

# Land Settlement Arrangement Based on Sustainable Approach (Case Study: Bhaskara Jaya Housing, Surabaya, Indonesia)

Merisa Kurniasari\*, Annisa Nur Ramadhani\*, Rika Kisnarini\*, Dewi Septanti\*

\* Architecture Department, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia

## Abstract-

There are several land issues in Bhaskara Jaya Housing when it viewed from the sustainable housing development theory, such as environmental, social, cultural, and economic aspects. However this paper concerns fully on the land efficiency which focuses on the environmental aspects. From the environmental aspect, the problems that occur in Bhaskara Housing are flood, lack of green open space and the accessibility problems include access to housing provisions and traffic inside the housing area. Therefore, this study provides recommendations for handling floods in terms of land use, the addition of green open space, the arrangement of trade facilities inside the housing area, and the application of Green and Clean Program in this housing area. The research method is by direct field observation and in depth interview with the residents.

**Keywords :** land, green and clean, site plan

## I. INTRODUCTION

The micro growth of cities in Indonesia gives a positive correlation to the fulfillment of the needs of various facilities, especially for residence in a good neighborhood and healthy areas. Today the problem of urban settlement is not only the limited land but also the settlement arrangement (Fatimah, 2017).

Structuring the Environment/Area is an attempt to repair, change, and reorganize certain environments in accordance with the principle of efficient utilization of space. The existence of a decline in the function of an environment, so that it can not operate optimally to restore the function needs, to be done arrangement. In addition, improving the quality of the housing and economic environment also needs involvement of the potential local community, so that it could become a major force in development (Marwati, 2008).

From the main function of the house as a place to live, according to Silas (1998) a good settlement and arranged will be created if it meets the ideal criteria for physical and non physical aspects. Physical aspects include geographical location, natural environment, and guidance; while non-physical aspects include social, economic, cultural, and psychological (sense of security, pleasure, peace and hope). This theory became one of the factor-makers, which influenced the concept of settlement development, from the physical and non-physical aspects. And according to Lee (2003), urban renewal implementation is necessary to be conducted through a sustainability concept approach that becomes a way to minimize the existence of problems that can be re-emerged in the post of urban renewal.

Undang-undang No. 1 Tahun 2011 (Law about Housing and Settlement in Indonesia) explains that the settlement is a part of a housing unit that has infrastructure, facilities, public utilities,

and other supporting functions of urban areas. The development of settlements need to consider the natural physical conditions and normative policy rules to be applied.

## II. THEORITICAL FRAMEWORK

### II.1. The Basic Requirements or Provisions for a Settlement

SNI 03-1733-2004 regulates the procedures for planning the urban housing environment that contains a detailed description of the principles of urban housing planning. SNI 03-1733-2004 states that the residential area consists of at least 50% of land use composition for settlements, of which 25% for road network, and 25% for public and commercial facilities.

Every guideline in the standard is a matter of concern in the fulfillment of public facilities and infrastructure in a settlement so that the settlements that are formed have a good quality and physically is feasible and inhabitable.

Table 1. SNI standart for the provision of housing and settlement

No	Provisions	Service Coverage (person)	Minimum Standart	
			Radius	Location Criteria
1	Education Facility	1250	500 m <sup>2</sup>	Based on district area
2	Health Facility	2500	1000 m <sup>2</sup>	Based on sub-district are
3	Religious Facility	2500	1000 m <sup>2</sup>	Based on Neighbourhood
4	Trade Facility	250	300 m <sup>2</sup>	Based on Neighbourhood
5	Social Facility	250	100 m <sup>2</sup>	Based on Neighbourhood

While the basic requirements or provisions that are good for a settlement (Nasrullah, 2014), are:

1. The location is not distracted by other activities such as factories, which generally could have an impact on air pollution or other environmental pollution.
2. Having access to the center services such as education, health, trade, and others
3. Having a drainage facility, which can drain rainwater quickly and does not lead to a puddle of water even though heavy rains
4. Has the water supply, in the form of a distribution network that is ready to be distributed to each house.
5. Equipped with septic tanks and seepage field for dirty water / faeces that can be made in individual or communal system.

