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Connectivity Infrastructure: Implications for Perth's Competitiveness

Veronica Huddleston and Paul Huddleston

Research Highlights

This paper argues that meeting the infrastructural requirements for connectivity is vital in ensuring Perth's competitiveness. As noted by Parkinson et al. (2006), investing in connective infrastructure is a means of ensuring global competitiveness. By exploring how Perth compares with other similar cities in terms of the traditional indicators of infrastructure and connectivity – air transport, public transport, internet and telecommunications - this paper provides valuable insights into Perth's general levels of performance in these areas and the means of enhancing the city's drive for competitiveness in terms of infrastructure.

Introduction

In a competitive and global economy, cities are constantly required to adapt and exploit their competitive edge. This means that governments and development interests must constantly rethink and adjust their competitive strategies. Additionally, more complex governance arrangements have emerged that require the different tiers of government (national, sub-national and local) and private sector interests to collaborate in order to ensure that urban economies can perform well on the international stage. As noted in an earlier Bulletin (FACTBase Bulletin 13), the competitive success of cities or city-regions depends on their economic diversity, skills and human capital, the quality of life and the environment, innovation and connectivity.

The question of connectivity is of particular importance, with a considerable body of research demonstrating that close ties with other cities is a crucial element in ensuring competitiveness. As Blakely (2001:139-140) has pointed out, "Communities will have to forge long-term economic development strategies with counterparts across the region and around the world. Communities that develop these networks of collaborative economic exchanges will flourish." The importance of connectivity is reflected in some of the indicators used by groups such as Mercer Consulting, Monocle Group, The Economist Intelligence Unit and CNN in their quality of life, livable cities and top 10 cities surveys.

Given the importance of connectivity to competitiveness, and the role of infrastructure in underpinning this, the present paper considers how

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Perth compares on a number of selected indicators with other cities. It examines Perth alongside four broadly similar Australian and North American cities - Brisbane, Calgary, Denver and Houston.

Connectivity, Infrastructure and Competitiveness – An Overview

According to Boddy and Parkinson (2004), the most successful cities are those that are highly connected globally as a result of well-developed physical or electronic infrastructure. This 'connectivity infrastructure' provides for efficient flows of information, money and people, and ensures high levels of integration with the global economy. Indeed, investing in connective infrastructure as a means of ensuring global competitiveness is now a critical public policy issue across much of the developed and developing world (Parkinson *et al.* 2006).

This was emphasised in a recent OECD (2006:55) report that demonstrated the importance of infrastructure and accessibility in determining city competitiveness. Much of the research on competitiveness and infrastructure tends to focus on two key dimensions: (i) physical infrastructure and connectivity (such as transport); and (ii) virtual infrastructure and connectivity (such as broadband internet and telephony). Indeed, these were some of the key dimensions of competitiveness identified in the Committee for Sydney's 2009 benchmarking report entitled *Global Sydney: Challenges and Opportunities for a Competitive Global City* (SGS Economics and Freestone, 2009).

The measures of competitiveness are generally based on pragmatic indicators, including:

- Air transport infrastructure and connectivity;
- Public transportation infrastructure and internal connectivity; and
- Internet and telecommunications infrastructure, use and connectivity.

A recent assessment by the World Economic Forum (WEF) (2010) used these and other measures in the construction of its Global Competitiveness Index (GCI). The results of this for selected nations are shown in Figure 1. One of the clear patterns here is the link between global competitiveness and infrastructure rank. Australia, which performed well in terms of global competitiveness, also had a very high infrastructure rank. The clear message here is that investing in infrastructure has been vital for ensuring Australia's international competitiveness.

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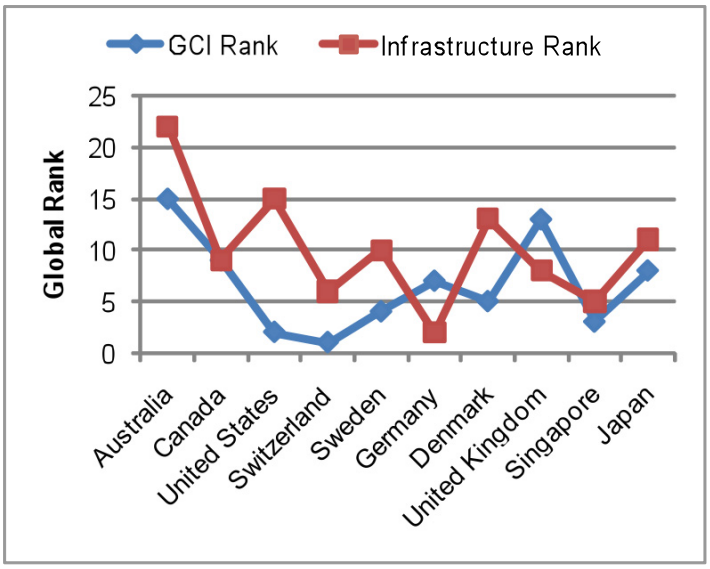


