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# **NAIROBI-THIKA HIGHWAY IMPROVEMENT PROJECT**

**An Environmental Assessment**

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### **List of Acronyms**

AfDB- African Development Bank  
BoQ- Bill of Quantities  
DEO- District Environment Officer  
DPHO- District Public Health Officer  
DPO- District Planning Officer  
DRE- District Roads Engineer  
DWO- District Works Officer  
EA - Environmental Audit  
EHS - Environment, Health and Safety  
EIA - Environmental Impact Assessment  
EMCA - Environment Management and Coordination Act  
EMP - Environmental Management Plan  
ERA - Environmental Risk Assessment  
ESIA- Environmental and Social Impact Assessment  
EMMP- Environmental Management and Monitoring Plan  
GoK - Government of Kenya  
I&APs - Interested and Affected Parties  
Kara – Kenya Alliance of Resident Associations  
KeNHA- Kenya National Highways Authority  
NEMA - National Environment Management Authority  
PPRO- Project Public Relations Officer  
WHO - World Health Organization

## **Executive Summary**

Transforming the road from Nairobi to Thika town into a super highway is one of Kenya's first large-scale transportation infrastructure projects. Funded by loans from the African Development Bank and the Chinese government, the project officially broke ground in 2009 and was inaugurated in November 2012. Like most road projects, the Thika Highway Improvement Project (THIP) is having major environmental, as well as social and economic impacts. While the required environmental assessments were prepared prior to the start of the project, it is unclear whether they accurately depicted potential environmental problems and/or recommended appropriate mitigation measures. To fill this gap, the Department of Geography and Environmental Studies, in partnership with the Center for Sustainable Urban Development (CSUD) at the Earth Institute at Columbia University, undertook an assessment of the environmental impacts of the THIP.

This preliminary environment assessment involved a desk review of relevant documents, visits to the project site, and interviews with stakeholders, meetings with key players in the construction project such as the Chief Project Engineer, and a laboratory water analysis. In addition, the study team joined in additional meetings conducted by the Kenya Alliance of Resident Associations (Kara) as part of their social and community assessment of the project. As this is the first superhighway being built in Kenya, it is important that lessons are drawn from the gaps so appropriate and necessary measures are taken to ensure that future projects do not have unnecessary and irreversible environmental consequences.

The findings in this report suggest a number of ways to improve future road projects. Recommendations to the government include the following:

- **Encourage more public consultation and attention to public safety throughout the project cycle**
- **Involve local governments and local governments should take their regulatory responsibilities seriously**
- **Improve the EIA system**
- **Improve Water Quality Standards and implementation of Air Quality Standards and invest in a monitoring system**

And to international financial institutions:

- **Support stronger capacity for environmental regulation and monitoring and link this to infrastructure projects financing**

## Chapter One: Introduction

### Background to the Study

The transformation of the road from Nairobi to Thika town into a super highway is one of Kenya's first large-scale transportation infrastructure projects. This project, known as the Thika Highway Improvement Project (THIP), is drawing mixed reactions from the neighboring residents and users of the road. Funded by loans from the African Development Bank and the Chinese government, the project officially broke ground in December 2009 following the signing of an agreement between the Government of Kenya and three Chinese construction firms.<sup>1</sup> It was originally expected to be completed in July 27, 2011 but was actually completed in November 2012. This project is one of Kenya's first large-scale infrastructure projects. The highway serves a highly populated zone of Nairobi, acting as a main artery for various satellite towns and economic hubs along the corridor. It also has areas of very high potential (social and economic) importance that extend to Central, Eastern and Northern Kenya as well as the neighboring countries to the north. The road constitutes an important section of the Great North Road, linking the port of Mombasa and northern Tanzania to inland economic centers.

