

## Sustainable Urbanism: Analysis of Sustainable Environment Principles in Practical Urban Form

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### Abstract

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Sustainable urbanism is one of the global issues with numerous publications both theoretically and practically; however, it needs to be in progress and there are still rooms to improve the practical form of sustainable environment. In fact, practical sustainable development is the approach of environment, sense of community, public safety, and economic growth in constructed form. This paper explores the practical form of sustainable environment principles by analyzing city of Melbourne, Australia as well as reporting one sustainable suburb in Sydney, Australia that is called Newington. It mainly focuses on functional part of sustainable urbanism. Therefore this paper illustrates what urban criteria and elements we require to attain practical sustainable urbanism and also we could reduce the negative impacts of both people and various elements on the next generation by performing with respect to the sustainable environment principles. These empirical findings propose what responsibilities and barriers confronting us as well as what challenges facing us in order to address these issues and approach sustainable environment.

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**Keywords:** sustainable urbanism, practice, principles, Melbourne, challenges

### 1. Introduction

Sustainability has a conceptual framework of cultivating humanity and nature based on preserving and conserving energy, resource, and the use of land without depletion of resources. The practical form of sustainability is the built environmental system to achieve the place with energy conservation, economic growth, safe public space, and healthy environment.

There are four dominant changes that would transforming our future including increasing population, increasing consumption, increasing waste (CO<sub>2</sub>) production, and increasing extinction of flora and fauna (Ed Ayres, 1999).

All these problems have negative impacts on our next generation and the question is who are responsible for these changes? Do consumerist part of the society lead into these kinds of problems or these are the responsibility of architects and planners who have designed the cities in consumer shape? We need to overcome these barriers in order to change our life style, urbanism, and energy use. But how could we manage these challenges and attain ideal environment? The obvious answer is Sustainable Urbanism.

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According to Hass (2012), "Sustainability means maintaining growth or maintaining the organism in a healthy mature state, or, sustainability could mean maintaining a "harmonious balance" between organism and environment" (p.59). In Sustainable city we need more walkable and less driving neighborhoods that lead to healthier lifestyle, less air pollution, and less obesity. We need alive and mixed-use neighborhood to live happier and feel more comfortable and safe. In fact, preservation of landscape, protection of biodiversity and reduction of energy consumption are the responsibilities for sustainable urbanism.

This paper demonstrates the functional principles of sustainable urbanism in real urban context by examining one of the most livable cities in the world, which is Melbourne, Australia. Then it reports one constructed sustainable environment in Sydney, Australia that is called Newington and it is regarded as one successful example of sustainable urbanism. At the end, the findings illustrate what responsibilities and barriers confronting us as well as what challenges facing us in order to address these issues.

## 2. Essential Principles of Sustainable Urbanism

Sustainable urbanism has three basic aspects: environmental, social and economic. In environmental terms, this urban form enables people to walk to amenities rather than using a car and therefore dwellings, retail, leisure and commercial uses are put into much closer and walkable proximity with effective public transport connections; Socially, sustainable urbanism contains an appropriate set of spaces and buildings with different sizes and types for a mix of community activities; In economic terms, sustainable developments involve business activities and opportunities capable of providing jobs for many of their inhabitants (The Princes Foundation, 2007).

Urban design needs special features to achieve these gains include density, mixed land use, greater walkability, safe and attractive public areas. It is obvious that changes have been occurring technically in urban context, however these alterations should be in the manner of improving sustainable urbanism. In this paper, the environmental and social principles of sustainable urbanism are illustrated based on practical experience in Melbourne, Australia in order to comprehend the actual functional forms of these features. There are various principles for sustainable environments and societies in different books and they were divided into three major categories as indicated in the following table:

**Table 1: Essential Principles of Sustainable Urbanism**

Principles	What We Need	Why We Need
Density	Harmony	Reduce The Length of walk
	Balance	Reduce Car Ownership and Use
	Varieties	Reduce Carbon Emission
	Mixed Uses	Reduce Energy Consumption
Accessibility	Transportation	Encourage Walking
	Sustainable	Corridor Encourage Cycling
	Walkable Public Areas	Reduce Car Dependence
Biophilia	Natural Systems	Green Visual Relief
	Open Spaces	Provide Habitat
	Green Cities	Civic Gathering

### 2.1. Density

Good urban design supports a mixture of activities, distinctive use of space, form and materials, and offers diverse sensory experiences (City of Melbourne, 2006). Mixing uses has many social and visual benefits including social contacts that stimulate community spirit and participation as well as providing visual details at a human scale (City of Melbourne, 2006). In fact, density or compatibility is the most significant feature of sustainable urbanism. People need a balance set of activities in their neighborhoods, including retail, business, and community, which are easily accessible (Farr, 2008). Moreover, increasing density is associated with shorter length of walk trips, mitigation in using cars and raising physical activities.