Source: WEF (2010).

Figure 1: Global Competitiveness and Infrastructure Ranks, Selected Countries, 2009-2010

Of course, these national rankings only show part of the picture. There is considerable variation within nations in terms of infrastructure investment, connectivity and competitiveness. Indeed, one might argue that national level assessments obscure the uneven performance of cities. In Australia, there is clear evidence that there are differential levels of competitiveness between cities, which may ultimately be linked to 'connective infrastructure'.

Infrastructure Networks and Connectivity Compared

This section uses a number of traditional indicators of infrastructure and connectivity to explore how Perth compares with other similar cities. It should, of course, be borne in mind that the geographical, economic and political contexts of these comparator cities vary considerably. Nevertheless, benchmarking against other locations can provide valuable insights into general levels of performance.

Air Transport

In his article on what makes cities successful, Brooke (2004) emphasised the importance of good air connectivity as a means of fostering the business linkages and flows of people that underpin global economic integration. Similarly, the Institution of Civil Engineers' aviation expert, Simon Godfrey-Arnold (IBT, 2010), argues that, "Air transport and airport infrastructure are vital for… international connectivity and prosperity".

Taylor and Aranya (2006) suggest that there needs to be comprehensive measures to assess connectivity other than solely airline data which provides only a partial measure of connectivity. However, they also recognise the difficulties involved in data collection concerning inter-city comparisons. Derudder and Witlox (2005:2376), citing the work undertaken by Smith and Timberlake (2001, 2002) and Keeling (1995), make the following interrelated arguments on the suitability of airline linkages as an empirical source for assessing world city networks:

- Global airline flows are one of the few indices available of transnational flows of interurban connectivity;
- Air networks and their associated infrastructure are the most visible manifestation of world city interaction;
- Great demand still exists for face-to-face relationships, despite the global telecommunications revolution;
- Air transport is the preferred mode of intercity movement for the transnational capitalist class, migrants, tourists and high-value goods; and
- Airline links are an important component of a city's aspirations to world city status.

In light of these arguments, the analysis presented in this paper will utilise available airline data for the comparator cities. Table 1 presents data on total passenger numbers, total cargo and total operations or movements for 2009. As the table indicates, Denver and Houston generated passenger numbers (both domestic and international) that are higher than Calgary and the two Australian cities. Indeed, these two airports ranked 10th and 18th, respectively, in the top 30 busiest airports in the world ranked by passenger totals (ACI-NA, 2010). Both are important regional hubs in the North American airline network, and play a quite different role to the airports in Calgary, Brisbane and Perth. The closest comparator to Perth is Calgary in terms of passenger numbers, although this airport still vastly exceeds Perth in terms of total number of operations. Again, geographic context makes comparison difficult in terms of air connectivity.

One of the characteristics of Perth though is its rapid growth. Between 2000/01 and 2009/10, the total number of international passengers grew from 1.66 million to 2.99 million, a rise of more than 80 per cent (see Figure 2). This suggests that in terms of air connectivity Perth is improving rapidly. Clearly one of the next tasks is to better understand the nature of this connectivity in terms of both its geography and the purpose of travel. There is some evidence to indicate that connectivity with South-east Asia and East Asia is increasing rapidly, and that business underpins this rise. However, more work is needed to understand this and how Perth might be able to better position itself in this arena.

