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Traffic Impact Analysis as a Tool for Planning Permiot Considewration in Lagos, Nigeria: Guidelines and Procedures

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1 ABSTRACT

This research based paper reviews the statutory requirements of developmental projects approval process and makes a case for the preparation of Traffic Impact Analysis (TIA) as a separate and distinct study for deserving proposed projects because of the pervasive nature of traffic. Because the Environmental Impact Analysis (EIA) report as one of the requirements for planning approval is required to cover such diverse issues as the socio-economic environment and the ecological character of the project, among others, the depth of impact measurement on each is often not detailed enough. This is more germane in such areas as the impact of the proposed project on traffic and transportation which represents a major challenge in a metropolis such as Lagos, as traffic remains the most concealed component of the Impact Analysis of any new development project. This paper posits that the impact of certain project on traffic and transportation is too far reaching to be subsumed under a generalized EIA study. This paper therefore recommends the inclusion of traffic impact analysis report as a statutory inclusion in the portfolio submitted for development approval process in Lagos. The paper advocates the need for the urgent enactment of necessary legislation to make this an obligation and also spells out the procedures and guidelines for its preparation.

2 INTRODUCTION

Approval for proposed development projects in Lagos statutorily requires developers, whether private or government, to prepare and submit alongside their proposals, an EIA report while applying for a development permit (LASG 2005). An Environmental Impact Analysis (EIA) report characteristically spells out the characteristic and conditions of the proposed project environment along physical, social, cultural, economic and aesthetic dimensions with a view to providing the baseline against which to measure real and potential impacts and changes to the environment arising from the execution of the proposed project: the nature of the projects in terms of its components, services to be rendered, end-users, sources and nature of wastes and associated problems: the nature and magnitude of environmental changes attributable to project activities and appraise their impact, positive and or negative, on the totality of its environment: and suggestion on how observable anticipated impacts could be ameliorated or managed in the light of available technology and within legislative limitations in order to eliminate or reduce the potentially significant environmental consequences as a way of achieving the objectives of environmental protection and sustainability.

Broad review of available EIA reports generally has revealed the contents of most of such reports to be too broad and the depth on specific issues considerably shallow. Because EIA reports are required to cover such diverse issues as the socio-economic environment and ecological character of the project, among others, the depth of impact measurement on each is often not detailed enough. This is more germane in such areas as the impact of the proposed project on traffic and transportation which represents a major challenge in a rapidly growing metropolis such as Lagos.

Traffic remains the concealed component of the impact analysis of any new development project. Therefore the impact of certain projects on traffic and transportation is too far reaching to be subsumed under a generalized EIA study. Till date, very few proponents, if any, of development projects in Lagos including major traffic generators like major shopping centers, new terminal facilities and large scale housing development projects; conducted and prepared a traffic impact analysis in order to obtain development permit. So far, a TIA study has not been requested as part of the portfolio that a developer must summit to approving agencies before building permit for a new development project is issued. Therefore this paper advocates the need for the preparation of TIA as a separate exercise for certain specific types of development projects. The paper justifies the need for enactment of necessary legislation and also spells out the procedures and guidelines for the preparation of a Traffic Impact Analysis

TIA should by law be a separate but integral document to be delivered alongside others for granting building permits for projects and uses of specified types and sizes.

ISBN: 978-3-9503110-2-0 (CD-ROM); ISBN: 978-3-9503110-3-7 (Print)
Editors: Manfred SCHRENK, Vasily V. POPOVICH, Peter ZEILE, Pietro ELISEI

3 LITERATURE REVIEW

Public interest in issues that concern the environment and its protection and sustainability has in recent years become notable. This has come in conjunction with a number of legislation, national and international, regulating the use of national resources. An often quoted definition of EIA by Munn (1979) refers to the need "to identify and predict the impact on the environment and on man's health and wellbeing of legislative proposals, policies, programmes, projects and operational procedures and interpret and communicate information about the impacts"

GeoSystems and Technologies Inc. (2008) itemized the broad outline of an EIA to include the definition of the proposed project; description of the existing site characteristics and infrastructure including land use, water bodies, social, cultural and heritage information; assessment of public perception of the proposed development through public consultations; identification of policies, legislation and regulations relevant to the project; description of other project alternatives; description of possible short, medium and long term impacts, indirect and cumulative impacts; identification of any mitigation action to be taken to minimize predicted adverse impacts, with associated costs where applicable and practical; and development of an Environmental Monitoring Plan (EMP) to ensure that mitigation measures are adopted during the implementation stage.