According to Farr (2008), "At high enough densities, concentrated mixed-use development can support district energy systems, reducing carbon generation by 30 percent and energy consumption by as much as 50 percent" (P.44).

Melbourne City Council, which is called City of Melbourne, has six key directions for 'Public Melbourne' including a city that is built to last, a city that welcomes all, a walking city, a creative city, a city that balances continuity and change, and a city that realises its potential through leadership, relationships and partnerships (City of Melbourne, 2006). Among them in order to have a city that welcomes all, Melbourne will have strong centres of activity, a fully supported diverse social fabric, personal safety throughout city spaces, more opportunities for people to pause, and diverse recreational uses in the city's parks and gardens (City of Melbourne, 2006).

Kerbside cafes are the most prominent urban elements in Melbourne. They contribute values to the public life of Melbourne such as social and cultural identity, and also economic prosperity and sustainability. Kerbside cafes provide a space for social interaction and the opportunity to eat, drink and relax while observing street activity (City of Melbourne, 2006). Moreover, these cafes suggest street life, even when they are empty, and increase the public safety and security in streets. The mixture of these cafes, shops and wide range of other activities in the city center raise the density and compactness in Melbourne and they are associated with public amenities and transport facilities for Melbourne residents. People can utilize these amenities within walking distance, and they contribute to higher levels of physical activity, reducing car use, and greater social communications.

## 2.2. Accessibility

In sustainable urbanism people have suitable connections and transit service to walk, ride, bike, and even use a wheelchair around the neighborhood. To gain this connection, wide sidewalks on both sides of the street are the essential parts of neighborhood, and the distance between intersections should not be longer than 300-400 feet (Farr, 2008). Street Speed limit is another dominant criterion for walkable city; according to Farr (2008), "a maximum automobile speed should be 25-30 miles per hours, and the widest street should have no more than two travel lanes between curbs" (p. 46).

When people walk, they are confronted with the variety of life in public places, and they are more likely to participate in street activity; however, they need convenient, high quality, safe and visible connections to be encouraged to walk and bike (City of Melbourne, 2006). Furthermore, these connections contribute to more physical activity and reduce car dependence and people will benefit from considerable health advantages of physical activity, walking, and cycling.

Another direction of City of Melbourne for 'Public Melbourne' is a walking city. Melbourne has high quality connections for pedestrians, which is part of its reputation as a liveable city (City of Melbourne, 2006). Its walkable streets and lanes with attractive destinations invite people to linger and contribute to a richly walked city. The combination of Melbourne's trams and people seems to be entirely safe and workable, since can be seen in the pedestrian shopping street, such as Bourke street. Furthermore, the quantity and distribution of car parking is another issue for sustainable environment, which has a significant impact on the city's pedestrian area and the quality of environment. In Melbourne parking facilities carefully placed on the edge of the central city in order to encourage people to walk and utilize public transports and maintain the quality of public places. (City of Melbourne, 2006)

## 2.3. Biophilia

Open space is another dominant principle for sustainable urbanism, which helps people to connect to nature and natural systems (Farr, 2008).

Open space by landscape contributes to a green visual relief and balance to the urban hardscape as well as having important ecological benefits (Hass, 2012). According to Farr (2008), "People are three times more likely to walk along landscaped pedestrian routes. Mature tree cover can further encourage daily outdoor activity by cooling outdoor summer temperatures between five and ten degrees Fahrenheit" (p.49).

Open space is another criterion that makes Melbourne as one of the most livable cities in the world. Based on recent survey, Melbourne's residents prefer living in center city due to these reasons: social connectedness, mental health and wellbeing, physical health and wellbeing, mitigation of urban heat, biodiversity, cultural heritage and character, economics and tourism; events and arts (City of Melbourne, 2006). Natural areas with divers facilities and high quality contributes health and wellbeing benefits to the society, including encouraging people to walk, bike, and jog; participation of people in social events, organised sports, and physical activities; reducing the impact of urban heat island; providing visual relief to scape from built forms (City of Melbourne, 2006).

