacts of ground and franchise relocations on fans, including Horak's (1995) work on Admira-Wacker's relocation in Vienna and Spirou and Bennett's (2003) work on stadium developments in Chicago, which each relate to the problem of transport access and changed market catchments. Other researchers have noted the transport problems caused by sports stadia. Both Bale (1990) and Humphrys *et al.* (1983) have found that traffic and parking issues are the most problematic for residents surrounding stadium developments, much more so than hooliganism or other such incivilities. And Burke and Woolcock (Forthcoming) have placed attention on the travel experiences of sports fans within the city, in an era of large mega-stadia and public transport priority.

Despite all this attention on transport concerns, there are very few studies that have explicitly placed attention on the transport and land use relationships of modern sports stadia, developing or providing new methods for catchment analysis.

2.2 Sports Stadia in an Era of Transit Oriented Development and Travel Demand Management

Sports stadiums are returning to the core of Australian cities and to sites supported by high-capacity public transport infrastructure, under the rubric of 'transit oriented development' (TOD). Stadium operators and state and local governments are also employing travel demand management (TDM) measures to encourage patrons into public transport and out of their motor vehicles. TDM is essentially "any action or set of actions aimed at influencing people's travel behavior in such a way that alternative mobility options are presented and/or congestion is reduced" (Meyer 1999). The scale of these shifts has significant implications for patrons, who in Australia mostly attend matches of the four main football codes – Australian Rules (AFL), rugby league, rugby union and soccer – the dominant spectator sports in Australia.

These sports have experienced considerable rationalisation over the last three decades. The nationalisation of the major football codes in the 1980s and 1990s created 'super clubs' with

expanded market regions, memberships and attendance. Air transport has been a key part of this shift, such that professional teams generally play in expansive national competitions, with few intra-city rivalries, best exemplified by the A-League Australian soccer competition which is 'one-team, one-town'. But what is intriguing is the geographical location of the rationalised mega-stadia in which teams now play. The small suburban stadia built to service local catchments in the late 19th or early 20th centuries have largely been abandoned for regional mega-stadia, with greater seating capacities. Adelaide's Westlakes stadium aside (built at the apogee of 1970s auto-dominated urban planning and surrounded by car parking), the main stadia in the major Australian metropolitan markets are all now near the rail system (or a major busway in the case of Brisbane's Gabba stadium) and lie either in the core of the city or, in the case of Sydney's Olympic Stadium, are at least central to most of the city's population. A typical example is Melbourne's Docklands stadium, only 1 km from Melbourne's CBD. Opened in the year 2000, it sits adjacent to one of Melbourne's busiest, high-capacity rail stations (Southern Cross Station) and provides a home ground for many of the city's sporting franchises. There is limited parking beneath the stadium, much of which also services the many office towers, restaurants, bars and other land uses clustered around the stadium. Docklands was planned specifically as a 'stadium village' TOD similar to Stamford Bridge in Chelsea, London, clustering land uses together to ensure activities beyond just game days (see Hodder 2000).

In addition to locational changes towards transit-oriented sites, TDM is now heavily employed at Australian stadia. The mass convergence of thousands of spectators on stadium precincts, and their dispersal after the game, generates heavy traffic flows, parking and congestion problems in surrounding streets, if prohibitions on parking and other TDM measures are not applied. As noted by Meyer (1999) key elements of TDM generally include:

- actions to ensure efficient use of road space, through:
 - o traffic management
 - o preferential treatment for public transport and/or high occupancy vehicles
 - o provision for cyclists and pedestrians
 - o parking controls
- actions to reduce vehicle use in congested areas
- actions to improve public transport.

