



Analysis Reducing Slum Settlement by Road Improvement (A Case Study: Jawa Lama Village Village, Lhokseumawe, Aceh-Indonesia)

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Abstract— a slum will cause many problems for many cities. The urbanization factor is one of the causes of slums due to the limited urban housing area. In general, there are seven slum indicators that can determine the quality of residential areas, one of which is physical infrastructure. Infrastructure conditions are interrelated with residential development. This study analyzes seven indicators of slums in Jawa Lama Village, Lhokseumawe, Aceh-Indonesia. In this study, the research team used data surveys with field tracking and field documentation from city roads. Documented data includes field photos and regional mapping that shows the location of the study. Data that has been collected can be used to determine urban facilities and infrastructure that are very influential for slums in the study area.

Keywords: Slum, settlement, city, road, infrastructure.

Introduction

The city always attracts many people to move in. The completed city facility for education, working place, entertainment, and others offer citizen a better life. Generally, the reasons for moving into a city could be to continue the study and to get a better job or new life. This urbanization has many effects on city development. One of urbanization effect is increasing city population years by years. Many people migrate to the city, and this will require living space. Thus, this additional space will increase settlement area in city. On the other hand, the city has a limited area for its own function to grow and expand. Every time new migrants move into city, this effect the settlement area of the city. If there is no housing area available, the illegal housing area, an area where is not for residential, will be developed. In Kaseke, Pakasi, & Ngangi's research (2017), Soetomo (2009) stated that the limited of settlement area in the city will raise slum settlement and shantytown, thereby damage the city face. The causes of urban slum areas are closely related to urbanization issues, limited urban land and inadequate urban development programs (Wijaya, 2016).

The crowded settlement creates an inhabitable residential area. This slum settlement is occurring in most of the cities in Indonesia. This slum area is always considered as an inappropriate living area for the city's dweller with bad view and become the city's problem. A slum is considered as illegally occupied houses and creates a nuisance to the environment and degradation to living conditions (Ragheb, El-Shimy, & Ragheb, 2016). Slum settlement is well-known to generate problems for the community. Slum settlement characteristic is non-permanent building material, simple, small, and full-crowded, as a result of density population (Effendi, 2018). As each slum area has its own characteristics, Barbara & Umilia, (2014) suggested to categorized the slum areas based on their characteristics such as the physical condition of their public facilities and infrastructure. Roads or streets are the starting point for the physical integration of slums into the formal and official systems of planning and urban management that govern a city (United Nations Human Settlements Programme, 2012).

An assessment was conducted by taking a sample from a domestic wastewater collecting pond located at Peuniti Village, Banda Aceh City. Three locations of sampling point were selected, i.e. inlet, inside, and

outlet pond to observed performance of the pond. The pond received domestic wastewater through a channel (combined sewer – domestic wastewater and rainwater). The wastewater produced from 1,850 households (7,172 people) of Peuniti Village (Faisal *et al.* 2015).

The waste tire is produced more than 10 million tons every year in the world. This problem needs serious treatment to eliminate waste tires. This work is aimed to recycle the waste tire in concrete as a reinforcement (Maryoto *et al.* 2017).

The goals of waste management are firstly the protection of human beings and the environment, and secondly the conservation of resources. Under the principles of sustainability, these goals should be reached in a way that does not impair the well-being of future generations. Thus, waste management practice should not export waste related problems in space and in time, requiring e.g. after carefree landfills. Goal number one has been reached in most countries with affluent economies (Johann Fellner, 2013)

In this study, physical road condition is used as an indicator for determining slum condition. The damaged road disturbs and interrupts public activities. The damaged road causes accident, interruption, and uncomfortable for the user. The result of this study is for road improvement strategy at the study site.

Study Site

This slum settlement is at most of the cities in Indonesia and the world, including Lhokseumawe City of Aceh Province. The city of Lhokseumawe has 64 villages. There are a few villages categorized as slum villages (see Major decree of Lhokseumawe number 442 the year 2016). These villages are Pusong (Pusong Lama and Pusong Baru), Kampong Jawa Hagu (Kampong Jawa Lama and Hagu Selatan), Keude Aceh, Mon Geudong, and Batuphat (Batuphat Timur and Batuphat Barat). This study focuses on Jawa Lama Village with slum area of 28.60 Ha, as this village is the worst slum settlement in the city of Lhokseumawe.