In addition to social and economic impacts, the Nairobi-Thika Highway Improvement Project (NTHIP) is having major environmental impacts. In fact, the THIP is designated as a Category 1 project according to the African Development Bank's (AfDB) environmental and social risk management system. Category 1 projects are those likely to induce important adverse and irreversible environmental and/or social impacts, such as the displacement of more than 200 people (AfDB 2003). Due to the magnitude of the road project, a full Environmental and Social Impact Assessment (ESIA), an Environmental and Social Management Plan (ESMP), and a Resettlement Action Plan (RAP) were required according to the AfDB guidelines. In 2007, Aquaclean Services Limited company, an EIA licensed expert, undertook a comprehensive environmental and social impact assessment study for Consulting Engineering Services which was contracted by the government to lead the design of the highway. The assessment was subsequently approved by the National Environment Management in June 2007, and an EIA license was issued to the Ministry of Roads, which then awarded construction contracts of the road project in three lots as follows:

- 1) LOT 1: Nairobi City to Muthaiga roundabout – China Wu Yi;
- 2) LOT 2: Muthaiga roundabout to Kenyatta University – Sinohydro Corporation Limited;  
and
- 3) LOT 3: Kenyatta University to Thika – Shengli.

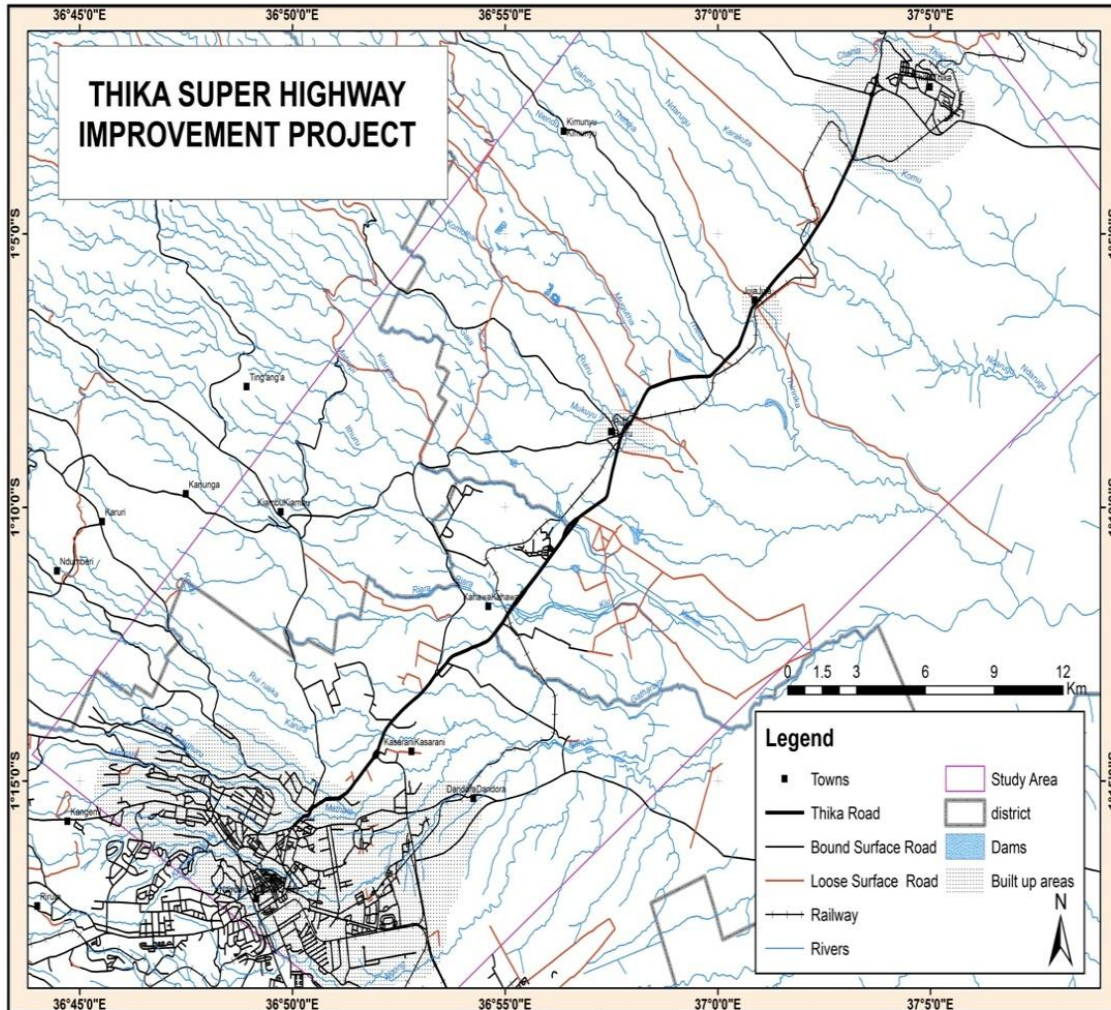
It is unclear if any monitoring system was put into place before construction of the highway improvement project began. This appears not to be the case.

