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VERTICAL SCHOOLS AS COMMUNITY HUBS IN RESIDENTIAL NEIGHBOURHOODS

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Abstract

Vertical schools are created in response to increasing residential density and land scarcity in metropolitan areas. While these schools are often short of space for children's recreational activity, the neighbourhood is usually rich enough to offer such amenities to the students. Vertical schools also contain high-quality facilities that the community can hire out of school hours. As vertical schools and their communities become reliant on the use of shared spatial resources, their interdependencies should be considered at different stages of planning, design and management of schools. This paper aims to understand the successful urban design and planning considerations that lead to a convenient sharing of resources by vertical schools and their neighbourhoods. The possible influential physical, social and organisational dimensions have been discussed in this paper by studying the literature surrounding children's use of school neighbourhoods and analysing five vertical schools in Australia. The review and the analysis show that the physical dimensions include the presence of recreational spaces in the school and the neighbourhood, their location and the pedestrian network connectivity between the school and the neighbourhood facilities. The social characteristics include the volume of car traffic and pedestrian traffic in the neighbourhood, and parental concerns for children's travel to the external recreational resources. The organisational dimensions include road rules and services and the collaboration between the school and their local agencies. The study suggests that for the community to share the school and neighbourhood resources successfully, this framework may be taken into account. The shared use of facilities can strengthen the concept of vertical schools as community hubs and increase the availability of recreational resources for both children and other members of the community in high-density neighbourhoods.

Keywords: vertical schools, community hubs, recreational resources, neighbourhood facilities, school design and planning

Vertical Schools as Community Hubs in High-Density Residential Neighbourhoods

Vertical schools are created in response to increasing residential density and land scarcity in metropolitan areas. This typology is new in Australia and there are relatively few examples of multi-story educational facilities. These schools are often located in high-density residential neighbourhoods where families are most likely living in apartment buildings where children have limited space and play areas at home. While they and the apartment buildings are often short of space for children's recreational activity, the neighbourhood is usually rich enough to offer such amenities to the students. These schools often contain high-quality facilities that the community can hire and could be regarded as community hubs. As vertical schools and their communities become reliant on the use of shared spatial resources, their interdependencies should be considered at different stages of planning, design and management of the schools.

This paper presents some successful urban design and planning considerations that lead to a safe and convenient sharing of resources by vertical schools and their neighbourhoods. By drawing on a socio-ecological framework (Stokols 1992), it studies the literature surrounding children's active use of school neighbourhoods analysing five vertical schools in Australia to explore their physical, social and organisational dimensions. The analysis shows that the physical dimensions include both the characteristics of schools (presence of sports fields and common areas) and the characteristics of the neighbourhood (pedestrian network connectivity, presence of parks, library and grassed fields, and barriers for the protection of children from vehicles). The social characteristics include the number of students, volume of traffic in the neighbourhood, pedestrian traffic and parental concerns for children's travel around the neighbourhood. The organisational dimensions include road rules and services (presence of traffic control devices, street lighting, road crossing, parking lots) and collaboration between the school and their local agencies (facility management of schools and their neighbourhoods and administration of timetables for the shared use). The study suggests that for the community to share the school and neighbourhood resources successfully, these broad sets of characteristics can be used as a starting point to understand the need for developing a more comprehensive framework. The shared use of facilities can strengthen the concept of vertical schools as community hubs and increase the availability of recreational resources for both children and other members of the community in high-density neighbourhoods.

The need for vertical schools in high-density neighbourhoods

There has been a significant growth in the number of students in Australian metropolitan areas. In 2017 it was predicted that the number of students in NSW government schools would jump from 780,000 in 2016 to 944,500 by 2031 and 80 per cent of this population will occur in Sydney (Audit Office of New South Wales, 2017). Similarly, in 2016 it was predicted that Victorian schools would need to accommodate

90,000 extra students over the next five years (Victorian Department of Education and Training, 2016). In Sydney, West Central, South West and Central Sydney were expected to have an enrolment increase of 63%, with an extra 102,650 students from 2016 to 2031 (Audit Office of New South Wales, 2017). In Bourke Street Public School alone, the number of enrolments jumped from 190 in 2013 to 440 in 2019 (Bourke Street Public School Annual Report).