Jawa Lama Village has received many funds and programs related to the village living quality improvements by government and other stakeholders. This coastal village has a dense population with seven hamlets. Among the seven hamlets of Jawa Lama Village, four hamlets are categorized as a slum area. These four hamlets are located close to Lhokseumawe's beach and the city of Lhokseumawe main street; Iskandar Muda Street. The public and government office are located along of Iskandar Muda Street. The slum residential area is found on the back of public and office area. Generally, most of the housing material at slum area is made from wood.

Method

This study used field data collected by tracking survey and field documentation. The methodology used in this study is mapping coupled with photographic documentation. This similar method has used by Paar & Rekitke, 2011. Then, the collected field data were recorded and draw on the village map. This study also used the village map from KOTAKU, as a secondary source. The analyzing of the condition of the road at the study site was carried out by ranking the factual road conditions i.e. hard damage, middle damage, and good condition. The zone with many damages is labeled as a high category. Finally, the results are presented as a map using ArcGIS 10.1, which is combined data from map and observation result.

Results and Discussion

Based on slum category in the Indonesian government regulation about Quality Improvement On Slum Housing and Slum Settlement, there are seven parameters to consider which are: road, drainage, sanitation, waste, water, building, and fire protection (Menteri Pekerjaan Umum dan Perumahan Rakyat, 2016). This study observed the condition of seven parameters at Jawa Lama Village.



Figure 1. Road Condition at Murthadahuddin Hamlet (left) and road condition at Cemara Hijau Hamlet (right) (Source: Observation)

Table 1. Road Condition at Jawa Lama Village

Condition	Length (m)
Existing Road	9104.84
Local road with width > 1.5 meter	6953.63
Local road with width > 1.5 meter with hard surface	6899.93
Local road with width >1.5 meters with hard surface and no damage	5824.72
Local road with width <1.5 meters with hard surface and no damage	261
Local road with width >1.5 meters with drainage	4064.06
Local road with width <1.5 meters with drainage	1335.31
Road Length Total	6085.72

Source: Jawa Lama Village RPLP document (KOTAKU, 2017)

The total length of the road network at the Jawa Lama Village is ± 9,104.84 M. The road condition at the study site is dominated by a good road condition of ± 6,085.72 M. The estimated damaged road is around ± 3,019.12 M. Very narrow road at the study site is around ± 261 M. The local secondary road (asphalt) at the Kampong Jawa Lama is good condition, only at a few points need to be repaired. We found that the road damage occurred in four hamlets; Tgk Chik Ditunong, Noeriman, Cemara Hijau, and Murthadahuddin. The quality of road appears same condition; narrow and damage.

Table 2. The road condition at four hamlets, at Jawa Lama Village

Hamlet	Length of Road (m)		Local Road with width > 1.5 meter		Local Road with width < 1.5 meter	
	Good	Damage	Good	Damage	Good	Damage
Noeriman	391.74	1091.09	130.95	264.19	260.79	826.91
Murthadahuddin	393.79	842.98	340.68	319.64	53.11	523.3426
Chik Ditunong	-	653.25	-	527.88	-	125.366
Cemara Hijau	-	578.78	-	217.39	-	361.3899

Source: ArcGIS map (KOTAKU, 2017)