The challenge for sports events transport planners is to make the public transport on offer as seamless and convenient as possible. This includes TDM measures such as special-events services, public transport fare discounts, promotion and advertising. Such TDM measures are generally introduced under a Transport Management Plan (TMP) to manage traffic flows and parking, primarily by discouraging private motor vehicle travel and encouraging public transport usage to stadia. The Gabba, Lang Park and Robina Stadium, the three largest stadia in South-East Queensland, are all examples of stadia using TMPs. The TDM measures at Lang Park are so onerous that a 'Traffic Area' surrounding the stadium – effectively anything within a fifteen minute walk – is affected by strict and rigidly enforced on-street parking restrictions for as many as four hours before and after the game. The Queensland Government has also introduced package pricing such that a public transport fare is 'built in' to any prepurchased ticket price. Stadium ticket holders obtain 'free' public transport to and from the stadium, simply showing their ticket or membership card to a bus driver or ticket inspector. In addition, special events buses run from major bus interchanges and the central business district for 2 hours before kick off and after the game. At Robina Stadium nil parking is provided for the general public, prohibitions on on-street parking, such that almost all patrons attend via public transport.

This has implications for transport planning and assessment. Conventional approaches to transport planning – such as traffic impact assessment (TIA) and conventional metropolitan 4-step traffic models (see Bureau of Transport Economics 1998; Pas 1995) – are inadequate for appraising the likely catchments and transport performance of stadia under TDM. There is a need to consider such land uses through the lens of accessibility – public transport accessibility.

3. ACCESSIBILITY ANALYSIS

3.1 Definitions of Accessibility

Accessibility essentially describes an individual's ability to reach goods, services, activities and destinations (Litman 2003). The ease with which destinations can be reached depends not just on the transport network but also the patterns of land use. Halden states that:

"[a]ccessibility measures seek to define the level of opportunity and choice taking account of both the existence of opportunities, and the transport network options available to reach them." (2002:214)

The recent development of geographic information systems (GIS) has allowed the development of workable accessibility planning tools providing for a range of transport analysis problems (Yigitcanlar et al. 2007). The problem of public transport access to proposed sports stadia can be considered a destination accessibility problem. Destination accessibility may be defined as "the ease with which a given destination can be reached from an origin or set of origins" (Simmonds et al 1998, as quoted in Halden, Jones and Wixey 2005). That access needs to be considered from the view of "people being able to get to ... (the stadium) at reasonable cost, in reasonable time and with reasonable ease" (Social Exclusion Unit 2003). Destination accessibility is usually "measured as the number of people or households affected, sometimes taking account of different population sectors" (Transport Scotland 2008).

Halden, Jones and Wixey (2005) suggests there are three principle components of accessibility. Adapted for our particular problem, these components are shown in Figure 1.

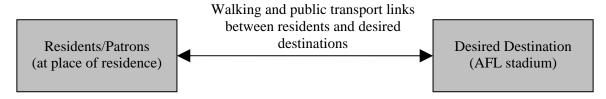


Figure 1: Principal components of accessibility

Our approach seeks to consider fundamental aspects of the public transport journey between a patron's place of residence and the proposed stadium site. The 'ease' with which a patron can travel requires consideration of:

- The walk access from home to a public transport stop;

- Waiting time for the public transport vehicle;
- Travel time on the vehicle;
- Interchange with other public transport services (if necessary); and
- The walk access from the final public transport stop to the proposed stadium site.

The intent was to determine the number of Gold Coast residents who can access each of the proposed stadium sites easily by public transport. Ease of access was defined in terms of travel time considering all the legs of journey described above.

3.2 Problem Definition: a New AFL Stadium for the Gold Coast

Queensland's Gold Coast is Australia's sixth largest city with over 550,000 residents. The AFL Commission has committed to establishing a team in the city from 2011. A major consideration for the team is where it will play. A number of locations for an oval stadium servicing AFL, cricket and potentially athletics have been mooted on the Gold Coast, which may play a role in a future bid to host the Commonwealth Games. A series of investigations were undertaken in 2007 and 2008, and the state and local governments and the AFL focused their interest on several new sites including at Nerang, Helensvale and Coomera where a new venue close to the Gold Coast rail line could be constructed. However, the Gold Coast City Council and the AFL now seem determined to redevelop the Carrara stadium site, where an inadequate facility with temporary stands is presently in place. Cararra is neither on the rail line, nor within walking distance of any priority public transport infrastructure. Figure 2 provides the set of proposed and existing stadium locations investigated in this research, including the location of the stadium's competitor in the sports market – the rectangular Skilled Park stadium at Robina, which services rugby league and soccer.

