ENVIRONMENTAL QUALITY ASSESSMENT OF PLANNED RESIDENTIAL AREAS IN A PERI-URBAN ZONE UNDER URBAN SPRAWL PRESSURE: A CASE STUDY OF INGIN JAYA SUBDISTRICT, INDONESIA

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Abstract: Urban sprawl in peri-urban areas encourages rapid growth of planned settlements, but this is often not accompanied by the provision of adequate basic infrastructure, thereby potentially reducing the quality of the settlement environment. This study aims to quantitatively assess the quality of planned settlements in Ingin Jaya Subdistrict, Aceh Besar Regency, as a peri-urban area experiencing post-disaster urban sprawl pressure. The assessment was conducted at the residential block level using a scoring and weighting method based on seven environmental quality parameters, including building layout, width and condition of access roads, residential location, drainage system, availability of clean water, and waste management facilities. A total of 61 residential blocks were analyzed out of 286 blocks, using proportional stratified random sampling. The results of the study show that 52% of residential blocks are in good condition, 36% are in fair condition, and 12% are in poor condition. The parameters of building layout and clean water availability generally meet the standards, while road width, road condition, drainage systems, and waste management facilities are the main factors causing a decline in the environmental quality of residential areas. Based on these evaluation results, improvement guidelines were formulated, focusing on enhancing basic infrastructure, enforcing spatial planning regulations, and strengthening the roles of local governments, developers, and the community.
Keywords: Urban Expansion; Residential Environmental Assessment; Block Level Analysis; Peri-Urban Settlement

Abstrak: *Urban sprawl* di kawasan *peri-urban* mendorong pertumbuhan pesat permukiman terencana, namun perkembangan tersebut sering kali tidak diikuti oleh penyediaan infrastruktur dasar yang memadai, sehingga berpotensi menurunkan kualitas lingkungan permukiman. Penelitian ini bertujuan untuk menilai secara kuantitatif kualitas lingkungan permukiman terencana di Kecamatan Ingin Jaya, Kabupaten Aceh Besar, sebagai kawasan peri-urban yang mengalami tekanan urban sprawl pascabencana. Penilaian dilakukan pada tingkat blok permukiman dengan menggunakan metode skoring dan pembobotan berdasarkan tujuh parameter kualitas lingkungan, meliputi tata letak bangunan, lebar dan kondisi jalan masuk, lokasi permukiman, sistem drainase, ketersediaan air bersih, serta fasilitas pengelolaan sampah. Sebanyak 61 blok

permukiman dianalisis dari total 286 blok melalui teknik proportional stratified random sampling. Hasil penelitian menunjukkan bahwa 52% blok permukiman berada pada kategori baik, 36% kategori sedang, dan 12% kategori buruk. Parameter tata letak bangunan dan ketersediaan air bersih umumnya telah memenuhi standar, sementara lebar jalan masuk, kondisi permukaan jalan, sistem drainase, dan fasilitas persampahan menjadi faktor utama yang menyebabkan penurunan kualitas lingkungan permukiman. Berdasarkan hasil evaluasi tersebut, dirumuskan arahan peningkatan kualitas permukiman yang bersifat empiris, dengan penekanan pada perbaikan infrastruktur dasar, penegakan pengendalian pemanfaatan ruang, serta penguatan peran pemerintah daerah, pengembang, dan masyarakat dalam pengelolaan permukiman secara berkelanjutan.

Kata Kunci: Perluasan kawasan perkotaan; Penilaian kualitas lingkungan permukiman; Analisis tingkat blok; Permukiman peri-urban.

Introduction

Urban sprawl is a form of uncontrolled city expansion that often occurs in peri-urban areas due to land use pressures and the growing demand for housing. Various studies show that this phenomenon not only impacts the conversion of agricultural land into built-up areas but also triggers a decline in residential environmental quality due to limited infrastructure, reduced accessibility, and decreased environmental carrying capacity, ultimately threatening the livability and sustainability of the area (Chen et al., 2021). In this context, residential environmental quality becomes an important issue because it is directly related to the sustainability of housing area development.

