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Environmental impact analysis on school building construction in Sawangan 1 State Elementary School, Depok City

Alimuddin Alimuddin, Muhammad Agung Wahyudi, Arien Hersyansyah
Civil Engineering Department, Ibn Khaldun University Bogor, INDONESIA
E-mail: alimuddin@uika-bogor.ac.id, agungmw.me11@gmail.com

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ABSTRACT

One of the goals of development is to improve the welfare of the community by building various supporting facilities and assets in people's lives. Depok City plans to build the Sawangan 1 State Elementary School. Environmental impact analysis studies are needed to predict the environmental impacts that will occur. This research aims to analysis the environmental baseline quality and predict the impacts that will occur as well as how to minimize impacts at the pre-construction stage, construction stage and operation stage. This research using observation method, interview method, and scoping. The results of this study are the initial environmental baseline at the research site indicates that the environmental quality at the research site is in good category, both in terms of ambient air quality, air quality and air quality, in order to create an environmental concept development environment. The predicted impacts that arise in the reconstruction activities of the Sawangan 1 State Elementary School, Depok City are at the pre-construction stage the impact is in the form of public perception, at the construction stage in the form of a decrease in air quality, an increase in increase, an increase in surface runoff, job opportunities and business opportunities, public health problems, domestic waste generation as well as the emergence of positive and negative public perceptions of construction activities, while at the operational stage the predicted impacts will be a decrease in air quality, increased opportunities and job opportunities for the surrounding community, public health problems, changes in environmental sanitation, traffic disturbance traffic and the emergence of public perception. In general, to minimize the negative impacts that occur in any reconstruction activity of the Sawangan 1 Elementary School building, Depok City can be carried out by means of a social approach with the community, carrying out construction activities only during the day, prioritizing local communities as workers, during the construction phase until the construction phase. and as a provider of workers' needs, optimizing reforestation in the environment and greem opem spaces as well as good waste management and complete cleaning facilities so as not to interfere with public health and produce environmentally friendly development.

Keywords: environmental impact analysis; building construction; minimize impact; community; development.

INTRODUCTION

National development is essentially a comprehensive human development in the context of human development in synergy with other humans as a group of people, development aims to improve the welfare of the community by building various supporting facilities and assets in people's lives. Good development is sustainable development taking into account the various effects caused of this development both now and in the future. In development planning, environmental and social aspects must be considered as objects that are directly related to development. Depok City plans to reconstruct the Sawangan 1 State Elementary School which is administratively located on Jalan Raya Muchtar No. 1, Sawangan Baru, Kec. Sawangan, Depok City, West Java. Development in addition to providing many benefits also causes various negative impacts on the community because in the planning process less attention the needs and problems in the community. The research of some impacts of development activities that are already underway is very necessary so that the community as the direct impact recipients can feel the benefits of the existence of the development carried out.

RESEARCH METHOD

Equipment and Material

This research uses tools such as digital pH meter, digital DO meter, impinger, sound level meter, hygrometer, tape recorder, questionnaire, and camera. This research using the air absorbance and water samples as test materials.

Method

Strategy that utilized in this exploration is overview technique. The information gathered as essential information and optional information. The initial step of the exploration completed was writing study, in particular exercises identified with library information assortment. The subsequent advance is gathering essential and optional information. The third step is information handling. The following stage is an examination of natural effect gathering. The exploration stream chart is introduced in Figure 1 underneath.