6. The settlements must be served by waste disposal facilities on a regular basis in order to keep a comfortable residential environment
7. Equipped with common facilities such as a children's playground, courts or parks, places of worship, education and health in accordance with the magnitude of settlements scale.
8. It is served by electricity and telephone networks.

## II.2. Site Planning

The objective of the site-planning in the planning-design of residential areas (Prawirto, 2012):

1. the purpose aspects of the use / function,
2. the purpose of structural and engineering aspect, and
3. the purpose of the aesthetic aspect / beauty in a residential area

## III. GENERAL DESCRIPTION

Bhaskara Jaya Housing is included in one of the residential areas in East Surabaya with middle and upper income class. Located in a strategic location as it is adjacent to the education and service trade area, thus enabling population density and housing density in this residential area. Bhaskara Jaya Housing is located in Mulyosari sub-district of 10.5 hectares consists of Bhaskara Jaya 1 to Bhaskara Jaya 5. In the local planning document, this area is planned as a meaningful settlement area based on field observation that there is no deviation of land use.

### III.1. Identify the Accessibility Flow of Bhaskara Jaya Housing

For the accessibility Bhaskara jaya housing, in the morning until the afternoon enacted the entrance rules using the southern gate and the exit is in the northern gate. For this case, two security guards are employed in order to keep each gate. Access flow can be seen in the picture below.



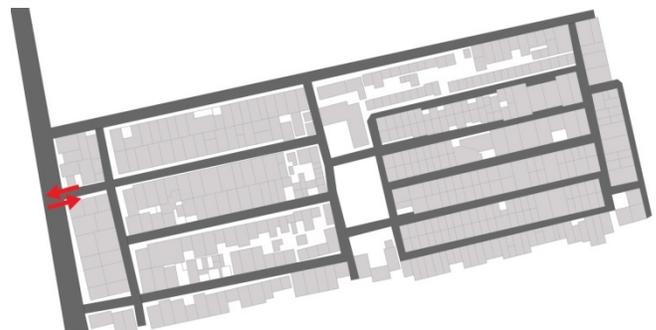
**Figure 1.** Access to the Housing Area in the morning till evening  
(source: survey, 2017)

The enforcement of this access has just been in effect since January 2017, which is intended to cope with congestion that occurs in the morning until noon due to public and private elementary schools in the housing area. However, the opinion of the community itself is less amenable to the existence of this new regulation due to ineffective access if through the southern

- Because it involves the process of changing site environmental (land) in a residential. There are two important aspects to be taken into consideration of the site splanning activity.
  1. The natural or ecological (environmental) aspect that is physical. And the second,
  2. The socio-cultural aspects that are non-physical. Natural or ecological aspects are aspects of the consideration that is used to predict the environmental conditions of the site (the land) to be used for the purposes of human life. While the socio-cultural aspects are non-physical aspects that are considered in site planning. But this study is focused on land efficiency which considers only the physical aspect.

entrance, because the preferred access to entry is the middle gate which is not opened in the morning until noon.

But unlike in the daytime, access in and out in the night time is only through one gate that is the middle gate this is due to limited security resources (security guards) and streamline security at night. Illustration of access at night can be seen in the following picture.



**Figure 2.** Access to the Housing Area in the night  
(source: survey, 2017)

### III.2. Identification of Flood Problem

There are significant environmental problems in this housing estate, namely the problem of flooding and puddles that always occur when the rainy season arrives. This because this residential area has proximity to the beach, so the soil level is relatively low and often gets floods water from other higher areas. In addition, poor drainage due to the closed access of darinases in front of residents' houses and the indication of siltation ditches also causing seasonal flooding in this housing area.