Table 1: Number of Air Passenger and Cargo, 2009				
January to December 2009	*Location*	*Total Passengers /a*	*Total Cargo (metric tonnes) /b*	*Total Operations /c*
Calgary International Airport	Calgary, AB	12,175,011	111,476	233,145
Denver International Airport	Denver, CO	50,167,485	224,375	607,019
George Bush Intercontinental Airport	Houston, TX	40,007,354	372,662	538,168
William P. Hobby Airport	Houston, TX	8,498,441	11,522	209,459
Brisbane Airport /d	Brisbane, QLD	19,052,310	n.a.	n.a.
Perth Airport	Perth, WA	10,057,480	n.a.	115,850

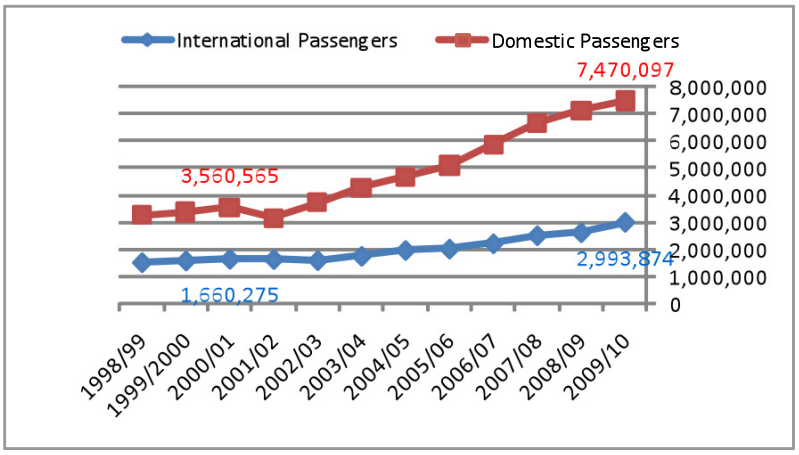
/a Refers to arriving and departing passengers plus direct transit passengers counted once for North American airports. For Australian airports, the figures do not include passengers on a domestic leg of an international flight.

/b Refers to loaded and unloaded freight plus mail in metric tonnes. Data include transit freight.

/c Refers to landing plus take off an aircraft.

/d Figures are for FY 2009/10 (July 2009 to June 2010).

Sources: Airport Councils International - North America; Brisbane Airport; and Perth Airport.



Source: Perth Airport (2010a).

Figure 2: Number of Domestic and International Passengers, Perth Airport, FY 1998/99 to FY 2009/10

In terms of domestic air connectivity, passenger numbers increased even more rapidly. Between 2000/01 and 2009/10, passenger numbers increased from 2.99 million to 7.47 million, a rise of nearly 150 per cent. Clearly one of the major drivers here is the increase in fly-in/fly out mining operations. This highlights an important component of connectivity, that of intra-national and regional connectivity. One of the strengths of the Western Australian economy is having an air infrastructure that underpins flexible and 'stretched out' labour markets that are less geographically constrained than has previously been the case. This has undoubtedly contributed to increased economic competitiveness at both a State and metropolitan level.

It is also important to recognise that fly-in/fly-out operations are just part of the story in terms of air connectivity. Perth's increasingly important position as a corporate player in the national setting has increased business linkages with the traditional economic core of Melbourne and Sydney. Thus, air infrastructure is critical in underpinning the success of these relationships.

The level of connectivity is reflected in Perth airport catering for 17 international airlines as well as 5 domestic and 11 regional airlines. The airport is connected to over 50 destinations around Australia and overseas. However, there are concerns that the airport is outdated, fragmented and dysfunctional. A lack of significant investment means that it now lags behind other 'second tier' Australian cities, such as Adelaide and Brisbane. A planned $500 million redevelopment for the Perth airport (2011-2013) may begin to address this. The redevelopment is aimed at delivering new and expanded passenger terminals, expanding aircraft parking areas and expanding public access infrastructure to ensure that the airport infrastructure can cope with the continuing growth in passenger numbers (Perth Airport, 2010b). What is important for the success of its future expansion is also the improvement of the infrastructure that integrates the airport into the metropolitan fabric, such as the local road network to and around the airport.

Public Transportation

> *Adequacy of vital [transport] infrastructure is an important determinant of the success of a nation's effort in diversifying its production base, expanding trade and lining together resources and markets into an integrated economy.*
>
> Pradhan (2010:167)

On the importance of investment in transport infrastructure in sustaining and improving competitiveness of cities in the United Kingdom, Docherty *et al.* (2009:328) argue that "although transport investment in itself cannot guarantee economic success, recent evidence suggests that it is difficult to build sustainable economic growth without it". This is also emphasised by Keil and Young (2008) who conclude that weak transportation infrastructure is a stumbling block to the regional competitiveness of Toronto, Canada.