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<sup>1</sup> Further information regarding the firm names, contract sums and other construction details are described in Appendix I.

While the required environmental assessments were prepared prior to the start of the project, it is unclear whether they accurately depicted potential environmental problems and/or recommended appropriate mitigation and monitoring measures.

To fill this gap, the Department of Geography and Environmental Studies, in partnership with the Center for Sustainable Urban Development (CSUD) at the Earth Institute at Columbia University, undertook an assessment of the environmental impacts of the THIP. The study is the second in a series of explorations by the interdisciplinary research consortium organized by CSUD to gain insight into various aspects of the THIP. The first report examined and raised questions about the extent and quality of public consultation in the project and sought to bring in more public feedback (Kara and CSUD 2012). A complimentary policy brief was also prepared that examined the institutional and legal gaps in environmental regulation in Kenya using the NTHIP as a case study (Barczewski 2013).



*Source: Study team original research data*

## Study Objectives and Rationale

Few independent studies exist of how well environmental regulation is working in relation to Kenya's growing road infrastructure projects even though it is well-established that roads have major and often negative environmental impacts (Coffin 2007, Fu et al 2010, Laurance and Balmford 2013). This study is a preliminary evaluation of the kind and extent of environmental impacts, monitoring and mitigation measures within the NTHIP. The objectives of the study are to:

- 1) Explore whether the required studies including environmental impact assessments prepared prior to the construction of the Thika Highway Improvement Project accurately depicted the potential environmental impacts of the project;
- 2) Determine whether mitigation measures recommended in the documents were appropriate (in light of both predicted, and in some cases, actual impacts);
- 3) Determine whether these mitigation measures have been followed and whether other measures were needed;

- 4) Review post-construction monitoring and evaluation plans for specific environmental impacts;
- 5) Review the relevant environmental regulations currently in place and highlight any gaps in the regulations and the institutions, which are to implement and enforce them;
- 6) Review environmental concerns raised in transportation policy (Integrated National Transportation Policy); and
- 7) Provide recommendations for more research and databases to assist KeNHA, NEMA and the public to make informed decisions during evaluation and approval of similar projects in the future.

This study provides some baseline information on the environmental impacts of the Thika Highway Improvement Project. It scrutinizes some of the documents prepared by the Government of Kenya, the African Development Bank (AfDB), Consulting Engineering Services, the Ministry of Roads, NEMA, and the Kenya Urban Roads Authority Environmental Management Plans (EMPs), and other relevant documents. The study analyzed specific environmental impact issues raised and recommendations for their mitigation of a number of relevant Nairobi-Thika Road Improvement Project documents. We attempted to identify the gaps in the presentation of issues as well as recommendations for their mitigation. Along these lines, the study went further to discuss certain aspects of the ongoing project vis-a-vis the scope of the predicted specific environmental impacts compared to the actual impacts. Specifically, the environmental issues touched on in this report include:

- Air quality along the route;
- Noise levels along the route;
- Visual quality along the route;
- Unique biodiversity of fauna and flora along the route; and
- Water quality and drainage issues.

