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Effect of Setback Distance on Low Impact Development Strategy Utilization Within Residential Plots, Oriade, Lagos, Nigeria

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Abstract- ***The essence of setbacks cannot be overlooked when considering functionality within residential plots. Most importantly, the area of natural cover within setbacks and level of setback compliance are factors that can influence residential plot sustenance. This study assesses the influence of setback distance on the level of low impact development strategy, generally occurring as unpaved areas within open spaces in setbacks of residential plots in Satellite town,,Amuwo-Odofin, Lagos, Nigeria. Questionnaires were distributed strategically to elicit information on resident's social status, residential site setback status and low impact development status. Analysis at two levels, which involved descriptive statistics and chi squared test, using Statistical Package for Social Science (SPSS) Version 21 was carried out. The study reveals that all the chi square values arrived at are lower than the accepted 0.05 significant level which indicates that there is significant relationship between the distance left as setback space around a residential building and the level of low impact development strategy employed around the residential building. The study concluded that setback compliance and monitoring are major issues affecting implementation, proposing a minimum percentage for natural area for low impact development strategies during residential site approval and development process.***

Index Terms- ***Setback, Residential Plot, Low Impact Development***

I. INTRODUCTION

Setback according to Tyler (2019) is an on-site building restriction that sets the minimum distance a building may be from a designated area such as a walkway or street, further established for environmental protection of sensitive areas and biodiversity. In urban planning and building regulations, setback refers to the minimum required distance/ open space building and its property line (Inframantra, 2025). Setbacks are significant urban planning provisions with goals directed towards safety, accessibility and environmental quality enhancement (Yahaya & Halim, 2025). As presented by United States Environmental Protection Agency (2019), the environmental characteristics of these areas are often irreplaceable, making setback requirements an important tool in protecting the environment from human impacts.

Major parameters for sustaining nature protection within setbacks include: purpose of the space, species present and existing natural conditions involving natural resources, vegetative cover, slope, soil type and surrounding land uses (East Asian flyway, 2018). As opined by Tyler & Charles (2019) local governments should be prepared to assess private landowners concerns regarding use restrictions when creating setback requirements.

Setback Relevance in Residential Plots in Lagos

According to the Lagos state planning permit regulations 2019, building setback is the distance at the front between the building and the property line, while the other spaces between the sides and rear to the property line are referred to as air space (In-depth Building Services, 2026) as illustrated in fig.1. In line with this definition, the Lagos state planning permit regulations for standard setback and air spaces for residential developments is 6m as minimum set back between the building approach and its property line and 3m for the air spaces on the other sides. Complying with these standards promotes open spaces for outdoor relaxation and environmental sustenance depending on their ground treatment.

Studies have shown that in Nigeria, adherence to setback requirements is one of the most contravened planning standard during land development (Alnsour & Meaton, 2009; Aluko, 2011; Omollo, 2020; Jimoh & Olagunju, 2022). Setbacks as presented by

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Inframantra (2025) provides essential functions within developments such as natural lighting and ventilation, privacy, accessibility, safety, planning orderliness. It further protects health, provides privacy and enhances residential environmental sustainability. Setbacks within residential plots provides open spaces for landscape design and development through installation of landscape elements, utilities and green space development (Aft Construction, 2025).

Urban master plans developed by the Lagos state government call for ecosystem-based measures in the Lagos mainland and central areas including vegetated banks capable of absorbing flood water, use of porous paving materials such as sea-binding gravel to allow rain and flood water to infiltrate into the soil and adopting green roof technology to reduce the burden on the storm water and sewerage systems (Adelekan & Asiyanbi, 2016). Hence there is the need to introduce nature-based approaches in the development of open spaces within residential plots, existing as setbacks and air spaces for improved human and environmental well-being.

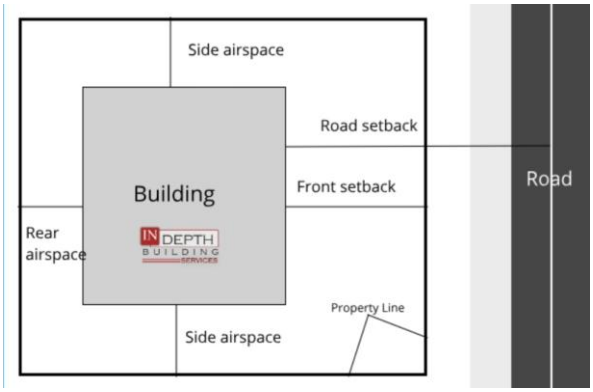

Fig 1: Setback and air space around a residential building
Source: (In-depth Building Services, 2026)

Low Impact Development as a Nature Based Approach

Bradley (2019) reports that several issues such as impermeable soil, standing water, increased runoff and poor soil ventilation evolve as a result of compacted soils, all of which propels adverse impacts on an environment. Low impact development (LID) is an environmentally sustainable planning and site development approach that integrates landscaping and storm water management design strategies to sustain natural hydrology of a site, mimicking water shed patterns of pre-existing site (State of Hawaii, 2026), and tackling the negative impacts of development on the environment (Pour et al, 2020) . LID employs a variety of natural and built features that reduces the rate of runoff, filters pollutants and facilitate infiltration of water into the ground by employing a set of overall site design strategies as well as highly localized small scale decentralized source control techniques known as integrated management practices (IMP) (Paul, 2023). LID have emerged as an essential strategy to mitigate urban storm water quantity and quality challenges caused by rapid urbanization. The results from a study by Jaemoon et al (2024) demonstrates that the introduction of LID techniques in open spaces can significantly enhance water management, providing insights into effective water circle management, specific urban land uses, foundation for future planning and sustainable development.