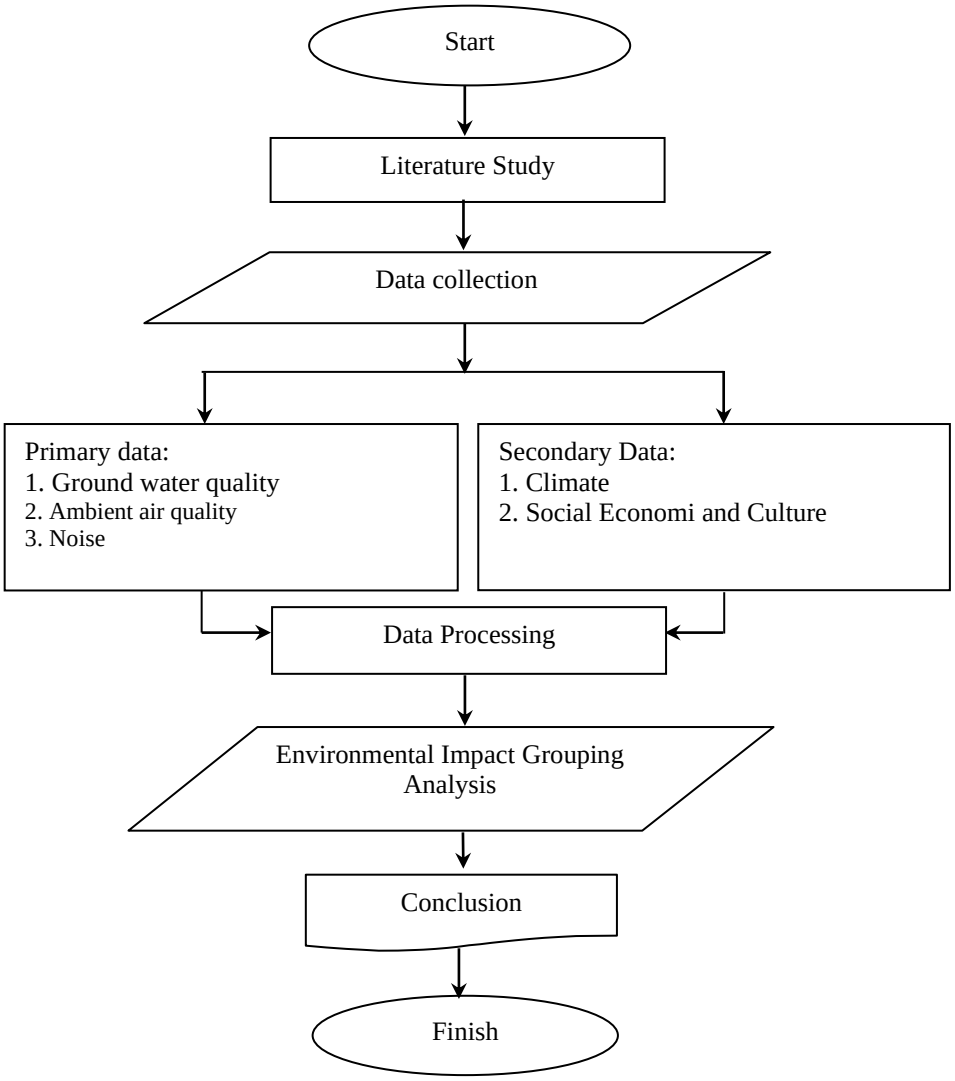

Figure 1. Research Flow Diagram

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RESULT AND DISCUSSION

Development of Sawangan 1 State Elementary School Building, Depok City are located in Raya Muchtar Street, No. 1, Region Sawangan Baru, Depok City, West Java. The area of the advancement plan is ashore where a current structure has been worked with the situation with land use rights. The Depok City Lodging and Settlement Administration will assemble 1 (one) story and 3 (three) stories of the Sawangan 1 Elementary School which will work as instructive offices. The exploration area map is introduced in the accompanying figure.

