

COMPLIANCE WITH ENVIRONMENTAL APPROVALS IN HOUSING DEVELOPMENTS IN GAUTENG, SOUTH AFRICA

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PURPOSE: The extent to which environmental issues are incorporated into housing development in Gauteng was investigated. In addition, the possible relationship between compliance follow-ups, the level of compliance to conditions of environmental authorisations and the nature of housing development were assessed.

ABSTRACT

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The extent to which environmental issues are incorporated into housing development in Gauteng was investigated. In addition, the possible relationship between compliance follow-ups, the level of compliance to conditions of environmental authorisations and the nature of housing development were assessed.

Methodology:

Records of environmental approvals for the five-year period April 2006 to March 2011 held by the Gauteng Department of Agriculture and Rural Development were examined. In addition, a questionnaire survey focusing on a 100 selected projects was undertaken. Correlation and regression analyses were employed to analyse the responses.

Findings:

It was established that the level of environmental responsiveness in real estate development was low. No correlation was found to exist between compliance and enforcement action and the level of compliance achieved in housing projects.

Value of the paper:

Regulatory requirements for the incorporation of environmental issues in housing development in Gauteng were found to be insufficient, by itself, to achieve the desired outcome. Alternative incentives therefore need to be considered.

Keywords:

Environmental issues, sustainable development, environmental responsiveness, environmental authorisation, green building, Gauteng

INTRODUCTION

The world is faced with numerous and complex environmental challenges including, among others climate change, water availability and pollution, loss of biodiversity and ecosystems, pollution of the atmosphere, waste production and disposal, impacts of chemicals, damage to aquatic ecosystems and deforestation¹ These issues require both global and localised responses.

Over the past 50 years, human activities have changed ecosystems more rapidly and extensively than in any comparable period of time in human history², leading to irreversible losses to some of the critical ecosystem functions³. Real estate development has substantial direct and indirect impacts on the environment and is regarded as a major source of pollution⁴. However, conventional development has tended to be insensitive to the natural environment⁵. In fact, around half of all non-renewable resources mankind consumes are used in construction, making it one of the least sustainable industries in the world⁶. Thus, the contribution of buildings and of the property and construction sector to sustainable development could be immense³.

Government, investors and other stakeholders are increasingly paying more attention to environmental issues⁷. While evidence exists that progress is being made by corporations including the real estate developers to respond to environmental issues, the prevailing view is that "action so far has lagged behind expectations"⁸. As a result, the United Nations Environment Programme Finance Initiative Property Working Group, expressed concerns that the property industry was moving far too slowly to address its environmental footprint, including reducing greenhouse gas (GHG) emissions⁹.

One of the tools implemented by governments to force consideration of environmental issues in real estate development is through promulgation and enforcement of environmental laws and regulations. In South Africa, most property developments are subject to environmental approvals, referred to as environmental authorisations. These approvals may contain specific conditions to limit the potential impacts of such developments on the natural environment. Compliance, however, remains low¹⁰.

While evidence exists that progress is being made by the corporate sector including real estate developers to respond to environmental issues, the prevailing view, certainly from environmentally conscious societies, is that “action so far has lagged behind expectations”⁸. Specifically, the “response from the real estate has been decidedly more tepid even sceptical”¹¹.

In South Africa, most housing development projects are subject to environmental approvals. These approvals may contain specific conditions which is an attempt by government to limit the potential impacts of such developments on the natural environment. The prevailing tendency however, is that compliance to such conditions of approvals remains low. This could be seen from the annual National Environmental Compliance and Enforcement Report of 2012-13 which shows that the number of non-compliance with environmental laws increased by 122% from those reported in 2011-12¹⁰.

The study investigated the extent to which environmental issues are incorporated into real estate development in general as well as into housing development including the possible relationship between the level of compliance and compliance follow-ups in housing developments in Gauteng Province and the level of compliance achieved in selected projects. Specific aspects that were addressed were:

- the extent to which the real estate sector in general has responded to environmental issues
- The extent to which environmental issues are addressed in the different phases of housing developments (site selection, design, construction and post construction/occupation) in Gauteng.
- compliance of housing projects to conditions of environmental approval, and whether there is a relationship between compliance follow-ups, the level of compliance to conditions achieved and the different types of housing developments.

Literature review

Climate change, biodiversity loss, impacts of extreme weather events and rain forest destruction demand a global response while effective waste management, pollution control, prevention of local habitat destruction and functioning of ecosystems, among others can be addressed through local actions. Most of these are problems directly caused by human activities³.

While corporations are responsible for most pollution and natural resource degradation among others¹², buildings and construction works have the largest single share in global resource use and pollution emission³ making it one of the least sustainable industries in the world⁶.

Real estate development encompasses activities that have substantial direct and indirect impacts on the environment⁵,¹³. Every aspect of property development and operation has significant environmental consequences: from the location of the site on which structures are built, to the materials required

to construct projects (imbedded energy), and then the energy required to operate them¹¹. Invariably, real estate activities “may scar the landscape, take valuable agricultural land out of production or destroy wildlife habitat”⁵.

In Europe, it is estimated that buildings account for about 40% of all energy consumption and 25% of CO₂ emissions¹⁴. On a global scale, the Intergovernmental Panel on Climate Change (IPCC), reports that residential and commercial buildings are responsible for approximately 8% of all anthropogenic greenhouse gas (GHG) emissions and suggests that real estate has the largest ‘economic mitigation potential’ of the significant emissions sources- far in excess of the potential of energy supply, forestry and industry¹⁴. Specifically, residential development is a leading driver of changes to biodiversity and ecosystem services that are critical for human well-being¹⁵. In South Africa, the built environment is directly responsible, through electricity consumption, for over 23% of South Africa’s carbon emissions¹⁶.