II. METHODOLOGY

The research is designed to assess site setback status with respect to level of Low impact development infiltration strategies employed. Survey approach was employed which involved administering questionnaires comprising of close ended questions to selected residents with the aim of gathering subjective LID utilization level within setbacks. Details of the variables studied are as summarized in table 1.

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Table 1: list of quantitative research variables

Component	Variables	No. of Variables
Residential Site plan status	Site design, parking space, open natural **space,** set back distances, site plan approval and development monitoring	**6**
Low impact development status	Nature preservation, nature **introduction,** site setback state, nature of paved area, nature of unpaved area	5

The research population for this study is all the accommodated residential plots in New-site residential estate, which is a fast-developing residential neighbourhood in Satellite town, Lagos with surrounding neighbourhoods having existing government developed residential buildings with standard setbacks. A total of 342 residential plots are accommodated either as personal ownership or rental ownership as at the time of this study. For the purpose of this research, the study area was divided into three (3) sectors according to the residential plot development pattern. These sectors include community road sector with a research population of seventy-one (71), David West sector with a research population of one hundred and forty-one (141) and David East sector with a research population of one hundred and twenty-eight (128).

The research sample size was calculated using a sample size calculator according to Creative Research System (2012) at a confidence level of 95% and confidence interval of 5 with a population size of 342. A sample size of 182 was generated by the sample size calculator which was compared with the sample size figure according to Raosoft Sample Size Calculator (2026). For the purpose of this research, a sample size of 182 was used. The samples were proportionally selected from each of the research sectors to make up a total of 182. This gives 21% from sector one with a total of 38 samples, 41% from sector two with a total of 75 samples and 38% from sector three with a total of 69 samples

Assessment of Residential Site Plan Status

The analysis revealed that 92.3% have site designs for their residential plot, 4.9% were uncertain and 2.7% have no site design which indicates that a large portion of the residential estate have plots with site designs. The analysis also reveals that 33% of the residential plots can accommodate 6 – 8 cars after development, 31.3% above 8 cars, 25.8% accommodating 3 – 5 cars and only 9.9% accommodating 1-2 cars. This could mean that most of the occupied residential plots in the estate give more setback space for car parking. Also from the analysis, 78.6% have open natural spaces in their residential plot, 19.8% have none and 3% were uncertain. This could mean that despite the areas developed for car parking most of the residential plots still have open natural area which could either be within the plot fence or between the plot fence and external drainage. About 83.5% of the respondents claimed to have building approval for their residential development. Also 44% of the respondents were uncertain about building control monitoring during their site development, while 26.9% had no building monitoring experience. This indicates that despite the large approval percentage it is likely that most of the residential sites in the estate were not developed in line with what was approved. Finally, in this section, 51.6% claimed to have completed their residential site development, 27.5% are not yet complete and 20.9% were uncertain. This indicates a probability that the nature of setback surfaces of almost 50% of the developed residential plots is likely to change.

Assessment of Low Impact Development Status

The analysis reveals that 52.2% preserved nature during site development, 44.3% did not and 0.5% were uncertain, while 61.5% introduced natural elements after site development and 38.5% did not introduce any. These results indicate that an average proportion of the developed residential plots within the estate have one form of natural surface or the

other within its setbacks. Also from the analysis 53.3% used concrete for their paved areas, 44.5% laid interlocking stones with nylon underlay and 2.2% laid interlocking stones without nylon underlay. This indicates that almost all the developed residential sites within the estate have impermeable paved areas. The analysis further reveals that 32.4% had only sand as their unpaved area, 31.3% had sand and shrubs, 8.2% had sand, shrubs and trees, 8.2% have sand and grass, 6% have sand and trees while 12.1% have no unpaved area. This an indication that most of the accommodated residential plots in the estate had either sand alone or sand and some other element as their unpaved area this is most likely going to drop looking at the percentage of uncompleted accommodated sites if certain measures are now put in place.

Eight variables were assessed in 182 residential plots for the significant relationship between distance left as setback and the level of low impact development employed. The variables include the setback between the residential building and approach and side fences, residential building and rear fence and between approach fence and external drainage. It further examined the state of the space between the above mentioned building setback spaces. Descriptive summary for the 182 residential plots are presented in tables below.