In terms of the optimal forms of public transport infrastructure, there is considerable debate amongst policy makers and planners. Much of the evidence suggests that the key issues are not the mode of transport, but the level of integration across different modes and with the urban fabric.

For example, recent attention has been turned towards transit-oriented development (TODs) that integrate various modes of transport with urban development, particularly higher density housing.

All five cities in this comparative study have a combined rail, bus and ferry system to provide transportation in and around their metropolitan areas. In addition, a number of cities, such as Calgary and Houston, operate light rail systems. Annual ridership is highest in Brisbane and Perth and lowest in Calgary (see Table 2). The higher local unemployment rate in Houston following the global financial crisis of 2009 accounted for the decline in the annual ridership in 2009 and 2010 (Metro, 2009a). In all these cities, various surveys on commuter satisfaction and safety ratings are continuously being undertaken to ensure continued support by the public for the transportation system.

Table 2: Transport Statistics, 2009

	Calgary	*Denver and 7 Nearby Counties*	*Houston and Harris County*	*Brisbane and SE Queensland*	*Perth, including Regional Centres*
Tranport Services Provided	972 Buses and 153 Light Rail Vehicles	1,050 Buses and 125 Light Rail Vehicles	1,374 Fixed route buses, 18 Metrorail cars, special buses and car/van pools	Additional 173 new Buses (complementing 2,100 vehicles in 2004) and additional 13 3-car trains for 2009-10 and ferry services	1,100 Buses, 48 2-car and 43 3-car trains and 2 ferries
Population Served	1.065 million	2.8 million	5.12 million	1.78 million (for Brisbane only)	1.44 million (for Perth only)
Service Area	848 sq. km.	6,091 sq. km. (2,348 sq. mi.)	3,328 sq. km. (1,285 sq. mi.)	10,000 sq. km.	
Service Route Kilometres	4,518	79 million (48.86 million miles)	134 million (83.06 million miles)	157.11 million	63 million
Annual Ridership	94.2 million	99.4 milion	105 million	181.8 million	131.6 million
Annual Ridership per capita	88.5	35.5	20.5	102.1	91.4

Sources: Calgary Transit, Denver Regional Transport District, Houston Metro, TransLink, and Transperth.

The data presented above indicates that the integrated public transportation in Perth compares favourably with other cities in providing transportation services for its population base. A comparison of annual ridership per capita demonstrates this comparability, with Perth registering the second highest data among the five cities, fuelled by continued and ongoing efforts to encourage commuters to utilise the train, ferry or bus system in Perth.

One of the more recent proposals to improve transport connectivity within Perth is the (re)introduction of a light rail system. The removal of Perth's tram and trolleybus network in the 1950s and 1960s eroded a core part of the city's internal connectivity. Reintroducing light rail has the potential to improve transport efficiency, reduce levels of traffic congestion, and increase environmental sustainability. It should be

noted that many of the cities that rank highly on the various indices of competitiveness have light rail systems. In other cases, cities such as Houston are re-introducing light rail to improve internal connectivity and, potentially, competitiveness.

Improving internal public transport and connectivity has been a longstanding policy concern. However, it is imperative that planning for future transportation investment takes into account that "it is not only the quantity of the physical infrastructure that is important, but also the quality of the infrastructure in a much wider context [including] political and institutional conditions" (Banister and Berechman (2001:212). It would be in Perth's interest to ensure that decisions on transport infrastructure in the city are not made on a piecemeal basis but rather are made in consideration of economic benefits as well as social, health and environmental benefits for the city's population. As stressed in the ODPM (2004) research covering 50 European cities, an integrated transport agenda anchored on multi-modal links within major cities and their regions was highlighted as an important contributor to competitiveness.

