International Journal of Contemporary Sciences (IJCS)
Vol. 4, No. 8, 2026: 2129-2150

An Evaluation of Environmental Carrying Capacity and Accommodation Capacity for the Utilization of Residential Space of Mataram City

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ARTICLEINFO

Keywords: Carrying capacity, Land, Environment, Population, Geographic Information System

Received : 15 June
Revised : 20 July
Accepted: 30 August

ABSTRACT

This study aims to (1) identify the existing conditions of residential areas in Mataram City, (2) analyze the level of carrying capacity and accommodation capacity of residential areas, and (3) formulate development directions based on evaluation results. The method used is a quantitative approach based on GIS spatial analysis, including Sentinel-2 image classification using CART algorithm, geometric population projection, overlay of 9 SKL parameters according to Ministry of Public Works Regulation No. 20/2007, and calculation of carrying capacity (DDPm) and accommodation capacity (DT). The results show existing residential land reaches 4,238.58 ha (70.19%), with an average actual density of 109.34 people/ha and the highest pressure in Ampenan (128.60 people/ha). SKL analysis shows suitable residential land (LPm) of 1,853.905 ha. Carrying capacity analysis shows Ampenan, Cakranegara, and Mataram experience deficits (DDPm < 1), while Sekarbela, Sandubaya, and Selaparang remain in surplus. Total accommodation capacity reaches 617,968 people with remaining capacity declining 30.4% (2025-2035). The largest land deficit is in Ampenan (-169.41 ha in 2025 and -228.59 ha in 2035), while Sekarbela consistently remains in surplus

DOI: https://doi.org/10.55927/2c8cxx70
E-ISSN: 3047-4078
https://journalijcs.my.id/index.php/ijcs

INTRODUCTION

The exponential process of urbanization in various parts of the world has significant spatial implications for the structure of urban land use. As centers of agglomeration of social and economic activity, urban areas consistently attract population movement from hinterlands through both permanent and circular migration (Rahmadana, 2020 & Wilonoyudho, 2014). This phenomenon has triggered the massive conversion of undeveloped land (open space) into built-up areas, particularly in the housing and settlement sectors.

The imbalance between the rate of provision of safe public spaces and the rate of horizontal residential expansion often triggers spatial segregation and environmental degradation (Ramadhan, 2025). If not controlled through standard spatial evaluation instruments, population accumulation in urban areas will exceed the environment's capacity to support the sociological activities within it.

Within the regional context of West Nusa Tenggara (NTB) Province, Mataram City plays a central role as the provincial capital. It is designated as a National Activity Center (PKN) by national spatial planning documents. This strategic position makes it a major magnet for investment concentrations, a center for higher education services, regional referral healthcare facilities, and a hub for Meeting, Incentive, Convention, and Exhibition (MICE)-based tourism activities. This multi-factorial attraction drives a highly dynamic population growth rate and triggers sociodemographic pressures on limited urban space (Hakim et al., 2022).

According to demographic data released by Budianto et al. (2025), the actual population of Mataram City has reached 441,147 people with an average annual growth rate of 1.34%. As a consequence of its relatively small administrative area in West Nusa Tenggara Province, which is only around 61.30 square kilometers according to BPS data, its population density has increased drastically.

The increase in residential density that is not balanced with compliance with spatial planning creates an asymmetric threat in the form of urban sprawl (unregulated urban sprawl). The commodification of productive agricultural land—such as Protected Rice Fields (LSD)—into new residential clusters on the outskirts of Mataram City not only threatens local food security but also radically changes the region's hydrological structure (Purwandari et al., 2025). The reduction in water absorption areas due to cementation and land-surface hardening linearly increases the runoff coefficient. The direct impact of this distortion of hydraulic function is reflected in the increased frequency, sequential distribution, and intensity of inundation and flooding risk in various densely populated residential areas during the rainy season.

On the other hand, the assimilation of extreme population density without the support of basic infrastructure upgrades triggers internal degradation of environmental carrying capacity (Basman et al., 2025). Residential areas with excessively high residential densities tend to trigger a decline in the livability index, characterized by the emergence of new slum areas.

Environmental sanitation issues pose a real threat due to limited physical space for the safe and hygienic placement of individual septic tanks. Based on the technical mandate of urban spatial planning, high-density housing should ideally be integrated with a Centralized Domestic Wastewater Management System (SPALD-T) or communal system to minimize coliform bacteria contamination in shallow groundwater layers. The inability of existing residential areas to provide these utilities triggers unequal access to basic infrastructure (Marlina et al., 2025), while simultaneously reducing the environmental health index and sustainable livability of urban communities in Mataram City.

The Mataram City Government has attempted to control spatial utilization through legal regulatory instruments, including the issuance of Mataram City Regional Regulation Number 5 of 2019 concerning Amendments to the Mataram City Spatial Plan 2011-2031 (Rizdarahman et al., 2022). However, there is a wide gap between normative spatial planning policies (das Sollen) and the empirical dynamics of real land use in the field (das Sein). Space allocation policies in spatial planning documents are often static-projectional, while anthropogenic pressures on population needs are dynamic-expansive. Many areas legally and formally allocated as Green Open Space (RTH) or protected areas are in reality being occupied for residential purposes due to high property market demand and limited land ready for development.