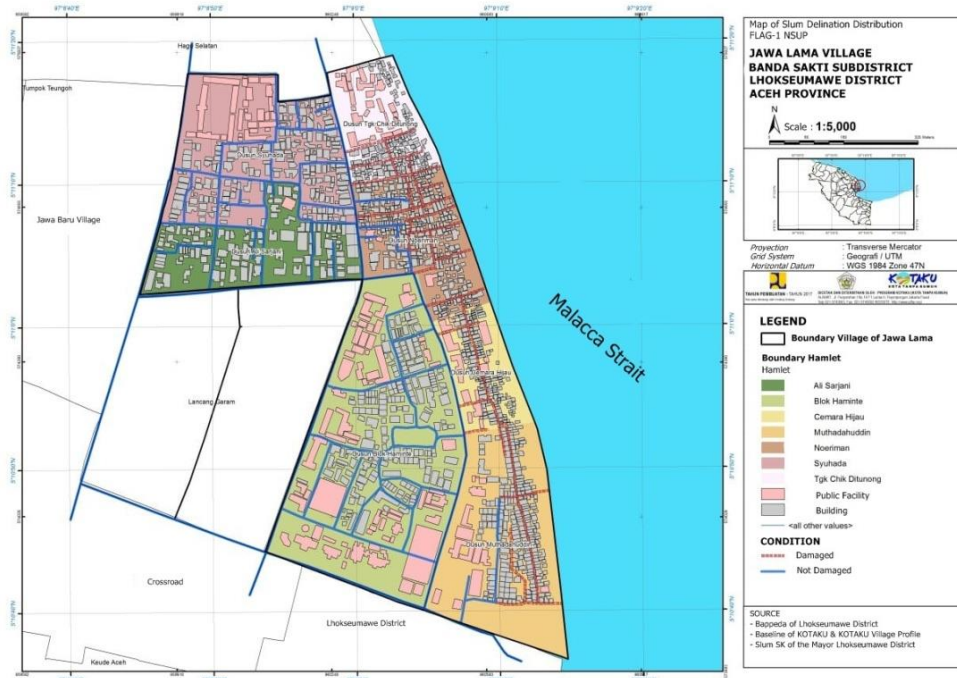


Figure 2. Road Condition Map (Source: ArcGIS map KOTAKU, 2017)

This study suggests the damaged road found only at four hamlets, as shown in Figure 2. The interesting thing is the location of damaged road. This study finds that most the damaged road is at along the seashore and at the back of government and military office. The other slum indicators of damage drainage, poor sanitation, poor waste management, inadequate water supply, building condition, and fire-prone are observed at the same hamlets.

Drainage at Jawa Lama Village is laid along the local road. The drainage system at a local road with width > 1.5 meter is an open system and located on the left or right side, meanwhile the drainage system at a local road with width < 1.5 meter is a closed system and located on the middle road. This study found that the drainage condition is very poor, damage, full and some even overflow.



Figure 3. Drainage condition at four hamlets (Source: Observation)

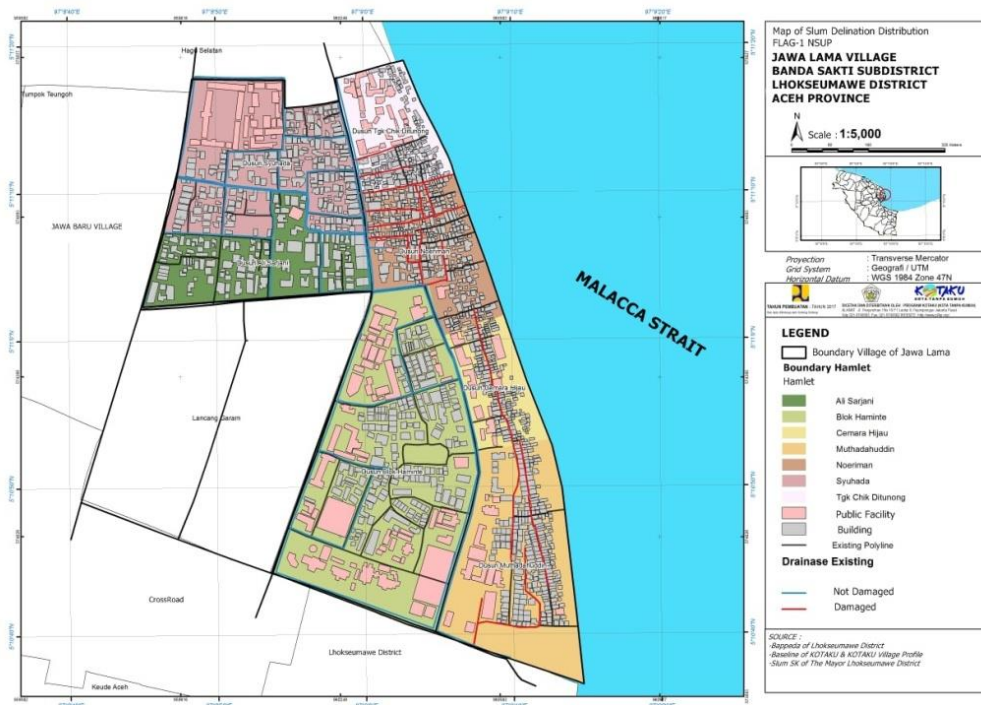


Figure 4. Drainage condition map, Source: ArcGIS map (KOTAKU, 2017).

For water supply, mostly community used water well as daily water needs. Water well is used for daily needs, such as shower, laundry, etc. Meanwhile, for drinking water, the community buy and use refill water as daily needs.



Figure 5. Water supply at four hamlets (Tgk Chik Ditunong, Noeriman, Cemara Hijau, and Murthadahuddin), Jawa Lama Village, Source: Observation.