The increasing student populations will place pressure on schools unless there is an increase in school capacity. According to the report by the Audit Office of New South Wales (2017), five per cent, or 180 of NSW schools, are already above capacity and 10 per cent of the state's classrooms are demountable. To meet the increasing demand for school capacity, there is a need for the provision of more schools. Considering the capacity of schools in 2016, the state of New South Wales alone needed to cater for 96,500 extra primary students and 67,500 extra secondary students by 2031 to meet the population demand (Audit Office of New South Wales, 2017).

As the population grows in in high-density neighbourhoods horizontal school models are no longer financially viable. The NSW Government is increasingly looking to build vertical schools in inner-city areas where land is expensive and the population is booming. Vertical schools can meet the demand for schools and increase capacity in smaller sites.

Vertical Schools as Community Hubs

Vertical schools can be viewed as public infrastructure that directly benefits students as well as the broader community. Being situated in densely populated neighbourhoods, vertical schools can offer accessible amenities to the community. The Department of Education and the local councils can enter agreements such as hiring school facilities. The Ultimo Public School, for example, can offer a full-sized basketball court. Its covered outdoor learning area can be used for community weekend markets (Singhal, 2017). At South Melbourne Primary School the community kitchen forms part of the school's canteen and its full-size indoor basketball and netball court are used by Sport and Recreation Victoria (Vukovic, 2018). Likewise, the members of the community in Richmond High and Inner Sydney High are able to hire out the schools' multi-purpose rooms and sports facilities outside school hours (Cook, 2017; Singhal, 2018)

Students in vertical schools can benefit from a diverse range of facilities accessible in their local neighbourhood. The schools' restricted site for children's physical activity and limited access to natural environments are common constraints that make vertical schools reliant on the neighbourhood assets. The limited space at Ultimo Public school, for example, makes the school contingent on the available space in Wentworth Park located right opposite the street (NSW School Infrastructure, 2017). Similarly, Inner Sydney High needs exclusive access to parts of Prince Alfred Park to meet the minimum requirement of 10 square metres of open play space per student in NSW schools (City of Sydney meetings, 2018). The lack of greenery and quality outdoor spaces often negatively affects the instances of play essential to

children's development (Taylor et al., 1998).

Managing the shared use of school facilities and neighbourhood facilities requires planning at a broader scale than within the school. Apart from the presence of these facilities in the school program or in the neighbourhood, there are other influential physical, social and organisational dimensions that underpin successful shared use. Research shows that children's active use of urban neighbourhoods is positively associated with the continuity of pedestrian network (Rosenberg et al., 2009), land use mix and diversity of use (Larsen et al., 2009; Rosenberg et al., 2009), and parents' perception of the neighbourhood's safety (Babb et al., 2017; Buliung et al., 2017) which itself is linked with crime safety (Rosenberg et al., 2009) and the presence of barriers for the protection of children from vehicles such as street buffer, sidewalks and trees (Kweon et al., 2017).

Previous studies also show that children's active use of neighbourhood amenities is negatively linked with the traffic volume and transport speed (Aminpour, Bishop, and Corkery, in review) and distances to facilities (Broberg, Salminen, and Kyttä, 2012; Oliver et al., 2015; Larsen et al., 2009; Rosenberg et al., 2009). The management of available facilities out of school hours may also go beyond the capacity of school staff, and consequently, the community may not be able to hire them out (Swinburn, 2017). In a case study research project, Swinburn (2017) shows that vertical schools prefer to have private sports fields because booking these field in the neighbourhood park is subject to their availability and may not work for the students' scheduled games and regular physical education.

A review of literature suggests multiple environmental dimensions that may need to be considered when planning and designing vertical schools to become community hubs. The next section draws on the possible influential physical, social and organisational characteristics in the context of some local case studies. The aim is to lay out the current understandings of vertical schools' contexts and their relationship to the neighbourhood, probe expectations of how these relationships might improve in the future and demonstrate how a poor-quality link can impair the shared use of facilities.