There is growing realisation that if real estate is part of the problem, it is also part of the solution¹⁷. This has led to sustainability issues becoming important for all those involved in development, use, ownership and governance of real estate¹⁷,¹⁸. As a result, corporations are increasingly making voluntary efforts to protect the environment¹⁹. Although the business case for sustainable real estate development has never been more compelling²⁰, the property industry is moving far too slowly to address its environmental footprint, including reducing greenhouse gas (GHG) emissions⁹.

However, the environmental issues both in general and across the real estate industry is neither universal nor harmonised around the globe¹⁸. Attitudes and policy responses to the environmental impacts of property vary in line with socio-political beliefs on how and whether government policies should influence market forces, with differing perceptions around the need to conserve or secure natural resources and energy, and with the differing stages of economic development yet reached around the world¹⁸. This is why the recent growth in the creation of more sustainable buildings through both new construction and retrofits to greener standards has been highly concentrated in the wealthiest nations¹¹.

Further, environmental responsiveness is not an end state to which all must aspire, but a measure of progress towards effective incorporation of environmentally sustainable practices into development projects. Because of the general focus of developers on economic returns, the ‘green issues’ have not been effectively incorporated into the business value case thus resulting in limited financial and human resources being allocated to deal with the consequences of economic production on the environment²¹.

The responsiveness to environmental issues by the private corporations including the real estate sector has followed a definitive trend, from resistance to acceptance²². Although corporations are increasingly making voluntary efforts to protect the environment¹⁹, the property industry is moving far too slowly to address its environmental footprint⁹. Despite the centrality of property development and operations to the world’s carbon use and greenhouse gas emissions, the creation of greener buildings has lagged the progress and commitment shown in many other industries¹¹. In fact, the “response from the real estate has been decidedly more tepid even sceptical” (ibid. 3).

The environmental impact of housing development range from resources used to build the houses, the waste produced during construction, the resources used and waste produced by

occupants of the house over its lifetime and finally, the waste and resources involved with demolition⁹. The impacts extend beyond the construction site as the housing development can attract both economic activity and additional settlement as well as wider infrastructure services²³ which can amplify over time²⁴.

While the South African government has enacted various pieces of legislation that deal with environmental issues, real estate developers are yet to play a meaningful and contributory role in addressing the environmental problems, some of which are a direct result of their actions. This has led to some criticisms and concerns raised by concerned citizens that developers do not pay attention to or are not responsive to environmental issues.

Although the incorporation of green technology into residential buildings and awareness around the benefits of green building has increased, South Africa is still far behind the trend relative to green buildings²⁵. Despite its infancy, there are however, many indicators that the South African market for green buildings is poised for rapid growth²⁶.

Concerns on the level of non-compliance to conditions attached to environmental approvals granted for development schemes have been raised. From records at the National Department of Environmental Affairs, the number of non-compliance with environmental laws increased by 122% from those reported in 2011-12¹⁰.

Effective compliance and enforcement of environmental laws remains a challenge for most authorities. Despite decades of environmental legislation and many years of attention to the concept of sustainable development the world continues to face serious and growing environmental problems due to inadequate compliance and enforcement of environmental laws at all levels^{27,28} confirms that ensuring effective implementation of environmental legislation is a pervasive challenge faced by all environmental authorities across the globe. According to²⁹ effective enforcement programs can deter illegal conduct through creating negative consequences for those who violate the law. A single enforcement action can have a cascading effect on potential wrongdoers, encouraging them to change their behaviour to comply with the law²⁹.

Creating an effective enforcement programme requires a firm commitment on the part of government and stability in the enforcement agency³⁰. In South African, the environmental compliance and enforcement sector is fragmented, ineffective and disorganised – a “barking dog without a bite”²⁸. On the other hand,³¹ suggests that the best tool for achieving environmental compliance is effective and consistent civil and criminal enforcement of the law.

METHODOLOGY

The study investigated the extent to which environmental issues are incorporated into housing projects. Further, it assessed the level compliance of housing estates to conditions of environmental authorisations. It also analysed the possible relationship between the level of compliance to conditions, compliance follow-ups as well as the type of housing development (affordable, middle to high income and mixed income).

The study utilised information obtained from 16, the Competent Authority for environmental matters in Gauteng Province. A total of 236 projects files out of a total of 730 housing projects issued with decisions during the period April 2006 to March 2011, selected through use of the Sample Size Table developed by 16, were reviewed. Of these, 15 (6.4%) were negative decisions while 221 were positive decisions. From these (221),

100 projects were selected for further study. Questionnaires were distributed to both the private sector and government housing developers of the relevant projects.

To analyse the data, the descriptive statistical models such as means and percentages were used. Through the review of literature and analysis of some of the responses generated from the questionnaire survey, it was possible to conclude on whether the responsiveness of developers to environmental issues is low or not. Through analysis of other questionnaire responses, regression and correlation analysis and testing of the significance of the findings it was possible to determine the extent to which environmental issues were incorporated into the different phases of housing developments, the relationship between compliance action/follow-ups, the level of compliance and the type of the housing projects. The significance of the findings was tested through a one tailed z-test.

A total of 52 responses out of the 100 questionnaires (52%) were received. Of these, ten (10) were ‘blank’ responses indicating that the related projects had either been abandoned or have not yet been implemented, leaving 42 responses to be evaluated. Most responses were from the affordable housing category (67% out of the total number of projects in this category) followed by the middle to high income housing (53%). The latter provided the most responses for review which correlate with the number of questionnaires distributed.

Overall consideration of environmental issues in housing developments

The overall level of responsiveness (reflected in the views of respondents and the level of consideration of issues in the actual development of projects) is highly concentrated between the 35% and 50 % mark (see Fig 1 on next page).

From the responses received, the majority of projects (60%) achieved a score of 50% and below. Relative to each type of project, most of these were within the medium-high income category (64% of projects within this category), followed by affordable housing, at 62% and lastly mixed income housing at 56%.