The fundamental weakness in the current spatial utilization control system is the minimal integration of Environmental Carrying Capacity (DDLH) and Environmental Carrying Capacity (DTLH) instruments, specifically in determining residential zoning (Sukarsa, 2017). Spatial planning evaluations conducted by local governments often rely solely on the administrative physical availability of land (land availability), without measuring the ecosystem's biological carrying capacity for anthropogenic waste and the long-term supply of clean water resources.

Without a precise scientific database on the maximum capacity of residential land to adequately accommodate a human population, future revisions to spatial policies such as the Mataram City Detailed Spatial Plan (RDTR) will only serve as legal justification for existing spatial planning violations. Therefore, a comprehensive evaluative study is needed that examines the spatial correlation between population growth, actual space needs, and the availability of spatially based environmental carrying capacity.

This study on the carrying capacity of settlements is highly urgent because it concerns the long-term sustainability of Mataram City's development. The novelty of this research lies in the integration of quantitative demographic-spatial analysis with Geographic Information System (GIS)-based land capability zoning mapping. The results of this study's carrying capacity and carrying capacity evaluation serve not only as a supplement to academic documents but also as a crucial science-based policy foundation for local governments.

The resulting recommendations can be used concretely as a basis for formulating a stricter spatial utilization control strategy, determining incentive-disincentive mechanisms, sharpening building permit zoning maps, and designing adaptive settlement concepts that are resilient to disasters and climate change at the local level.

Based on the entire description of demographic dynamics, ecological crisis, and policy gaps above, the author is motivated to conduct in-depth scientific research with the title: "Evaluation of Environmental Carrying Capacity and Accommodation Capacity for the Utilization of Residential Space in Mataram City".

To focus the direction of the study so that it runs systematically and measurably, this research was designed by establishing 3 (three) main objectives as follows:

1. Identifying the existing conditions of residential areas in Mataram City based on the spatial distribution patterns of residential land, the accumulation of actual residential areas, and the level of population density in each administrative sub-district.
2. Analyse the level of carrying capacity and capacity of residential space in Mataram City quantitatively spatially by comparing the variables of potential land availability and clean water availability with the volume of real space requirements from population projections.
3. Prepare directions for the development of Mataram City's residential areas based on the results of the evaluation of the carrying capacity and environmental capacity, to formulate residential zoning that is safe, inclusive, suitable, and ecologically sustainable.

LITERATURE REVIEW

The Mataram City Government has attempted to control spatial utilization through legal regulatory instruments, including the issuance of Mataram City Regional Regulation Number 5 of 2019 concerning Amendments to the Mataram City Spatial Plan 2011-2031 (Rizdarahman et al., 2022). However, there is a wide gap between normative spatial planning policies (das Sollen) and the empirical dynamics of real land use in the field (das Sein). Space allocation policies in spatial planning documents are often static-projectional, while anthropogenic pressures on population needs are dynamic-expansive. Many areas legally and formally allocated as Green Open Space (RTH) or protected areas are in reality being occupied for residential purposes due to high property market demand and limited land ready for development.

METHODOLOGY

Research Methods

This research employed quantitative methods, including descriptive analysis and Geographic Information Systems (GIS)-based spatial analysis. The analysis was conducted through spatial and statistical data processing to evaluate the carrying capacity and spatial utilization of residential areas in Mataram City.

Data Analysis

Analysis of Existing Residential Space Conditions

a) Population Projection

The method used is the Geometric Model, based on the assumption that population growth occurs progressively based on compound interest calculations, in accordance with the characteristics of urban population growth, such as in Mataram City. The formula used is as follows:

$$Pt = P_0 \times (1 + r)^t$$

$$r = [(Pt / P_0)^\wedge(1/t)] - 1$$

Description:

Pt = population in projection year t;
P_0 = population in base year;
r = average annual population growth rate;
t = time period (difference between base year and projection year).

b) Classification of Existing Residential Land

Residential land classification was performed using Sentinel-2 Level 2A imagery with the Classification and Regression Tree (CART) algorithm. The CART algorithm was chosen because it can automatically generate classification rules without assuming a strict parametric distribution (Lawrence, 2001; Pan et al., 2025). Land cover was grouped into two classes: residential land (buildings and built-up areas) and non-residential land (rice fields, gardens, and vegetation).

c) Classification Accuracy Assessment

Classification results were validated by comparing them to reference data obtained from validation points. A total of 50 validation points were used for each class to test the accuracy of the classification results (Congalton & Green, 2019). The level of agreement between the classification results and the reference data was evaluated using the Kappa coefficient (κ), which indicates the level of agreement between the classification results and the reference data, taking into account the random probability of agreement:

$$\kappa = [N(a+d) - ((a+b)(a+c) + (c+d)(b+d))] / [N^2 - ((a+b)(a+c) + (c+d)(b+d))]$$

Table 1. Interpretation of Kappa Coefficient Values.

Kappa Coefficient Value	Interpretation
< 0.00	Poor
0.00-0.20	Slight
0.21-0.40	Fair
0.41-0.60	Moderate
0.61-0.80	Substantial
0.81-1.00	Almost Perfect

Source: Congalton & Green (2019)

Population density is calculated by dividing the population projection (step a) by the settlement area obtained from the classification (step b): Population Density = Population (people) / Settlement Area (ha).

Analysis of Carrying Capacity and Accommodation Capacity of Settlement

a) Land Capability Analysis for Settlement

Land capability is determined through an analysis of nine Land Capability Unit (SKL) parameters, each of which has a specific weight and value, as stipulated in Minister of Public Works Regulation Number 20 of 2007:

Table 2. Land Capability Unit (SKL) Parameters and Weights.