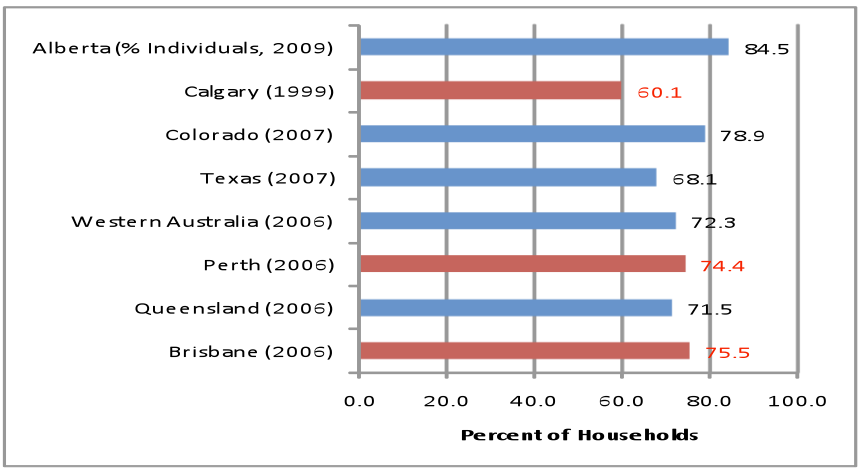
Internet and Telecommunications

> *A successful digital economy – the global network of economic and social activities that are enabled by platforms such as the Internet, mobile and sensor networks – is essential for Australia's economic growth and our ability to maintain our international standing. It offers new opportunities for businesses to a larger, potentially global, audience and for individuals to connect and collaborate.*
>
> DBDCE (2009:iv)

Good communications are crucial to a city's competiveness in terms of enabling its residents to communicate both to the outside world and within the city (Brooke, 2004). One of the critical means of engaging in the global economy is through internet connectivity. In Australia, connectivity in the form of internet subscription is considered one of the principal drivers of city productivity and consequently, city competitiveness (MCU, Infrastructure Australia, 2010). Key initiatives being undertaken by the Australian government, industry and community focus on the laying the foundations for Australia's digital infrastructure, building digital literacy skills and adopting smart technology.

Household internet access in Perth and Western Australia compares reasonably well with the American states of Colorado and Texas and with

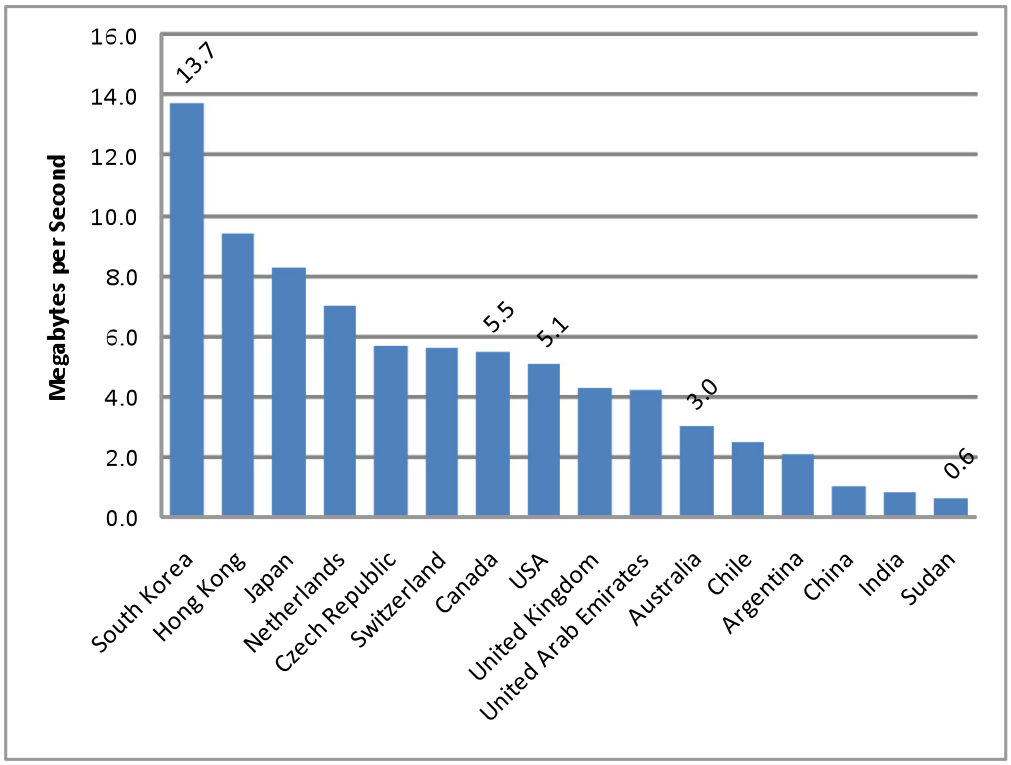
the Canadian province of Alberta. As shown in Figure 3, three-fourths of all households in Perth had internet access in 2006. Perth also compares well with the other Australian cities in terms of types of connection; over 50 per cent of households utilise broadband connections. This figure is expected to rise with the increasing competition among service providers to provide upgraded internet access to Perth households.