Theoretically, the quality of residential environments is often studied through the concept of livability, which emphasizes the ability of the living environment to support health, safety, comfort, and social welfare (Fendiriani et al., 2024). Several studies emphasize that residential quality is the result of the interaction between the physical conditions of housing, the availability of infrastructure, and policy and governance support (Adriani & Okviyani, 2023; Sari & Ridlo, 2022). However, studies in Indonesia show that spatial disparities and weak implementation of housing policies still cause the quality of residential environments to develop unevenly and tend to disadvantage certain groups (Inayah et al., 2025). These findings indicate a gap between the ideal planning concept and the actual conditions in the field.

Empirical research in various cities shows a relatively similar pattern, namely the continued presence of basic infrastructure, sanitation, and public service issues even though residential areas have been previously planned. Rahman & Putro (2022) indicate both achievements and shortcomings in the quality of residential

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environments in Semarang City, while Aitrem et al. (2024) and Rahmawati & Arif (2023) highlight the gap between planning and implementation, which results in excessive density, poor sanitation, and limited access to clean water. This shows that the existence of spatial plans and technical standards does not necessarily guarantee the creation of a quality residential environment, because the quality of housing is also greatly determined by the effectiveness of implementation and development control (Oktarini et al., 2022).

Beyond technical and socio-economic dimensions, housing also carries cultural and ethical significance as a space for protection, social interaction, and the formation of family cohesion (Frans Mitrano, 2020; Rif'ah & Yulistiani, 2023). In Islamic teachings, the Qur'an emphasizes this multidimensional meaning, as stated in Surah An-Nahl (16:80), which describes homes as places of tranquility. This verse underscores that housing is not merely a physical necessity, but also a manifestation of God's mercy that supports both physical and spiritual well-being. This perspective highlights that residential environmental quality is not solely related to the fulfillment of physical standards, but also to the capacity of the living environment to support quality of life in a holistic manner. However, empirical evidence in Indonesia indicates that many residential areas, including planned housing developments, continue to face limitations in basic infrastructure and public facilities, suggesting that the ideal meaning of housing as a decent and tranquil living space has not yet been fully realized (Rizki et al. 2021; Dediyanto et al. 2022; Hudia et al., 2023).

Peri-urban areas are transitional zones at the urban fringe that combine both urban and rural characteristics as a result of urbanization. Urbanization pressure in these areas tends to be relatively high because the primary motivation is the acquisition of residential land driven by lower land prices compared to city centers, leading developers to favor large-scale residential development in suburban locations (Pradana et al. 2021). Despite their strategic role in urban growth, peri-urban areas are vulnerable to spatial and social problems in the absence of adequate planning and control, including urban sprawl characterized by dispersed settlement patterns and poor integration with urban infrastructure systems. Several studies indicate that even planned residential areas in peri-urban regions continue to experience environmental quality problems due to built-up growth occurring faster than the capacity of infrastructure and public service provision (Chen et al. 2021; Hudia et al., 2023).

Based on the Aceh Besar Regency Spatial Plan for 2012–2032, Ingin Jaya District is designated as an agricultural and residential area. However, in its development, land-use pressure in peri-urban areas such as Ingin Jaya District has begun to intensify, not only in metropolitan cities but also in smaller urban areas (Membala & Dewi, 2024). Several studies indicate that population growth and the increasing demand for residential land encourage the conversion of agricultural

land into built-up areas due to the higher economic value of non-agricultural land uses (Agung Saputra et al., 2022).

These conditions have been further reinforced by post-tsunami urbanization, which has driven the expansion of Banda Aceh City toward the southern and eastern directions, encompassing Ingin Jaya District. This development has resulted in a relatively dispersed and non-concentrated expansion of built-up areas, which in several studies is identified as a characteristic of urban sprawl (Rizkiya et al., 2023). Such development patterns potentially pose challenges to residential environmental quality, including in planned housing areas.