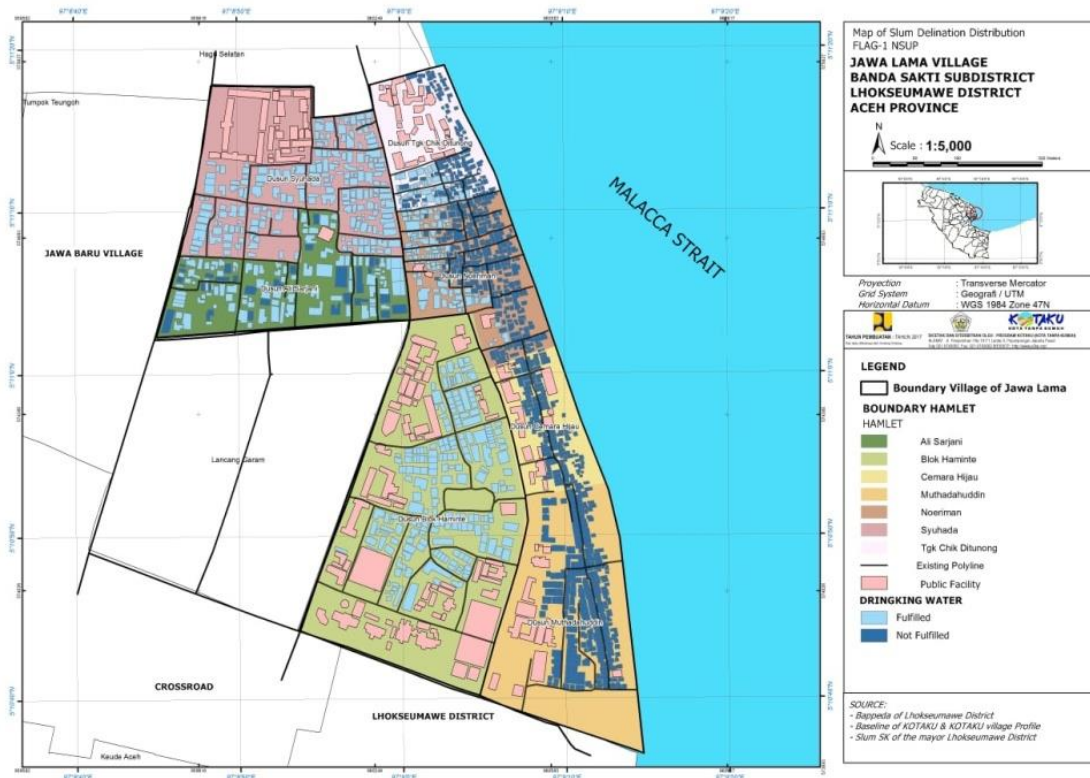


Figure 6. Inadequate water supply indicator map, Source: ArcGIS map (KOTAKU, 2017).

The housing characteristic at four hamlets, Jawa Lama Village, is timber, small, no house yard, semi-detached house, and dense. The dense settlements relate to fire-prone and risk area.



Figure 7. House characteristic at four hamlets, Jawa Lama Village, Source: Observation.