No	SKL Parameters	heavy	Purpose of Analysis
1	Morphology	5	Grouping land forms/morphology that are suitable for development
2	Ease of Work	1	Assess ease of excavation/land preparation
3	Slope Stability	5	Assessing slope stability under load
4	Foundation Stability	3	Assess the suitability of land to support heavy buildings
5	Water Availability	5	Assessing water availability and supply capacity
6	Drainage	5	Assessing natural rainwater drainage capacity
7	Erosion Resistance	3	Assessing land resistance to erosion
8	Waste Disposal Compliance	0	Identify suitable areas for waste storage/processing
9	Resilience to Natural Disasters	5	Assessing land capacity against natural (geological) hazards

Source: Peraturan Menteri Pekerjaan Umum No. 20/2007

b) Analysis of Residential Space Requirements

Based on SNI 03-1733-2004, the standard space requirements per housing unit consist of the following:

Table 3. Standard Space Requirements per Housing Unit.

Type of Room	Standard (m^2/unit)	Weight (Number of Occupants)
Bedroom (3 units)	60	3
Living/family room (2 units)	80	2
Kitchen + service room (1 unit)	200	1

Source: SNI 03-1733-2004

Residential land requirements are calculated by adding the area of the house plot (LK) and the area of the infrastructure facilities (LPS), following Wahyudi (2018):

$$KLP = LK + LPS \quad LK = JP \times \alpha \quad LPS = 42\% \times LK$$

Description:
KLP = residential land need (m^2);
JP = total population (people);
LK = area of house plot (m^2);
α = coefficient of space requirement (22.5 m^2/person);
LPS = land for facilities and infrastructure.

c) Analysis of Carrying Capacity and Housing Capacity

(1) Area of Land Suitable for Settlement (LPm)

$$LPm = (LWp - LKL - LKB) \times \text{Rasio Tutupan Lahan}$$

Description:
LWp = potential development area (ha), obtained from land capability classes D and E (result of overlaying nine SKL); Land cover ratio = 60% for residential areas (Regulation of the Minister of Public Works Number 20/2007);
LKL = protected area area (ha) based on the RTRW spatial plan;
LKB = area of disaster-prone area (ha) based on the high hazard class SKL value.

(2) Settlement Carrying Capacity (DDPm)is ca lculated by comparing the area of residential land that corresponds to the population's space needs (Hernawan & Rudiarto, 2023):

$$DDPm = LPm / (JP \times \alpha) \text{ or, in hectares: } DDPm = LPm / (JP \times 0{,}00225)$$

Table 4. Criteria for Land Carrying Capacity Relative to Settlement Carrying Capacity.

Value DDP	Criteria	Interpretation
DDP > 1	Surplus carrying capacity	Land is capable of accommodating residents; residential capacity is still available
DDP = 1	Balanced	Equivalent conditions between population and existing land capacity; there is neither excess nor shortage of space
DDP < 1	Carrying capacity deficit	The land is unable to accommodate the population; there is a shortage of space for settlements.

Source: Hernawan & Rudiarto (2023)

(3) Suitable Land Area for Settlement (LPmo)

The ideal land area available for settlements is based on the carrying capacity value: LPmo = (1 / DDPm) × LPm. (4) Optimal Population (JPo) - the maximum number of residents that can be accommodated by the available land, representing the accommodation capacity (DT): JPo = DDPm × JP (Hernawan & Rudiarto, 2023).

d) Analysis of Land Availability and Balance for Settlement

Land availability for settlement was identified by combining (i) existing land use maps from the Sentinel-2 classification, (ii) land capability maps (Class D and E), and (iii) maps of protected and disaster-prone areas (for exceptions), using the Superimpose and Geoprocessing Clip tools in GIS software. Land was considered available for settlement if (i) it fell within capability Class D or E, (ii) it was not a protected area, (iii) it was not a disaster-prone area, and (iv) it was currently undeveloped.

Table 5. Criteria for Evaluating Land Needs and Availability for Settlement.

Criteria	Category
KLP > LPmo	Deficit
KLP = LPmo	Balance
KLP < LPmo	Surplus

Source: Hernawan & Rudiarto (2023).

Description:
KLP = residential land requirement (ha);
LPmo = optimal suitable residential land area (ha).
If KLP > LPmo, there is a residential land deficit, meaning that the available land is insufficient to accommodate the population; conversely,
if KLP < LPmo, there is a surplus, meaning that land is still available for future residential development.

RESULTS AND DISCUSSION

Geographical Location and Administrative Areas

Mataram City is the capital of West Nusa Tenggara Province, administratively located in the western part of Lombok Island. Astronomically, Mataram City is located at coordinates 08°33′–08°38′ South Latitude and 116°04′–116°10′ East Longitude. It borders Gunung Sari and Lingsar Districts to the north, Labuapi District to the south, the Lombok Strait to the west, and Narmada and Lingsar Districts to the east.