Based on these conditions, it can be identified that studies on residential environmental quality in peri-urban areas experiencing urban sprawl pressure are still predominantly focused on residential areas in general or on unplanned settlements. Meanwhile, research that specifically evaluates the environmental quality of planned residential areas remains relatively limited, even though such areas are developed through more systematic planning processes involving developers and relevant authorities and take technical, social, and environmental aspects into more comprehensive consideration. Therefore, planned housing areas are considered more representative for assessing the extent to which planning processes have succeeded in creating high-quality residential environments. In contrast, unplanned settlements tend to develop spontaneously without adequate spatial control, resulting in highly heterogeneous conditions that are less suitable for evaluation using uniform assessment parameters.

The limited number of studies addressing planned residential areas in peri-urban contexts, particularly in Ingin Jaya District, indicates a research gap that needs to be addressed in order to provide more specific empirical insights into the environmental quality of planned housing under urban sprawl pressure, as well as to formulate targeted improvement strategies for parameters exhibiting low performance, serving as a basis for evaluating the effectiveness of residential planning and development control.

Research Methodology

This research was conducted in Ingin Jaya Subdistrict, Aceh Besar Regency, which is a suburban area of Banda Aceh City with rapid planned residential development. This study uses a quantitative evaluative approach supported by qualitative descriptive analysis to formulate directions for improving the quality of planned residential environments. The unit of analysis in this study is the planned residential blocks spread throughout the villages in Ingin Jaya Subdistrict.
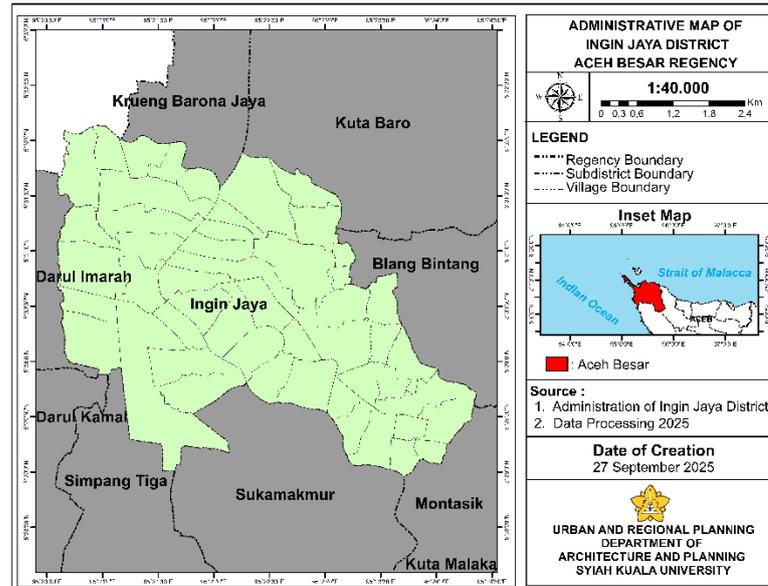
Figure 1. Administrative Map of Ingin Jaya District
Source: Data Analysis, 20253

Research data were obtained from primary and secondary data. Primary data were collected through field observations and direct documentation based on seven residential environmental quality parameters, namely building layout, entrance road width, road surface conditions, residential location, drainage conditions, availability of clean water, and availability of waste bins. Field observations were conducted using standardized procedures, including measuring road width with a measuring wheel and recording physical environmental conditions through photo documentation. Secondary data were obtained from SASPlanet and Google Earth Pro satellite imagery for analyzing building layout and measuring the distance of residences from pollution sources or potential hazards, as well as from regional planning documents such as Aceh Besar Regency Spatial Plan (RTRW) and official statistical data.

The study population includes all planned residential blocks in Ingin Jaya Subdistrict, Aceh Besar Regency. To ensure the representativeness of the characteristics of planned residential areas, only blocks with ≥20 housing units were used as evaluation objects. Sample determination was carried out using a proportional stratified random sampling technique to ensure representation from each village, considering the varying number of residential blocks across regions. From the entire population, a total of 61 residential blocks were selected as the study sample with a margin of error of 11.4%, which is considered statistically adequate to represent the overall population conditions.