The individual project with the highest score of 68% was within the mixed income housing category. This score is, however, within the same range of scores achieved in the other two categories, 64% for medium-high income and 66% for affordable housing. Projects with the lowest scores of 32% were in the Affordable and Medium-High Income housing categories.

The above results suggest that environmental issues are generally given the same level of consideration across the housing typologies in Gauteng. Therefore, irrespective of whether it's private or public developed housing, affordable or high income, it would be expected that the level of treatment of environmental issues would be the same. This may point to the fact that environmental issues are not yet mainstreamed into the development process and therefore remain one of the lesser important considerations in housing projects.

Reasons for consideration of environmental issues in projects

Both the private and public sectors (at 79% and 63% respectively) regard meeting the regulatory requirements as the main reasons for addressing environmental issues in housing developments. Of least importance is environmental stewardship for the private sector while for government is enhancing the product offering (attractiveness/prestige of the housing development).

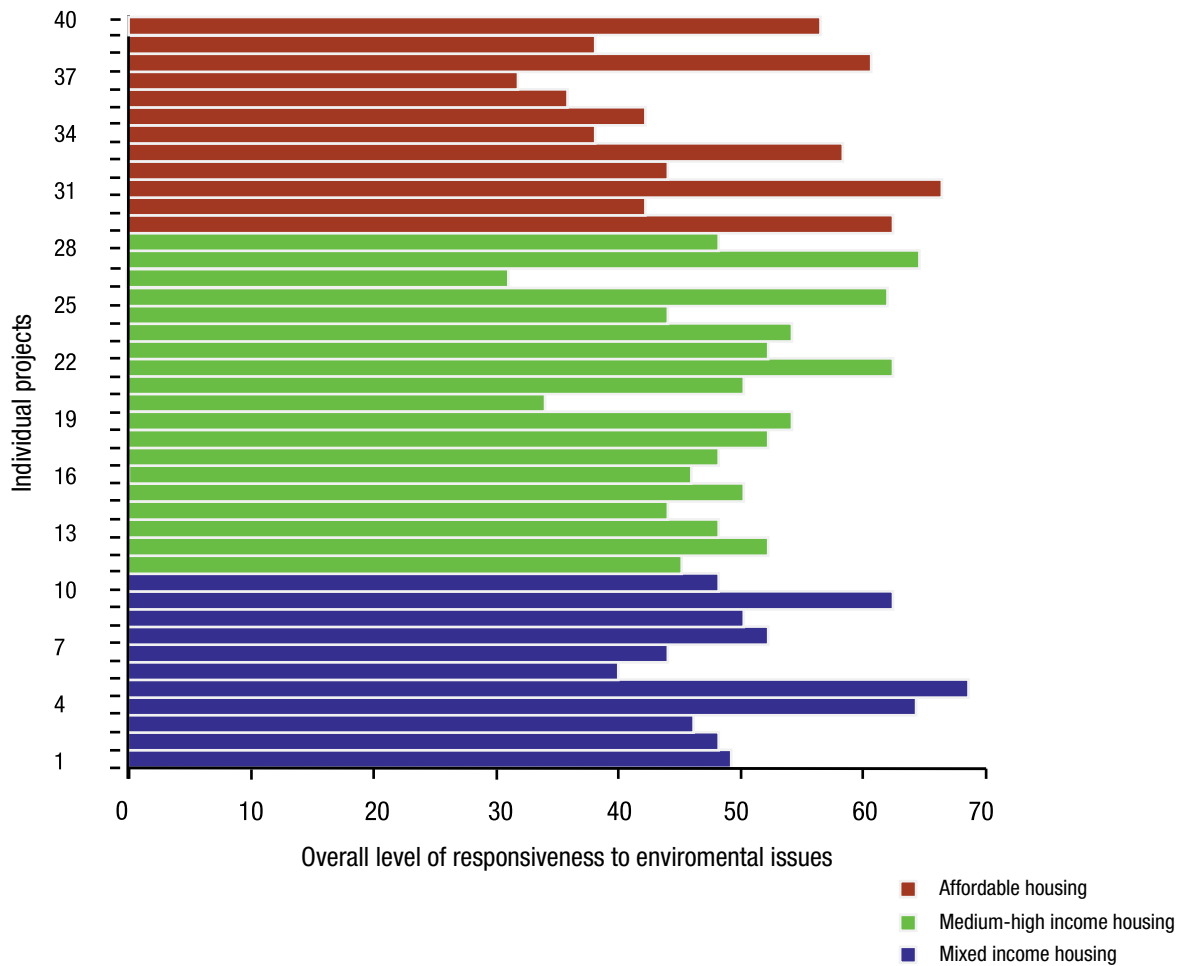


Figure 1: Consideration of environmental issues in housing projects

The results support the view that compliance with environmental laws drive environmental considerations in housing developments. For both government and private sector housing developers, environmental stewardship is almost the least concern. Similarly, voluntary initiatives or considerations such as seeing environmental issues as having potential to enhance the products as well as providing environmentally responsive housing to the market are not prioritised. This suggests that developers may not be concerned with environmental issues but other considerations, possibly financial returns they can derive immediately from the development.

The hypothesis that the responsiveness of the housing development to environmental issues is less than average was tested using the one-tailed z-test (right) with an upper critical value of 1.645 and significance level of 0.05.

$$H_0: \mu \leq 50 \quad (H_0: \mu = 50)$$

$$H_1: \mu > 50$$

With a computed z-score of -0.22960529, no sufficient evidence was established to reject the null hypothesis. Thus the assumption that the level of responsiveness to environmental issues in housing development in Gauteng is low could not be rejected.