On the other hand, the process of EIA preparation can be summarized as characterization (qualitative and quantitative) of the baseline environmental conditions of the study area, prior to the start of the project activities; identification and assessment of potential impacts of the proposed project; recommendation of practical and cost effective mitigation plans to limit plans to or completely eliminate negative impacts; recommendation of practical and cost effective post-developmental environmental management programme; preparation of a detailed EIA report, which will form the basis for the issuance of an EIA and the final clearance by the approving authority.

TNL (1999), in a report identified the objectives of an EIA study to include;

- Identifying negative and positive impacts that are likely to result from the implementation of a proposed project
- Generating mitigation options that can be used to reduce or completely eliminating the negative impacts of the projects during construction and those associated with the operation of the project after construction;
- Generating technical schemes which must be added to the design of the project, to ensure environmental benignness and;
- Developing an environmental management plan that must be in place to ensure continuous environmental soundness throughout the project lifetime (Thermosteel Nigeria Limited 1999).

The Nigerian Constitution in its environmental and directives of state policy on the environmental states that "the state will protect and improve the environment and safe guard the water, air and land, forest and wildlife of Nigeria" (Nigerian Constitution, Chapter 2 and Article 28).

The legislation that made the preparation of the impact analysis mandatory for development projects in Nigeria were focused mainly on assessing the impacts of projects on the broad environment. For instance, the National Environmental Impact Assessment Decree No 86 of 1992, Nigerian Urban and Regional Planning Law Decree No 88 of 1992, Environmental Impact Assessment Decree No 59 of 1992 and several states (including Lagos) enacted urban and regional planning and development laws. All these laws stipulated that before any person, corporate body or agency takes a decision to undertake or authorize the undertaking of any activity that may likely or significantly affect the environment, prior consideration of its environmental effects should first be taken; hence the need for the preparation of an EIA report.

Lagos State government recognizes the need to protect its territorial environment and has affirmed its commitment to the preservation of same. Hence … specifically, the Lagos State Urban and Regional Planning and Development Law of 2005 stressed that "where the application submitted (to planning authorities for approval) is in respect of any development of land area of four hectares and above, and other institutional, commercial, industrial complexes, such application shall be accompanied with an Environmental Impact Analysis Report giving the details of effects of the processed development on socio-

economic environment, traffic, ecology and communication network duly prepared by a Town Planner registered to practice in Nigeria".

This existing administrative and legal framework which has ensured that the impacts of development projects are subjected to pre-construction evaluation before a go-ahead is given to construct does not however include the preparation of TIA, specifically as a precondition.

A Traffic Impact Analysis (TIA) is a study carried out to predict the magnitude and effects that a proposed development project generated traffic will have on the transportation network. TIA is an important document in helping planning authorities in making decisions on land and its use. TIAs can also be used to evaluate whether the proposed developmental project is appropriate and what type of transportation facility improvements would be necessary. Traffic impacts could be direct or cumulative. A direct impact would result solely from the implementation of the proposed project while cumulative impact is based on list of past, present and probable future projects in the area. This means that a cumulative impact would occur as a result of traffic growth both the project and from other projects in the area.

Specifically, according to Edwards (2000), Traffic Impact studies help to

- Forecast additional traffic associated with new development;
- Determine the improvement that are necessary to accommodation the new development's anticipated traffic;
- Identity potential problems with the proposed development which may influence the developer's decision to build;
- Help to ensure safe and reasonable traffic conditions (volume, flow, etc) on streets after the development is completed;
- Reduce negative impacts created by developments by helping to ensure that the transportation network can accommodate the development; and
- Provide direction to decision makers and the developer of expected impacts
- TIS is to be prepared and submitted, if one of the following criteria applies to the project.
- The site to be developed for a residential use is to generate more than 100 vehicles per peak hour,
- The site to be developed for a use other than residential is to generate 250 vehicles per peak hour, or more than 2,500 per day, or
- The site to be developed for a residential use, is located on a low volume road, and generates 200 vehicles per day or more and at least doubles the existing volume of the road (Edwards 2000).

4 TRAFFIC IMPACT MEASUREMENTS

A traffic impact is an effect, either positive or negative, on the traffic of the adjoining roads and other transportation infrastructures that may be associated with a proposed project activity. The assessment of the proposed project may be based on a synthesis of such criteria as, the nature of the impact, directness of the impacts, spatial extent, duration, intensive or magnitude and determination of significance.

The study of the nature of impact is an evaluation of the type of effect the proposed activity would have on the affected roads and other transport facilities and traffic attributes or components. Its description should include, what is being affected and how. A direct impact refers to an immediate impact appearing because of the project activity while a secondary level. Spatial extent analysis is a description of the scale of potential impact, using the following parameters.