Case Studies

The schools chosen as cases have common characteristics such as being newly built, located in high-density neighbourhoods with diversity of use, and in close proximity to parks or other recreational facilities (Table 1). They also feature some contrasting characteristics in terms of their connection with their neighbourhood.

South Melbourne Primary School

This was the first high-rise state school in Victoria, opened to primary school students and early learning students in 2018. The school (highlighted in Fig. 1) is located close to a recreational space and surrounded by offices and car parking between neighbouring buildings and along the streets (purple area

Table 1

Selected Vertical Schools

School name	Location	Nearby park space	Structure/size	Pax	Date	Designed by
South Melbourne Primary School	Southbank, VIC	no name	6-storey/ 5,000 m2 block of land	560	2018	Hayball
Haileybury City Campus (K-12)	Melbourne, VIC	Flagstaff Gardens	12-storey/ 13,000 m2	700	2017	Darren Carnell Architects
Ultimo Public School	Sydney, NSW	Wentworth Park	Sloping 3-storey	800	2020	DesignInc, Lacoste and Stevenson, Paris-based BMC2
Inner Sydney High School	Surry Hills, NSW	Prince Alfred Park	14-storey	1200	2020	FJMT
Botanic High School	Adelaide, SA	Botanic Park	6-storey	1250	2019	Cox Architecture, DesignInc

Figure 1

South Melbourne School Site

Source: Google Maps

on the map). The site analysis of the school suggests the presence of cars parked around the school does not encourage safe use of the nearby recreational space by the primary school-age children. Moreover, the abundance of office buildings surrounding the site and lack of commercial or residential buildings can discourage the pedestrian population around the school (Fig. 2).

The location of a school and the surrounding urban fabric can also influence both children's and families' use of school facilities out of school hours. The Victorian Government is working with the City of Port Phillip to ensure there is delivery of community facilities by the school. This includes the multi-purpose rooms and the indoor and outdoor sports courts (Victorian School Building Authority, n.d.). However, the school is not located in a site suitable for pedestrians being surrounded by industrial buildings and the school's catchment area is dissected by the M1 motorway. The community may have easier access to the sports courts close to Sol Green Reserve (south of the area) being surrounded by residential buildings or Docklands Sports Courts (north of the area) if they live north of the M1 motorway (Fig. 3). Similarly, families living in the eastern school catchment area have more convenient access to the Royal Botanic Gardens than the school facilities.

Figure 2

South Melbourne Primary School

Source: Google Street View

Figure 3

Sports courts available in South Melbourne Primary School catchment area

Source: Google Maps

Haileybury City Campus

The school is a 13,000 square-metre building with 1,500 square metres of outdoor green recreation space on three terraces and 1,000 square-metre indoor active recreation sporting facility. Considering the open play space requirement in Victorian schools (seven sqm per child) and the number of students the school is catering for (approximately 700 students), the students would need at least 4,900 metres of open play space. Given that the school has limited access to open space in-house, it becomes reliant on the use of nearby recreational spaces.