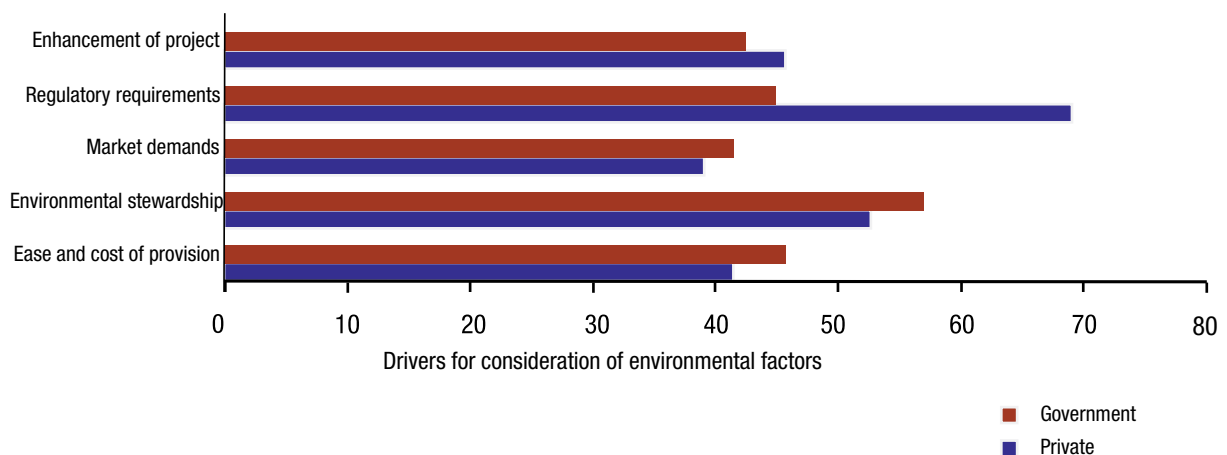


Figure 2: Drivers for consideration of environmental factors

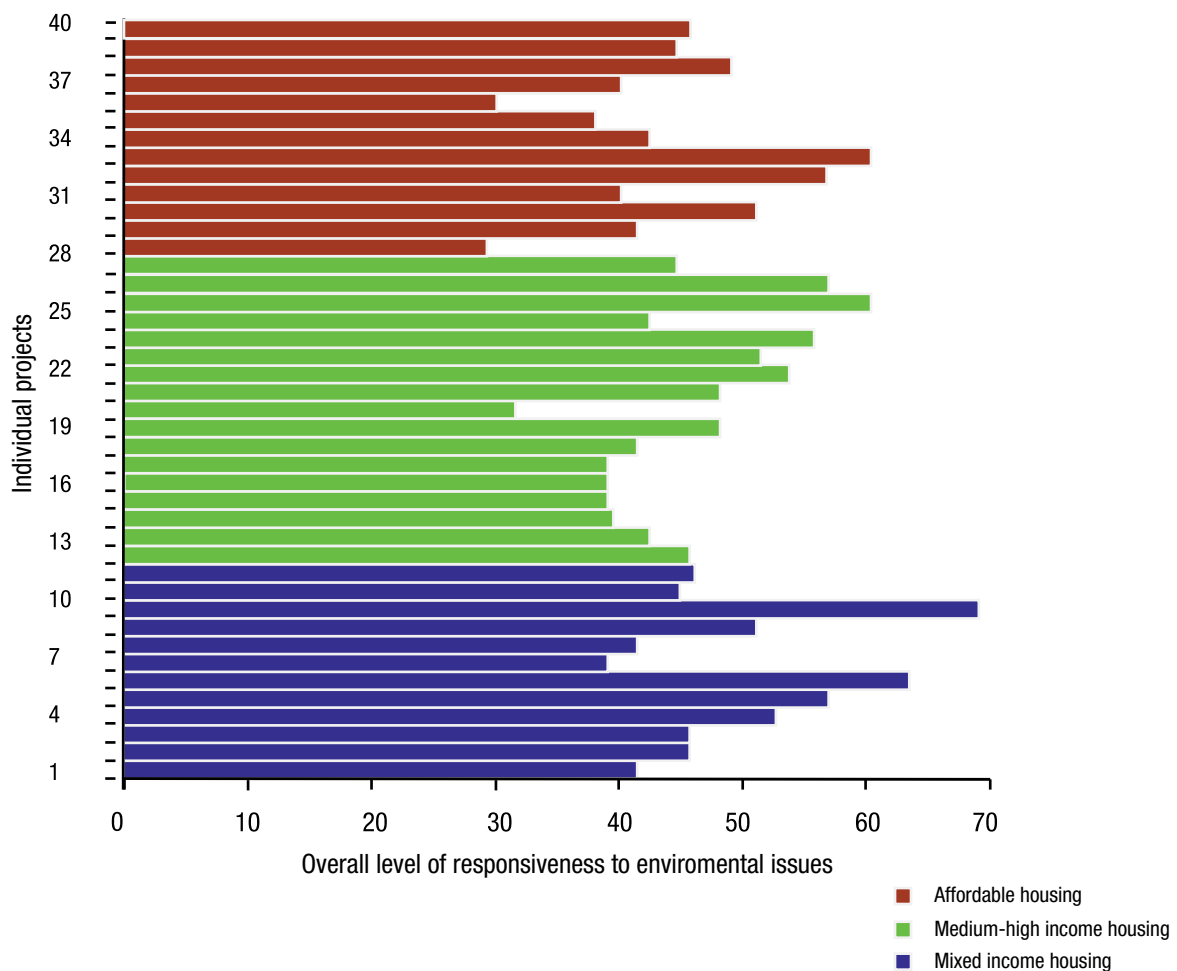


Figure 3: Incorporation of environmental features in different phases of projects

Consideration of environmental issues in different phases of housing development

Incorporation of the environmental issues in different phases of housing developments was undertaken. The phases of the development included site selection, layout design, construction (building materials used, environmental features incorporated, waste management), and occupation (on-going environmental management responsibilities).