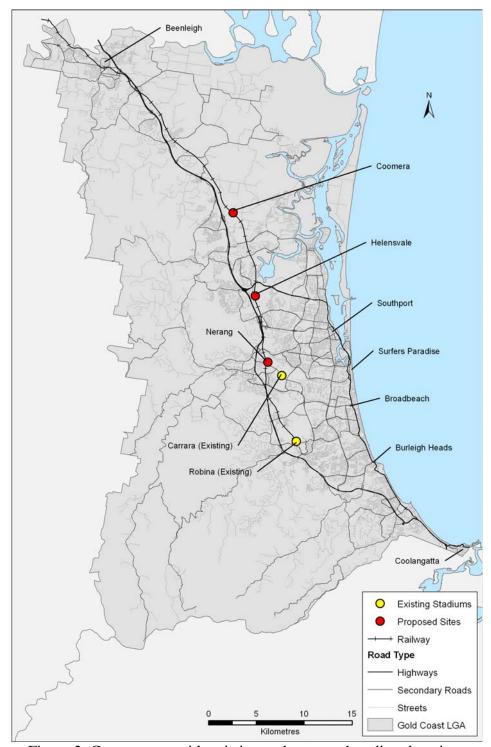


Figure 2: Context map with existing and proposed stadium locations

Transport and land use scenarios were developed for each of these sites, using existing public transport services and special events services based on those provided at present to rugby league matches at the existing Skilled Park stadium at Robina. Due to topographical constraints two separate options were prepared and modeled for the Helensvale site, being:

- Helensvale (a); a stadium located 800 metres south of the existing Helensvale railway station, requiring patrons to make a 10 minute walk; and

- Helensvale (b); a stadium located 800 metres south of the existing station, but that is co-located with a new purpose-built stadium rail station.

3.2.1 Study Area

The extent of the study area for this project was defined as the Gold Coast Local Government Area (LGA) as of June 2006 (to match the ABS 2006 census). Apart from the local government boundary, this extent was chosen as the stadium will in the first instance serve residents on the Gold Coast and existing public transport services generally terminate at the NSW/QLD border in the south and Beenleigh in the north. In recent local government reforms the boundaries of Gold Coast City have changed, notably with the excision of some suburbs on the northernmost sections of the city.

3.3. Datasets

Several spatially-based datasets were required, which included:

- The State Digital Road Network for the study area.
- Public transport routes and stops data, both spatial and temporal, for the South East Queensland region, supplied by Translink (the regional public transport authority). The dataset covers 2,518 stops of 53 separate bus routes, and six stops of the Gold Coast rail line. Note that the bus routes all provide services throughout the day at reasonable frequencies (on average approx. half hour headways).
- Population data for the Gold Coast derived from the 2006 Census Basic Community Profile at the collection district level, supplied by the Australian Bureau of Statistics (ABS).

3.4. Conceptualisation of the Transport Network

Since people generally conceive travel length in terms of time, particularly when walking or using public transport, this accessibility analysis uses timed measures instead of distance measures. Another important factor when using public transport is wait and transfer times at public transport stops. The accessibility analysis calculated:

- Travel times on the public transport network based on public transport stop temporal data for each route;
- Walking on the road network based on the standard measure of 80m/min (4km/hr); and
- Wait and transfer times (impedance function) between the road (walking) and public transport network, which is set at 7.5 minutes and which equates to approximately half the 15 minute headways experienced on much of the trunk bus network."