### **Research Methodology**

The key environmental issues in the study area were identified based on the following research techniques/methods:

- Site visits to the project;
- Desk review of relevant literature on the physical and socio-economic conditions in the project area;
- Consultations with stakeholders in the project area (e.g. by way of the Kenya Alliance of Residents Associations (KARA) stakeholders' meeting and public forum)<sup>2</sup>;
- Interviews with the City Engineer (City of Nairobi), Town Clerk (Ruiru Municipality), the Chief Resident Engineer (Thika Highway Project), and other stakeholders; and
- Laboratory analysis of water samples collected at Globe Cinema on Nairobi River which was conducted at the Department of Civil Engineering, University of Nairobi.

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<sup>2</sup> As part of the interdisciplinary THIP research consortium organized by CSUD, KARA organized a series of focus group discussions, a stakeholder meeting and a public forum to share information and discuss concerns about the THIP. The KARA/CSUD report can be accessed at: <http://csud.ei.columbia.edu/2012/07/16/csud-and-kara-release-the-socialcommunity-component-of-their-ongoing-analysis-of-the-thika-highway-improvement-project/>.



### ***Site Visits to the project***

We collected information through a site walk assessment survey at the project site and its surrounding areas including households on 20<sup>th</sup> January 2012. Officials of KeNHA and the Chief Resident Engineer in charge of the Thika Highway Improvement Project facilitated these visits. Site visits involved systematically traversing the field to assess the perceived impacts of the road project on the environment. During the site visits, some photographs were taken to document visual impacts of the road improvement project. (Some of these are found in Appendix 4). The environmental aspects examined included:

- Existing sensitive environmental receptors (e.g. surface water, wetlands, and methods of protection from destruction);
- Waste management and disposal methods;
- Environmental Health and Safety (EHS);
- Material sources to be used during the project implementation and maintenance phases;
- Effluent management;
- Flood control facilities; and
- Vegetation cover.

### ***Desk Review***

This study required a review of the relevant project documents (especially CES 2007). The team gathered all of the necessary documents and conducted a critical analysis of the material available. This enabled the team to develop an in-depth understanding of the project and identify whether there is sufficient information available regarding the project with specific focus on the environmental impact. The team also explored whether any post-construction monitoring and evaluation plans were in place since environmental impacts (such as air and noise pollution, etc.) would continue beyond the construction phase.

### ***Consultations with Stakeholders and Informal Interviews***

As part of the collaboration with the Center for Sustainable Urban Development's Thika Highway Research Consortium, we participated in a stakeholders 'meeting and a public forum - undertaken by the Kenyan Alliance of Residents Associations (Kara). We also consulted with transport operators, business owners, passengers, pedestrians, and residents in the project area, and some were interviewed directly. The purpose of the exercise was to introduce the project to the directly affected stakeholders and generate feedback on the key issues of environmental concern and their mitigation.

### ***Expert Interviews***

To provide further insight into the available documents reviewed, the team interviewed environmentalists (inclusive, for example, of environmental and environmental health scientists) related to and knowledgeable on the THIP to provide insight into environmental aspects of the project. In addition, the interviews were aimed at expanding the network and providing further contacts to investigate and observe the ongoing construction project. Some of the people interviewed included the Nairobi City Council Engineer Muthama, Ruiru Municipal Council Town Clerk Lesley Khayadi, Chief Resident Engineer of CES Mr. Hari Ramesh in charge of

Thika Highway Improvement Project, various business people along Thika Highway, and other stakeholders.

***Laboratory Analysis***

Two water samples were taken from Nairobi River. The first sample was taken at the Globe Cinema roundabout in Lot 1 where the contractor has a batching plant (a site set aside for construction material preparation), and the second was taken upstream of the bridge and another one taken just downstream of the bridge on 4<sup>th</sup> April 2012. Water quality indicators such as suspended solids, dissolved solids, turbidity, and pH were obtained from the laboratory analysis. It was not possible to carry out laboratory analysis for water samples from other rivers crossed by the road because of high costs involved and time constraints.