The assessment of residential environmental quality is carried out using scoring and weighting methods. Each parameter is evaluated on a three-level scale: good, moderate, and poor, which is arranged based on official standards and guidelines for residential environmental assessment as well as previous studies on

similar topics. The weight of each parameter is determined by referring to prior studies that consistently used relatively similar levels of parameter importance, so the weights used are considered to objectively represent the contribution of each parameter. The residential environmental quality score is calculated by summing the results of the multiplication between the score and the weight of all parameters.

The validity of the data in this study is ensured through content validity and construct validity. Content validity is achieved by using parameters that refer to national standards and technical guidelines that have been widely used in residential environmental quality research. Construct validity is strengthened by the alignment between the theoretical concepts of residential environmental quality and the operational indicators measured in the field, as well as through spatial analysis. In addition, the simultaneous use of primary and secondary data serves as a form of data source triangulation aimed at improving the accuracy and reliability of the measurement results.

Data reliability is maintained through the implementation of consistent observation procedures and standardized evaluation criteria. All observations are conducted using the same scoring guidelines for each parameter to minimize subjectivity in assessment. Physical measurements are carried out using uniform measuring tools, while satellite image interpretation is performed with consistent data sources and resolution. The consistency of the assessment results is tested through repeated scoring on several settlement blocks to ensure the stability of measurement outcomes.

Data analysis was conducted using quantitative descriptive analysis to classify residential environmental quality into good, moderate, and poor categories based on class intervals calculated from the minimum and maximum scores. Furthermore, qualitative descriptive analysis was used to identify the main parameters causing low residential environmental quality and to formulate directions for quality improvement based on field findings and relevant policy documents.

Results and Discussion

General Overview of the Study Area

Ingin Jaya District is a rapidly developing peri-urban area as a direct result of the expansion of Banda Aceh City, especially post-tsunami. Its spatial proximity to the city center gives this area a strategic position within the Banda Aceh–Aceh Besar urban system, while also facing high pressure from land-use changes. According to the Aceh Besar Regency Spatial Plan 2012-2032, Ingin Jaya is planned as an agricultural and residential area. However, actual development dynamics show a mismatch between spatial planning and on-the-ground development practices, particularly regarding the conversion of agricultural land into residential areas.

The massive land conversion in this suburban area has impacted the reduction of the productive function of agricultural land. Data from the Central Statistics Agency (2023) shows that over the past decade, Aceh Besar Regency has experienced a decline in rice production of about 10%, reflecting a decrease in both the area and productivity of agricultural land. This finding aligns with the tendency of communities and developers to prioritize residential development, as it is considered to provide higher economic value compared to the use of agricultural land. This condition confirms that the housing market pressure has become a dominant factor in shaping spatial development patterns in peri-urban areas.

Residential development in the Ingin Jaya District also shows a fairly strong urban sprawl characteristic. The study by Rizkiya et al. (2023) identified ribbon development as the dominant pattern in the Ingin Jaya and Darul Imarah areas, followed by concentric and leapfrog patterns. Although the data is aggregated, several villages in Ingin Jaya District were recorded to have relatively high urban sprawl indicators, such as Meunasah Kaluet, Cot Alue, and Meunasah Deyah. The high urban sprawl scores in these villages indicate that residential growth occurs faster than the provision of basic infrastructure and spatial planning control, potentially reducing the quality of the residential environment.

This development pattern does not stand alone but is part of the suburbanization trend that is also occurring in various cities in Indonesia. Studies in the peri-urban areas of Yogyakarta, for example, show that urban sprawl triggers the growth of scattered settlements, increases dependence on private vehicles, and heightens the challenges of providing basic services and infrastructure (Permatasari et al., 2020). The similarity in these patterns indicates that the case of Ingin Jaya reflects the structural phenomenon of peri-urban development in Indonesia, although it has the specificity of a post-disaster context that accelerates the pace of physical development.