"The analysis modelled:

- single mode trips (i.e. walk to the stadium) modelled using walk travel solely on the road and path network;
- trips involving a single public transport mode/journey (i.e. walk, bus, walk) and more complex trip chains involving multiple public transport modes/journeys (i.e. walk, bus, train, bus, walk) both of which were modelled using combinations) modelled using walk travel on the road and path network as well bus or train travel on the public transport network

3.5. Accessibility measures

Existing household travel survey data for the Gold Coast (the SEQTS Coastal Survey 2003/04) contained insufficient records on sports patron travel on the Gold Coast to allow for the development of accessibility measures based on observed travel behaviour. Without such data it is difficult to define levels of accessibility (i.e. what is excellent, what is acceptable, and what is not) and this may be influenced by the particular travel market. Accessibility measures were therefore developed in conjunction with local transport planners familiar with sports patron travel planning. For the purpose of this study:

- Total travel times of 45 minutes or less from the place of origin to the stadium was considered "high accessibility"
 - o This roughly equates to a 30 minute public transport journey plus walking and wait/transfer time, a total travel time most fans would readily consider.
- Total travel times of 75 minutes or less from the place of origin to the stadium was considered "reasonable accessibility"
 - This roughly equates to an 60 minute public transport journey plus walking and wait/transfer time,
- Total travel times in excess of 75 minutes were considered unsatisfactory, being beyond what all but the 'heroic' team supporter would be willing to countenance.

Although arbitrary and not derived from direct observation of sports event travel on the Gold Coast, these measures are likely to provide a meaningful comparison of the accessibility offered for AFL patrons by alternative stadium locations.

3.6. Development of the Model

A destination-based approach was adopted due to its computational advantages for accessibility modelling. In preparation for the analysis, the public transport and road networks were combined into a single multimodal database. This allowed for a streamlined accessibility analysis, with one run replacing three separate analyses:

- Walking from stadium to public transport;
- Travel on the public transport network (with or without interchange); and
- Walking from public transport to the point of origin.

Assumptions in simplifying the public transport network included not accounting for bus routes that loop or backtrack, or for variations in the frequencies of daily or weekend services.

3.7. Examining Population Coverage

ABS census collection districts (CCDs) were used to examine the population's access. There are 887 CCDs on the Gold Coast, each relating to approximately 200 households. Due to the irregular shape and size of many CCDs, it is difficult to calculate the exact population coverage for each stadium location. Further, accessibility to a stadium may differ within a CCD. Only part of the road network within a single CCD may be accessible to a stadium in a given travel time.

In order to calculate the population catchment for each of the four stadium locations, a proportion of the total road network covered in each CCD was used, according to Equation 1:

Total collection district road length covered by accessibility (m)

Total collection district road length

Total collection district road length

Total collection district road length

Equation 1. Calculating Population Coverage within Census Collection Districts

While it is acknowledged there may be some areas where housing densities may vary, generally densities are consistent across a collection district and the increased presence of roads in an area indicates areas of population.

3.8 Limitations

Limitations with the approach and methods include:

- Not including for differences in residents' social, economic, physical and travel preferences. The approach assumes that any person, regardless of their ability or social standing, will have equal opportunities to access public transport services. It assumes any person, regardless of their socio-economic circumstances, will have equal preferences in regards use of public transport, regardless of the mode available (rail or bus). All residents are assumed to be possible AFL patrons. And as noted, the accessibility measures used are not derived from observed travel behaviour.
- The study area does not consider neighbouring populations south of the Tweed border, populations north into Logan City that are outside of the Gold Coast LGA (as at 2006), or west into the Scenic Rim Regional Council area.
- The study considers only present transport/land use arrangements. Though relative growth may have slowed, the Gold Coast remains one of Australia's fastest growing urban regions. Expansion through Coomera to the north and to the south in Tweed Shire will alter the transport land-use arrangement significantly in future years.

4.0. RESULTS

4.1. Mapping outputs

Figures 3, 4 and 5 show the road segments within the 'high accessibility' and 'reasonable accessibility' parameters for the Carrara, Nerang and Robina stadium locations, respectively. It is not possible to include mapping outputs for the Helensvale and Coomera sites and the reader is directed to Burke *et al.* (2008). The figures demonstrate that there are significant differences in the road catchments serviced with high and reasonable accessibility for each stadium location.