**Figure 3.** Flood in Bhaskara Jaya Housing Area  
(Source : Survey, December 2017)

Like in the picture above, flood problem is quite serious issues in this housing area. Therefore, we identified area that are flooded and not flooded, so with this sign it can be analyzed the required slope level of bhaskara jaya housing.

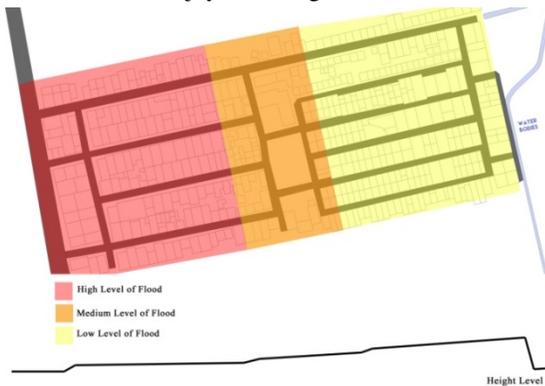


Figure 4. Flood Level of Bhaskara Housing Area (Source : Survey, 2017)

### III.3. Lack of Thematic Green Open Spaces

Another environmental problem is the lack of green open space, where the existing green open land is a field located in the middle of the Bhaskara Jaya housing site. The field is functioned as an open area for playing soccer and other social activities. In this housing there is no thematic green open space that are processed for the needs of the community, such as elderly park or playground for children.



Figure 5. green open space existing (Source: survey, 2017)

### III.4. Identification of Public Facilities of Bhaskara Jaya Housing

In Bhaskara Jaya housing there are public facilities that are not only used by residents in housing but also residents outside the housing. This results in overcrowding of car and motorcycle in Bhaskara Jaya housing at certain hours that resulting in traffic jams. The public facilities include: two primary schools in Bhaskara Jaya housing opposite the Square. The density of vehicles (cars and motorcycles) in the hours of entry and school home comes from this school, and it also resulted in street vendors popping up around the field intended for introduction or pickup.

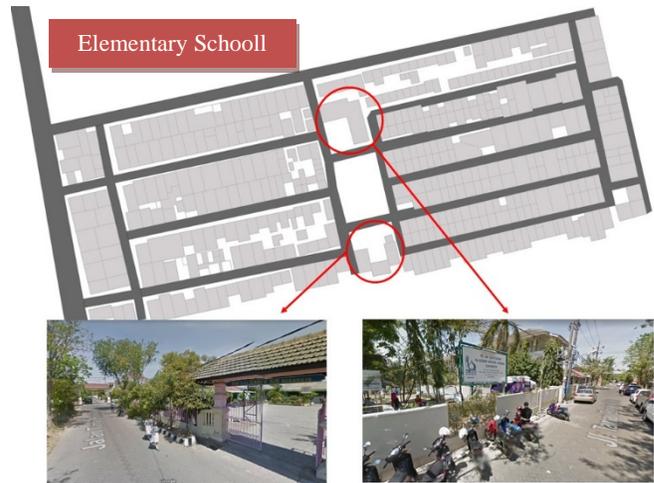


Figure 6. Existing school facilities inside the housing area (source: survey, 2017)

The Bhaskara Jaya housing facility consists of mosque and church. A large mosque that can accommodate 500+ pilgrims is located adjacent to the church, while the church with a capacity of 250+ worshipers is located in the midst of housing residents.