In a theoretical context, this condition reinforces the view that urban sprawl not only affects the morphology of space but also has direct implications for the quality of residential environments. The imbalance between the growth of built-up areas and the capacity of basic infrastructure becomes a key indicator of declining residential sustainability in suburban areas. Therefore, understanding the spatial context and dynamics of urban sprawl in Ingin Jaya District is important as a basis for analyzing the quality of residential environments at the block level, as well as for assessing the extent to which planned residential development can respond to ongoing urbanization pressures.

From the perspective of Islamic values, the uncontrolled conversion of agricultural land also carries ethical implications in spatial management. The principles of amanah (trust) and mizan (balance) emphasize the harmony between land use and environmental sustainability, while the concept of khalifah positions humans as responsible stewards of the earth. Within this framework, the issues of urban sprawl and declining quality of residential environments in Ingin Jaya are not

only understood as technical territorial planning problems but also as moral challenges in realizing sustainable and equitable residential development for present and future generations.

Condition and Quality of Planned Residential Environments in Ingin Jaya District, Aceh Besar Regency

The quality conditions of planned residential environments in Ingin Jaya District show quite a contrasting difference across parameters. In general, aspects that are formal and determined from the initial planning stage, such as building layout, show relatively good and uniform performance. In contrast, parameters related to the provision and maintenance of basic infrastructure, such as entrance road width, road surface conditions, drainage, and environmental facilities, exhibit significant quality variation. This pattern indicates that the control of residential development in peri-urban areas tends to be strong at the site planning stage but weakens at the implementation and infrastructure management stage.

The assessment results of building layout parameters indicate that all residential blocks studied are in the good category. Based on a survey of 61 residential blocks spread across 25 housing areas, all blocks received a score of 3, with no blocks falling into the medium or poor categories. This condition reflects that the planned housing development in Ingin Jaya has generally followed the site plan and technical regulations from the beginning of construction. These findings confirm that the regularity of residential morphology is not a major issue in the study area. However, the uniformity of the building layout contrasts with the quality of supporting infrastructure, reflecting an imbalance between the visual-spatial aspects of the settlement and the functional environment that supports residential sustainability.

The assessment results of the entrance road width parameter indicate a fairly dominant weakness in most residential areas. Observations of 25 housing complexes showed that 9 of them (36%) fell into the poor category, with entrance roads less than 4 meters wide, allowing only small vehicles to pass alternately and hindering access for emergency vehicles and public services. Fifteen housing complexes (60%) were in the moderate category, with entrance roads between 4–6 meters wide, which, although still passable for two-way traffic to a limited extent, were deemed suboptimal, especially under congested or emergency conditions. Only 1 housing complex (4%) was in the good category, with entrance roads wider than 6 meters. This condition indicates that accessibility has not been a primary priority in residential development, which is a common characteristic of peri-urban areas and reinforces the indication of urban sprawl developing functionally.

Figure 2. Residential Area Classified as Poor Based on Entrance Road Surface Condition
Source: Field Observation, 2025

The assessment results of road entrance surface condition parameters show a pattern of uneven infrastructure quality among residential areas. Out of 25 observed residential areas, 11 (44%) fall into the poor category because their entrances have not been paved at all. This condition directly affects the comfort and safety of residents' mobility, especially during the rainy season, which causes flooding and muddy roads. One residential area (4%) falls into the moderate category, with paved roads that have suffered damage due to lack of maintenance. Meanwhile, 13 residential areas (52%) are in the good category, with paved and properly maintained road entrances. These findings indicate that the provision and maintenance of basic infrastructure have not been carried out evenly, even though the entire area is classified as a planned residential area.