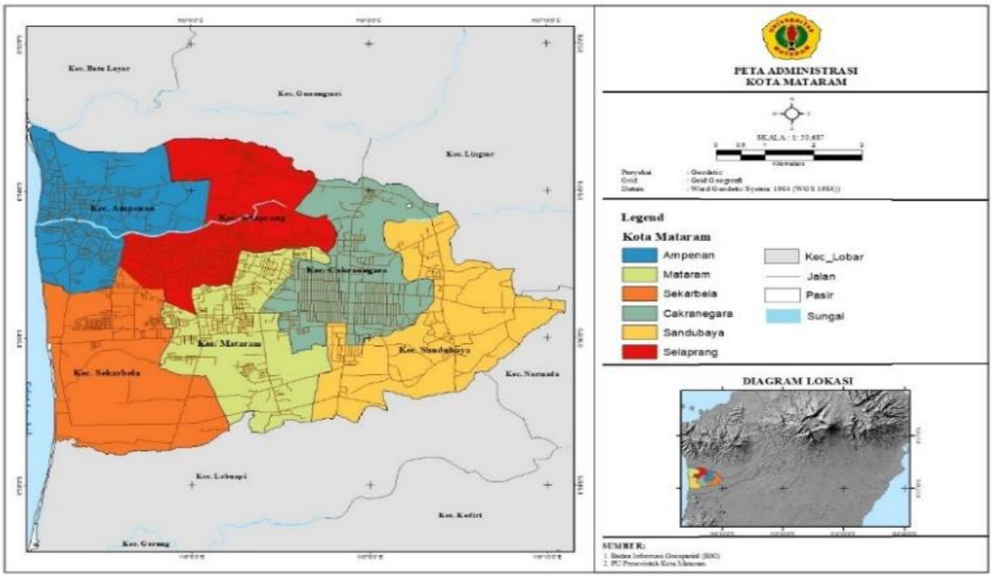

Figure 1. Administrative Map of Mataram City

Table 6. Area of Mataram City by District.

District	**Area (ha)**	**Percentage (%)**
Ampenan	918.69	15.21
Sekarbela	1,162.63	19.25
Mataram	923.68	15.30
Selaparang	963.55	15,96
Cakranegara	908.27	15.04
Sandubaya	1,162.19	19.24
Total	6,039.01	100.00

Source: Indonesian Terrain (RBI)

Sekarbela and Sandubaya districts have the largest land area, covering 1,162.63 ha and 1,162.19 ha, respectively, while Cakranegara sub-district has the smallest land area, namely 908.27 ha.

Existing Conditions of Residential Space in Mataram City
Population Projections

Table 7. Population Projections of Mataram City by District, 2025–2035 (people).

Year	Ampenan	Sekarbela	Mataram	Selaparang	Cakranegara	Sandubaya	Total
Year 2024	94,006	62,222	82,969	76,605	72,785	71,369	459,956
Year 2030	101,312	66,669	87,803	78,367	76,862	76,259	487,272
Year 2035	107,753	70,605	92,049	79,868	80,440	80,587	511,302

Source: Geometric Projection Analysis (2026)

Ampenan District is projected to have the highest population in 2035 (107,753 people), increasing by 12,560 people (13.19%). Sekarbela District has the lowest population projection in 2035 (70,605 people) but experiences significant growth of 12.17%. Sandubaya, Cakranegara, Mataram, and Selaparang are projected to grow by 11.67%, 9.52%, 9.90%, and 3.86%, respectively.

Distribution and Area of Existing Residential Land

The distribution and extent of existing settlement areas were identified through pixel-based classification using the Classification and Regression Tree (CART) algorithm applied to Sentinel-2 Level 2A imagery from 2025. CART was chosen because it can automatically form classification rules without assuming a strict parametric distribution (Lawrence, 2001; Pan et al., 2025). Land cover was grouped into two main classes: (1) Settlement Land (buildings and built-up areas) and (2) Non-Settlement Land (rice fields, gardens, and vegetation).

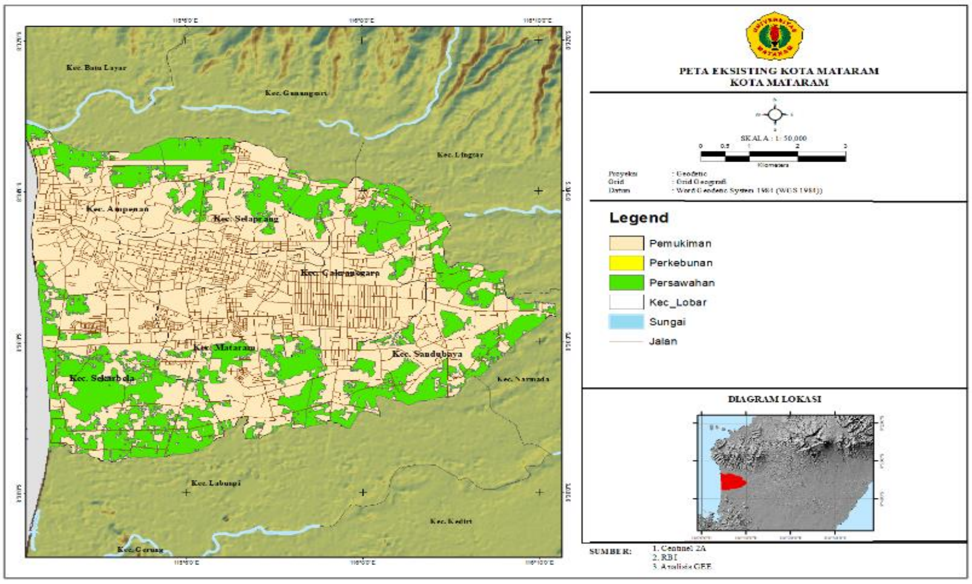

Figure 2. Residential Land Classification Map of Mataram City, 2025

The distribution pattern of residential land in Figure 2 shows a concentration in the central to southern areas of the city. The districts of Selaparang, Ampenan, and Mataram form a dense physical conurbation.