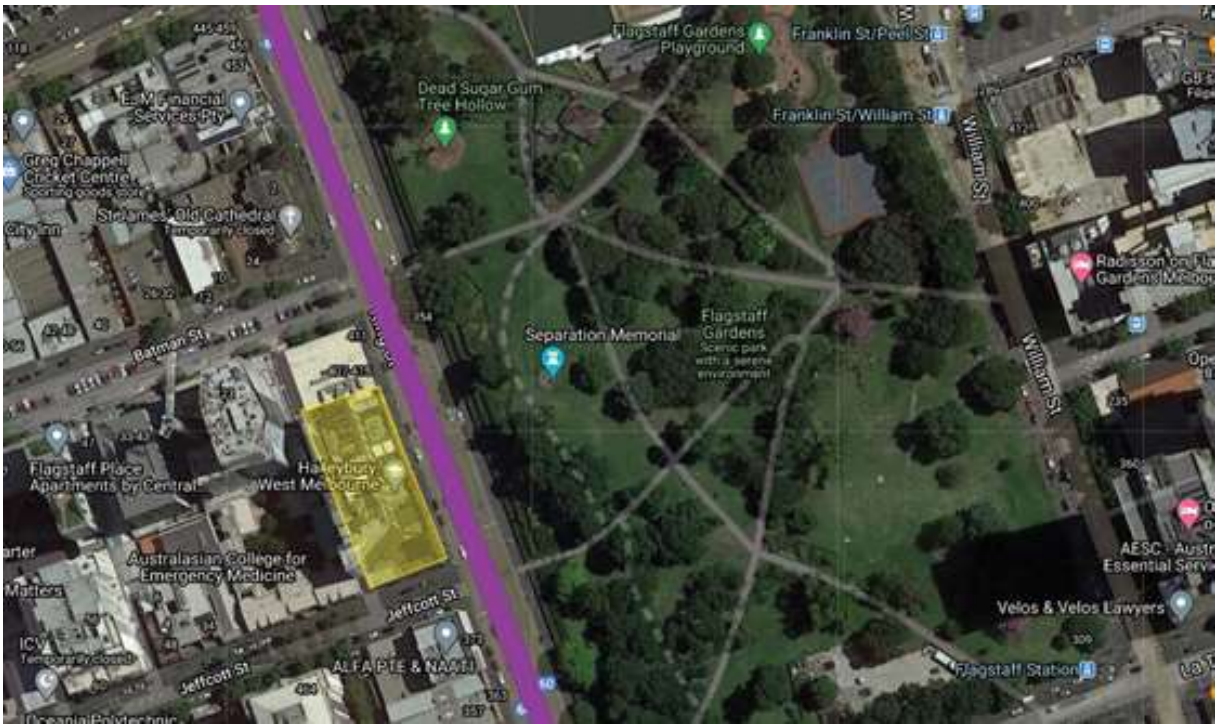
The campus is located directly opposite the Flagstaff Gardens, but the pedestrian connection between the two is not strong. Although this is a 40 km/hour area with traffic control devices such as road signals and speed controllers, King Street (the purple line in Fig. 4) is usually very busy. The safe crossing from the campus is only available with the traffic light (Fig. 5). The analysis suggests that for vertical schools to easily use the nearby natural environments, a safe and fortified pedestrian connection is required.

Ultimo Public School

The school is now catering 375 students but is expecting to accommodate an extra 525 pupils, bringing the school's total capacity to 800 students. When the school reaches its full capacity, the playground space will be insufficient for 800 students considering NSW schools open space requirements