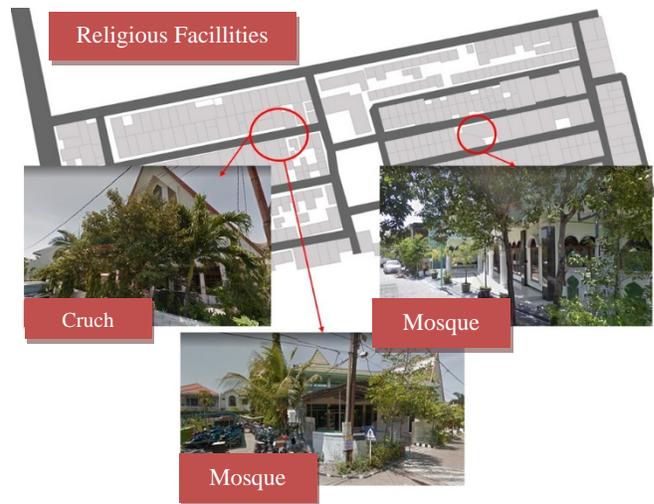
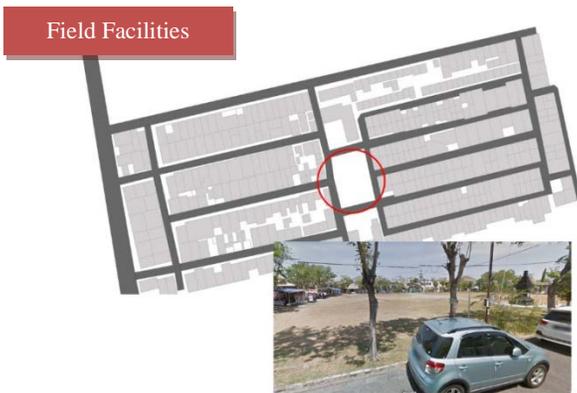


Figure 7. Existing religious facilities inside the housing area (source: survey, 2017)

Other public facilities in Bhaskara Jaya housing are community hall and open space. Citizen halls are often used as local RT and RW meeting venues. While the open space in the form of a field is located adjacent to the school, but unfortunately, greening is less visible in this field.



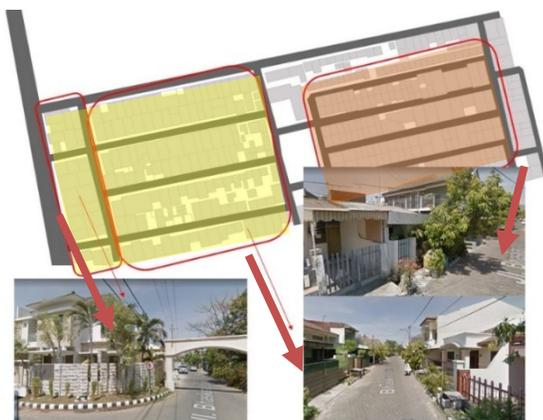
**Figure 8.** Existing social gathering facilities inside the housing area (source: survey, 2017)



**Figure 9.** Existing green open space inside the housing area (source: survey, 2017)

### III.5. Identify Bhaskara Jaya Housing

In one residential area there are several types of houses. At the entrance of the housing are houses with large type with a lot of plot  $\pm 500$  m<sup>2</sup>. While in the middle is a house with moderate plot and at the back is filled with houses of small plots.



**Figure 10.** Housing form inside the housing area (source: survey, 2017)

## IV. RESEARCH METHOD

Judging from the classification of research based on its purpose this research is included into descriptive research. When viewed from the classification of research based on data collection techniques it is included as survey research and field research.

Sources of data in this study are primary and secondary data. Primary data are obtained through survey (observation), while secondary are data obtained from the relevant literature Data collection techniques intended for data needed as input for each stage of the analysis. The data required are primary and secondary data by collecting as follows:

1. Primary data collection related to environmental conditions, conducted by Direct Observation to location and Interview.
2. Secondary data collection is primary data that has been processed further and presented by the primary data collector or other parties may. This data can be in the form of tables or diagrams. This data is obtained from the results of research, articles, library search and official documents from relevant agencies.