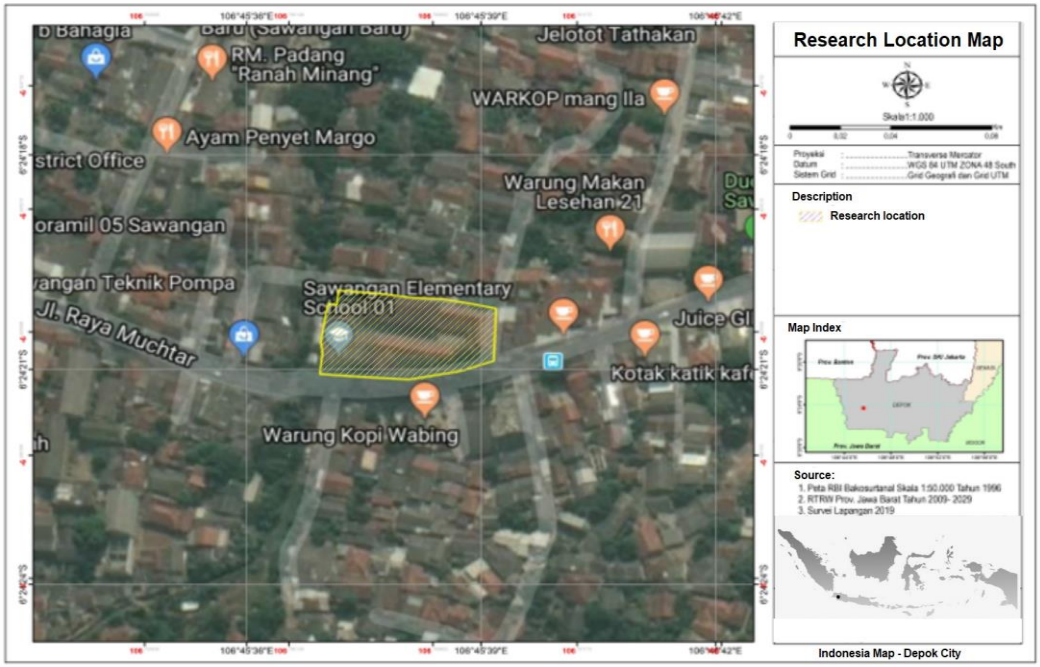

Figure 2. Research Location Map

Environmental Physical – Chemical Aspects

The average annual climate data at research location is shown below.

Table 1. Climate Data In Research Location

Month	Rainfall (mm)	Air Temperature (°C)	Humidity (%)	Wind speed (m/s)	Wind direction
January	8,2	26	81,6	2,1	
February	15,4	26	85,4	1,8	
March	6,8	26	83,3	1,4	
April	18,7	26	85,3	1,5	
May	21,9	27	81,9	1,5	
June	18,6	26	82,5	1,4	
July	9,1	26	76,3	1,2	North
August	7,4	26	74.5	1,7	
September	14,4	26	75,4	1,8	
October	13,3	26	79,6	1,4	
November	20,4	26	83,3	1,3	
December	15,1	26	84,1	1,6	
Average	14,1	26	74,9	1,6	

Source : Dramaga Climatology Station, 2020

The observed climatic factors include rainfall, air temperature, humidity, wind direction, and wind speed.

a) Rainfall

Environment information at research location shows that the normal yearly precipitation is 14.1 mm/month. The least precipitation happened in March, namely 6.8 mm, while the highest precipitation happened in May, which was 21.9 mm. From this information, it tends to be seen that at the movement area there is precipitation consistently and there is practically no critical dry season, so it very well may be presumed that at the action area there is no dry month.

b) Air Temprature and Humidity

The air temperature at the research location range from 26 °C - 27 °C with a normal of 26.1 °C, for the most part the normal yearly air temperature has an example with the month to month temperature. The example of least air temperature happens in the wet months while the example of most extreme air temperature typically increments towards the dry months. Air stickiness at the action site goes from 74.5% - 85.4% with a yearly normal of 74.9%. The most elevated mugginess happens in the wet months, while the least moistness happens in the dry months. Month to month air stickiness variances at the movement locales are somewhat little and there are no exceptional (outrageous) changes. The air dampness incorporates the relative mugginess that is as yet okay (80% - 90%)

c) Wind Direction and Wind Speed

The wind direction at the activity site is uniform, with the wind blowing towards the north. The wind speed ranges from 1.2 m/s – 2.1 m/s with an annual average speed of 1.6 m/s. Wind direction and wind speed greatly affect the distribution pattern of pollutants causing air pollution that will be scaterred around the activity arae.

Biological Aspect

The higher the variety of verdure species, with the goal that higher the degree of ecological supportability of the science or the lower the degree of contamination. Moreover, the other way around. The kinds of vegetation in the examination area are by and large mango, rambutan, nut, banana, papaya, lemongrass, and some normal vegetation (wild plants, for example, nut grass, while the sorts of fauna in the exploration area are birds, butterflies, grasshoppers, chameleons and other tamed creatures, in particular: felines, canines, chickens and ducks

Ambient Air and Noise Aspect

To decide the state of surrounding air quality and commotion at the examination area, encompassing air inspecting was completed utilizing an impinger and clamor utilizing a sound level meter and direct estimation results were acquired. Estimations of surrounding air quality and commotion were completed in two areas, specifically in primary school plan area and around local area settlements. The testing result are examined in a certify lab.

Table 2. Results of Laboratory Analysis of Ambient Air Quality and Noise

No	Test Description	Regulatory Limit **	Unit	Sample Result	
				UA-1	UA-2
	Ambient Air Quality:				
1	Sulfur Dioxide, SO_2	900/1H	µg/Nm^3	<47.9	<47.9
2	Carbon Monoxide, CO	30000/1H	µg/Nm^3	640	560
3	Nitrogen Dioxide, NO_2	400/1H	µg/Nm^3	29,43	29,37
4	Oxidant, O_3	235/1H	µg/Nm^3	<48.3	<48.3
5	Dust, Particulate	230/24H	µg/Nm^3	34,5	26,6
	Odor Air Quality:				
1	Ammonia, NH_3*	2•	ppm	<0.023	0,151
2	Hydrogen Sulfide, H_2S*	0.02•	ppm	< 0.004	< 0.004

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No	Test Description	Regulatory Limit **	Unit	Sample Result	
				UA-1	UA-2
	Noise:				
1	Equivalen noise, Leq	55 – 70	dB (A)	42,4	52,7
2	Minimum Noise, L_{min}			40,2	50,5
3	Maximum Noise, L_{max}			44,6	54,8

- (**) Ambient Air Standard Quality Regulation, PPRI No. 41/1999
- The test results relate only to the items tested
- References sampling SNI 19.7119.6 - 2005
- (■) The test results can not be comparised to the regulation of PPRI No. 41/1999

Meteorology Data

No	Description	Unit	Result	
			UA-1	UA-2
1	Temperature	°C	31,5	32,4
2	Relative Humidity	%	57,8	54,3
3	Wind Speed	m/s	0,2 - 0,5	0,3 - 1,9
4	Wind Direction	-	West	West

In view of data in table above, it is realized that predominant breeze course is westward with speeds heading from 0.1 - 0.8 m/s. The enveloping air quality at the space of the organized development and its natural components is satisfactory, where the purposeful limits really fulfill the ecological quality norm as Republic of Indonesia unofficial laws No. 41 of 1999 for SO_2, NO_2, TSP, CO, and O_3, Announcement of the State Pastor for the Climate of the Republic of Indonesia No. 50 of 1996 for H_2S and NH_3, and Republic of Indonesia unofficial laws No. 41 of 1999 concerning Public Encompassing Air Quality Rules. The eventual outcomes of the assessment of the upheaval level at the assessment region were 42,4 – 52,7 dB (A), where the results of the racket assessment were still under the quality standard.

Ground Water Aspect

Groundwater quality estimations were completed in two areas, to be specific the research location plan and around the local area settlement (AT-2). The testing items were examined in a certify research center. The aftereffects of in situ estimations and research center examination are momentarily introduced as below.

Table 3. Results of Laboratory Analysis of Groundwater Quality

No	Test Description	Sampel Result		Regulatory Limit**	Unit
		AT-1	AT-2		
	Physical Properties:				
1	Turbidity*	1,26	0,28	25	NTU
2	Color*	< 1	< 1	50	TCU
3	Total Dissolved Solid, TDS*	66	133	1000	mg/L
4	Temperature•*	27,6	28,2	Air temp. ± 3	-
5	Taste	Tasteless	Tasteless	Tasteless	-
6	Odor	Odorless	Odorless	Odorles	-
	Chemical Anorganic Properties:				
1	pH•*	5,51	6,57	6.5 - 8.5	mg/L
2	Iron, Fe*	0,106	<0.013	1	mg/L
3	Hardness Total as $CaCO_3$*	30,59	53,54	500	mg/L
4	Manganese, Mn*	0,236	0,035	0,5	mg/L
5	Nitrate as N (NO_3-N)*	0,133	0,146	10	mg/L
6	Nitrite as N (NO_2-N)*	0,004	0,013	1	mg/L
7	Mercury, Hg*	< 0.00009	< 0.00009	0,001	mg/L
8	Arsenic, As	< 0.00006	< 0.00006	0,05	mg/L
9	Chromium hexavalent, Cr^{6+}*	< 0.001	< 0.001	0,05	mg/L