Conversely, the districts of Sekarbela and Sandubaya still have quite extensive undeveloped areas in the north and east.

Table 8. Existing Residential Land Area by District, 2025.

District	Settlement Area (ha)	Non-residential Area (ha)	Total Area (ha)
Ampenan	740.27	178.42	918.69
Sekarbela	602.27	560.36	1,162.63
Mataram	738.41	185.27	923.68
Selaparang	760.48	203.07	963.55
Cakranegara	713.49	194.78	908.27
Sandubaya	683.66	478.53	1,162.19
Total	4,238.58	1,800.43	6,039.01

Source: Sentinel-2 Image Classification Results (2026)

Land use in Mataram City in 2025 will be dominated by residential areas covering 4,238.58 ha (70.19%), while non-residential land will cover 1,800.43 ha (29.81%). The largest residential area is in Selaparang District (760.48 ha), while the smallest is in Sekarbela District (602.27 ha). This dominance of built-up areas reflects high land conversion due to population growth pressures (Hadi et al., 2025; Witjaksono et al., 2023).

Table 9. Area of Existing Residential Land by District, 2025.

Parameter	Value	Information
Overall Accuracy (OA)	93.00%	≥ 80% (Very Good)
Koefisien Kappa (κ)	0.8600	Very Good (Almost Perfect)
Producer's Accuracy (settlement)	92.00%	Good
Producer's Accuracy (Non-settlement)	94.00%	Good
User's Accuracy (settlement)	93.88%	Good
User's Accuracy (Non-settlement)	92.16%	Good

Source: Sentinel-2 Image Classification Results (2026)

Accuracy test results indicate that the residential land classification has an overall accuracy of 93.00% with a Kappa coefficient of 0.8600, which is considered very good (almost perfect). Producer's and User's Accuracy values for both residential and non-residential classes were each above 90%, indicating that both classes could be identified with a high level of accuracy. Overall, these test results indicate that the residential land classification has a good level of reliability and is suitable for use as a basis for research analysis.

Real Residential Population Density

Real population density measures the ratio between the population and the actual residential land area extracted from imagery, not the total administrative area (Huda et al., 2026).

Table 10. Real Settlement Population Density by District, 2025.

District	Population 2025 (people)	Settlement Area (ha)	Real density (people/ha
Ampenan	95,193	740.27	128.59
Sekarbela	62,944	602.27	104.51
Mataram	83,756	738.41	113.43
Selaparang	76,896	760.48	101.12
Cakranegara	73,448	713.49	102.94
Sandubaya	72,163	683.66	105.55
Avanger	–	–	109.36

Source: Analysis Results (2026)

Ampenan District has the highest real population density at 128.59 people/ha, followed by Mataram District at 113.43 people/ha. Conversely, Selaparang, Cakranegara, Sekarbela, and Sandubaya Districts have relatively lower densities, thus still offering opportunities for residential development depending on land availability.

Land Capability Analysis for Settlement

The land capability analysis for settlement was conducted using an overlay technique on nine Land Capability Unit (SKL) parameters: morphology, workability, slope stability, foundation stability, water availability, drainage, erosion resistance, waste disposal, and natural disaster vulnerability, in accordance with Minister of Public Works Regulation Number 20/PRT/M/2007. A summary of the analysis results for each parameter is presented in Table 11, which shows that most areas of Mataram City have land conditions that support residential development.

Table 11. Summary of Land Capability Unit (SKL) Parameter Results for Mataram City.

Parameter SKL	Weight	Dominant Class (ha),	Percentage (%)	Lowest Class (ha)
SKL Parameters	High	3,360.07	55.64	Low: 166.87 (2.76%)
Morphology	High	6,039.01	100.00	–
Ease of Work	High	3,719.32	61.59	Low: 60.56 (1.00%)
Slope Stability	High	4,018.44	66.54	Medium: 164.26 (2.72%)
Foundation Stability	Medium	4,628.35	76.64	Low: 1,410.66 (23.36%)

Parameter SKL	Weight	Dominant Class (ha),	Percentage (%)	Lowest Class (ha)
Water Availability	Sufficient	6,039.01	100.00	–
Drainage	Sufficient	4,212.44	69.75	High risk: 190.90 (3.16%)
Erosion Resistance	Low	3,579.61	59.27	Fair: 65.02 (1.08%)
Waste Disposal Compliance	Low risk	4,704.59	77.90	High risk: 107.37 (1.78%)

Source: Overlay Analysis Results, ArcGIS (2026)

The analysis results show that most of the Land Capability Unit (SKL) parameters are dominated by classes that support residential development. The parameters of workability and drainage have dominant classes that cover the entire area of Mataram City, while the parameters of morphology, slope stability, foundation stability, water availability, erosion resistance, and natural disaster vulnerability are also dominated by classes suitable for residential development. Conversely, the waste disposal parameter is still dominated by low classes, so it is one of the factors that need attention in the development of residential areas. In general, the analysis results show that the physical condition of the land in Mataram City supports residential development, although some parameters still require better management.