- Local, where the impact could affect the extended area adjacent to the site such as a neighourhood or town, probably affecting traffic up to 10km outside the immediate environment.
- Regional, where the impact could affect traffic in areas which include outlying parts of the city, transportation route, adjoining towns, etc; and
- National, where the impact could be as far reaching as national boundaries.

The duration criterion refers to the expected lifespan of the proposed project's traffic impact. This can be defined as;

- Short term, if the traffic impact will disappear with mitigation, or will be reduced in a span shorter than the construction phase; impacts that are predicted to last only for a limited period.
- Medium term, if the traffic impact will last for only the construction phase; thereafter, it may completely terminate; and
- Long term, if the traffic impact will continue or last for the entire operational period of the project, however, it will be mitigated by direct engineering or traffic control solution afterwards.
- Permanent, if the traffic impact is considered non-transitory. That is mitigation by engineering or human processes will not occur is such a way or in such a time span that the impact can be considered transitory.

Impact intensity or magnitude analysis refers to a description of whether or not the intensity or magnitude of the impact would be high, medium (moderate), low or negligible (no impact). Evaluation of potential traffic impacts on traffic components may be qualitative or quantitative. The factors used to describe intensity or magnitude include;

- Low, if the impact will not have significant influence on the adjoining traffic, hence it will not require significant accommodation in the project design or implementation. The impact may alter the affected transport environment in such a way that traffic processes or functions are not affected in any significant way, i.e., the existing road networks are not overburdened, or existing traffic patterns and flows are not altered or affected).
- Moderate, if the impact could have an adverse influence on the existing level and flow of traffic, requiring a modification of the project design or alternative implementation schedules. The affected traffic and transportation environment is altered, but the functions and processes will continue, albeit in a modified way.
- High, if the impact could have significant influence on the traffic environment, but cannot be mitigated or accommodated by the project design, but introducing alternative mitigation measures, such as road re-alignment at a particular stretch, construction of new parking facilities, widening of existing adjoining roadways, etc. Functions or process of the existing traffic environment is distributed to the extent where it may be affected temporarily or permanently.

Determination of significance criteria is an indication of the potential impact in terms of physical extent, intensity and time scale. It is an indication of the required level of mitigation, and is determined through a synthesis of impact characteristics or combination of effects. The various classes of significance are defined as follows;

- Negligible, if the impact is considered to be insignificant and does not require any mitigation efforts;
- Low, if the impact of the little importance, but may require limited mitigation;
- Moderate, if the impact is of importance and considered to have mitigation. Mitigation is required to reduce the negative impacts to acceptable levels or to maximize positive impacts; and
- High, if the impact is of great importance. Hence, failure to mitigate and reduce impact to acceptable levels could potentially negate development, or make entire project unacceptable.

5 METROPOLITAN LAGOS: CASE STUDY

Lying approximately between Longitudes 20 42’ E and 30 22’ E and Latitude 60 22 ‘N and 60 2’ N in the southwestern part of Nigeria, Lagos, the nation’s most populous city, Nigeria, with an estimated population of 18.5 million (2009 projections), is located south of Ogun State and 800km southwest of the nation’s capital, Abuja. The metropolitan area, an estimated 300 square kilometers, comprises 88.7% of Lagos State, a total of 19.87 square kilometers is centrally located within the coastal frontage of Lagos state, comprising of 17 local government areas (LGAs).

Lagos with its 29 industrial estates and 4 CBDs, is the commercial and industrial hub of Nigeria, is home to 70% of the country’s total industrial investment and 65% of its commercial activities and accounts for approximately 50% of the country’s manufacturing sector (Ehingbeti 2002, NEPAD City Lagos Profile, 2003 and Badejo 2009).

6 NEED FOR TRAFFIC IMPACT ANALYSIS STUDIES IN NIGERIA AND LAGOS

Given the high population density of Lagos metropolitan area (estimated 18.5 million people, on 3,577 square kilometers of land) with over 85% of this population on an area that is 37% of the land area in Lagos, the amount of pressure that the existing transport infrastructure system bears can be envisioned, especially in an urban environment with no efficient transit system. Lagos population is growing ten times faster than the population of New York and Los Angeles (in US), and more that the population of 32 African countries combined (Badejo 2009). This growth rate plus the chaotic character of the urban transport system has manifested a number of outcomes. Some of these, according to Badejo (2009), include long travel times on the road, poor road condition largely due to overuse and lack of maintenance, high level of emission and pollution from vehicles, deplorable road system, traffic congestion along major corridors of the state, among others.