From table 2, it can be seen that about 64.1% of the developed residential plots have approach setback distance well above 6m which is within the approved standard. It also reveals that 61% of the residential plots have their side setback distances within 3m and above which is within standard. Also 86.3% of the residential plots have their rear setback distance falling below 3m, which is below standard and 62% have setback distances above 0.5m between their approach fence and external drainage.

Table 3 shows that 48.4% of the approach setback space are partially paved, 47.8% are totally paved and 3.8% are unpaved which means that there is more approach paved areas within the estate. It also shows that 57.7% of the side setback spaces are paved, 20.9% are partially paved and 21.4% are unpaved, which is an indication that a larger percentage of side setback spaces within the estate are paved.62.6% of the occupied residential plot in the estate have their rear setback space paved, 13.7% partially paved and 23.6% unpaved which is also an indication that most of the rear setback spaces of developed sites within the estate are paved.

Table 2: Distance between Building and Site Spaces

Variable	Frequency	Valid Percent (%)
Distance between		
Building and Approach	10	5.5
Fence	55	30.2
1m - 2.9m	55	30.2
3m - 5.9m	62	34.1
6m - 8.9m		
9m - Above	182	100.0
Total		
	27	14.8
Distance between	44	24.2
Building and Side Fence	78	42.9
0.1m - 1.9	33	18.1
2m - 2.9m		
3m - 3.9m	182	100.0
4m - Above		
Total	91	50.0
	66	36.3
Distance between	9	4.9
Building and Rear Fence	16	8.8
0.1m - 1.9		
2m - 2.9m	182	100.0
3m - 3.9m		
4m - Above		
	69	37.9
Total	94	51.6
	13	7.1
Distance between	6	3.3
Approach Fence and		
Drainage	182	100.0
0.0m - 0.5m		
0.6m - 1.0m		
1.0m - 1.5m		
1.6m - Above		
Total		

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Table 3: State of Setback Space between Building and Site Spaces

Variable	Frequency	Valid Percent (%)
State of Setback Space between Building and Approach Fence		
partially paved	88	48.4
paved	87	47.8
unpaved	7	3.8
Total	182	100
State of Setback Space between Building and Side Fence		
partially paved	38	20.9
paved	105	57.7
unpaved	39	21.4
Total	182	100
State of Setback Space between Building and Rear Fence		
partially paved	43	23.6
paved	56	30.8
unpaved	92	50.5
Total	182	100
State of Setback Space between Approach Fence and Drainage		
partially paved	34	18.7
paved	56	30.8
unpaved	92	50.5
Total	182	100

Chi square test was employed in analysing hypothesis one, which is to check for significant relationship between low impact development and setback distance. The distributions are reported for the null hypothesis in table 4.3. The test was carried out at an alpha level of 95% confidence and 0.05 significance level.

The table 4 shows from the chi square test carried out that an asymptotic significant value of approximately 0.000 is arrived at for significant relationship between the distance left as approach, rear and fence setbacks and the level of low impact development within the spaces. While an asymptotic value of approximately 0.001 is arrived at for significant relationship between the distance left as side setback and the level of low impact development within the space. All the chi square values arrived at are lower than the accepted 0.05 significant level which indicates that there is significant relationship between the distance left as setback space around a residential building and the level of low impact development strategy employed around the residential building.

Table 4: Chi square test between the different Setback Distances in the residential plot and State of setback space

CHI-SQUARE TESTS

	VALUES		df	Asymptotic Value
Setback Distance	Likelihood Ratio	Pearson Chi-Square		
Approach Setback	36.148[a]	40.041	6	.000
Side Setback	21.799	20.182	6	.001
Rear Setback	97.012	67.953	6	.000
Approach Fence/Drainage	44.494	58.957	6	.000
N of Valid Cases	182			

III. RECOMMENDATIONS AND CONCLUSION

The following are the recommendations evolving from the results of the study

- The Federal, state and local agencies in charge of building developments should revive their monitoring team to ensure the compliance and adherence to setback standards during site development.

- Government's building control and monitoring agencies should go beyond checking for the compliance with building setback standards alone, but should include compliance with introduction of low impact development practices on site.
- The government through its various housing authorities should periodically organise low impact and sustainable development programmes to constantly enlighten building users, developers and professionals about the strategies and essence to develop sustainably.
- An area of the residential plot can be set aside for low impact development to serve as environmental sustaining and nature sustaining area of residential plots during plot development, which must be adhered to and presented as part of the analysis on the site plan drawing before approval.

IV. CONCLUSION

The study also reveals that the distance left as setback is a major determinant of the level of low impact development practice employable within the residential development. Though the study has proven that the minimum standard regulation for setbacks as authorized by the building authority of Nigeria is reasonably adequate, more compliance with these standards by residential site owners was observed to be the underlying factor hindering the actualization of low impact development in the area.
The study therefore concludes that through Government's implementation of the preservation of a certain area for low impact development strategies during residential site approval and monitoring, there is a large likelihood of achieving environmental sustenance and human wellbeing within residential plots. Complimenting this implementation with public sustainable development enlightenment programmes will enhance low impact development of residential plots in Lagos and Nigeria at large.

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