## V. PROPOSAL FOR IMPROVEMENT

Bhaskara Jaya housing is included in Kalisari district. Kalisari district has an area of 213 hectares with a population of 14,580 inhabitants. While Bhaskara Jaya, own housing area of 10 hectares with a population of 729 inhabitants. To find out the requirement of public facility that are not yet owned by Bhaskara Jaya housing, this research analyze facility requirement according to SNI (Indonesian National Standard) on local scale it is found that facilities required in Bhaskara Jaya housing is Green Open Space and trading facility.



**Figure 11.** Land use Bhaskara Housing area (source: survey, 2017)

For green open space it is found that Bhaskara Jaya housing still lacks Green Open Space, after analysis it is found that this housing requires 3 units of green space with an area of approximately 0.0729 hectares. This analysis is based on the number of population divided by the standard of meeting the needs for the Green Open Space. As for trade facilities as it is known that there is an informal sector around the field, it is necessary to allocate the center of the informal sector so that in the future the access will be no longer disturbed and well ordered. Based on the analysis, the area accommodated for this informal sector center is 0,0243 hectares.

From the observation results it is found the density of vehicles in the school area at peak hours. This became one of the resentments of Bhaskara Jaya housing residents because of their

area is often entered by people from outside. To overcome the density of vehicles during peak hours, this study recommends the provision of parking facilities adapted to the size and number of residents for the Bhaskara Jaya housing so that the parking area must be provided in Bhaskara Jaya according to SNI is 0,02916 hectares.

The following analysis is done in accordance with the principle of sustainable settlement:

### V.1. Environmental Aspects

#### a. Improvement of public Facilities in Bhaskara Housing

According to the SNI standart, there are several aspect of facilities that should be improved in this housing area. The aspects include Green Open Spaces facilities, Trade facilities, and Health facilities. The breakdown of each facilities are mentioned below:

##### a) Green Open Space Facilities

For green open space it is found that Bhaskara Jaya housing still lacks Green Open Space, after analysis it is found that this housing requires 3 units of green space with an area of approximately 0.0729 hectares. This analysis is based on the number of population divided by the standard of meeting the needs for the Green Open Space.

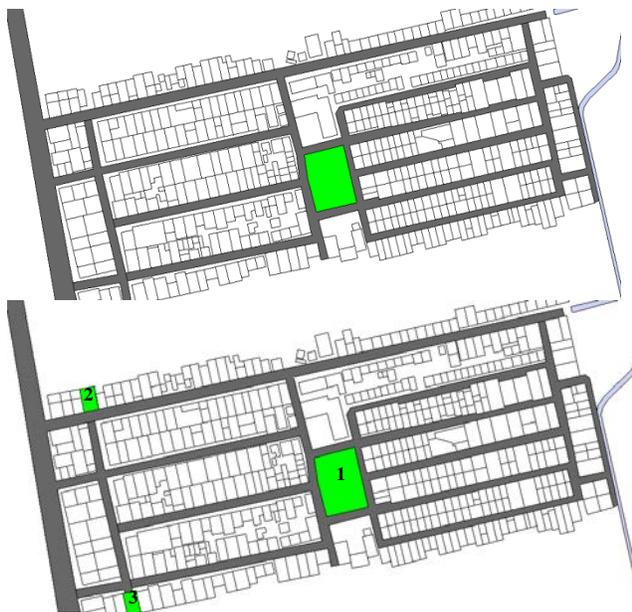


Figure 12. Existing green open space (above); Proposed green open space section 1, 2, and 3 (below) (source: survey, 2017)

The top image is the existing cross section and the bottom image is the cross section proposed, in which there are 2 additional new green open space that functioned as thematic park, that is in the form of elderly park and playground park which is intended for public society.



Figure 13. Proposed design of new green open space for field and jogging track (section 1) (source: writer design, 2017)



Figure 14. Proposed jogging track design of new green open space (section 1) (source: writer design, 2017)



Figure 15. Proposed playground design of new green open space (section 2 & 3) (source: writer design, 2017)

##### b) Trade Facilities

For trade facilities as it is known that there is an informal sector around the field, it is necessary to allocate the center of the informal sector so that in the future it will not disturb the accessibility and well ordered. Based on the analysis, the area accommodated for this informal sector center is 0,0243 hectares.