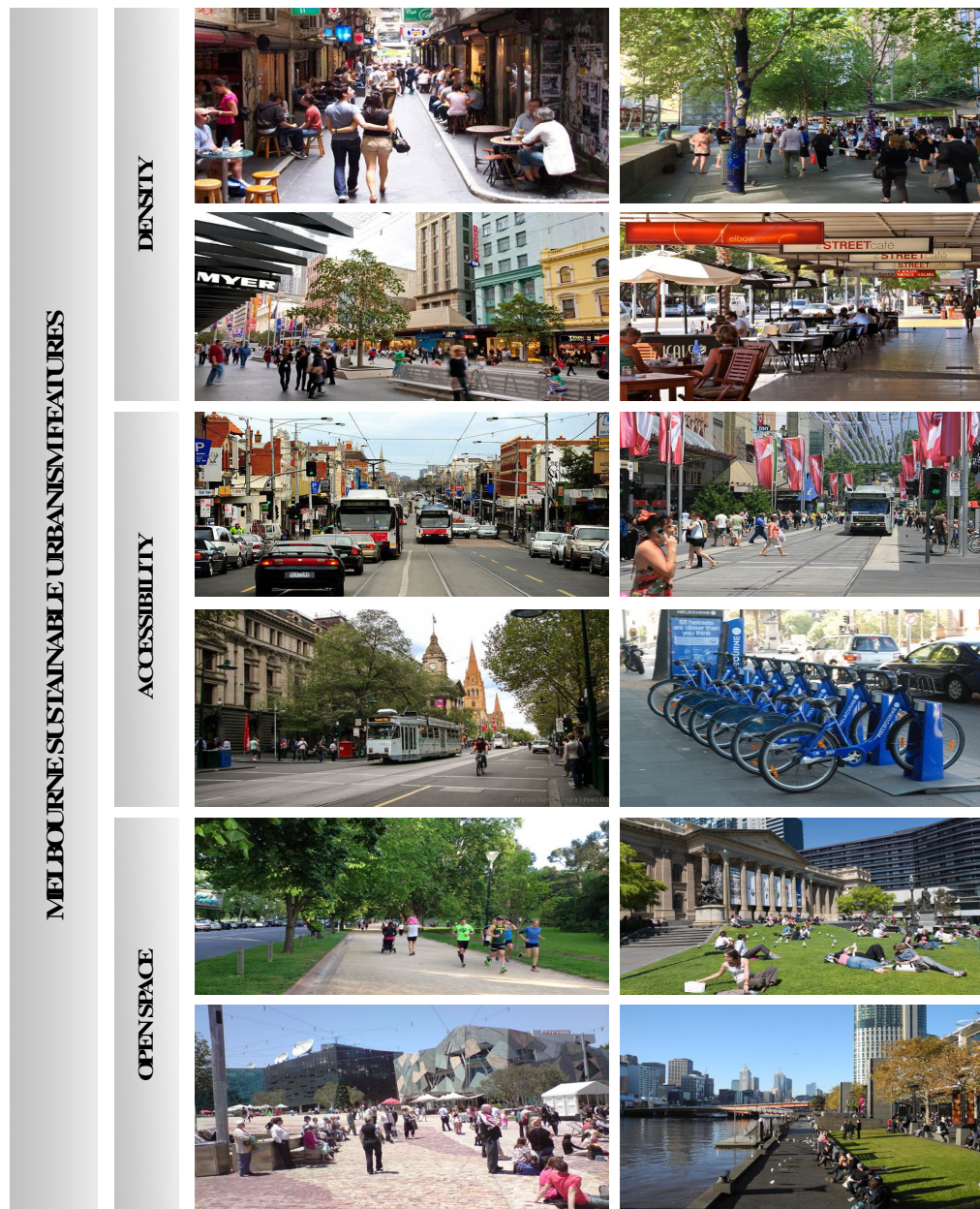


Figure 1: Presentation of Sustainable Urbanism Principles in Melbourne

### 3. Newington, Sydney, NSW, Australia

Newington, Sydney, Australia is one of innovative examples for the applications of sustainable principles. Visiting Newington and examining how the principles of sustainability have been adapted to the real urban area is dominant part of this paper. Moreover, analyzing its sustainable features is a great opportunity to comprehend what is the actual feeling of being there.