Sources: ABS (2006), Dickinson and Ellison (2000), Statistics Canada (2010), and US Department of Commerce (2008).

Figure 3: Household Internet Usage, Selected Cities and Provinces/States

While rates of internet adoption across the globe are high, variances abound in terms of internet speeds and the types of underlying technologies in place as well as patterns of internet connectivity. In its 2009 report of internet speeds in American cities, CWA (2009:2) emphasised its importance stating that, "Speed determines whether we will have the 21st century networks we need to create the jobs of the future, develop our economy, and support innovations in tele-medicine, education, public safety, energy conservation, and public services to improve our lives and communities". In Akamai's (2010) latest State of the Internet Report on average connections speed at a global scale, South Koreans enjoyed the highest average connection speeds in the fourth quarter of 2010 (see Figure 4). Canada fared a little bit better than the United States, registering average connection speeds of 5.5 Mbps and 5.1 Mbps, respectively. While Australians continued to have access to slower networks, registering an average of 3.0 Mbps, this is still comparable to the 1.9 Mbps global average connection speed.



Source: Akamai (2010).

Figure 4: Fourth Quarter 2010 Average Connection Speed, Selected Countries

Comparing the broadband adoption of Australia, Canada and the United States, Canada recorded the highest level of "high broadband" (>5 Mbps), with 41% connections at speeds above 5 Mbps (Akamai, 2010). The United States had 36% connections at "high broadband" while Australia had 12%. In terms of "narrowband" (>256 Kilobytes per second) connections, 4.0% of Australians had connections at this speed, compared to 1.6% of Canadians and 2.5% of Americans. The establishment of the National Broadband Network is expected to address this deficiency by "providing reliable, ubiquitous high-speed broadband to all Australian premises by 2020" (DBDCE, 2011:49). To the extent that Perth benefits from this nationwide program to provide its businesses and residents with increased access to high speed internet, it would be able to further increase its competitiveness and connectivity potential.

Conclusion

The foregoing analysis and a review of the relevant literature point to the important role that infrastructure plays in determining a city region's connectivity and thus its overall competitiveness. Better transport infrastructure will continue to facilitate trade and tourism prospects and as such, cities must invest in airport and public transportation

infrastructure to remain competitive. Digital connectivity in terms of internet access and high speed connections also need to be enhanced in the city's drive for competitiveness.

It is therefore within the interests of cities such as Perth to have proactive infrastructure investment and development strategies to ensure it high levels of connectivity to the rest of Australia and the world at large. In order to be competitive and to provide for ongoing economic opportunities, the question that should be asked is not whether Perth should expend funds to meet its infrastructural requirements, but rather on the quality of the investments that will ensure that it remains a globally competitive city.

About FACTBase

The FACTBase project is a joint venture between the University of Western Australia and the Committee for Perth, an influential member-based organisation driven by a diverse assembly of Perth's leaders. Members collaborate with business, government and community groups to actively improve the liveability of our city, resulting in a real and enduring contribution to Perth and the metropolitan area.

One of the only broad-reaching projects of its kind to be undertaken in the southern hemisphere FACTBase condenses the plethora of databases and studies on the subject of liveability and analyse what's happening in Perth through words, maps and graphs.

About the Author

Veronica and Paul Huddleston are Associate Professors of Human Geography at The University of Western Australia.

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Contacts

For further information on the FACTBase project contact:

Marion Fulker, CEO, Committee for Perth
0419 048 665 or marion.fulker@committeeforperth.com.au

Dr Veronica Huddleston, Associate Professor - Human Geography,
School of Earth and Environment,
The University of Western Australia
08 6488-2705 or veronica.huddleston@uwa.edu.au

Dr Paul Huddleston, Associate Professor - Human Geography,
School of Earth and Environment,
The University of Western Australia
08 6488-2695 or paul.huddleston@uwa.edu.au

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