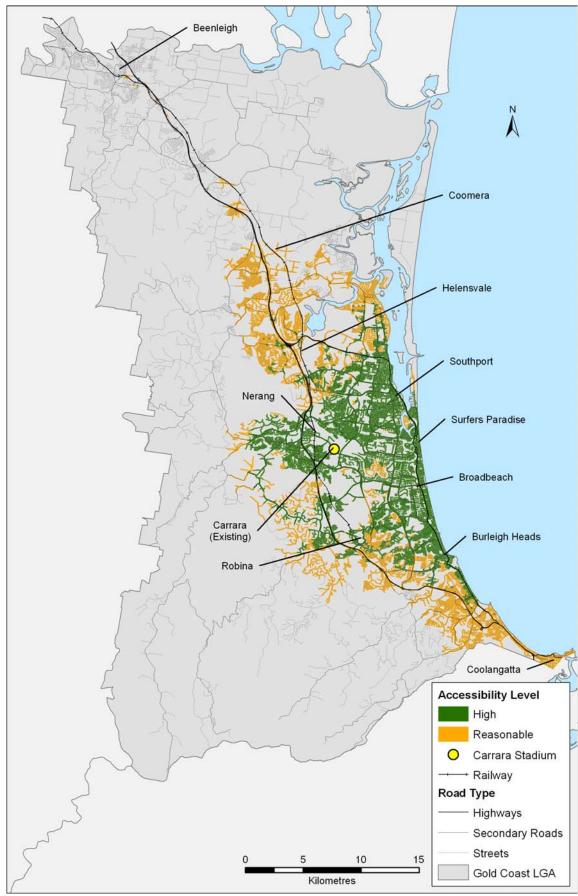


Figure 3: Public transport accessibility to the Carrara stadium location

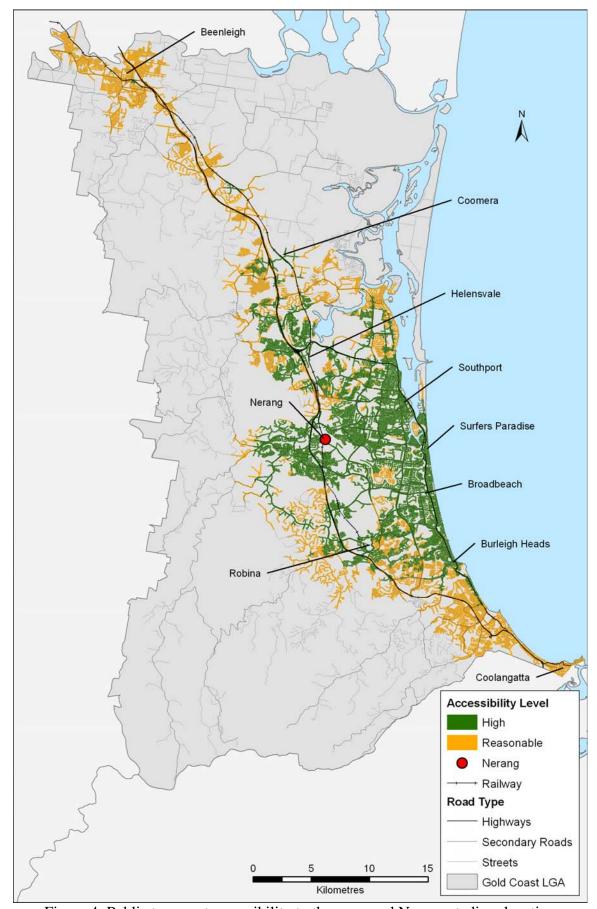


Figure 4: Public transport accessibility to the proposed Nerang stadium location

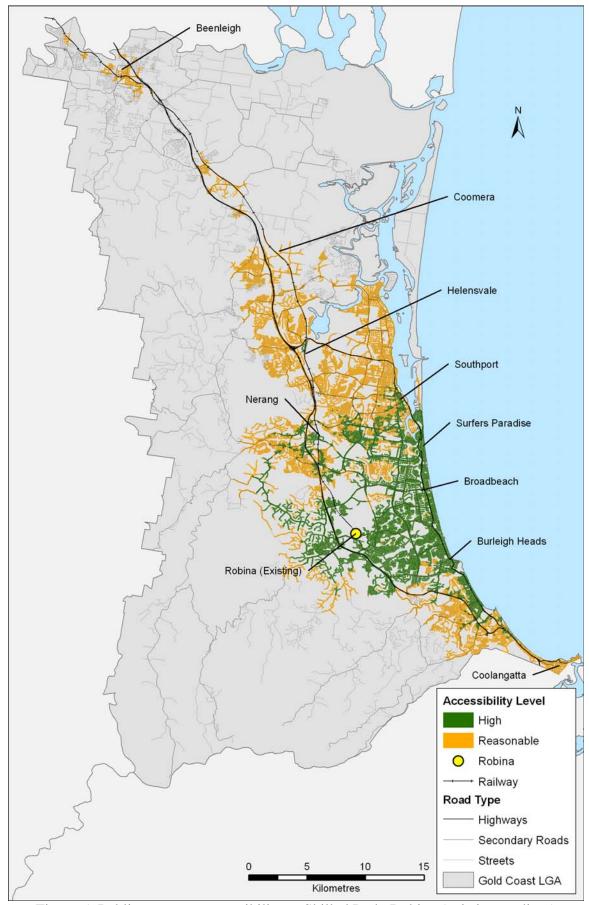


Figure 5: Public transport accessibility to Skilled Park, Robina (existing stadium)

4.2. Public Transport Accessibility by Road Network Kilometres

Ignoring population density for a moment, Table 1 shows the length and the proportion of the existing Gold Coast's road network that were within 45 and 75 minutes access of the proposed stadium sites. Note that the total Gold Coast road network in the dataset is 4,210 kilometres.

Table 1: Public transport accessibility of the Gold Coast road network to the proposed stadium locations

Location	High Accessibility		Reasonable Accessibility	
	Road km accessed within 45 minutes	%Total road km accessed within 45 minutes	Road km accessed within 75 minutes	% Total road km accessed within 75 minutes
Carrara	1331.48	31.6	2557.52	60.7
Nerang	1515.20	36.0	3001.72	71.3
Helensvale (a)	836.63	19.9	2822.39	67.0
Helensvale (b)	892.91	21.2	2943.11	69.9
Coomera	1150.43	27.3	2996.59	71.2
Robina	1032.52	24.5	2552.43	60.6

Nerang provides high public transport accessibility to a significantly greater proportion of the Gold Coast road network than all of the other proposed sites. It also offers reasonable public transport accessibility to more of the current network, though Helensvale (b) and Coomera provide approximately equivalent accessibility on this measure. This suggests that Nerang may offer greater potential than other sites should there be densification of the Gold Coast population in its existing urban areas.

4.3. Public Transport Accessibility by Residential Population

It is more important to consider the population in each CCD as well as the accessibility offered to each stadium site at that CCD location. Table 2 shows the proportion of the Gold Coast's population (471,536 persons at 2006 Census) that were within 45 and 75 minutes access of the proposed stadium sites via public transport.