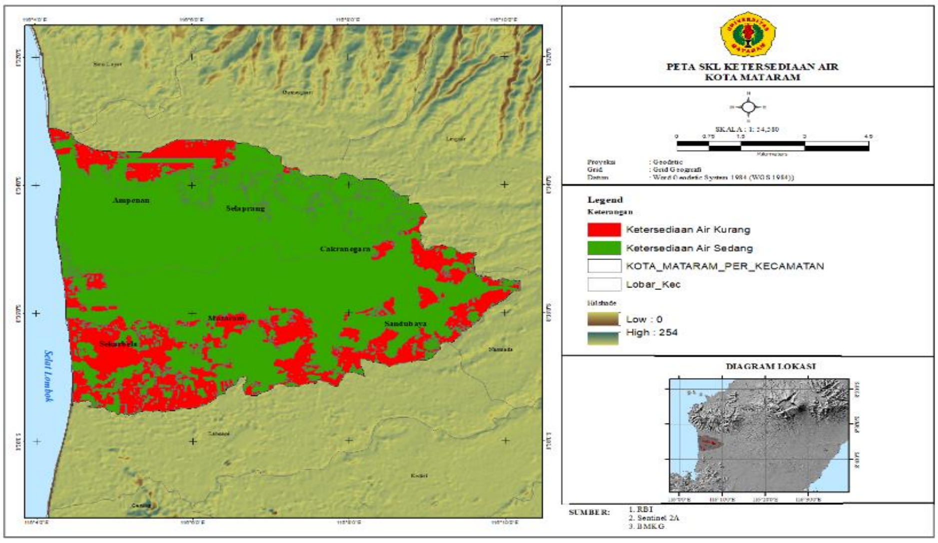

Figure 4. Water Availability Map (SKL) of Mataram City (representative SKL parameter map)

Land Capability Classification

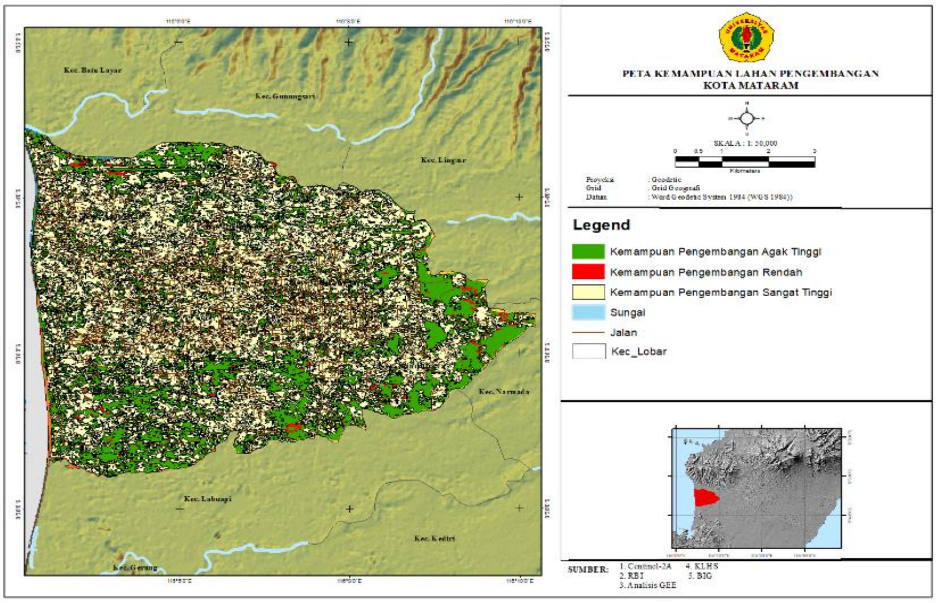

Figure 5. Map of Land Development Capability of Mataram City

Table 12. Recapitulation of Land Development Capacity in Mataram City

District	Low Developmental Ability (Grade C)	Somewhat High Developmental Ability (Grade D)	Very High Development Ability (Class E)	Total
Ampenan	108,84	323,94	485,91	918.69
Cakranegara	220,06	275,29	412,93	908.27
Mataram	205,01	301,85	416,83	923.68
Sandubaya	112,45	430,40	619,35	1,162.19
Sekarbela	106,56	432,99	623,09	1,162.63
Selaparang	100,09	354,02	509,45	963.55
Total	**853.01**	**2,118.47**	**3,067.53**	6,039.01

Source: Overlapping Analysis of Nine SKL Parameters (2026)

Based on Table 4.29, land development potential in Mataram City is dominated by Class E, covering an area of 3,067.53 ha (50.80%), followed by Class D at 2,118.47 ha (35.08%) and Class C at 853.01 ha (14.12%). Overall, Classes D and E total 5,186.00 ha (85.88%), indicating that most of the Mataram City area has relatively high to very high land development potential.

Availability of Residential Land

Table 13. Components for Calculating Suitable Residential Land Area (LPm)

District	LWp (Class D+E)	LKL (Protected, RTRW)	High Risk Area	LWp - LKL - Disaster	LPm (×50%)
Ampenan	809,85	264.41	4.61	540,83	270.42
Cakranegara	688,21	255.49	25.99	406,73	203.37
Mataram	718,67	191.20	0.00	527,47	263.74
Sandubaya	1.049,74	340.39	0.00	709,35	354.68
Sekarbela	1.056,07	183.99	51.62	820,46	410.23
Selaparang	863,46	135.34	25.15	702,97	351.49
Total	**5.186,00**	1,370.82	107.37	**3.707,81**	1.853,91

From a potential development area of 5,186.00 ha, after subtracting protected and disaster-prone areas and applying a maximum coverage ratio of 50%, the resulting Land Area Suitable for Settlement (LPm) is 1,853.91 ha. The largest LPm is in Sekarbela (410.23 ha) and the smallest in Cakranegara (203.37 ha), reflecting differences in protected and disaster-prone areas across sub-districts.