Figure 16. Existing location of trade facilities inside the housing area (red area) (source: survey, 2017)



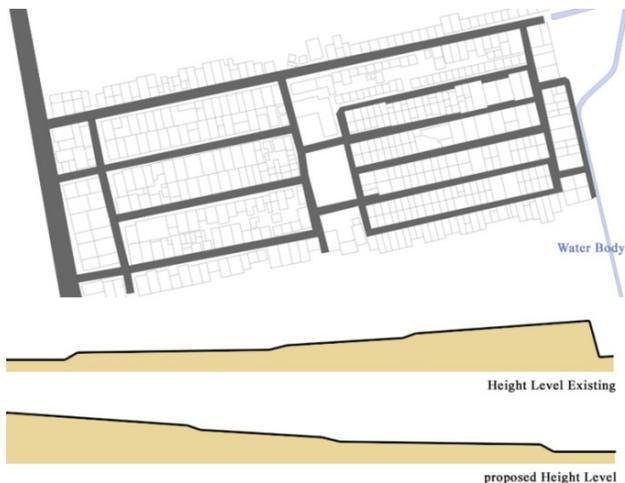
**Figure 17.** Existing trade facilities inside the housing area (illegal) (source: google map, 2017)



**Figure 18.** Proposed design of new trade facilities inside the housing area (planned) (source: writer design, 2017)

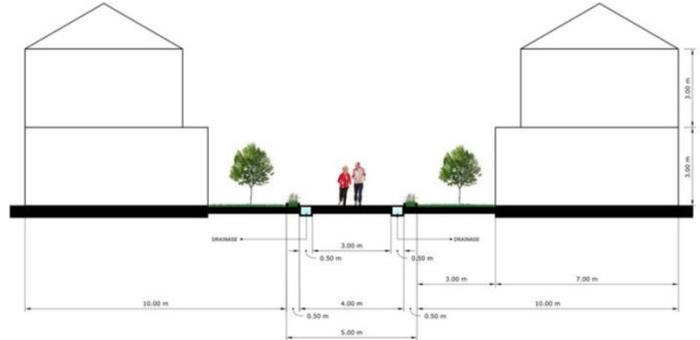
**b. Improvement of Flood Problem**

For flood problems, one of the efforts that can be done is to direct the height of the housing ground level towards the water body that leads to the beach. With that, from existing conditions, it is necessary to improve the elevation of drainage level of residential area on the west side so that it has a higher level than on the east side, because the water body is located on the east side of the housing.



**Figure 17.** Proposed height level of drainage (source: survey, 2017)

Beside that, there is a need to improve the road width in housing neighborhood into 4 meters with 0.5 meter for drainage width. The minimum standard of road width in housing neighborhood based on SNI 03-1733-2004 is 4 meters with 0.5 meter of drainage width. So, the road width on the existing condition still can be utilized optimally to the needs of other facilities such as green open space for sports and park facility



**Figure 20.** Proposed road geometry of Bhaskara Housing (source: survey, 2017)

**c. Improvement of Traffic Problem**

The main problem of Bhaskara housing area is traffic problem that affect to accessibility of the housing area. It is due to the existence of private school inside the housing area that mainly using cars to pick up the students. Beside that, in existing condition, the private school didn't provide the parking area nor drop zone area to prevent the traffic during the school rush hour. It causes cars park offhanded in the body of street and make the traffic around the school in trouble.