Table 2: Public transport accessibility of Gold Coast residential population to proposed stadium locations

Location	High Accessibility		Reasonable Accessibility	
	Population within 45 minutes	% Total population	Population within 75 minutes	% Total population
Carrara	229,840	48.7	388,797	82.5
Nerang	251,216	53.3	434,793	92.2
Helensvale (a)	138,510	29.4	413,933	87.8
Helensvale (b)	140,810	29.9	423,055	89.8
Coomera	169,986	36.0	424,660	90.0
Robina	172,006	36.5	388,620	82.4

Nerang provides high public transport accessibility to a significantly greater proportion of Gold Coast residents than all of the other proposed sites. It also offers reasonable public transport accessibility to more of the population, though Helensvale (a) and (b) and Coomera also provide relatively equal accessibility on this measure. At the existing stadium site at Carrara, the public transport system can currently service 48.7% of the Gold Coast population within 45 minutes. This is the second most efficient service within this time frame for all the proposed sites, extensively covering suburbs such as Broadbeach, Surfers Paradise, Southport, Burleigh and Nerang. However, at 82.5%, Carrara has the worst performance for population access within the 75 minutes parameter, servicing 10% less of the population than the site with the highest accessibility at Nerang. Looking at the mapping outputs (See Figs 3 and 4 for comparison) this difference appears to relate to Carrara's location away from the Gold Coast rail line, limiting its ability to service communities such as Coomera and Beenleigh in the north. The Carrara location provides unsatisfactory public transport accessibility to 17.5% of the Gold Coast population. The Nerang location provides unsatisfactory public transport accessibility to just 7.8% of the Gold Coast population.

5. DISCUSSION

In Australia, sports stadia are returning to the city centre and to sites supported by high-capacity public transport infrastructure. TOD and TDM are redefining stadium developments, with fans now forced to accept public transport as the preferred mode of access. With public transport the priority, proactive transport planning and careful appraisal potential stadium locations will be a pressing concern when considering stadium development. The research has demonstrated a promising approach to appraise market catchments for stadium proposals where public transport is the only real means to get there. Whilst other factors are important, and should be considered, this research has provided a clear technical appraisal of the proposed research sites in terms of public transport accessibility. The results question the decision of the AFL Commission and the Gold Coast City Council to support the Carrara site. The success of an AFL stadium (if not the team that plays there) will largely hinge on its location. Nerang offers a significantly greater population catchment and in the long term the proponents may rue the decision not to create a stadium TOD at this location, in preference for a non-TOD development at Carrara.

These results are subject to important limitations, especially in terms of the population area modelled and the use of 2006 data. Results may differ if one were to consider future populations, tourist accommodation (for visiting fans), different population areas (i.e. including populations to the north and south of Gold Coast City) and new public transport networks. With much of the Gold Coast's population growth being to the north and to the south, where rail services either already exist or are planned for provision, stadium locations along the rail line may outperform Carrara even more in future years.

The tasks for future research are many. Better understandings of traveller's behaviour to and from stadia are needed, not the least to help manage sports events and transport systems. This includes better understanding trip-chaining behaviour and travel preferences. We suggest that testing and revising improved accessibility models like that demonstrated is also needed, to improve catchment analysis and decision-making for transit-oriented stadia.

ACKNOWLEDGEMENTS

The authors wish to thank Translink and Queensland Transport for the provision of public transport data and for funding research on Transit Oriented Development. The research on accessibility modelling has also has been generously supported by the Queensland Development Research Institute (QDRI) and the Australasian Centre for the Governance and Management of Urban Transport (GAMUT). The authors wish to thank the anonymous reviewers whose input improved the final paper.