The assessment results of residential location parameters indicate that most blocks fall into the good category. Based on observations of 61 residential blocks, 42 blocks (70.5%) received an average score of 2.5–3 and were classified as good, indicating a safe distance from sources of pollution as well as flood hazards from both large and small rivers. Eighteen blocks (29.5%) were in the moderate category, generally due to proximity to riverbanks, although still relatively far from pollution sources. Only 1 block fell into the poor category due to its closeness to both factors. Although, in general, the residential locations are in good condition, the presence of blocks near vulnerable zones indicates that space utilization control is not yet fully consistent and could potentially increase environmental risks in the long term.

Figure 3. Residential Area Classified as Poor Based on Drainage
Source: Field Observation, 2025

The assessment results of the drainage parameters indicate an imbalance in the fulfillment of basic environmental infrastructure. Out of 61 blocks studied, 43 blocks (70.5%) fall into the good category, followed by 9 blocks (14.8%) in the moderate category. However, there are 8 blocks or 5 residential areas (13.1%) that do not have any drainage channels at all, and 1 block (1.6%) falls into the poor category. The absence of a drainage system in planned settlements indicates that the growth of built-up areas is not always accompanied by the fulfillment of minimum environmental standards, thereby increasing vulnerability to flooding and the degradation of residential environmental quality.

The assessment of clean water availability parameters shows a condition that is relatively better compared to other parameters. Of the 25 housing areas observed, 20 (80%) fall into the good category because more than half of the houses are already served by the PDAM network. Meanwhile, 5 housing areas (20%) are in the poor category because most houses still rely on alternative water sources such as dug wells. Dependence on non-network water sources in rapidly developing areas has the potential to cause issues with water quality and sustainability in the long term.

Figure 4. Residential Area Classified as Poor Based on Waste Disposal Availability
Source: Field Observation, 2025

The assessment results for the availability of trash bins indicate that environmental sanitation remains one of the main weaknesses. Out of 61 residential blocks, 30 blocks (49.2%) were categorized as good, followed by 8 blocks (13.3%) in the moderate category, and 23 blocks (37.7%) in the poor category. The low availability of waste management facilities in several areas reflects weak integration between residential physical development and environmental service systems, which directly impacts cleanliness, public health, and the overall quality of the residential environment.

Based on the assessment results of all parameters of planned residential environmental quality in Ingin Jaya District, it is known that the residential conditions show significant variations in quality across different areas. The assessment was conducted on 25 residential areas spread across 17 villages using seven main parameters: building layout order, entrance road width, road surface condition, proximity to pollution sources and hazards, drainage condition, availability of clean water, and availability of waste management facilities.

The summary of these assessment results is presented to provide a comprehensive overview of the level of residential environmental quality in each area, as well as to serve as a basis for identifying priorities for improving the quality of planned residential environments in Ingin Jaya District.

Table 1. Classification of residential environmental quality levels
Source: Analysis Results, 2025

Village	Housing Estate Name	Average Score	Classification
Ajee Cut	Bumi Asri Housing Estate	32	Moderate
Ateuk Lueng Ie	Ingin Jaya Garden City Residential Complex	23	Poor
	Saudi Arabia Residential Complex	48	Good
Bada	Bada 1 Housing Estate	29	Moderate
	Bada 1 Housing Estate	38	Moderate
Bakoy	Police Housing Complex	44	Good
Bineh Blang	BHI Residential Complex	40	Good
Gani	Gani Residence	50	Good
Jurong Peujeura	Special Needs Teacher Residential Complex	44	Good
	Griya Peujera Indah Housing Estate	20	Poor
Kalut	Royal De Khansa Residence	39	Moderate

Village	Housing Estate Name	Average Score	Classification
Kayee Lee	Royal De Khansa Residence	48	Good
	Kuwait Residential Complex	43	Good
	Green Jewel Residential Complex	26	Poor
	IOM Residential Complex	38	Moderate
Lubok Batee	Sharia Court Housing Estate	44	Good
	IDI Residence	30	Moderate
Meunasah Krueng	BHI IV Residential Complex	40	Good
Pantee	Police Housing Complex	41	Good
Meunasah Manyet	Meunasah Manyet 1 Housing Estate	32	Moderate
Reuloh	Bumi Bakti Residential Complex	38	Moderate
	Putroe Aceh Residential Complex	37	Moderate
Santan	Regional Customs Office Residential Complex	46	Good
	BHI IV Residential Complex	40	Good
	Griya Jaya Residential Complex	40	Good
Tanjong	BULOG Residential Complex	42	Good