Figure 4

Haileybury City campus opposite the Flagstaff Gardens



Source: Google Maps

Figure 5

King Street between the Haileybury City campus and Flagstaff Gardens

Source: Google Street View

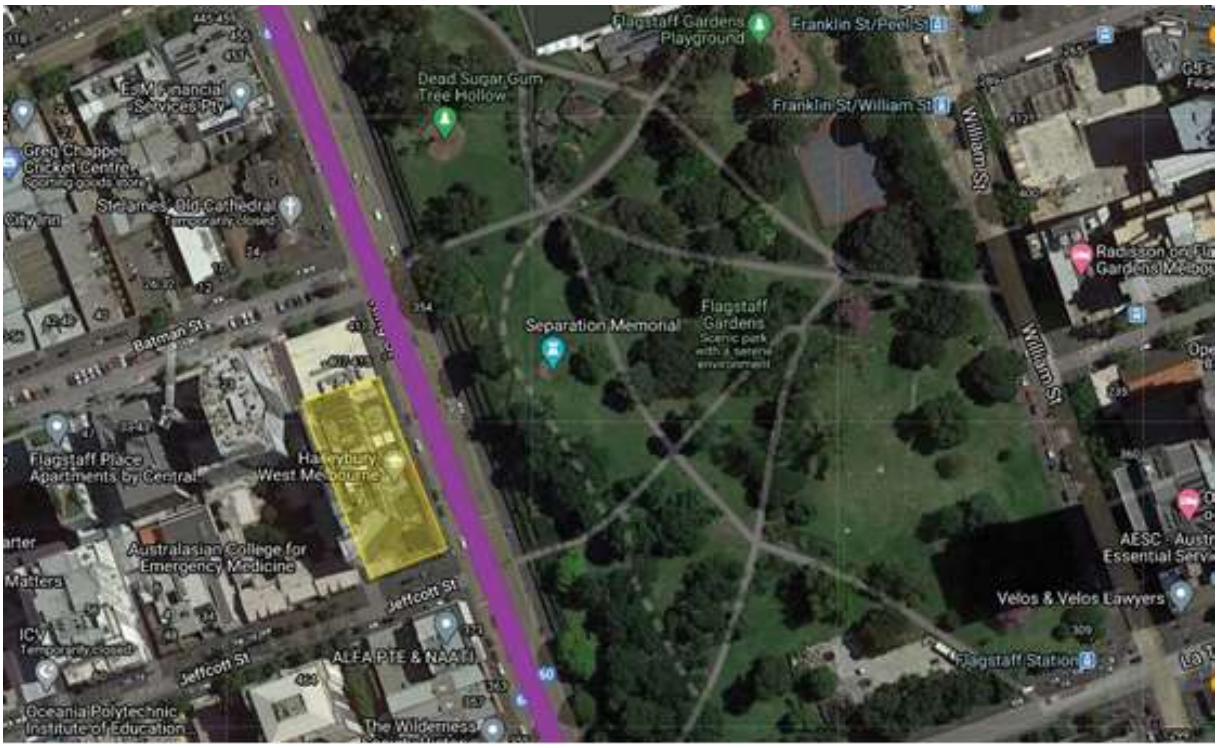
(i.e. 10 square metres per student) and the school therefore becomes dependent on the use of neighbourhood open spaces during recess (Singhal, 2017).

Similar to Haileybury's City campus, Ultimo Public School is located opposite the local park (Wentworth Park), separated from the school by a busy street. The main difference is the presence of a pedestrian bridge (in red in Fig. 6) which directly connects the school to Wentworth Park. The pedestrian bridge can provide a safe route from the school to the park during school hours.

The area surrounding the school is identified as a school zone with the speed limit of 40 km/hour during the school pick-up and drop-off time (i.e. 8-9:30 am and 2:30-4 pm) (Fig. 7). The analysis suggests that the speed limit could apply to the whole duration of school hours, if the neighbourhood facilities are to be used safely during the school program, morning tea or lunch time periods. The normal school zone rules could be adapted to the patterns of children's presence around the vertical schools' surrounding streets, as these schools tend to be more reliant on the use of neighbourhood facilities.

Figure 6

The pedestrian connection between Ultimo Public School and Wentworth Park by a pedestrian bridge



Source: Google Maps

Figure 7

The busy road between the Ultimo Public School and Wentworth Park

Source: Google Street View

Inner Sydney High School

This high school is located inside of the Prince Alfred Park with abundant green space and sports facilities (seven sports courts and a swimming pool). Children can access the park safely via pedestrian walkways without any disruption from car traffic (Fig. 8). The school is still accessible through Chalmers Street and Cleveland Street for pick-up or drop-off by cars. The site analysis suggests that corners of neighbourhood parks are more efficient locations for vertical schools compared to the opposite streets as they can encourage safer and more convenient use of facilities located in the parks.

The school is close to the edges of the catchment which covers suburbs as far as Woollahra, Darling Point and Pitts Point (Fig. 9). This means that children from the north of the area will be travelling distances as far as four kilometres to get to school from home. As the school is not well-connected to the precinct by cycling paths, the busy traffic roads can reduce the chances for children's active transport