REFERENCES

- Baim, D. V. (1994) **The Sports Stadium as a Municipal Investment**. Westport, Conn.: Greenwood Press.
- Bale, J. (1990) In the shadow of the stadium: football grounds as urban nuisances, **Geography**, **Vol. 75**, **No. 4**, 325-34.
- Bale, J. (2001) Sport, Space and the City. Caldwell, N.J.: Blackburn Press.
- Berry, J., Carson, D., and Smyth, M. (2007) **A Multi-purpose Sports Stadium: in-town versus out of town location**. June 2007. Belfast: University of Ulster.
- Buraimo, B., Forrest, D. and Simmons, R. (2007) Freedom of Entry, Market Size, and Competitive Outcome: Evidence from English Soccer, **Southern Economic Journal**, **Vol. 74**, **No. 1**, 204-13.
- Bureau of Transport Economics (1998) **Urban Transport Models: a review**. Working Paper No. 39. Canberra: Bureau of Transport Economics.
- Burke, M., Evans, R. and Hatfield, E. (2008) **A Sporting Chance: accessibility of proposed AFL stadium locations on the Gold Coast**. Urban Research Program Research Paper No. 18. September 2008. Brisbane, Australia: Urban Research Program, Griffith University.
- Burke, M. and Woolcock, G. Getting to the game: travel to sports stadia in the era of transit oriented development, **Sport in Society** (Forthcoming).
- Halden, D., Jones, P. and Wixey, S. (2005) **Working Paper 3: Accessibility Analysis Literature Review**. June 2005. London: University of Westminster.
- Hodder, R. (2000) Stadium Village. **Herald Sun,** 15 November 2000, 7.

- Horak, R. (1995) Moving to Suburbia: stadium relocation and modernization in Vienna. In J. Bale and O. Moen (eds.), **The Stadium and the City**. Staffordshire, UK: Keele University Press. 81-93.
- Humphreys, D. C., Mason, C. M. and Pinch, S. P. (1983) The externality fields of football grounds: a case study of the Dell, Southampton, **Geoforum, Vol. 14, No. 4**, 401-11.
- Leonard, W. M. (1993) A Sociological Perspective of Sport. New York: Macmillan.
- Lertwachara, K. and Cochran, J. J. (2007) An Event Study of the Economic Impact of Professional Sport Franchises on Local U.S. Economies, **Journal of Sports Economics**, **Vol. 8, No. 3**, 244-54.
- Lipsitz, G. (1984) Sports stadiums and urban development, **Journal of Sports and Social Issues**, **Vol. 8**, 1-17.
- Litman, T. (2003) Active Transportation Policy Issues. Presented at the National Roundtable on Active Transportation. Victoria, BC, Canada, 9-10 April 2003.
- Metz, D. (2008) **The Limits to Travel: How Far Will You Go?** London: Earthscan/James & James.
- Meyer, M. D. (1999) Demand management as an element of transportation policy: using carrots and sticks to influence travel behavior, **Transportation Research Part A: Policy and Practice, Vol. 33, Nos. 7-8**, 575-99.
- Nelson, A.C. (2001) Prosperity or Blight? A Question of Major League Stadia Locations, **Economic Development Quarterly, Vol. 15, No. 3**, 255-65.
- Pas, E. I. (1995) The Urban Transportation Planning Process. In S. Hanson (ed.), **The Geography of Urban Transportation**. New York: Guilford Press. 53-77.
- Siegfried, J. and Zimbalist, A. (2000) The Economics of Sports Facilities and Their Communities, **The Journal of Economic Perspectives, Vol. 14, No. 3**, 95-114.
- Social Exclusion Unit (2003) Making the Connections: Final Report on Transport and Social Exclusion Report by the Social Exclusion Unit. February 2003. London: Office of the Deputy Prime Minister.
- Spirou, C. and Bennett, L. (2003) It's Hardly Sportin': stadiums, neighborhoods, and the new Chicago. DeKalb: Northern Illinois University Press.
- Thornley, A. (2002) Urban Regeneration and Sports Stadia, **European Planning Studies**, **Vol. 10**, **No. 7**, 813-8.
- Transport Scotland (2008) **Scottish Transport Appraisal Guidance (STAG) 11.7 Access to Local Services**. 20 July 2008. Glasgow: Transport Scotland.
- Wassmer, R.W. (2001) Metropolitan Prosperity from Major League Sports in the CBD: Stadia Locations or Just Strength of the Central City? A Reply to Arthur C. Nelson, **Economic Development Quarterly, Vol. 15, No. 3**, 266-71.
- Yigitcanlar, T., Sipe, N., Evans, R. and Pitot, M. (2007) A GIS-based land use and public transport accessibility indexing model, **Australian Planner**, Vol. 44, No. 3, 30-7.