Based on Table 1, it can be seen that special settlements or institutions (such as police housing complexes, military dormitories, special needs school teacher complexes, regional customs office residential complexes, and BULOG complexes) are generally in the good category. This shows that the management of institutional settlements is relatively more organized and the quality of the environment is guaranteed. Meanwhile, private or public housing (such as Bumi Asri, Griya Peujera Indah, Royal De Khansa, and Putroe Aceh) show more varied conditions, ranging from moderate to poor, which indicates uneven quality of management and environmental maintenance in these areas.

Next, based on the results of the assessment of the quality of planned residential environments in Ingin Jaya District, the directions for improving the quality of planned residential environments in Ingin Jaya District are formulated by integrating applicable policies and planning frameworks, previous academic studies, and the empirical findings of this research. Specifically, the formulation of these directions refers to the Housing and Settlement Quality Improvement and

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Prevention Plan (RP2KPKP) of Aceh Besar Regency in 2019, Aceh Besar Regency Spatial Plan (RTRW) and the approach to improving settlement quality as proposed by (Saputra & Ismail, 2021). All these references are then critically analyzed and modified based on the results of the residential environment quality assessment in 25 housing areas in 2025, so that the resulting directions are contextual and responsive to the real conditions of the study areas.

The analysis results indicate that the need to improve the quality of residential environments is spread across 25 housing areas located in 17 villages, with problem levels ranging from moderate to poor. In housing areas classified as moderate, the main issues generally relate to limited access road width, road surface conditions, availability of drainage, as well as environmental facilities such as clean water and trash bins. Meanwhile, in housing areas classified as poor, the problems tend to be more complex and involve almost all technical parameters of the residential environment.

In several villages, such as Ajee Cut, Ateuk Lueng Ie, Bada, Jurong Peujeura, Kalut, Kayee Lee, Reuloh, and Meunasah Manyet, guidance for quality improvement is focused on the provision and repair of basic infrastructure, particularly the construction and improvement of access roads, drainage systems, enhancement of clean water services through the PDAM network, and the provision of waste management facilities. Residential areas categorized as poor, such as Ingin Jaya Garden City, Griya Peujera Indah, Permata Hijau, and Putroe Aceh, require more intensive intervention through the active involvement of developers, village governments, regency governments, and relevant technical agencies.

In residential areas that are already categorized as good, such as institutional housing (TNI dormitories, police dormitories, BULOG housing, Sharia courts, and office complexes), improvement directives are more focused on infrastructure maintenance, adjustment of entrance road widths, enhancement of environmental facilities, and strengthening of land use control, especially for housing located near riverbanks or disaster-prone areas. This indicates that good-quality residential environments still require sustainable management to prevent degradation over time.

In general, the results of the analysis confirm that although some residential areas have been classified as good, the majority of areas still require quality improvements, especially in terms of basic infrastructure and environmental facilities. This reflects a disparity between the success of physical housing development and the provision of supporting infrastructure and facilities. Therefore, the active involvement of developers, local governments, technical agencies, and the community is a key factor in realizing livable and sustainable residential environments.

The phenomenon of urban sprawl in Ingin Jaya District is clearly reflected in the physical condition of settlements that are scattered, not efficiently clustered, and not matched by the provision of adequate basic infrastructure. Non-standard

entrance road widths, poor road conditions, and the absence of drainage systems in several areas indicate that the growth of settlements is happening faster than the capacity to provide environmental infrastructure. This pattern aligns with the characteristics of urban sprawl, which is marked by dispersed residential development with minimal support from facilities.