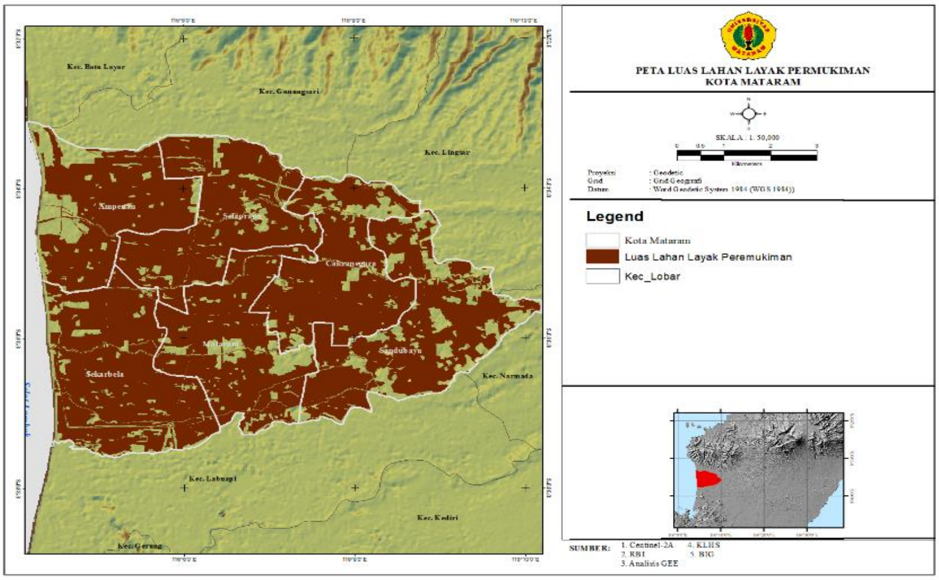

Figure 6. Map of Suitable Land for Settlement (LPm) in Mataram City

Overall, Mataram City has 1,853.91 hectares of suitable residential land, unevenly distributed across six sub-districts. Sekarbela District has the largest share (22.12%), while Cakranegara has the smallest share (10.97%), indicating that the availability of suitable residential land in Mataram City is uneven and requires attention in future residential development planning.

Housing Carrying Capacity and Carrying Capacity

Table 14. Housing Carrying Capacity (DDPm) and Carrying Capacity (DT) of Mataram City, 2025 and 2035.

District	DDPm 2025	DDPm 2035	DT 2025 (person)	DT 2035 (person)	Sisa DT 2035 (person)
Ampenan	0,95	0.83	90.138	**DT 2035**	-17.870
Cakranegara	0,92	0,84	67.788	90.138	-12.652
Mataram	1,05	0,96	87.912	67.788	-3.730
Sandubaya	1,65	1,47	118.225	87.912	37583
Sekarbela	2,17	1,94	136.743	118.225	66.280
Selaparang	1,52	1,47	117.162	136.743	37.312
Total	–	–	**617.968**	117.162	**106.923**

Source: Analysis Results (2026).

DDPm = ratio of residential land to population space needs;
DT = maximum population that can be accommodated.

The results show that housing carrying capacity varies among districts in Mataram City. In 2025, Sekarbela has the highest DDPm value (2.17), followed by Sandubaya (1.65) and Selaparang (1.52), indicating a surplus of residential land capacity. In contrast, Ampenan (0.95) and Cakranegara (0.92) have DDPm values below 1, indicating a deficit in residential carrying capacity. By 2035, DDPm values are projected to decline across all districts, with Ampenan (0.83) and Cakranegara (0.84) remaining below 1, while Sekarbela (1.94), Sandubaya (1.47), and Selaparang (1.47) retain a surplus. These results indicate increasing pressure on residential land due to population growth, highlighting the need for effective spatial utilization and control to ensure sustainable settlement development.

Evaluation of Land Availability and Balance

Table 15. Evaluation of Residential Land Availability in Mataram City.

Kecamatan	LPm	KLP 2025	Status 2025	KLP 2030	Status 2030	KLP 2035	Status 2035
Ampenan	270,415	439,82	Defisit	468,48	Defisit	499,00	Defisit
Cakranegara	203,365	339,34	Defisit	355,12	Defisit	371,63	Defisit
Mataram	263,735	386,80	Defisit	404,68	Defisit	423,39	Defisit
Sandubaya	354,675	333,41	Surplus	352,44	Surplus	372,57	Defisit
Sekarbela	410,23	290,74	Surplus	307,65	Surplus	325,54	Surplus
Selaparang	351,485	355,25	Defisit	362,01	Defisit	368,91	Defisit

Source: Analysis Results (2026)

The evaluation of residential land availability shows that four districts (Ampenan, Cakranegara, Mataram, and Selaparang) consistently experience deficits throughout the 2025–2035 period. Sekarbela maintains a consistent surplus, while Sandubaya transitions from surplus in 2025 and 2030 to deficit by 2035. Sekarbela has the largest surplus (119.49 ha in 2025, declining to 84.69 ha in

2035), whereas Ampenan has the largest and most rapidly increasing deficit, reaching 228.59 ha by 2035. These conditions indicate that pressure on residential land is expected to intensify along with population growth, particularly in Ampenan District.