**Figure 2: Newington Suburb in Sydney, Australia**

The developers of Newington are Mirvac and Lend Lease, and it was approximately 2000 dwellings. Development was commenced in 1997 and it was completed in 1999, though further development is still occurring. Newington has been designed based on mitigation of using private vehicles as well as encouraging people to walk, bike, and use public transport. Thus residential precincts have been connected to green place, retail area, and Olympic Park Railway Station via the bus, cycle, and walk lanes. According to Farr (2008), "Greenpeace argue that discouraging the private ownership of vehicles is an essential strategy for promoting reductions in greenhouse gas emissions" (p.230).

This sustainable environment has been built on a brownfield site and it includes a residential area, parklands, and retail areas, which is called Newington Marketplace and is where the highest density developments are clustered (Farr, 2008). Newington has three essential elements of sustainable urbanism, which are neighborhoods, districts, and corridors. There are three neighborhoods with defined center and edges and they are pedestrian-friendly, compact and mixed use. There is one basic sustainable corridor from northeast to southwest, which connects these three neighborhoods and the residential districts together. Along this corridor, there are residential districts that are compact, and walkable. One small part of Newington's districts is school zone with transport facilities beside it.



Figure 3: Parklands in Newington and School Zone in Newington

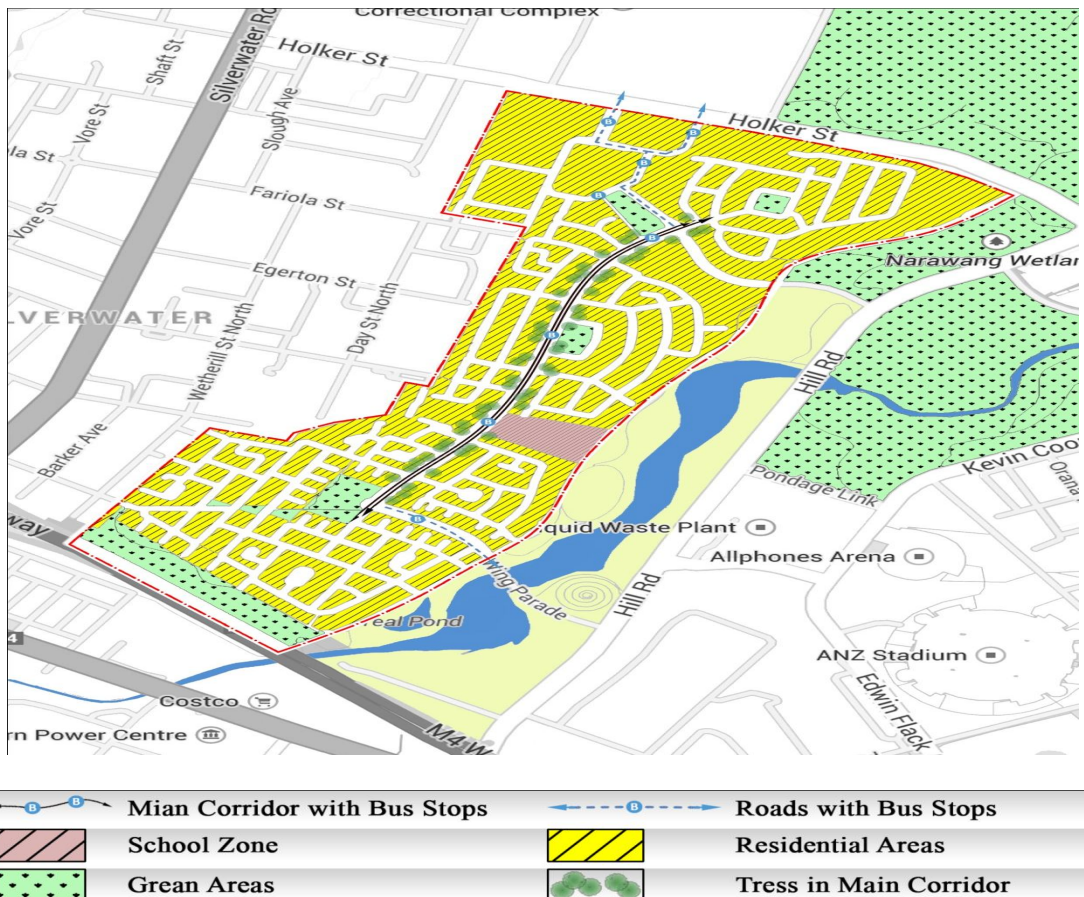


Figure 4: Analysis of Newington Suburb

### 3.1. Orientation

Newington was the largest solar village in the world at the time of its construction. According to Farr (2008), "Up to 90 percent of homes are oriented within 30 degrees east of north and 20 degree west of north to take maximum advantage of sunlight" (p.232). The solar panels are facing north to trap the sun during a day, which is north sunlight in Australia. According to Farr (2008), "All homes have been designed to require 50 percent less energy than conventional developments using element such as wool insulation, slab construction, and cross ventilation; beside, window awnings and glazing draw heat inward in winter and provide shade in summer" (p.232).



**Figure 5: Solar Panels of Residential Houses in Newington**

### 3.2. Pedestrian and transit

Transit is another important element of Newington's infrastructure that helped Sydney provide a green home for its athletes during the Olympic Games (Farr, 2008). The public transport in Newington is bus service, which is connected to heavy rail and a ferry. There is extensive pedestrian and bicycle network along Haslams Creek River, a southern tributary of the Parramatta River, which is an interesting area for Newington residents to walk and bike. Aside from this network, there are also suitable pedestrian and bike lanes within the suburb for comfortable walking and cycling. The width of the pedestrian lanes is proper and there are street trees beside the pedestrian lanes as well, which makes the lanes safe for walking. Priority is always given to pedestrian and cycling in Newington. There are narrow streets with bike lane and no parking lot open to the sky. The limited speed for cars is 50km/h and Sydney Olympic Park is also adjacent to the site.