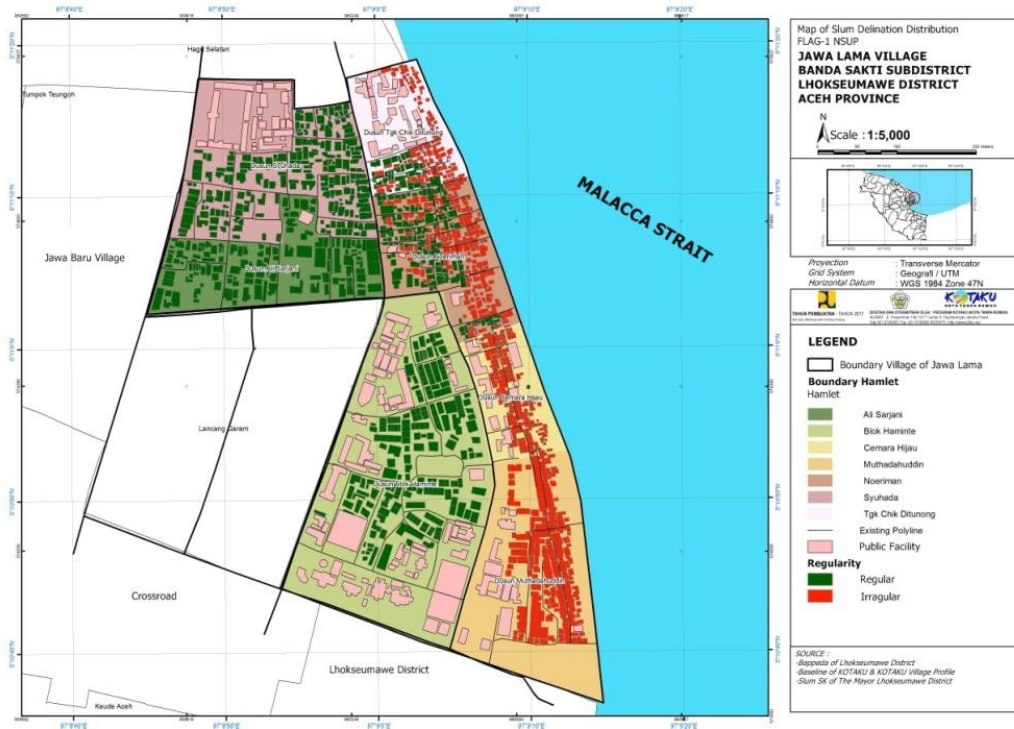


Figure 8. Housing characteristic map
 Source: ArcGIS map (KOTAKU, 2017)

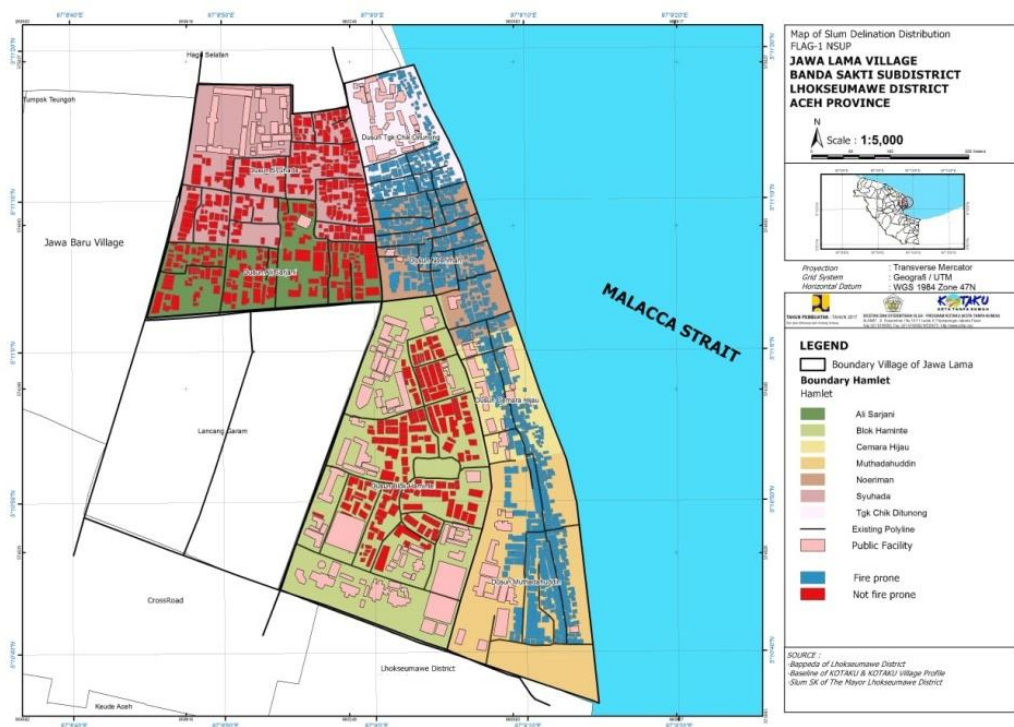


Figure 9. Fire prone maps
 Source: ArcGIS map (KOTAKU, 2017)

For waste management, each hamlet shows a different pattern as shown in Figure 11. Tgk Chik Ditunong Hamlet, Noeriman Hamlet, and Cemara Hijau Hamlet communities apply open dumping and burning practices in a sporadic open field. But, Murthadahuddin Hamlet uses a better practice by allocating a specific area for managing their trash; burn the trash and/or throw the trash on the sea, along the seashore.