**Figure 21.** Existing area of school with no parking area nor dropzone area (source: google map, 2017)



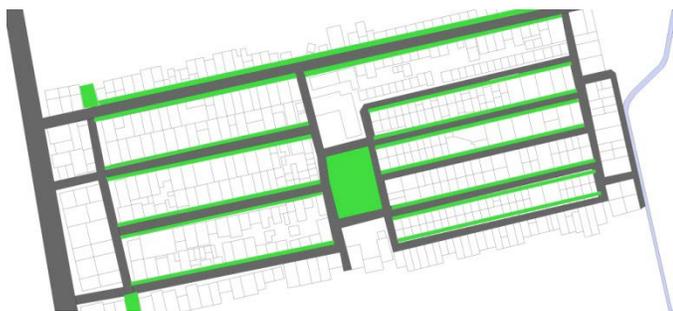
**Figure 22.** Existing area of school with no parking area (left); proposed new parking area of school (right) (source: survey, 2017)



**Figure 23.** Existing area of school with no parking area nor dropzone area (source: writer design, 2017)



**Figure 24.** Proposed parking area of school to solve traffic problem (source: writer design, 2017)



**Figure 25.** Green and clean location in front of the resident's house (source: survey, 2017)

### CONCLUSION

Bhaskara Jaya Housing is housing with decent conditions to live in. There are several land issues when viewed from the theory of sustainable approach as in the environmental aspects of the problems that occur are Flood, lack of green open space and accessibility issues. While other problems that follow are the lack of interaction between neighbors and the existence of gated that

restrict access. Therefore, this study provides recommendations for handling floods in terms of land use and the addition of green space and the application of Green and Clean Program in this housing.

### REFERENCES

- [1] Arifin, e. (2009). *Permukiman Sehat Berwawasan Lingkungan Seri III*.
- [2] BPS Kota Surabaya. (2016). *Kecamatan Kalisari dalam Angka*. Surabaya.
- [3] Fatimah. (2017). *Inclusive Development and Social Policy in Solo*, East Java. Jakarta
- [4] Pawitro, U. (2012). *Kaidah - Kaidah 'Site-Planning dan 'Thematic Design' Dalam Perancangan Kawasan Perumahan yang Berkelanjutan*. Seminar Nasional Sustainable Housing :Toward Low Carbon City and Eco City. Jakarta: Jurusan Teknik Arsitektur FT Universitas Kristen Indonesia (UKI).
- [5] Badan Standarisasi Nasional Indonesia. (2004). *SNI 03-1733-2004*. Indonesia.
- [6] Lee, J.S. (2003), "Enhancing Sustainability in Downtown by Triple-Value Adding to Urban Redevelopment Efforts: A Case Study of Seoul, Korea" , University of Washington, (unpublished PhD dissertation), USA
- [7] Marwati, "Peremajaan Permukiman melalui Keswadayaan Masyarakat" *Jurnal Permukiman* vol. 3, no. 1 Mei 2008 available at [http://www.pu.go.id/uploads/services/infopublik201311191\\_23742.pdf](http://www.pu.go.id/uploads/services/infopublik201311191_23742.pdf)
- [8] Nasrullah, A. D. (2012). *Perencanaan Prasarana Dasar Permukiman*. Makasar: Universitas Hasanudin.
- [9] Silas, Johan. (1998). *The kampung of Surabaya*. Municipal Government Of Surabaya. Undang-undang No 11 Tahun 2011. Regulates.
- [10] Surabaya Municipal. (2005). *Surabaya Green and Clean Program*. Surabaya.
- [11] UN-Habitat. (2012). *Sustainable housing for sustainable cities : a policy framework for developing countries*. ISBN: 978-92-1-132488-4. Nairobi: UNON Publishing Service Section.
- [12] Undang Undang Republik Indonesia No. 1 Tahun 2011 tentang Perumahan dan Permukiman

### AUTHORS

**Merisa Kurniasari; Annisa Nur Ramadhani** – Master Student of Architecture Department, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia  
**Rika Kisanarini; Dewi Septanti** – Lecturer of Architecture Department, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia