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Determining The Location of Regional Landfill in Kediri District Using Spatial Approach with Geographic Information System Applications

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KEYWORDS
Inhibiting Factors; Spatial; Geographic Information System; Final Waste Processing Site

ABSTRACT
Existing landfills in Kediri Regency and City are experiencing overcapacity conditions which are influenced by the increasing volume of waste along with the increasing population and the rapid development of urban areas. The Regional Landfill in Kediri Regency which is a national project based on Presidential Regulation of the Republic of Indonesia Number 80 of 2019 concerning the Acceleration of Economic Development in the Gresik - Bangkalan - Mojokerto - Surabaya - Sidoarjo - Lamongan, Bromo - Tengger - Semeru, and Selingkar Wilis - Lintas Selatan areas and is part of the Kediri Regency Regional Spatial Plan needs to be analyzed for location feasibility. The feasibility of the location of the Regional Landfill is the goal of this research with a spatial approach using Geographic Information Systems by considering the parameters in SNI 03-3241-1994 concerning Procedures for Selecting the Location of Waste Landfills. The selected variables are constraining factors consisting of regional criteria, namely geological conditions, hydrogeological conditions, slope, protected areas, distance to airfields, flood susceptibility and distance to water bodies. The feasible locations for regional landfill based on spatial analysis using GIS are in Ngadiluwih, Kras, Purwoasri, and Mojo sub-districts.

Introduction

The increase in population and urban development in Kediri Regency and Kediri City has a direct impact on the volume of urban waste. This is influenced by the diverse activity patterns and consumption levels of the population. The increasing volume of waste that is not balanced with optimal waste handling has an impact on the availability of landfill land which is decreasing. The problem of the availability of landfill land is increasingly limited experienced by the regional governments of Kediri Regency and Kediri City, so the East Java Provincial Government even to the center plans the existence of the Kediri Regency Regional Landfill to serve waste in Kediri Regency and Kediri City.

Waste services in Kediri Regency are served by the Sekoto landfill covering an area of 3.5 Ha with the processing system at the Sekoto landfill initially having open dumping and in 2021 it has switched to a sanitary landfill system (SIPSN, 2022). The waste entering the Sekoto landfill in 2021 reached 100 tons/day or 36,500 tons/year. Of the waste that enters the landfill, around 97% or 35,551 tons/year goes to landfills and 0.3% or 109.50 tons/year is processed organic waste (SIPSN, 2022). Meanwhile, waste services in Kediri City are served by TPA Corner with a Controlled landfill operational system. Until now, the Waste III Landfill in Kediri City is the only one that is still operating. Previously, TPA I and TPA II had been closed by the Kediri City Government because they had exceeded capacity (overload). From the existing study, it is estimated that TPA III Kediri City can still accommodate waste until the end of 2022. Waste entering the Corner Landfill in 2021 reached 136 tons / day or 49,640 tons/year (SIPSN, 2022).

The Regional Landfill Plan which is a solution for handling waste in Kediri Regency and Kediri City is contained in Presidential Regulation 80 of 2019 concerning the Acceleration of Economic Development in East Java Province and in Regional Regulation 5 of 2012 RTRW of East Java Province mentions one of the regional landfill development plans located in Kediri (Kediri City and Kediri Regency). With the Regional Landfill plan, the government needs to think about which locations are worthy of being used as Regional Landfill locations and how waste handling strategies can be done so that later this Regional Landfill does not experience overcapacity like the existing landfill. Later, in meeting the space needs of the Regional Landfill site plan, there will definitely be problems that need to be thought about and sought solutions by the government, both provincial and district / city considering the existence of this landfill is regional. Problems that often arise such as the availability and existence of land, location feasibility, conflicts of interest, social conflicts about community acceptance of this Regional Landfill plan to environmental quality degradation (Basyarat in (Birawida et al., 2018)).

Feasibility of Regional Landfill location is the goal to be achieved in this study with a spatial approach using a Geographic Information System by considering the parameters in SNI 03-3241-1994 concerning Procedures for Selecting Waste Landfill Sites (Anonymous, 1994) and Regulation of the Minister of Public Works of the Republic of Indonesia Number 03 / PRT / M / 2013 which explains three stages, namely, the regional stage, the preliminary stage and the determination stage through the spatial analysis process (Irawan & Yudono, 2014). GIS can be used as a tool in determining the location of landfills where the use of GIS can shorten the time in analyzing various landfill location parameters with a good level of accuracy because the use of GIS is multi-disciplinary, which is devoted to managing data containing spatial information (Kosakoy et al., 2022).

Research Methods

This research is quantitative descriptive research, namely determining the location of the Regional Landfill based on SNI 19-3241-1994 and Regulation of the Minister of Public Works of the Republic of Indonesia Number 03 / PRT / M / 2013 which is analyzed spatially with geographic information system (GIS). Quantitative analysis is used to obtain alternative locations which are suitable as the location of the Kediri Regency Regional Landfill (Mizwar, 2012).

The variable factors used in this study are inhibiting factor variables, where the parameters refer to SNI 193241-1994 concerning guidelines for landfill site selection,

among others: geological conditions, hydrogeological conditions, slope, protected areas, distance to airports, coolness to floods and distance to water bodies.

Data collection techniques in this study are primary and secondary data collection. Secondary data collection in the form of agency surveys to obtain maps of the physical condition of Kediri Regency and primary surveys to obtain directions and recommendations for determining the location of the Kediri Regency Regional Landfill.

This study uses GIS to conduct spatial analysis including *data rasterization, buffer, overlay, raster calculator*. When the complexity of factors influencing the landfill siting process is coupled with the need to involve different stakeholders in the decision-making process, there is often a need to integrate multi-criteria techniques with GIS (Fentinha, 2021). These studies use *Boolean logic* in supporting spatial decision-making (*Spatial Decision Support System*).

In the first step, after data collection, the next step is the rasterization of data into sizes of 10 × 10 data both constrain factors and driving factors aimed at storing data in the form of a matrix or grid. 2. Furthermore, the *constrain factor* data is standardized using *boolean logic* with the aim of assessing the feasibility of the Regional Landfill zone. A value of 1 is defined as feasible. A value of 0 is interpreted as unworthy. The final stage is in the form of determining recommendations for the location of the Kediri Regency Regional Landfill based on social surveys and field validation (Figure 1.).

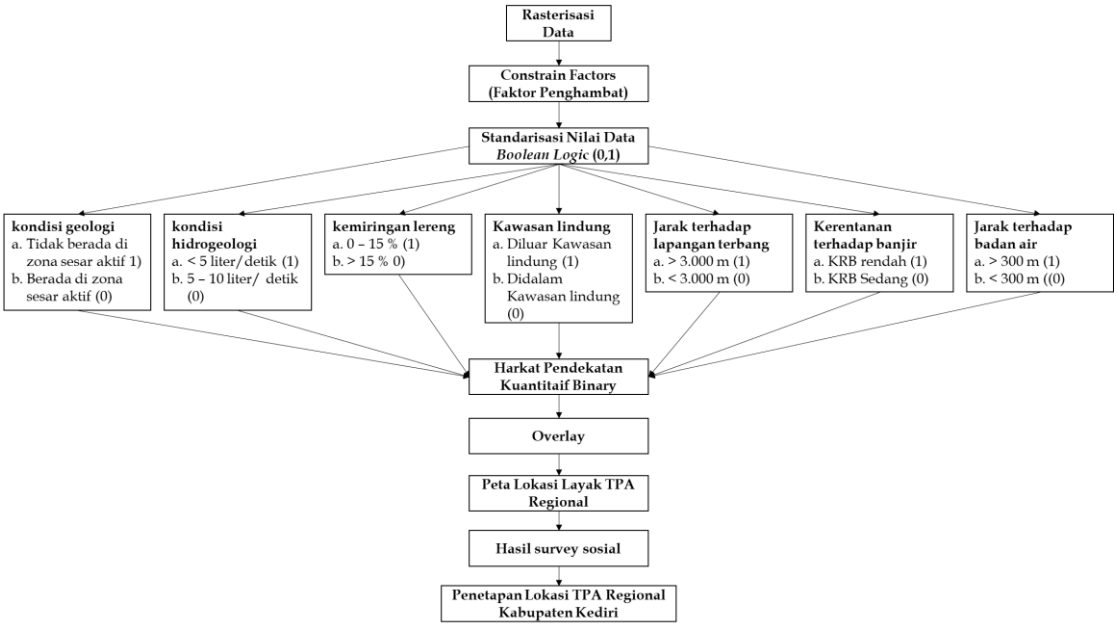

Figure 1. ***Constrain Factors Analysis Framework***

Results and Discussions

In the analysis *of constraining factors*, several parameters or criteria were determined to obtain alternative locations that are feasible and not suitable to be used as Regional Landfill of Kediri Regency based on research and assessment conducted using the GIS approach (Yedidia, 2016).

1. **Constrain *factors* parameters**

The parameters included in *the constraining factors* are parameters required in

SNI 19-3241-1994 as regional eligibility criteria, namely geological conditions, hydrogeological conditions, slopes, protected areas, distance to airfields, coolness to flooding and distance to water bodies.

2. Geological Conditions

Based on geological conditions, Kediri Regency is in a fault / volcanic zone, where areas that have the potential for earthquake disasters such as in Purwoasri District, Kandat District, and in Kandangan District. The results of the analysis of the geological map can be seen in Table 1 and for the feasibility map of Regional Landfill based on geological conditions can be seen in Figure 2.

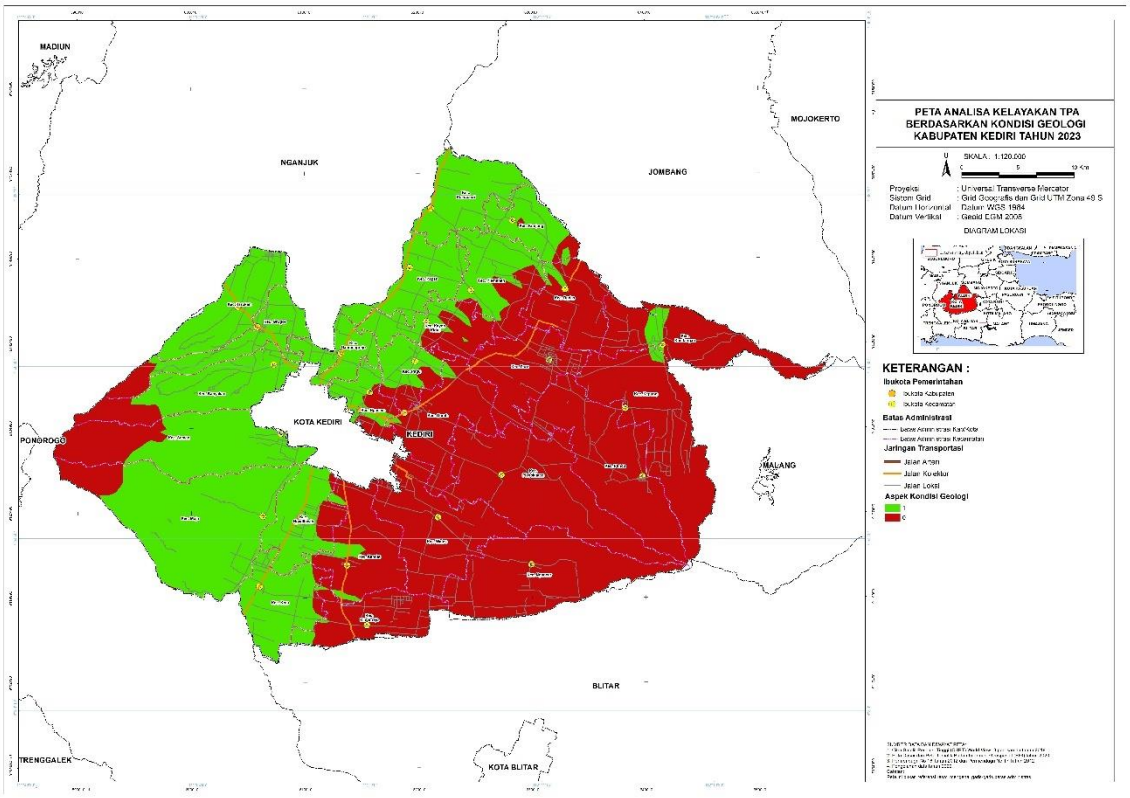

Figure 2. Feasibility Map of Kediri Regency Regional Landfill Location Based on Geological Conditions

Inappropriate geological conditions (Value = 0) = 57.65 % (87,793.52 Ha).

Feasible geological conditions (Value = 1) = 42.35% (64,496.15 Ha). Locations that are eligible as Regional Landfills based on geological conditions are Purwoasri, Papar, Gampengrejo, Tarokan, and some areas of Mojo, Semen, Manyan, Grogol, Ngadiluwih, Kras, Ngasem, Pagu, Kayen Kidul, Plemahan, Kunjang, and Badas Districts.

Table 1. Geological Map Assessment

Zone	Broad (Ha)	Value	Percentage (%)
Not in fault/volcanic zones	64.496,15	1	42,35
Located in a fault / volcanic zone	87.793,52	0	57,65

3. Hydrogeological Conditions

Hydrological maps are used to provide information on groundwater conditions, where soils that have *high permeability* (water graduation degrees) are not good for being used as regional landfill locations because leachate water can freely pollute groundwater. Table 2 is the result of hydrogeological map analysis where there are 2 (two) categories, namely high aquifer characteristics with flow discharges of 5-10 liters/second and < 5 liters / second (rare productivity).

Table 2. Hydrogeological Map Assessment

Zone	Broad (Ha)	Score	Percentage (%)
Productivity Rare	101.353,99	1	66,54
5-10 l/detik	50.955,06	0	33,46

Eligible locations (Value = 1) for Waste Regional Landfills are spread throughout the sub-district area, with the highest feasibility scores in Wates, Plosoklaten, Kandat, Gurah and Mojo sub-districts. For a map of the feasibility of Regional Landfill based on hydrogeological conditions can be seen in Figure 3.

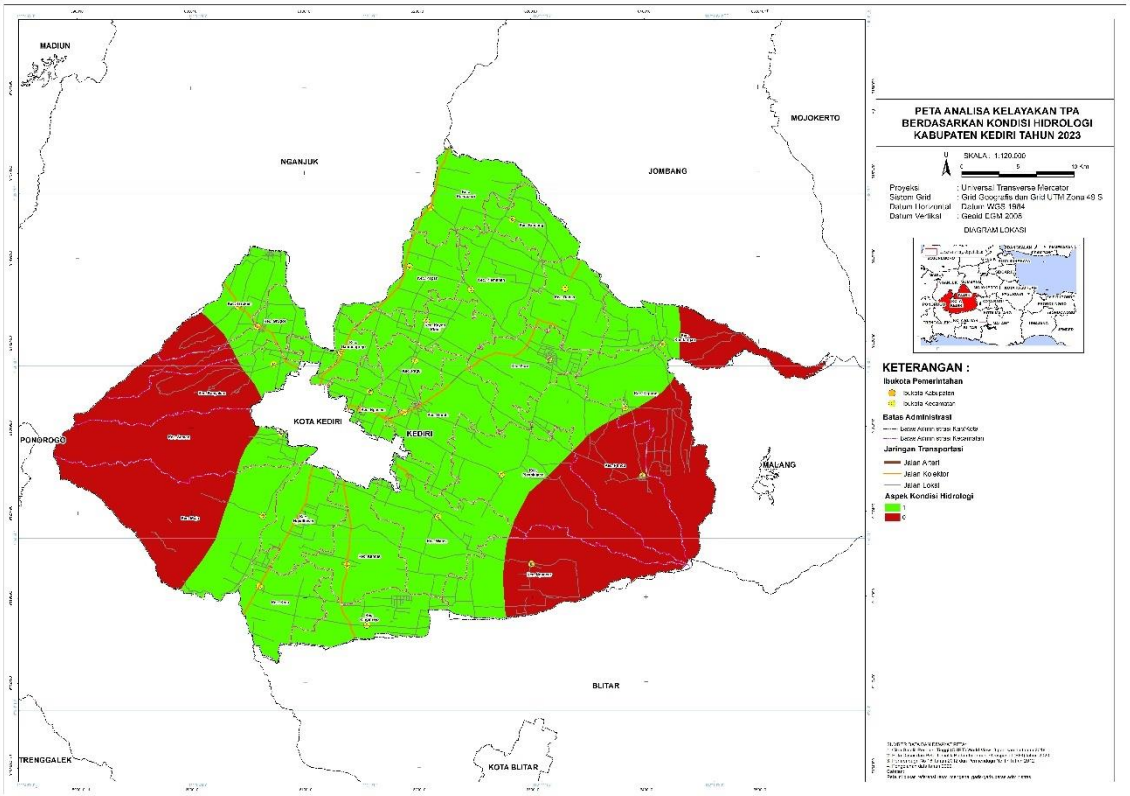

Figure 3. Feasibility Map of Kediri Regency Regional Landfill Location Based on Hydrogeological Conditions

4. The slope of the slope

The slope of the slope is closely related to the ease of construction work and

operation of the waste landfill, where the slope value of <20% is highly recommended to be used as a candidate for the location of the landfill (TPA) garbage. Based on the results of the analysis on the slope map in Kediri Regency, there are 5 classifications of slopes, namely very steep, rather steep, gentle, steep and flat, can be seen in Table 3.

Table 3. Slope Map Assessment

Slope	Broad (Ha)	Score	Percentage (%)
0 - 2 %	86.734,87	1	56,96
2 -15 %	39.637,61	1	26,03
15 -25 %	312,85	0	0,21
25 -40 %	5.890,19	0	3,87
> 40 %	19.707,81	0	12,94

The location that is eligible to be used as a Regional Landfill (Value = 1) covers an area of 126,372.47 Ha which is spread throughout the sub-district, with the highest feasibility value in Plosoklaten, Ngacar, Puncu, Wates and Kepung Districts. While the highest unfit location in Mojo, Semen, and Manyan Districts. For a map of the analysis of the feasible location of the Regional Landfill based on slope slope can be seen in Figure 4.

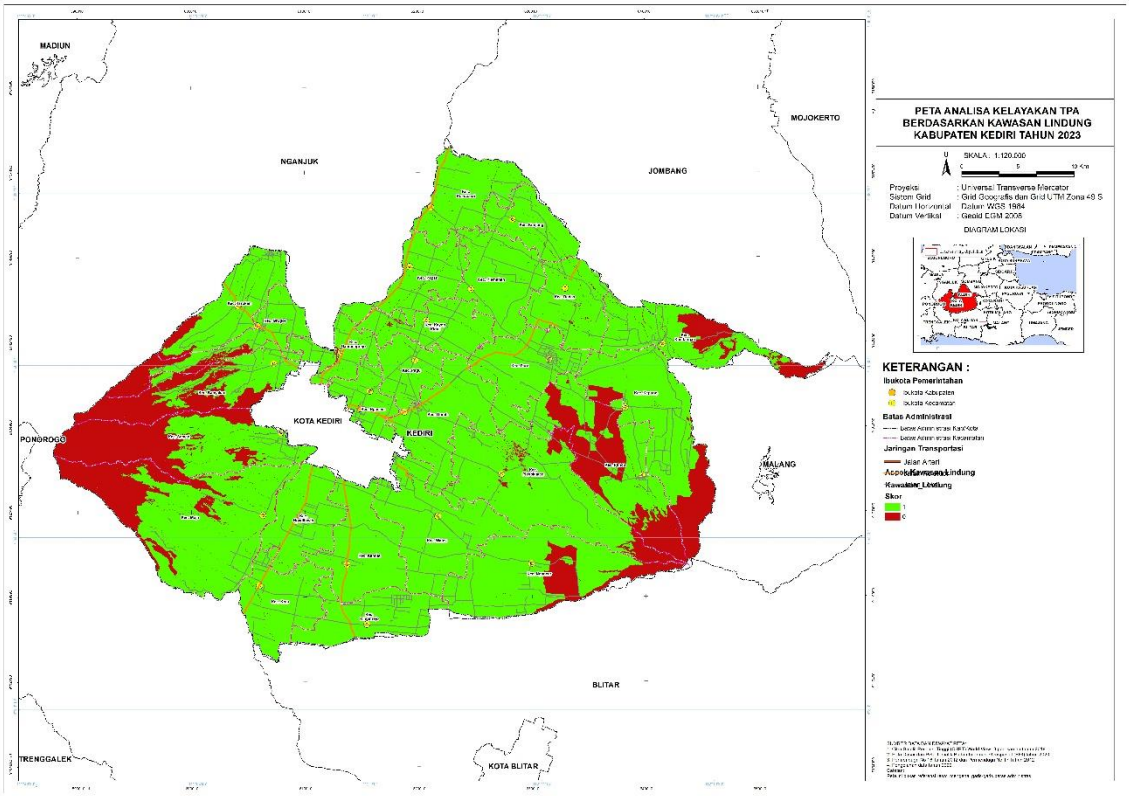

Figure 4. Feasibility Map of Kediri Regency Regional Landfill Location Based on Protected Area Conditions

5. Protected Areas

The main function of protected areas is for environmental sustainability, both natural and artificial resources, so it is not suitable if allocated as a location for Regional Waste Landfill.

The feasible location of the Waste Regional Landfill is in a non-protected area (value = 1) with a total area of 128,036.39 Ha, can be seen in Table 4.

Table 4. Protected Area Map Assessment

Zone	Size (Ha)	Value	Percentage (%)
Non Protected Areas	128.036,39	1	84,08
Protected Areas	24.247,33	0	15,92

The districts with the highest eligibility scores are Mojo, Plosoklaten, Wates, Ngancar, and Kepung. For an analysis map of the feasible location of Regional Landfill based on protected areas can be seen in Figure 5.

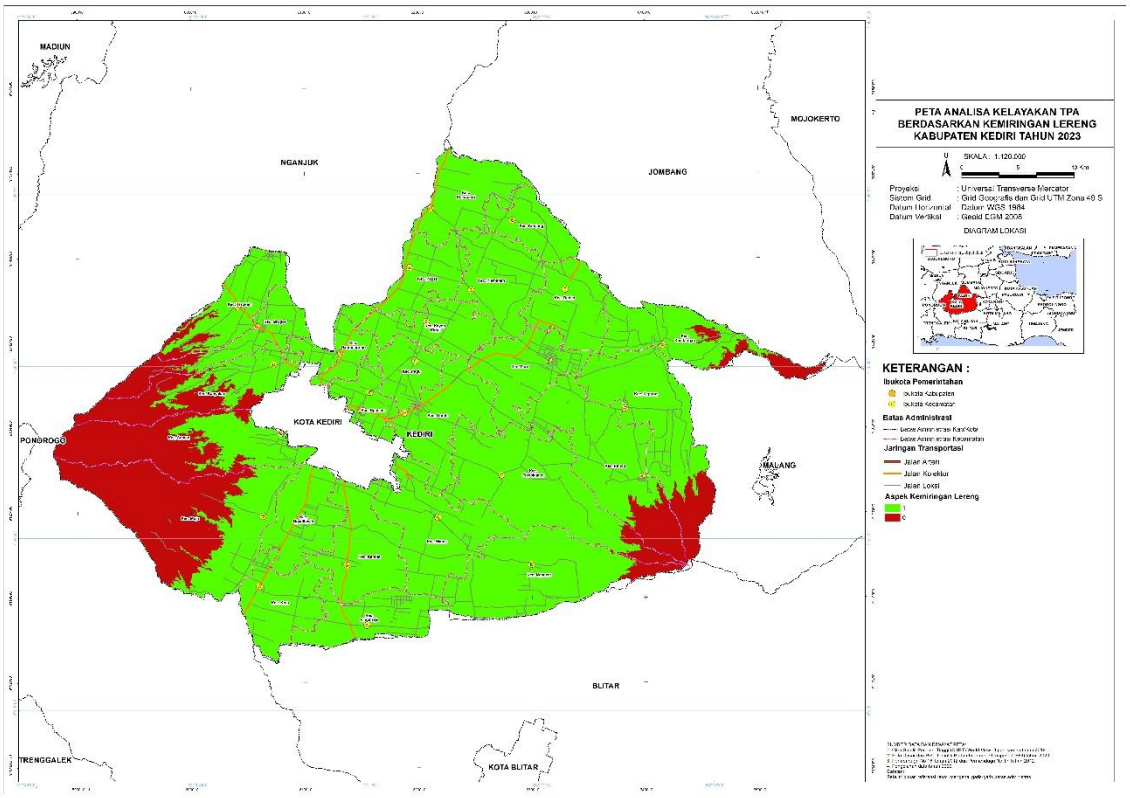

Figure 5. Feasibility Map of Kediri Regency Regional Landfill Location Based on Slope Conditions

6. Distance to Airport

Kediri Regency in its development (stated in the revision of RTRW) has a privately owned airport or airport. The location worthy of being a Regional Landfill for Waste is one that has a distance of > 3,000 m from the airport area. The location of the Regional Landfill if it is close to an airfield can disrupt traffic and flight paths.

The location outside the airport area getting a value of 0 (feasible) is an area of

149,462.37 Ha (can be seen in Table 5), which is spread across Mojo, Plosoklaten, Ngancar, Puncu, and Kepung Districts. For a map of the analysis of the feasible location of the Regional Landfill based on the distance to the airfield can be seen in Figure 6.

Table 5. Assessment of Distance Map to Airfield

Zone	Size	Score	Percentage (%)
Outside the airport area	149.462,37	1	98,14
Airport area with a buffer of 3000 m	2.827,31	0	1,86

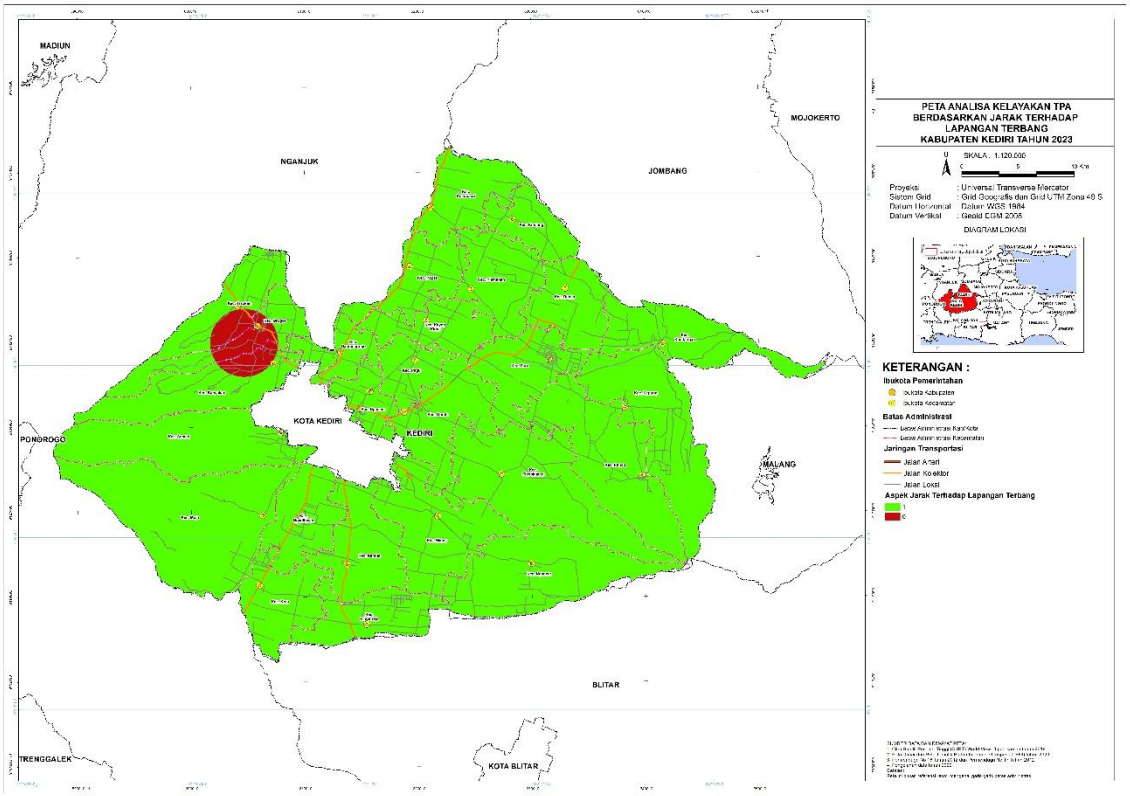

Figure 6. Feasibility Map of Kediri Regency Regional Landfill Location Based on Distance Conditions to the Airport

7. Distance to Flood

Kediri Regency is in a medium and low level bair disaster-prone area. The area of Kediri Regency that is included in the KRB low-level flood covering an area of 126,998.34 Ha is in Mojo, Plosoklaten, Puncu, Ngancar, and Cement Districts. Meanwhile, those included in the KRB moderate floods covering an area of 25,274.58 Ha are in Purwoasri, Papar, Plemahan, Kras, and Gurah Districts.

Areas that often experience inundation or flooding are not recommended to be used as the location of the Regional Landfill plan. This aims to prevent pollution of water

sources that are used by the community as water reserves and prevent the spread of diseases carried by the garbage itself.

The location eligible for Regional Landfill is in the low-level KRB Flood, where there are 127,007.81 Ha (can be seen in Table 6) spread across Mojo, Plosoklaten, Ngancar, Puncu, and Kepung Districts. For an analysis map of the feasible location of Regional Landfill based on flood-prone areas, it can be seen in Figure 7.

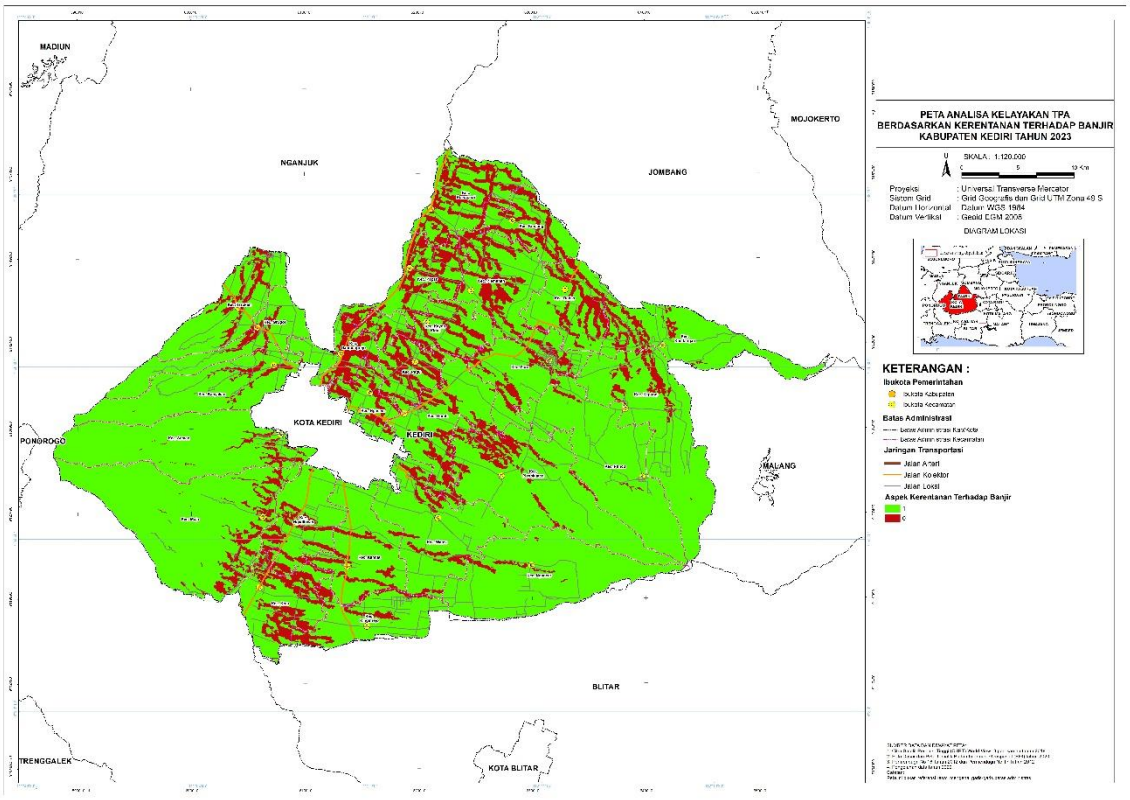

Figure 7. Feasibility Map of Kediri Regency Regional Landfill Location Based on Flood Distance Conditions

Table 6. Map Assessment of Flood-Prone Areas

Areas Prone to Flooding	Luas (ha)	Skor	Percentage (%)
Low Flood Prone	127.007,81	1	83,40
Moderate Prone Flooding	25.275,51	0	16,60

8. Distance to Water Bodies

Kediri Regency has several rivers with large enough water discharge and continuity almost as long as tofu. These rivers are Brantas River, Konto River, Bakung River, Kolokoso River, Turitunggorono River, Bangi River and Sedayu River. In addition to rivers, Kediri Regency also has 95 springs. There are several springs that have a large enough discharge, namely Sumber Dlopo, Sumber Branggahan, Sumber Krenceng, Sumber Bening. For sub-districts that are in the buffer zone of the highest water bodies

are in Mojo, Semen, Tarokan, Sometimesan, and Puncu Districts.

A suitable location as a Regional Waste Landfill location is one that is outside the buffer zone of the water body. This aims to minimize the occurrence of leachate water pollution (*leachate*) garbage to water bodies.

The area of Kediri Regency which is outside the buffer zone of water bodies that are suitable locations for Regional Landfill is 125,339.76 Ha, can be seen in Table 7.

The sub-districts that have the highest feasibility value that are worthy of being the location of the Regional Landfill are Mojo, Plosoklaten, Ngancar, Puncu, and Kepung Districts. For a map analysis of the feasible location of Regional Landfill based on distance to water bodies can be seen in Figure 8.

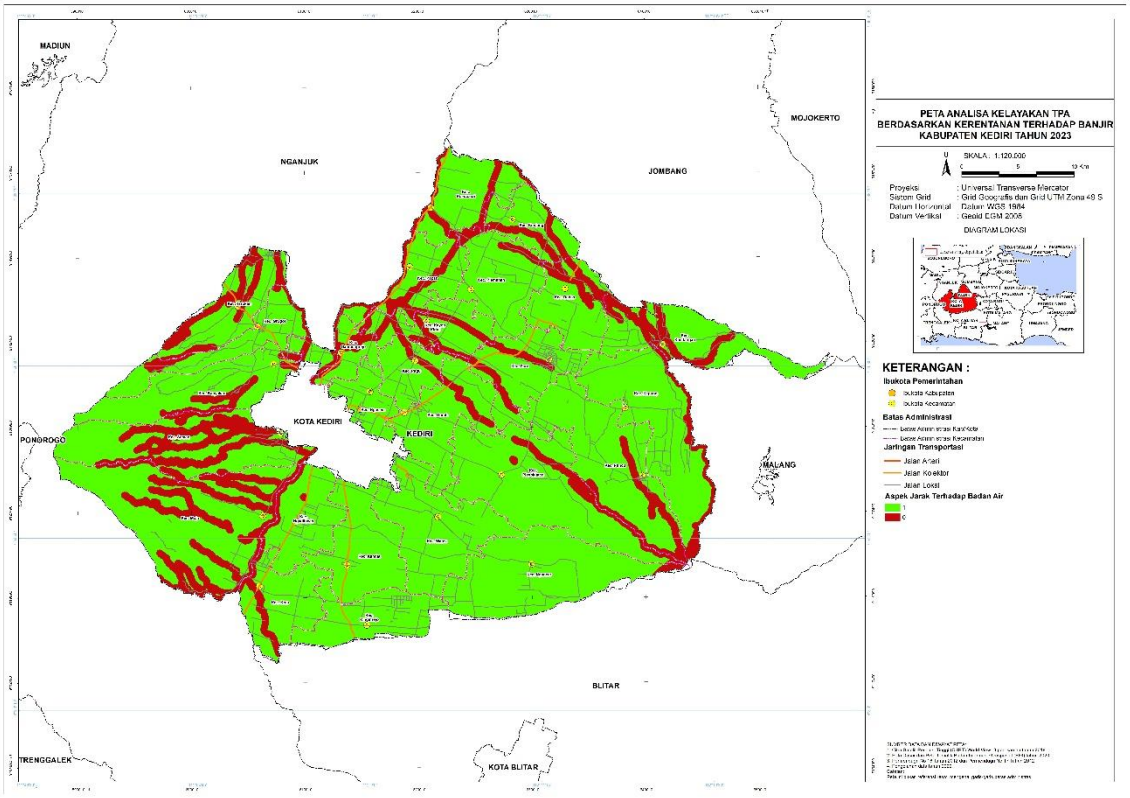

Figure 8. Feasibility Map of Kediri Regency Regional Landfill Location Based on Distance Conditions to Water Bodies

Table 7. Assessment of distance maps against water bodies

Zone	Size (Ha)	Score	Percentage (%)
Outside the buffer zone of water bodies	125.339,76	1	82,30
buffer zone of water bodies	26.949,91	0	17,70

9. Feasibility of Regional Landfill Location in Kediri Regency

Of the seven parameters of the *constrain factors*, overlays were carried out to obtain a location suitable for the Regional Waste Landfill. The eligibility criteria for the Regional Landfill location in Kediri Regency were analyzed using *the Boolean logics* method, namely by giving a score of 0 for unfit areas and a score of 1 for areas that are eligible to be the location of the Regional Waste Landfill plan. The area eligible for regional landfill in Kediri Regency is 21,928.01 (can be seen in Table 8).

Table 8. Feasibility Assessment of Regional Landfill Sites in Kediri Regency

Category	Size (Ha)	Score	Percentage (%)
TPA Eligible Areas	21.928,01	1	14,40
TPA Not Eligible Areas	130.361,69	0	85,60

From the results of the analysis, 4 (four) candidates for Regional Landfill locations were obtained with the first location area in Ngadiluwih District of 2,551.56 Ha, the second location in Kras District covering an area of 2,284 Ha, the third location in Purwoasri District covering an area of 2,242.07 Ha, and the fourth location in Mojo District covering an area of 1,996.01 Ha (can be seen in Table 9 and for a map of feasible locations as Regional Landfill in Figure 9).

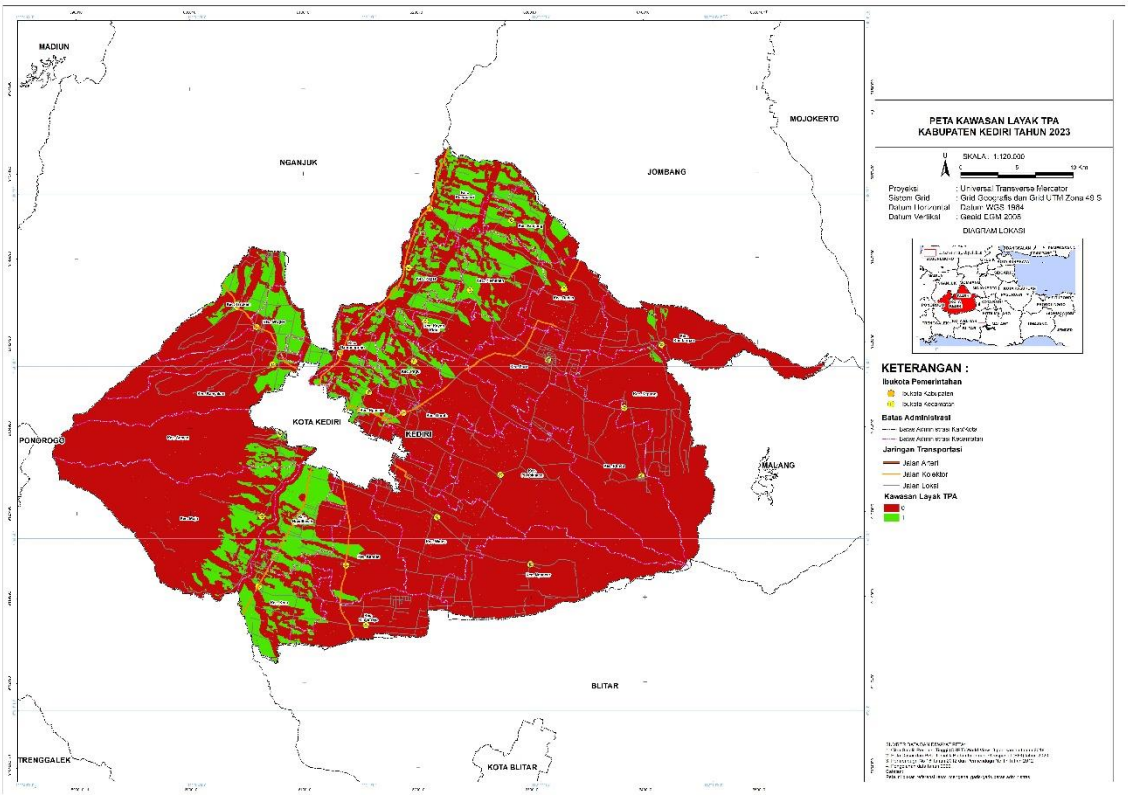

Figure 9. Map of Feasible Location as Regional Landfill of Kediri Regency

These locations are not in earthquake-prone areas or outside fault zones and prone to flooding, the slope of the area is between 0-2% except Mojo District which is partly

on a slope of 2-15% and >40%, not in protected areas, soil graduation < 5 liters / second, with geological types of alluvial rocks and lava deposits that have a clay and dusty texture that tends to have a moderate to slow permeability level (Mulyono et al., 2019) because it is influenced by very small pore size (Dariah et al, 2006).

Table 9. Feasibility of Regional Landfill Location in Kediri Regency Based on District Area

District	Area Size			
	Eligible Areas TPA	Percentage	TPA Not Eligible Areas	Percentage
Badas	103,18	0,47	4.173,78	3,20
Banyakan	1.072,85	4,89	6.012,40	4,61
Gampengrejo	486,29	2,22	1.317,16	1,01
Grogol	1.088,38	4,96	2.970,20	2,28
Gurah	160,62	0,73	5.232,78	4,01
Kandangan	129,88	0,59	5.804,04	4,45
Kandat	538,19	2,45	4.949,54	3,80
Kayen Kidul	966,78	4,41	2.799,49	2,15
Kepung	61,96	0,28	9.052,15	6,94
Kras	**2.284,00**	**10,42**	2.356,61	1,81
Kunjang	1.359,66	6,20	1.750,08	1,34
Mojo	**1.996,01**	**9,10**	11.929,93	9,15
Ngadiluwih	**2.551,56**	**11,64**	1.908,17	1,46
Ngancar	-	0,00	9.426,15	7,23
Ngasem	846,30	3,86	1.424,82	1,09
Pagu	732,57	3,34	1.958,78	1,50
Papar	1.551,47	7,08	2.417,52	1,85
Pare	-	0,00	5.008,44	3,84
Plemahan	1.799,71	**8,21**	3.239,70	2,49
Plosoklaten	-	0,00	10.939,20	8,39
Puncu	-	0,00	9.371,69	7,19
Purwoasri	**2.242,07**	**10,22**	2.435,72	1,87
Ringinrejo	139,18	0,63	4.361,83	3,35
Semen	614,93	2,80	8.429,70	6,47
Tarokan	1.202,41	5,48	3.549,34	2,72
Wates		0,00	7.542,46	5,79
Total	**21.928,01**	**100,00**	**130.361,69**	**100,00**

10. Waste Management Scenarios in Regional Landfills

In order to reduce the burden on the Regional Waste Landfill so that the condition is not like the condition of the existing landfill, a scenario of gradual waste reduction can be carried out through *composting* and the 3R (*Reduce-Reuse-Recycle)* concept. With this scenario, it can reduce the volume of waste that will enter landfills, optimize land and increase load efficiency in Regional Landfills.

The process of reducing waste by composting supported by the 3R concept affects the volume of landfills that tend to decrease and minimal land requirements (Yustikarini et al., 2017). This is in line with the direction of the Prosecutor that the target of handling waste is 70% and waste reduction is 30%.

The waste management scenario is carried out in stages, namely into 3 stages over a 20-year planning period:

a. Scenario 1 (years 2025-2029). Waste processing (composting and 3R) 20% and 80% of waste goes into *landfills*.
b. Scenario 2 (2030-2034). Waste processing efforts with *composting* and 3R increased to 50% and waste entering landfills was reduced to 50%
c. Scenario 3 (2035-2045). 100% management efforts are carried out by *composting* and 3R so that the waste that enters the landfill is only residue.

In addition to the waste management mechanism scenario, there is also a scenario of waste service stages which are divided into 2 stages, namely:

a. Phase 1 (Year 2025-2029)
    - 3 sub-districts in Kediri City (Kota District, Mojoroto, and Pesantren)
    - 11 sub-districts in Kediri Regency (Manyan District, Grogol, Tarokan, Mojo, Semen, Ngadiluwih, Kras, Ringinrejo, Kandat, Wates, and Ngancar)
b. Phase 2 (Year 2030-2045). Serving all sub-districts in Kediri Regency and City.

11. Social Conditions of Regional Landfill Plan Location

Based on the results of spatial analysis with GIS, the results of locations that are suitable for Regional Landfill site plans are in Ngadiluwih, Kras, Purwoasri, and Mojo Districts. Of the four locations that are ready to be used as locations for the Regional Landfill plan in Kediri Regency is Mojo District, which has been socialized and agreed with the sub-district and village. From the results of socialization and musrenbang, it has been agreed that there are 3 (three) proposed villages, namely Surat, Sukoanyar and Keniten Villages.

To determine the willingness and participation of the community for the existence of Regional Landfill, interviews and questionnaires were conducted with the following results:

A. Perception of the people of Sukoanyar Village

Of the 18 respondents, as many as 67% while the remaining 33% were people who rejected or disagreed. People who refuse or disagree have several considerations and reasons, namely the impact that will be caused in the form of unpleasant odors because the location is very close to residential areas and reduce the aesthetic value of the environment where the road passed will become dirty due to the splattering of garbage from transport trucks.

B. People's perception of Keniten Village

Of the 13 respondents, all respondents did not agree with the plan to build a Regional Waste Landfill in Keniten Village with considerations and reasons, namely that in Njengglong Hamlet there is a spring that flows through 2 hamlets below and an Agrotourism area has been built which in the future will be developed in collaboration with the Keniten Village government.

C. The perception of the people of Surat Village

Of the 39 respondents, as many as 87% of respondents agreed with the construction of the Regional Waste Landfill and only 13% rejected or disagreed.

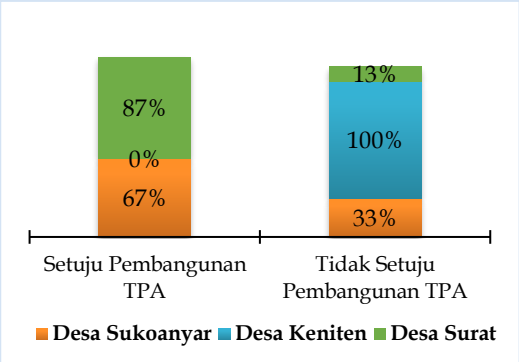

Figure 10. Community Willingness for Regional Landfill

12. Ketersediaan Lahan TPA Regional di Kabupaten Kediri

The land provided by Surat Village for the Regional Landfill in Kediri Regency is 50.51 Ha with ownership status owned by residents.

13. Regional Landfill Area Needs in Kediri Regency

If the waste management scenario in the Regional Landfill can be achieved, namely by implementing *the composting and* 3R mechanisms, it is expected that the amount of waste volume entering the landfill can be reduced and the need for land for landfill can also be reduced.

The volume of waste generation generated by residents in Kediri Regency and Kediri City according to the calculation of population projections until 2045 reaches 5,551.88 m3 / day. For the projected trend of waste volume can be seen in Figure 11.

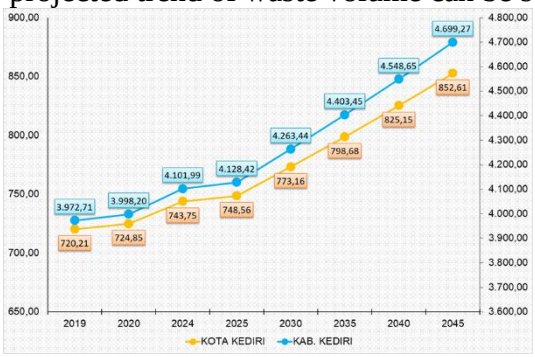

Figure 11. Projected Graph of Waste Volume (m3/day) in Kediri Regency and City

The calculation of the projected volume of waste is the basis for land requirements for Regional Landfills consisting of landfills, composting, sarpras supporting landfills, sorting sites and *buffer* areas. Land requirements by following composting and 3R scenarios tend to be smaller than land area if they do not follow waste management scenarios. The land area needed for Regional Landfill without handling reaches 112 Ha, while by implementing the composting and 3R mechanisms, it only requires a land area of 44 Ha.

Comparison of land area without handling, by applying composting and 3R mechanisms, as well as land availability can be seen in Figure 12.

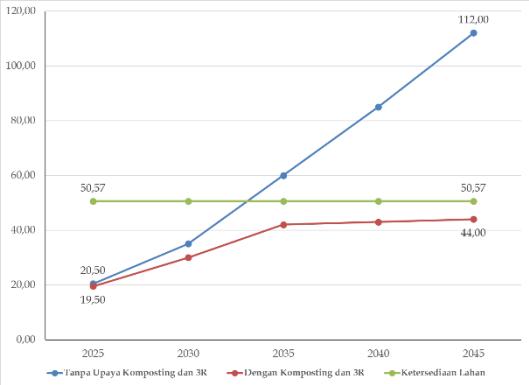

Figure 12. Area of Regional Landfill in Kediri Regency

Conclusion

Regional parameters from SNI 03-3241-1994 concerning procedures for determining the location of landfills that become constrain factors are geological conditions, hydrogeological conditions, slopes, protected areas, distance to airports, coolness to floods and distance to water bodies.

From the results of the analysis, 4 (four) candidates for Regional Landfill locations were obtained with the first location area in Ngadiluwih District covering an area of 2,551.56 Ha, the second location in Kras District covering an area of 2,284 Ha, the third location in Purwoasri District covering an area of 2,242.07 Ha, and the fourth location in Mojo District covering an area of 1,996.01 Ha.

The location agreed by the province and region to be used as the location of the Regional Waste Landfill in Kediri Regency is in Surat Village, Mojo District, which is strengthened by community willingness and participation.

The availability of land in Surat Village, Mojo District, amounted to 50.51 Ha with ownership status owned by residents.

There are 3 scenarios for managing the Waste Regional Landfill, namely: a. Scenario 1 (years 2025-2029). Waste processing (composting and 3R) 20% and 80% of waste goes into landfills. b. Scenario 2 (2030-2034). Waste processing efforts by composting and 3R increased to 50% and waste entering landfills was reduced to 50%. C. Scenario 3 (2035-2045). 100% management efforts are carried out by composting and 3R so that the waste that enters the landfill is only residue.

There are 2 stages of Regional Landfill waste services, namely: a. Phase 1 (Year 2025-2029) 3 sub-districts in Kediri City (Kota, Mojoroto, and Pesantren sub-districts) and 11 sub-districts in Kediri Regency (Manyan District, Grogol, Tarokan, Mojo, Semen, Ngadiluwih, Kras, Ringinrejo, Kandat, Wates, and Ngancar) b. Phase 2 (Year 2030-2045). Serving all sub-districts in Kediri Regency and City.

Land needs: Without implementing a management scenario requires 112 Ha. With composting mechanism and 3R requires 44 Ha.

References

Birawida, A. B., Makkau, B. A., & Dwinata, I. (2018). Penentuan Lokasi Tpa Dengan Pendekatan Spasial Di Pulau Kecil Kota Makassar. *Media Kesehatan Masyarakat Indonesia Universitas Hasanuddin*, *14*(3), 278–284.

Irawan, A. B., & Yudono, A. R. A. (2014). Studi Kelayakan Penentuan Tempat Pemrosesan Akhir Sampah (Tpa) Di Pulau Bintan Propinsi Kepulauan Riau. *Jurnal*

Ilmu Lingkungan, *12*(1), 1–11.

Kosakoy, M. N. M., Wallah, S. E., & Riogilang, H. (2022). Analisis Pemilihan Lokasi Tempat Pemrosesan Akhir Sampah Berbasis Sistem Informasi Geografis (Sig) Di Kabupaten Minahasa Tenggara. *Paduraksa: Jurnal Teknik Sipil Universitas Warmadewa*, *11*(1), 57–72.

Mizwar, A. (2012). Penentuan Lokasi Tempat Pengolahan Akhir (Tpa) Sampah Kota Banjarbaru Menggunakan Sistem Informasi Geografis (Sig). *Enviroscienteae*, *8*(1), 16–22.

Mulyono, A., Lestiana, H., & Fadilah, A. (2019). Permeabilitas Tanah Berbagai Tipe Penggunaan Lahan Di Tanah Aluvial Pesisir Das Cimanuk, Indramayu. *Jurnal Ilmu Lingkungan*, *17*(1), 1–6.

Yedidia, D. (2016). Penentuan Alternatif Lokasi Tempat Pembuangan Akhir (Tpa) Sampah Di Kabupaten Sidoarjo. *Jurnal Tehnik Its*, *8*(2).

Yustikarini, R., Setyono, P., & Wiryanto, W. (2017). Evaluasi Dan Kajian Penanganan Sampah Dalam Mengurangi Beban Tempat Pemrosesan Akhir Sampah Di Tpa Milangasri Kabupaten Magetan. *Proceeding Biology Education Conference: Biology, Science, Enviromental, And Learning*, *14*(1), 177–185.

Badan Standarisasi Nasional. (1994). SNI 19-3241:1994 tentang Tata Cara Pemlihan Lokasi Tempat Pembuangan Akhir Sampah. Badan Standardisasi Nasional

Anonim. (2008). Undang-Undang Republik Indonesia Nomor 18 Tahun 2008 tentang Pengelolaan Sampah. Lembaran Negara Republik Indonesia.

Anonim. (2012). Peraturan Pemerintah (PP) Nomor 81 Tahun 2012 tentang Pengelolaan Sampah Rumah Tangga Dan Sampah Sejenis Sampah Rumah Tangga. Pemerintah Republik Indonesia.

Anonim. (2012). Peraturan Daerah Provinsi Jawa Timur Nomor 5 Tahun 2012 Tentang Rencana Tata Ruang Wilayah Provinsi Tahun 2011 - 2031. Pemerintah Daerah Provinsi Jawa Timur.

Anonim. (2013). Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat Nomor 03/PRT/M/2013 tentang Penyelenggaraan Prasarana dan Sarana Persampahan dalam Penanganan Sampah Rumah Tangga dan Sampah Sejenis Sampah Rumah Tangga. Kementerian Pekerjaan Umum dan Perumahan Rakyat.