Figure 8

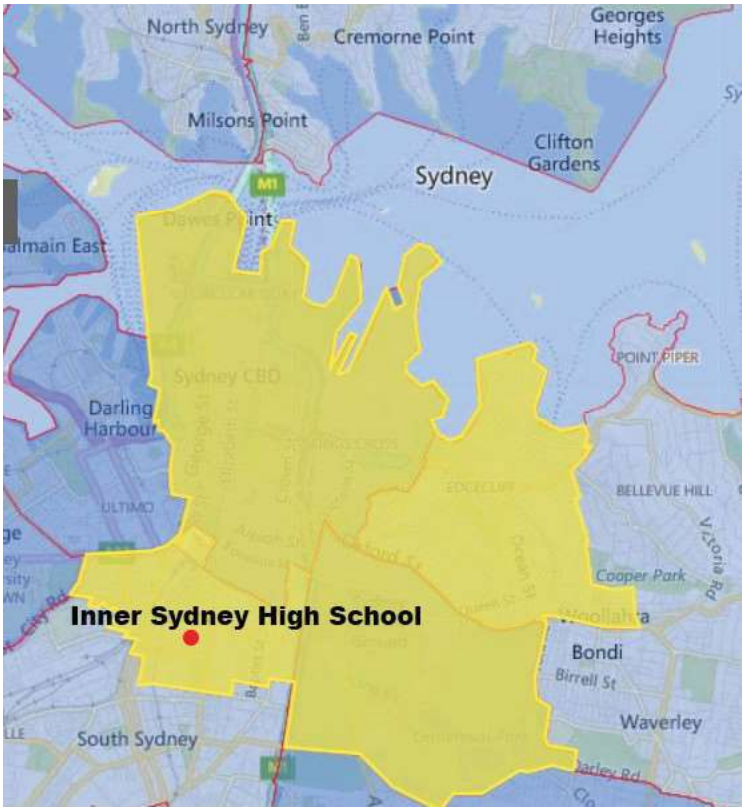
The location of Inner Sydney High School in Prince Alfred Park

Source: Google Maps

options and their independent travel to school (Fig. 10). For schools to be community hubs, schools need to be located in closer proximity to the student's home or children get a chance for active and/or independent travel (McDonald and Aalborg, 2009).

Figure 9

Inner Sydney High School zone



Source: Schoolcatchment.com.au

Figure 10

Inner Sydney High School on the corner of Cleveland St and Chalmers St

Source: Google Street View

Botanic High School

Similar to Inner Sydney High School, this school is surrounded by parklands with multiple pedestrian connections. The students can have safe access not only to the abundant green space in the Botanic Gardens, but also to the museum, herbarium and conservatory, Adelaide Zoo, state library and performing arts facilities (Fig. 11). The strategic location of the school in the CBD provides the opportunity of using the neighbourhood resources in the school program. Vertical schools should be strategically located to enhance their relationship with the neighbouring facilities as the bond between this school typology and their neighbourhood tends to be stronger compared to the horizontal schools.

While schools' abundant access to the parklands is an advantage, building a school on parklands can cause concerns if the broader picture for the school development is not clear. The idea of redeveloping hard courts on the parklands was proposed for the use of students in Botanic High School. However, the plan was refused by Adelaide City Council which believed that the school would consume too much free land (Campbell, 2016). The Council believed that developing more playing fields on the parklands is not necessary the school has already access to plenty of sporting fields within walking distance, under-utilised on weekdays and playing fields with the University of Adelaide that could be shared with the school (Campbell, 2016).

Figure 11

The neighbourhood assets surrounding Botanic High School in Adelaide

Source: Google Maps

Conclusion

The analysis of the cases shows that the land use surrounding the school neighbourhood, the pedestrian network connectivity, the location of the school in the school catchment area, and road rules and services can influence the shared use of resources. The volume and speed of traffic and the presence of car parks on the site are factors that may raise parental concerns.

Other key issues arising from the analysis of these cases were:

- safe and fortified pedestrian connections to public spaces are required;
- normal school zone rules could be adapted to the patterns of children's presence in the schools' surrounding streets; and
- siting schools on corners of neighbourhood parks is more efficient than building them on the streets opposite them.

These findings point to the need to strategically locate schools to enhance their relationship with the neighbouring facilities. They can be explored further to yield useful insights about how the integration of vertical schools in their neighbourhood enhances shared use of facilities for a growing bond between the schools and their communities.

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