- In site selection, environmental factors are the least considered for private developers, while for government projects they were the third most important factor (at 42%) after costs of and availability of land.
- The design of township layouts and orientation of the housing structures affects and can be affected by the environment. While cost efficiency (71%) and town planning requirements (63%) were the major considerations, environmental features on site were identified as the third most important consideration (50%) in private sector projects. For the public sector, these were identified as the fourth most important consideration but at only 42%.
- Environmentally preferable materials have a reduced effect on, among others, the environment¹³. Energy consumption, carbon dioxide emissions and water demand can all be reduced by, among others, improving technologies and promoting eco-friendly alternative materials³². Environmental issues were almost the least of concerns for both the private (at 26%) and public sector

- (at 27%) in choosing materials for house construction. Factors such as transport costs, availability, supply chain relations (except for government) and quality of materials were the major considerations.
- Incorporation natural lighting, design orientation, water and energy saving utilities in housing structures supported by other environmental features in the housing scheme has the potential to reduce the adverse impacts of housing development on the environment³⁴. For both the private and government projects, outdoor facilities followed by housing orientation for the private sector, the latter at 57%, were the main environmental features incorporated at this phase of development. The second highest consideration for government housing was energy efficiency at 51%
- For both private and government housing construction disposal of waste at landfill sites was the main disposal method used. Waste recycling was insignificant, at 21% and 20% respectively in private sector and government housing projects..
- The main source for on-going environmental management was the conditions of environmental approvals. This was true for both the private sector, at 63% and government provided housing at 56%. Self-imposed responsibilities (outside of park development) for government projects (15%), and the conditions of establishment (town planning requirements) for private sector developed houses were almost non-existent.

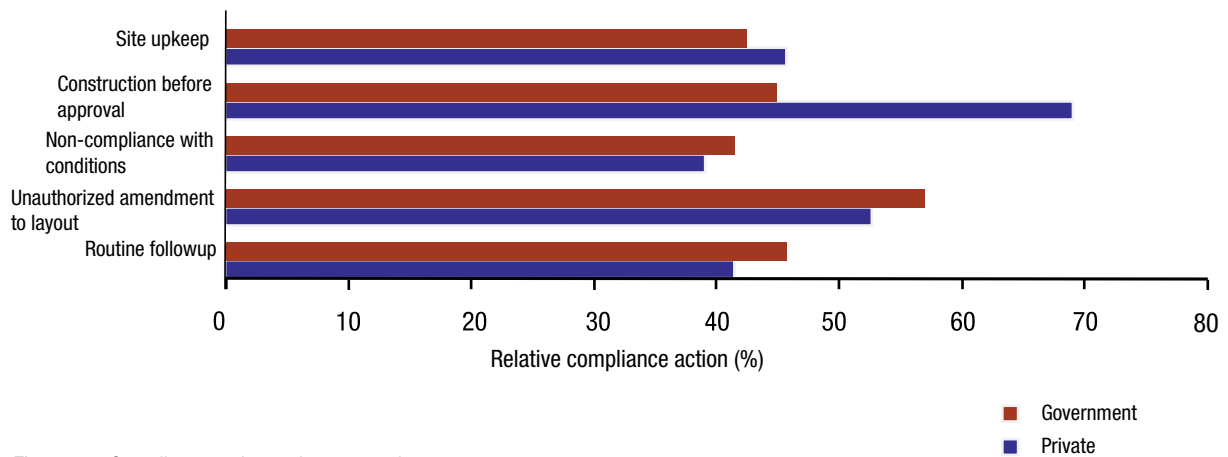


Figure 4: Compliance action and transgressions

The aggregate level of consideration of environmental features in different phases showed a high concentration of scores between 30% and 50%. A total of 69% of the projects achieved a score of less than 50%. The contributions to this level of performance was the fact that 77% of the projects in the Affordable housing category, 72% in the Medium-high income and 55% in the mixed income category achieved a score below 50%.

The results do not demonstrate any specific pattern relative to each phase or overall performance. Except for instances where the requirements are regulated the performance was very low. In terms of housing type, mixed income housing performed better. This could be because innovation is required in such projects considering that these are expected to balance the different needs (range of income groups) within the scheme. As a result, environmental issues then benefit from these efforts.

To determine the significance of the above findings, the sub-hypothesis that environmental issues are not incorporated into the different phases of housing developments in Gauteng (or on average, the level of consideration of environmental issues in different phases of housing developments in Gauteng is low - does not exceed a mean of 50%) was tested:

$$H_0: \mu \leq 50 \quad (H_0: \mu = 50)$$

$$H_1: \mu > 50$$

A one-tailed z-test (right) with an upper critical value of 1.645 and significance level of 0.05 was employed. With a computed z-score of -2.89774, there was no sufficient evidence to suggest that the incorporation of environmental issues in different phases of housing development in Gauteng was above average.

Relationship between compliance to conditions, compliance follow-ups and the type of housing development

Compliance of housing projects to conditions of environmental approvals, the nature of compliance action instituted by the authority as well as the relationship between compliance to conditions, compliance follow-ups and the type of housing developments in Gauteng were investigated.

Projects subject to compliance action

While 39% of all projects considered (236) had been subjected to compliance action, the figure was higher at 64% for projects analysed. The latter figure is made up of the following:

- 73% of mixed income housing;
- 67% of medium-high income housing;
- 54% of projects in the affordable housing category (all by government).

The above could be explained by the fact that Affordable housing is mainly provided by government and this may point to the reluctance by the Department responsible for environment to 'act' on government projects.