No	Test Description	Sampel Result		Regulatory Limit**	Unit
		AT-1	AT-2		
10	Zinc, Zn*	0,041	0,028	15	mg/L
11	Sulphate, SO_4^{2-}*	0,76	5,36	400	-
12	Lead, Pb*	<0.0002	<0.0002	0,05	mg/L
	Biological Properties:				
1	Total Coliform	<1.8	<1.8	50	CFU/100 mL
2	E. Coli	< 1.8	< 1.8	0	CFU/100 mL

- (*) Accreditade by KAN
- (**) Clean Water Standard Quality Regulation, PerMenKes No. 32/2017
- The test results relate only to the items tested
- References sampling SNI 6989.58:2008

Source: analysis results, 2020

According to laboratory analysis results of groundwater quality, there are no parameters that pass the quality standards refer to Minister of Health Regulation No. 32 of 2017 about Environmental Health Standard Quality and Water Health Requirements for Sanity Hygiene, Swimming Pool, Solus Per Aqua, and Public Baths.

Socio - Economic and Cultural Aspects
Livelihood

Occupation is a crucial part of human existence since it covers social and monetary measurements. The social component of work is identified with the local area's acknowledgment of individual capacities and the monetary measurement to the satisfaction of every day life needs.

The predominant monetary action is the job of individuals in the research location, principally dealers, private workers, workers, military, and police. The structure development of the Sawangan 1 State Elementary School exercises will affect the jobs of the encompassing populace/local area since it will open up business openings and business openings for the local area to chip away at tasks and exchange giving every day needs. Consequently, they can build neighborhood monetary exercises with the inexorably swarmed and creating slows down and little shops around the research location.

Household Income

The construction of Sawangan 1 State Elementary School building should give profits to a lot of parties. In line with the increasing job opportunities with people who working in schools who will receive daily and monthly salaries, and job opportunities for the community around the research location. Interviews with respondents as shown in below.

Table 4. Public Income from Main Works at the Location of Study

No	Income (Rp)	Percentage (%)
1.	≤ 1.000.000	14,22
2.	1.000.000 – 3.000.000	60,41
3.	3.000.001 – 5.000.000	18,21
4.	≥ 5.000.000	3,55
5.	Uncertain	1,34
6.	Not Respond	2,27
	Total	**100,00**

Sumber: Survei Team, 2020

The biggest pay of respondents is in the scope of Rp. 1 million - Rp. 3 million/month is 60.41%, while individuals with pay of 3 million – 5 million/month are 18.21%. Uncommonly from selling, the respondents expressed that they had a turnover of Rp. 1 million to 2.5 million every day. The vast majority of the use is to address utilization issues, while the littlest use is for amusement.

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Perception and Community Attitude

As indicated by results completed with comminity, 98% of individuals know the arrangement for the development of Sawangan 1 State Elementary School will worked in their area. Local area's discernment about this action is acceptable in light of the fact that work openings that will be acquired, which is 60% and can open up business to be specific 38%. In light of a study of local area, it is realized that 85% for the most part concur and 15% concur. More complete about the reactions of local area in regards to the data on the Sawangan 1 State Primary School building development plan, Depok City was introduced beneath.