Urban sprawl in peri-urban areas is generally driven by uncontrolled land conversion, population growth, and weak integration of spatial planning policies. In Ingin Jaya District, poor coordination between urban and rural planning has created opportunities for the development of settlements without adequate oversight. As a result, residential patterns grow sporadically in agricultural areas, which not only reduces productive land but also eliminates ecological functions as environmental buffers.

This condition is exacerbated by limited transportation networks and integrated public facilities, causing some residential areas to develop in isolation and rely on private vehicles. In the long term, urban sprawl has the potential to increase infrastructure maintenance costs, raise emissions due to mobility, and heighten vulnerability to disaster risks and climate change. To address these issues, guidance on improving the quality of residential environments needs to be integrated with strategies for controlling urban sprawl through the implementation of compact growth patterns, strengthened land use control, and enforcement of zoning regulations. In the context of Ingin Jaya Subdistrict, this strategy requires cross-sector coordination and a long-term spatial planning vision so that the growth of peri-urban areas can proceed in alignment with the principles of sustainability, environmental resilience, and social equity.

From an Islamic perspective, efforts to maintain the quality of residential environments are in line with the principle of maslahah (public welfare), which emphasizes meeting basic human needs such as housing, clean water, and sanitation. The Qur'an prohibits acts that harm the earth as mentioned in Surah Al-Baqarah (2:205), and affirms the role of humans as stewards in Surah Al-Baqarah (2:30). In this context, planning and managing sustainable settlements is not only a technical necessity but also a moral responsibility to ensure that development brings benefits (rahmatan lil 'alamin) and prevents harm to society and the environment.

Conclusion

This study reveals that the environmental quality of planned residential areas in Ingin Jaya Subdistrict varies considerably. Approximately 52% of the settlements are classified as having good environmental quality, 36% fall into the moderate category, and 12% are categorized as poor. Building layout regularity and access to clean water emerge as the main factors contributing positively to environmental quality. In contrast, limited access road width, poor road surface conditions, inadequate drainage systems, and insufficient waste management facilities are the dominant factors associated with lower environmental quality in

several residential areas. These findings indicate that residential development in peri-urban areas does not always proceed in balance with the provision of essential infrastructure.

From a theoretical perspective, the findings strengthen the understanding of urban sprawl as a phenomenon that affects not only spatial expansion patterns but also the functional quality of residential environments. The study demonstrates that well-organized settlement morphology, commonly associated with planned housing does not automatically ensure high environmental quality when basic infrastructure provision is insufficient. In this regard, the research contributes to urban sprawl studies by emphasizing the need to integrate morphological characteristics, infrastructure availability, and environmental management when assessing the quality of peri-urban settlements.

In practical terms, the results provide empirical evidence to support local governments and other stakeholders in prioritizing infrastructure improvement as a key strategy for mitigating the impacts of urban sprawl. The proposed directions for improving residential environmental quality including widening and upgrading access roads, constructing and maintaining drainage systems, improving clean water services, providing adequate waste management facilities, and strengthening spatial control enforcement can serve as references for settlement planning and budgeting processes. The findings also highlight the importance of post-development monitoring to ensure that the environmental standards envisioned during the planning stage are maintained over time.

This study also identifies several directions for future research. Further studies are encouraged to examine the gap between spatial planning policies and their implementation, particularly in relation to the provision and management of basic infrastructure in planned settlements within peri-urban areas. In addition, incorporating temporal spatial analysis would allow a better understanding of how residential environmental quality evolves over time as a consequence of urban sprawl.

From an Islamic perspective, efforts to maintain and improve residential environmental quality are closely aligned with the principles of *maslahah* (public interest) and *amanah* (responsibility) in managing living spaces. A healthy, safe, and sustainable residential environment not only fulfills physical needs but also reflects the moral responsibility of humans as *khalifah* in maintaining environmental balance. Therefore, controlling urban sprawl and improving settlement quality in peri-urban areas can be viewed as part of a broader effort to achieve sustainable community welfare, both materially and spiritually.

Conflict of Interest

The authors declare that there are no conflicts of interest in the research and writing of this article.

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