According to Edwards (2000), "understanding the demands placed on the community's transportation network by development". Every development is a generator of traffic and some development projects can generate large enough traffic and so as to create congestion, leading to more public investment in the transportation network (construction of new roads, expansion or improvement of existing routes, new traffic control mechanisms, new terminal facilities etc.). Traffic congestion leads to economic costs as a result of longer travel times, air and noise pollution and accidents. As a road becomes more congested, drivers tend to turn to other roads not necessarily intended for thorough traffic (Edwards 2000).

The purpose of TIA study is to maximize traffic related impacts on the existing land use in the immediate vicinity of the proposed development, on the proposed development itself and on traffic conditions and traffic control devices that are not within the vicinity of the proposed development but are expected to be affected by increased traffic volumes.

7 METHODOLOGY

The methodology employed in this research is largely secondary dat. The secondary data for this research were sourced from various published and unpublished documented sources, such as urban and regional mater plans, policy documents published texts, journal articles, etc. a number of transportation and planning reports were studied and relevant information extracted

8 GUIDELINES AND METHODOLOGY FOR TIA

Traffic Impact Analysis (TIA) is developed to estimate the impact of new development on adjoining area's roadways and identify improvement necessary to mitigate that impact. For the purpose of determining what level of study must be completed for a proposed development, the following thresholds have been established. For project generating fewer than 100 net new peak hour trips, a Traffic Impact Statement is required, while for those generating 100 or more net new peak hour traffic, a Traffic Study has to be prepared.

A Traffic Statement includes a review of a site access, circulation and access management, and also provides driveway volume, distribution, site trips and roadway information; while a traffic study includes the review of site access, circulation, access management, safety, roadway links analysis and intersection analysis that will be significantly imposed by the development.

At the minimum, the TIS shall include site access review the circulation and access management components to be considered complete. On the other hand the Traffic Impact Study shall include at a minimum an introductory note which typically includes the description of the type, size, location and the expected construction duration of the project development. This is followed by an analysis of the existing condition which is usually presented in a tabular format and presents a review of the current conditions in the study area without the trips generated by the proposed development.

Intersection and Segment Analysis table, which presents an analysis of all road intersections and segments within the study area and the project analysis based upon the results from traffic volume estimates (trip generation), directional distribution (trip distribution), and total traffic projections are presented. The study area segments, intersections and the site access are evaluated for capacity constraints and operating conditions.

A complete future conditions analysis is also included in the study. This analysis includes all roadway links and intersection analysed in the existing condition section of the study and also includes a peak hour/peak direction Level of Service (LOS) analysis showing the future roadway conditions after applying the base traffic, the proposed project traffic, any other improvements.

As an additional inclusion, future conditions table and a future turning movement illustration are also to be included in all traffic studies. The future conditions table shall be consistent with the existing conditions table, for easy comparison; and provision has to be made for the analysis for roadway segments and intersections within the study area. The table, at a minimum should provide information such as, functional classification, Generalized LOS Tables classification, LOS capacity future projected traffic volumes, and the projected LOS (peak hour/peak direction for two weekdays). In some cases, a Saturday or Sunday analysis may be required. Segment identified in the future conditions table shall be consistent with those identified in the existing LOS table. The analysis for all intersections and segments within the study area shall be performed and the existing intersections peak hour segments with the projected intersection peak hour segments shall be compared; calculating the estimate LOS and volume-to-capacity ratios.

A future turning movement illustration shall be prepared as part of the analysis, showing the individual movements for the project traffic, projected background traffic and total traffic. A mitigation analysis section summarizes the overall impact of the proposed development on the study area and identify specific improvements required, timing for construction of those improvements, and the agency responsible for those improvements. All supporting documentations are to be included in the appendix.

9 CONCLUSION

Development projects, depending on their intended use and intensity of development, have varying level of traffic attraction, causing imposition of new traffic on the existing traffic on adjoining roads. As traffic increases, delays and convenience to commuters becomes increasingly costly and ultimately unacceptable to both the public and the decision makers. As developments become larger and more complex, their effects on local traffic conditions become more pronounced.

For a city like Lagos, when traffic flow and management is a major challenge and given the rate of its urban expansion, especially with its megacity status with its attendant attraction of mega projects, it has become imperative that proposed development projects are subjected to TIA so as to predict and mitigate its impact on traffic and transportation. This paper is therefore recommending the inclusion of traffic impact analysis report as a statutory inclusion in the portfolio submitted for approval process. The paper advocates the need for the urgent enactment of necessary legislation to make this an obligation and also spells out the procedure and guidelines for its preparation.

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