Nature of compliance action and transgression recorded

Compliance follow-ups by officials accounted for 51% and 49% of compliance action in private and government housing respectively. At 43% for private sector and 23% for government housing projects, non-compliance with conditions is the main transgression followed by lack of site up-keep during the construction phases. The least transgression is construction before approval which reinforces that adherence to regulations rather than voluntary environmentalism is the driver for the sector.

Nature of project and compliance action

All categories of projects had been subjected to enforcement action. The figure is highest for mixed income projects (73%) followed by medium-high income housing at 67% and lastly affordable housing at 54%. The main enforcement action was driven by routine compliance follow-ups by officials across all the projects categories. The level of follow-up action ranges from the lowest, 45% for affordable housing to the highest of 53% for mixed income housing. The level of compliance follow-ups corresponds with the number of projects that have been subjected to enforcement action discussed above.

In terms of transgressions, non-compliance with conditions was the highest across the three categories of housing. The high non-compliance scores for the medium-high and mixed income housing could be attributed to the high level of follow-ups on these projects compared to those for affordable housing.

Although at a very low score of 13%, government developed Affordable housing projects lead the construction before approval transgression. It is anticipated that this might be as a result of pressure either to provide affordable housing at a faster pace or simply a response to illegal occupation of land and the need for government to resettle affected communities/ individuals on appropriate land.

Measures implemented to meet requirements of approvals

Monitoring of construction activities through appointment of Environmental Control Officers (ECO) was the dominant measure for both government (100%) and private sector housing (98%). Environmental audits were the least implemented at 2% for government projects and 10% for private sector projects. Budget provision and environmental upkeep were also not prominent, at 29% for government projects and 42% for private sector housing.