**Figure 6: Bike Lanes, Bus Stop, and Pedestrian and Bicycle Network along Haslams Creek River**

### 3.3. Water and Plants

Stormwater runoff is a valuable resource at Newington. According to Farr (2008), "It is cleansed on-site with gross pollutant traps and then channeled to water quality ponds in the adjacent Millennium Parklands, providing an important habitat area" (p. 233). According to Farr (2008), "Plantings at Newington are 90 percent native species, which ensures that they are compatible with existing soils, require minimal water, and produce few allergens" (p. 233).

### 4. Barriers and Challenges

Sustainable urbanism has some central challenges to be operated including fundamental knowledge, design capacity, and policy process. There is no one particular form or type for sustainable cities. There are varieties of urban forms with different environmental, social, and economical issues, which mean comprehensive researches are essential to attain various functional forms of sustainable cities. Therefore research challenge is the first step meeting us to attain sustainable environment. We need to analyze the impacts of sustainable characteristics on each city before performing them in real urban context and these results would be revealed via researching measure.

Design stage is the next challenge facing us which is the responsibility for urban designers, architects, planners, and who determines the shape of the cities. This step should be based on research consequences in order to have various alternatives for different environments.



Furthermore, peoples' behaviors and lifestyles have prominent roles to achieve sustainable environment. In fact, we need sustainable communities before sustainable cities and changing peoples' minds in dealing with sustainability is necessary in order to make it not only moral, but imperative. Therefore design challenge is associated with training people for sustainable urbanism, otherwise we would not approach sustainable environment without peoples' cooperation.

Finally, all the consequences of previous measures need to practice in real urban context, which confronting us with functional challenge of sustainable urbanism. The practical part of sustainable urbanism is the result of all stages and it is very significant because we cannot reduce our negative impacts on next generation with only research, design and principles. We require fixing the cities with performing the constructed form of these principles in real urban context to see the results of our research, analysis, and design.

## 5. Conclusion

It is prominent to reiterate that the practical form of sustainability is the main part of the sustainable urbanism and this form is the built environmental system to achieve the place with energy conservation, economic growth, safe public space, and healthy environment.

We need specific urban features to attain these mentioned goals, which are density, mixed land use, greater walkability, safe and attractive public areas. Therefore, we should research and analyze about these features to approach various designs for different cities, because it is not possible to have one form of sustainable environment for all cities. Moreover, it is dominant to make society familiar with these principles, otherwise the performance of them in urban context is almost impossible. It is noteworthy to mention that we are responsible for the next generation and future cities, thus we have to decrease our negative impacts on every parts of environment with practicing reasonable sustainable urbanism.

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