Table 5. Respondents Responses to the Sawangan 1 State Elementary School Building Construction Plan

No	Description	Total (%)
1	Have you ever heard about the Sawangan 1 State Elementary School construction plan?	
	a. Yes	98
	b. No	2
	Total	100
2	If yes, where did the information come from?	
	a. Socialization	60
	b. District/kelurahan	10
	c. Public figure	10
	d. Others	20
	Total	100
3	How do you respond to the activity plan?	
	a. Strongly agree	85
	b. Agree	15
	c. Disagree	0
	Total	100
4	What are your expectations regarding the Sawangan 1 State Elementary School construction plan?	
	a. Possibility of job opportunities	80
	b. There is a business opportunity	15
	c. The company's contribution to the advancement of the region	5
	Total	100
5	What do you worry about from the Sawangan 1 State Elementary School construction plan	
	a. Air pollution	45
	b. Increased noise	30
	c. Disruption of traffic	20
	d. Others	5
	Total	100

Source: Field Survey, 2020

Community Health Aspects

Health Facilities and public Health Service

Public services are fundamental to the government to meet the demands of the community. The service itself aims to provide what is needed by the community. Government policy in providing health services to the community is very important, where health is the main thing for a person. Health facilities in Sawangan Baru sub-district are 1 hospital unit, 1 community health centers unit, 10 posyandu units, and 3 medical centers.

Clean Water and Environmental Sanitation

Water is one of the fundamental components on Earth that is a necessary piece of every person. Living things can't live in case there is no water, so water is expected to keep up with the endurance of living things. The water we utilize each day like drinking, cooking, washing and others should be perfect so we can keep away from sicknesses brought about by helpless water quality. As indicated by the aftereffects of meetings with local area, the level of families that approach drinking water comes from well water, which is just about as much as 95%. All things being equal, drinking water sources come from filtered water/gallons. The state of the underlying due disinfection of the local area climate at the exploration site mirrors the sterilization of current culture. The conduct of the vast majority for natural wellbeing the board has been directed as per the executives norms and solid expectations for everyday comforts that are suggested, for example, discarding trash in its place and utilizing clean water for washing and washing.

Impact and How to Minimize Impact.

The effect of the arranged development of the Sawangan SDN Sawangan 1 influences the parts of the physical and financial and social segments of the neighborhood local area. Portrayal of source sway, kind of effect, measure of effect, and how to limit the effect is introduced in the accompanying table.

Table 7. Impact and How to Minimize Impact in Sawangan 1 State Elementary School Construction Activity

Impact	How to Minimize Impact
A. Pre-Construction Stage	
1. Community Perception	
The emergence of community perception both positive and negative	- Cultivating great relations with local area pioneers, approved foundations around the area of the venture - Quickly settle issues that emerge with the neighborhood local area by consultation and family relationship - Working with and obliging the desires and assumptions for the influenced local area individuals as per the capacity of the advocate
B. Construction Stage	
1. Decreased Air Quality	
Decreased air quality	- Utilizing roadworthy material vehicles - Material carrier vehicles are outfitted with acceptable canvas covers. - Cleaning the vehicle tires prior to leaving the venture impression - Making a defensive fence around the venture site as a windbreak to disengage gases, residue, and toxins all together for the breeze doesn't convey those over to different areas.
2. Increased Noise	
Increased noise	- Creating a protective fence around the project site as a windbreak to reduce noise - Not to perform noisy night work, where the surrounding community is sleeping/resting. - Using roadworthy vehicles
3. Increased surface water runoff	
Increased surface water runoff	- Make a seepage design as indicated by the incline of the street body, particularly at focuses that have a lower slant. - Follow the space of green open regions and water catchment regions as per the site plan supported by the Depok Regional Government - Make penetration wells. The volume of penetration wells is changed in accordance with the appropriate guidelines - Keeping up with sufficient extent of green open region
4. Employment and Business	
Employment	- Giving the essential chance or need for individuals straightforwardly