Figure 10. Waste management at four hamlets, Jawa Lama Village, Source: Observation

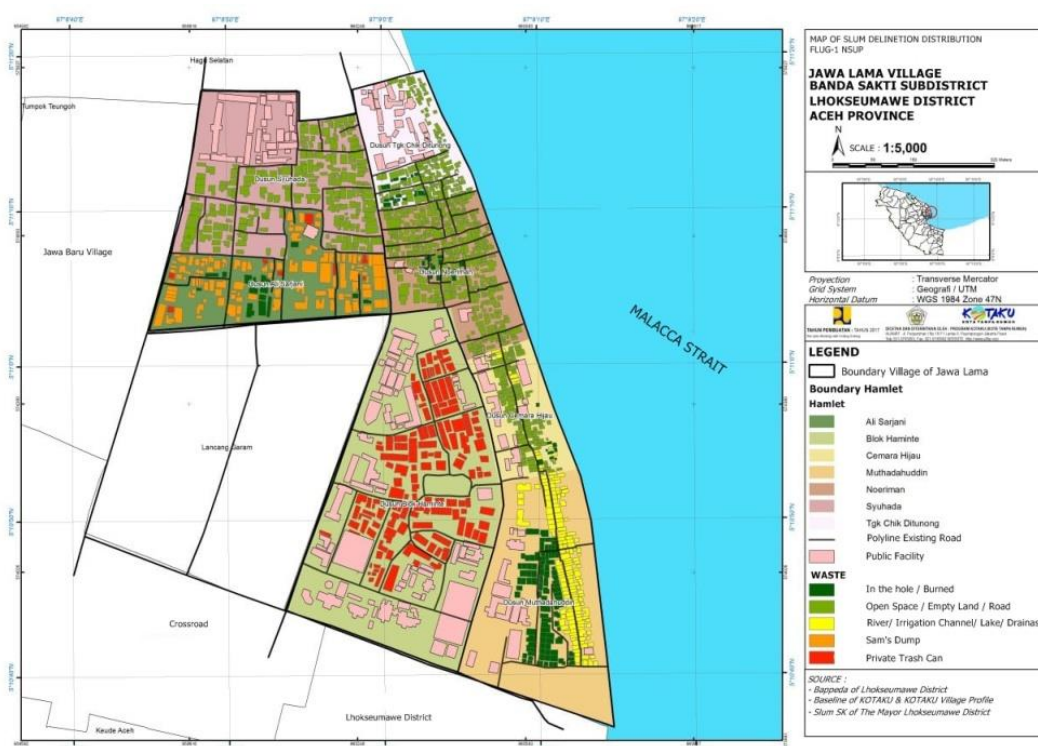


Figure 11. Waste management map
 Source: ArcGIS map (KOTAKU, 2017)

From the slum indicators as aforementioned above, this study suggests broken/damage facilities and infrastructures at all four hamlets along the seashore. Most of the roads at all hamlets are very narrow. This narrow road is blocking the fire truck if any wildfire occurs at these hamlets. So, it will increase the risks of casualties and economic losses. The narrow road also provides a problem to dump trucks to collect rubbish from the household at these hamlets.

Problems at these urban villages cannot only be accused of a specific community group or just to government institution because these problems cover many interrelated dimensions and sectors (Handayani, 2009). These slum settlements have the most deplorable living and environmental conditions and can be characterized by inadequate water supply, squalid conditions of environmental sanitation, overcrowded and dilapidated habitation, hazardous location, and insecurity of tenure, as well as economic and social deprivation (Arimah, 2010). This study suggests building facilities and infrastructures at this slum settlement for improving its living conditions. These facilities and infrastructures are; a road, drainage, sanitation, water,

waste management, fire protection facilities, and other public facilities.

The road as a vital infrastructure of an area requires more attention. The road is not only for access, it is also for people movements and activities. In mitigation issue, road is for evacuation access.

Conclusion

Slum settlement will rise rapidly if the insufficient residential area in the city. The slum area growth indicates the failure of the settlement development which is more inclined to the middle to the upper class economic community (Sueca, 2004). Based on the result above, the slum settlement is located at four hamlets at Jawa Lama Village Village, i.e. Tgk Chik Ditunong, Norman, Cemara Hijau, and Murthadahuddin. Slum settlement can be solved by improving the quality of the environment and it appropriates to social, economic, cultural condition (Alit, 2005). The slum is a complex city problem.

From slum indicators, this study found that the access or road at the slum settlements of this study needs improvement. If there is a road improvement, some problems at the study site can be solved. Street upgrading provides a great opportunity for the community (United Nations Human Settlements Programme, 2012). This road improvement must involve many people and stakeholders i.e. the government, community, experts, and academicians.

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