Direction of Residential Spatial Development in Mataram City

Development directions are formulated based on the evaluation of settlement carrying capacity (DDPm) and land availability status (KLP relative to LPm) for each district, which are summarized in the status and priority matrix in Table 16.

Table 16. Status and Priority Matrix for Residential Spatial Development Direction

District	DDPm 2025–2035	Status DDPm	Prioritas Arahan
Ampenan	0.95 - 0.83	Defisit	Prioritas 3
Cakranegara	0.92 - 0.84	Defisit	Prioritas 3
Mataram	1.05 - 0.96	Defisit	Prioritas 3
Sandubaya	1.65 - 1.47	Surplus	Prioritas 2
Sekarbela	1.17 - 1.94	Surplus	Prioritas 2
Selaparang	1.52 - 1.47	Surplus	Prioritas 2

Source: Analysis Results (2026).

Priority 1: DDPm > 2.00 with a large land surplus;
Priority 2: DDPm 1.00 - 1.50;
Priority 3: DDPm < 1.00 with a small land surplus.

Table 17. Direction of Residential Spatial Development by District

District	Priority	Main Direction
Ampenan	3 (Control)	Horizontal development control; vertical housing (apartments); revitalization of slum areas; public green open space ≥30%
Cakranegara	3 (Controlled)	Horizontal development control; vertical housing (apartments); revitalization of slum areas; public green open space ≥30%
Mataram	2 (Controlled)	Optimization of existing built-up areas; multifunctional development; public green open space ≥30%
Sandubaya	2 (Controlled)	New settlement development planning; settlement master plan; medium density 60-80 people/ha

District	Priority	Main Direction
Sekarbela	1 (Priority)	Main development priorities: basic infrastructure (wastewater treatment, drainage); medium density 60-80 people/ha
Selaparang	2 (controlled)	Planned settlement development; utilization of undeveloped land; density 50-80 people/ha

Source: Analysis Results (2026)

Policy recommendations are formulated over three periods, summarized in Table 18: short-term (2025-2030), focusing on controlling development in densely populated areas and optimizing vacant land; medium-term (2030-2035), focusing on implementing planned settlements and vertical development; and long-term (after 2035), focusing on periodic evaluation and revision of the RTRW.

Table 18. Policy Recommendations for Residential Spatial Development in Mataram City

Period	Main Targets	Implementation Examples
Short term (2025-2030)	Ampenan, Mataram, Cakranegara; all districts for green open spaces and infrastructure.	Temporary moratorium on horizontal housing development permits in areas with a population density of >110 people/ha; vacant land inventory; settlement master plans; green open space of ≥30%.
Medium term (2030-2035)	Sandubaya, Sekarbela, Selaparang; Ampenan, Mataram	Planned settlement development with a density of 60-80 people/ha; apartments in areas with a density of >120 people/ha; strengthening zoning.
Long term (after 2035)	All districts	Evaluate carrying capacity and accommodation every five years; revise the Spatial Plan (RTRW); strengthen regulations for protected areas and productive agricultural land.

Source: Analysis Results (2026)

Directives for residential spatial development are formulated based on the analysis of settlement carrying capacity, settlement carrying capacity, and land capacity. These guidelines serve as the basis for controlling spatial use to ensure that settlement development remains in line with environmental capacity. Therefore, residential spatial development in Mataram City is expected to be sustainable through appropriate land use and controlled residential area growth (Saputra et al., 2022).

CONCLUSIONS AND RECOMMENDATIONS

Based on the results and discussion, it can be concluded that the existing residential area of Mataram City in 2025 covers 4,238.58 ha (70.19% of the total area), with population projected to increase from 464,362 in 2025 to 511,045 in 2035. The residential land classification achieved high accuracy, with an Overall Accuracy of 93.00% and a Kappa coefficient of 0.8600. Land capability analysis identified 1,853.905 ha as suitable residential land, while the residential carrying capacity indicates increasing pressure, reflected in the decline in remaining population capacity from 153,606 people in 2025 to 106,923 people in 2035. Land availability assessment shows that Ampenan has the largest deficit, while Sekarbela consistently maintains a surplus and Sandubaya is projected to become deficient by 2035. Based on the integrated assessment, Sekarbela is classified as the Priority 1 development area due to its high carrying capacity and consistent land surplus; Sandubaya and Selaparang are classified as Priority 2 areas requiring limited and controlled development; while Ampenan, Cakranegara, and Mataram are classified as Priority 3 areas requiring strict development control due to low carrying capacity and persistent land deficits. These findings provide a basis for differentiated residential development strategies that emphasize land suitability, infrastructure provision, environmental protection, efficient land use, and periodic carrying-capacity evaluation.

ACKNOWLEGMENT

The authors would like to thank the Chairman of Master's Study Program of Natural Resources and Environmental Management, Postgraduate, University of Mataram, as well as all data provider institutions (Central Statistics Agency of West Nusa Tenggara Province, Population and Civil Registration of Mataram City, Geographic Information Center, Meteorology, Climatology and Geophysics Agency, Environment Office, and Regional Disaster Management Agency of Mataram City) for the data and facilities provided during this research.

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