Impact	How to Minimize Impact
and business opportunities for residents	influenced by the movement intend to have the option to function as work as indicated by the capabilities and labor force necessities required - Giving data about work freedoms to the local area and town authorities around the area of the action - Give compensation following the UMK Depok City
5. Public Health Disorders	
Public health disorders	- Arrangement of discrete natural and inorganic waste compartments, in an adequate aggregate - Arrangement of cleaning gear in an adequate aggregate and sufficient sorts - Arrangement of cleaning officials who are answerable for the neatness of the workplace, specialist cleanliness offices, and infection vector control - Helping out outsiders in the transportation of waste
6. Change in Environmental Sanitation	
Domestic waste production	- Arrangement of independent natural and inorganic waste holders (packs), in absolute that is adequate in the headquarters - Arrangement of cleaning hardware in an adequate aggregate and satisfactory sorts - Arrangement of cleaning officials who are liable for the tidiness of the workplace, specialist cleanliness offices, and sickness vector control - Team up with outsiders in the transportation of waste
7. Community Perception	
The emergence of community perception both positive and negative	- Encouraging great relations with local area pioneers, approved establishments around the area of the task - Promptly settle issues that emerge with the neighborhood local area by pondering and family relationship - Working with and obliging the desires and assumptions for the influenced local area individuals as per the capacity of the advocate
C. Operation Stage	
1. Decreased Air Quality	
Decreased air quality	- Planting and keeping up with vegetation on the yard or nursery - Streamlining of greening in the climate and green open spaces with plants that can capacity to diminish residue and contamination gases, for example, a post of godogan, pecan, mahogany, cape, and decorative bamboo/needles
2. Increased Noise	
Increased noise	- Making a generator set specific room (soundproof) to limit commotion from the motor generator set. - Introducing the silencer on the generator to decrease commotion.
3. Employment and Business Opportunity	
Employment and business opportunities for residents	- Giving the main chance or need for individuals straightforwardly influenced by the action intend to have the option to fill in as work as indicated by the capabilities and labor force prerequisites required. - Giving data about work and business freedoms to the local area and town authorities around the area of the movement. - Giving wages following the Depok City UMK
4. Public Health Disorders	
Public health disorders	- Arrangement of isolated natural and inorganic waste compartments, in an adequate aggregate - Arrangement of cleaning gear in an adequate aggregate and sufficient sorts - Arrangment of cleaning officials who are answerable for the neatness of the workplace, laborer cleanliness offices, and illness vector control - Helping out outsiders in the transportation of waste
5. Change in Environmental Sanitation	
Change in environmenta	- Getting ready garbage cans on each floor and separate natural and non-natural waste.

Impact	How to Minimize Impact
l sanitation.	- Carrying out the 3R guideline (lessen, reuse, and reuse) - Giving and discarding waste at an impermanent dumpsite and transport it as indicated by the timetable and prerequisites to the landfill as a team with pertinent organizations
6. Traffic Disruption	
Traffic disruption.	- Giving security unit to oversee vehicle traffic at the passageway/exit - Establishment of street hardware, for example, traffic signs and street markings depending on the situation and intersection offices as zebra cross. - Follow and conform to traffic specialized counsel given by applicable organizations
7. Community Perception	
The emergence of community perception both positive and negative	- Cultivating great relations with local area pioneers, approved foundations around the area of exercises - Quickly settle issues that emerge with the nearby local area by pondering and family relationship - Working with and obliging the cravings and assumptions for the influenced local area individuals as per the capacity of the initiator

CONCLUSION

Conclusion of this research are the initial environmental baseline at the research area indicates that the environmental quality at the research area is in good category. The predicted impacts that arise in the reconstruction activities of the Sawangan 1 State Elementary School, Depok City are at the pre-construction stage the impact is in the form of public perception, at the construction stage in the form of a decrease in air quality, an increase in increase, an increase in surface runoff, job opportunities and business opportunities, public health problems, domestic waste generation as well as the emergence of positive and negative public perceptions of construction activities, while at the operational stage the predicted impacts will be a decrease in air quality, increased opportunities and job opportunities for the surrounding community, public health problems, changes in environmental sanitation, traffic disturbance traffic and the emergence of public perception. In general, how to minimize the negative impacts that occur in any reconstruction activity of the Sawangan 1 Elementary School building can be carried out by means of a social approach with the community, carrying out construction activities only during the day, prioritizing local communities as workers, during the construction phase until the construction phase. and as a provider of workers' needs, optimizing reforestation in the environment and greem opem spaces as well as good waste management and complete cleaning facilities so as not to interfere with public health and produce environmentally friendly development.

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