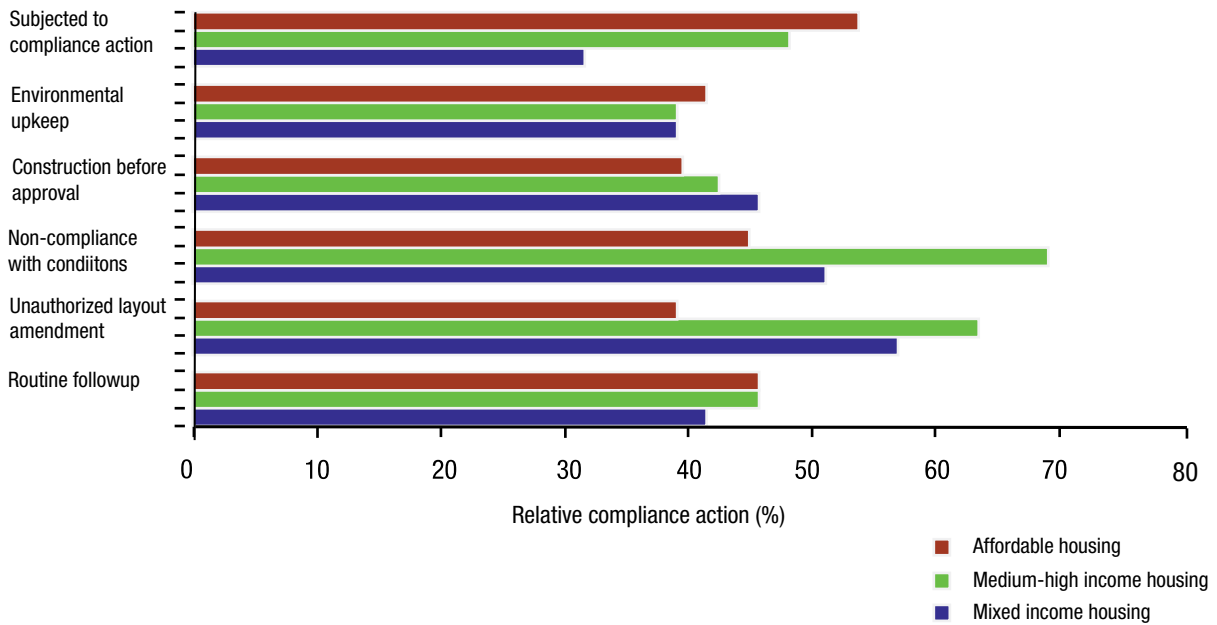


Figure 5: Compliance actions and transgressions per projects categories

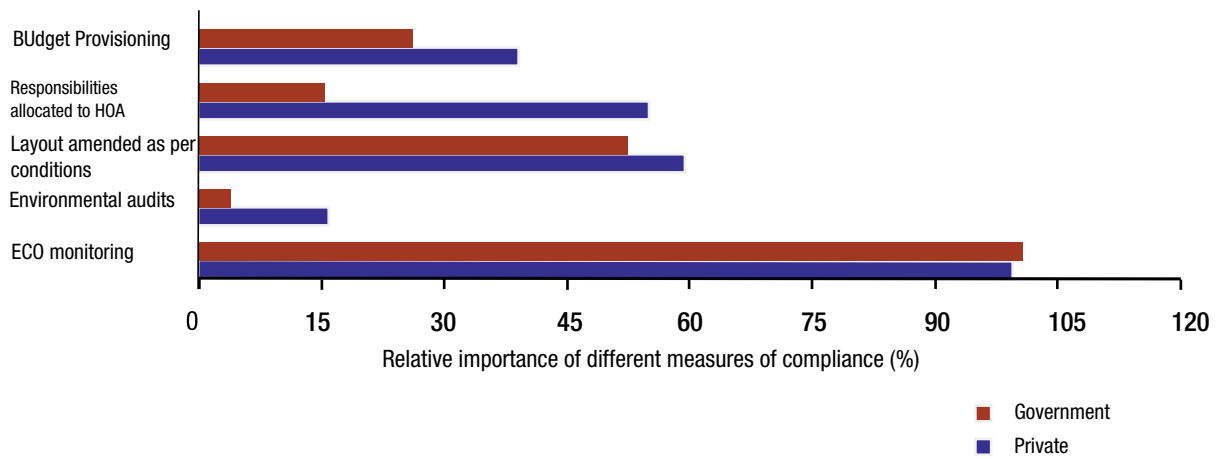


Figure 6: Measures implemented to meet conditions of environmental approvals

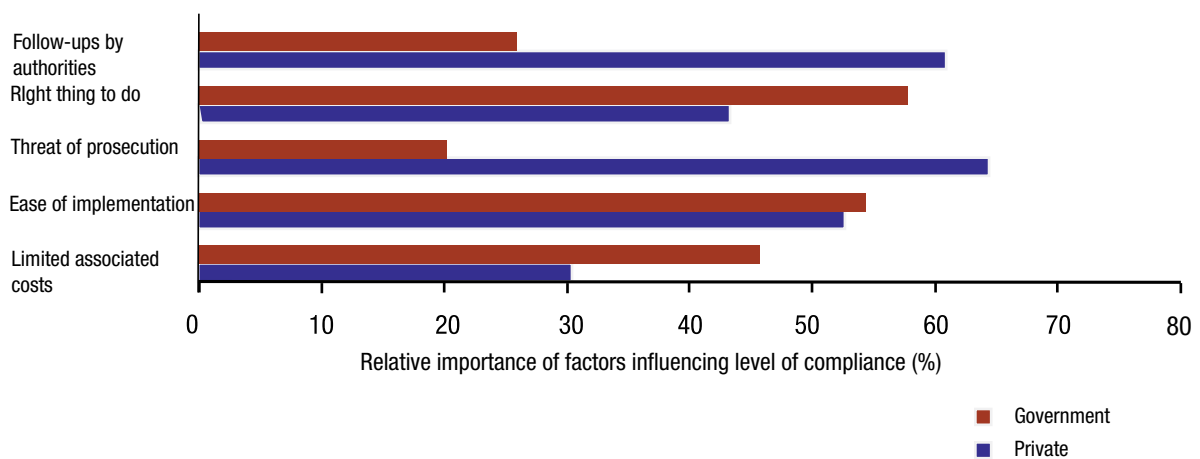


Figure 8: Factors influencing level of compliance

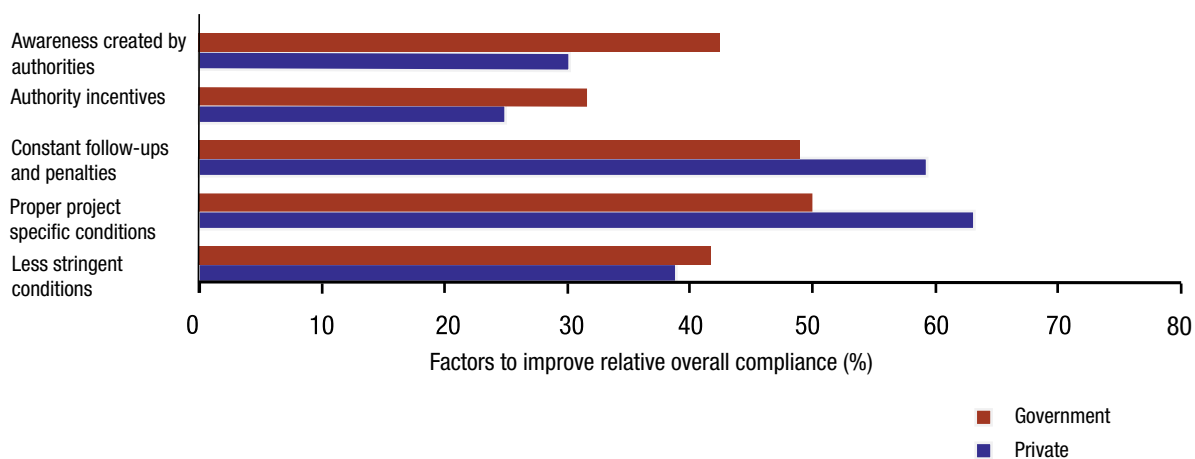


Figure 10: Factors to improve overall compliance in housing projects

As ECOs are required as part of environmental conditions of approval, these results should be expected given that adherence to regulatory requirements drives incorporation of environmental issues in housing projects.

Factors influencing the levels of compliance

The threat of prosecution (66%) and follow-up by authorities (63%) were the major factors influencing compliance in private sector housing. Environmental responsibility (57%) and ease of implementation (51%) influenced compliance in government housing. Cost of implementation of compliance measures was the least concern for private sector while the threat of prosecution was the least concern on government projects.

The last point emphasises previous points that compliance action against government projects is low. As a result, it is not a major threat in government projects that the specific government department can be prosecuted for non-compliance with conditions of environmental approvals.

Measures required to improve overall compliance of projects

Respondents were asked to rank different measures that could be implemented to improve the overall compliance of housing projects to conditions of environmental approvals. Better formulated and project specific conditions (69%) and follow-ups resulting in penalties (60%) were key in facilitating compliance

in projects provided by the private sector. For government housing projects, project specific conditions (52%), follow-ups and penalties (50%) and raising awareness by environmental authorities were identified as key.

Authority incentives and less stringent conditions were not regarded as critical for both the government and the private sector projects. This could be explained by the fact that compliance is a regulated requirement therefore with or without incentives it has to be achieved.

Relationship between compliance follow-ups and compliance with conditions

Effective enforcement creates negative consequences for those who violate the law and has a cascading effect encouraging transgressors to change their behaviour to comply with the law 29. To check if any relationships existed between compliance follow-ups and the level achieved in compliance with conditions of approval, a scatter graph was developed followed by correlation analysis.

Scatter plot

Although all the data points were positively grouped they did not display any obvious linear relationship between the two variables. Given $r > 0.2$, the level of compliance to conditions was not directly related to the compliance follow ups undertaken by GDARD on housing developments in Gauteng.

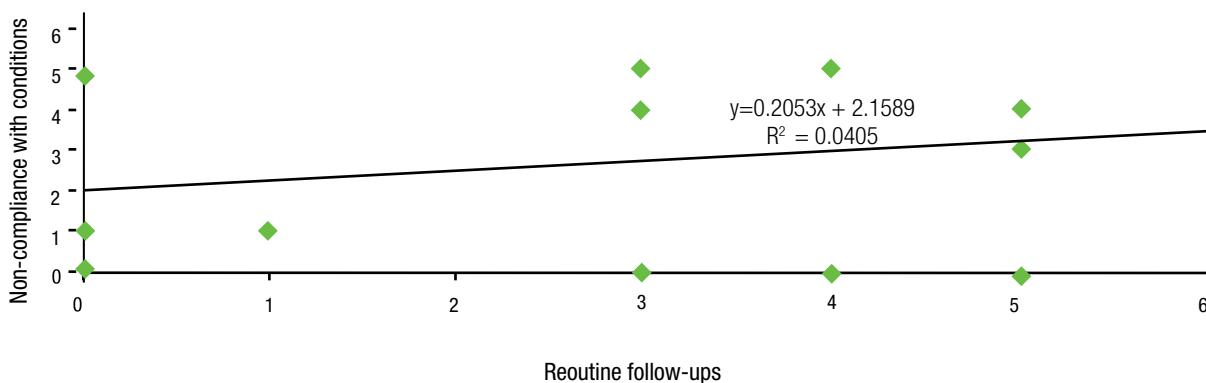


Figure 11: Scatter plot

Significance test for correlation- overall

Given the scatter plot that shows no or very weak correlation between compliance follow-ups and level of compliance to conditions of approval, the following hypothesis was tested:

$$H_0: \rho = 0$$

$$H_1: \rho \neq 0$$

Using the t- statistical table, a significance level of 0.05 and df = 25 the critical value of t = 1.708 the null hypothesis was tested. As the calculated $t < 1.708$, the H_0 could be rejected in favour of the alternative. Thus the sample data did not demonstrate a positive relationship between compliance follow-ups and the

level of compliance with conditions of authorisation in housing developments in Gauteng.

This analysis possibly suggested that with increased follow-ups, increased incidences of non-compliance with conditions are identified which would not have been revealed without follow-up action. With the level of responses to environmental issues, compliance follow-ups have served to ensure that non-compliance with conditions are identified and addressed in Gauteng. Because the study did not have the “before” and “after” scenarios, it was therefore not possible to be definitive on whether the follow-ups (or knowledge that these will be undertaken) have improved or not the level of compliance in housing projects.

Table 1: Summary Regression Statistics

Summary Output

Regression statistics	
Multiple R	0.201337
RSquare	0.040537
Adjusted Rsquare	0.002158
Standard Error	1.965563
Observations	27

ANOVA

	df	SS	MS	F	Significance F
Regression	1	4.080679	4.080679	1.05623	0.313918281
Residual	25	96.58599	3.863439		
Total	26	100.6667			

	Coefficient	Standard Error	t-Statistic	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2.985138	0.671673	4.444332	0.000157	1.601801382	4.368475	1.6018014	4.36827463
XVariable 1	0.197452	0.192125	1.02773	0.313918	-0.19823569	0.59314	-0.198236	0.59314014

Significance test for correlation- by type of housing

The significance of the correlation results per housing type was also tested. The table below summarises the key results of the regression analysis. Using the p-values and significance level of $\alpha = 0.05$, the $H_0: \beta_1 = 0$ could not be rejected. Therefore irrespective of the nature of housing development no relationship could be established between compliance follow-up action and the level of compliance with conditions of environmental

approvals in Gauteng. These results confirm the overall findings on the relationship between the two data sets. Although the research did not delve into this aspect, it is suspected that because of the infancy of environmental compliance and enforcement in South Africa and Gauteng, compliance to conditions of environmental approvals in housing development is still not integral to the development process. This was supported by the findings relative to the first and second sub-hypotheses.

Table 2: Significance test for correlation per type of housing

Type of housing	Regression analysis results			Decision	
	Multiple R	t stat	P-Value	P values vs. α	Conclusion
Affordable Housing	0.300	0.703	0.513	p value > 0.05	Null Hypothesis cannot be rejected.
Medium-high income Housing	0.034	-0.108	0.913	p value > 0.05	Null Hypothesis cannot be rejected.
Mixed income housing	0.584	1.762	0.129	p value > 0.05	Null Hypothesis cannot be rejected.

CONCLUSIONS

The research investigated the extent to which environmental issues were incorporated into real estate development in general and into housing projects, including the possible relationship between the level of compliance to conditions of environmental approvals and the nature of housing developments in Gauteng.

From the literature review, it was established that environmentally sustainable business practice is financially beneficial and has potential to be a driver of business success. However, the level of responsiveness has remained low. For real estate, it has been argued that there is need for the sector to address its environmental footprint. Despite its centrality to the carbon use and greenhouse gas emissions of the world, the creation of greener buildings has lagged the progress and commitment shown in other industries.

It was established that the incorporation of environmental issues in housing development in Gauteng is mainly driven by regulatory requirements. Environmental issues are not integral to the bottom-line determinants as they are not seen to be part of the product offering or the competitive advantage. The trend was observed across government and private sector projects as well as the different housing types investigated. The leading non-compliance issue was failure to adhere to conditions of environmental approval in projects across all categories of housing.

The relationship between compliance follow-ups, compliance to conditions of environmental approvals and the different types of projects was tested through correlation and regression analysis. The analysis did not prove that there is any significant relationship among these variables. Thus, on the basis of the data available, no positive and significant relationship could be established between the level of compliance and compliance follow-ups and the type of housing development in Gauteng.

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