## Chapter Two: Consultations and Interviews

Government policy on major development and social projects requires that those impacted be consulted, by way of seeking their views, before project implementation. This aspect was captured in the Nairobi-Thika Highway ESIA report presented to NEMA for approval, which included five public meetings in the month of May 2007. The Kara/CSUD report (2012) looked at this aspect of the THIP but this study team also administered a questionnaire<sup>3</sup> to stakeholders and residents along the Thika Highway construction site with a particular focus on the environmental and social impacts of the project. Among the key stakeholders interviewed were business people, individual citizens, and the Ruiru Municipal Council. Interviews with the Chief Resident Engineer, Contractors and Nairobi City Council Engineer provided the bulk of our consultative meetings with those responsible for the project implementation.

The study team had the opportunity to meet with the THIP Chief Resident Engineer, Mr. Hari Ramesh. During our conversation, we discussed a number of environmental issues related to THIP. The following points summarize the conversation:

- (i) **Alternative route.** The existing route was seen to be economically viable and cheaper, offering better accessibility and connectivity, and less challenging to upgrade compared to any other alternative for the project. However, there were notable environmental challenges encountered during the initial project implementation. Mr. Ramesh observed problems of land acquisition, general terrain modifications, destruction of vegetation on the road reserves, and re-routing of streams and wetlands.
- (ii) **Noise pollution and vibrations.** This environmental impact is inevitable during the construction phase particularly from moving vehicles and machines. Regarding vibrations, the contractors were using water hammer technology to break down big boulders and rocks with minimal cracking sound.
- (iii) **Drainage systems.** The contractors were expanding the waterway channels within proximity to the NTHIP by constructing broadened waterways to minimize flooding. Spill culverts had been constructed for clearing the road, while box culverts were used to expand the river channels.
- (iv) **Waste generation.** There was no major waste disposal challenge experienced in the project implementation. Much of the waste generated was mainly debris such as granular materials. The contractors had leased out land for disposal of unutilized black soil on neighboring farms.
- (v) **Land degradation.** The degraded environment, particularly in areas where the digging of murrum, gravel, and red soil for construction was inevitable. The contractors had earmarked the degraded areas such as borrow pits and quarries for rehabilitation once the materials were exhausted. To avoid land degradation and accumulation of unused

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<sup>3</sup>See Appendix 3 for a sample questionnaire.

materials, the contractors had leased sites for material preparation at Jomo Kenyatta International Airport (JKIA) and the Katani area.

- (vi) **Water use.** The THIP needs huge amounts of water during the construction phase. The project requires approximately 60 tonnes of water daily. The major sources of water for the upgrading project are underground boreholes, whose water has been tested for qualities such as reactivity.
- (vii) **Road Greening.** The Thika Highway Improvement Project has removed a substantial amount of vegetation along the highway during the project implementation phase. Further, the 50.4 km road section has 14 major intersections and 18 bridges, which contributed to removal of vegetation during the construction phase. The project has identified a contractor to carry out greening of the highway, especially on road reserves, along the avenues, and at intersections. The interview with Mr. Ramesh revealed that some of the plant species earmarked for greening the highway include Kikuyu grass (*Pennisetum clandestinum*), Ash plant (*Fraxinus*), and rubia among others.

The study team additionally spoke with the Nairobi City Council Engineer, Mr. Muthama. The following points summarize that conversation:

- (i) The City Council planning department was not adequately involved in project implementation, but rather KeNHA was. As a major stakeholder Mr. Mathura said, the City Council Engineering department should have been involved in every design aspect of the THIP.
- (ii) Resettlement of people at the Maasai market at the Globe Cinema should have considered the inclusion of a bus terminus to avoid large volumes of vehicles constricting movement into the Nairobi central business district (CBD) from the highway, thus causing more traffic jams on entry to the City Centre.
- (iii) Regarding design challenges, the engineering aspects of the road should have considered or created areas for safe crossing. For instance, it was observed that the highway project should provide safe crossing for pedestrians walking along University Way and near the Globe Cinema area.

## Chapter Three: Identification and Assessment of Environmental Impacts

In this section we examine the environmental impacts foreseen in the Consulting and Engineering Services Environmental and Social Impact Assessment (2007) report for the THIP and the proposed mitigation measures. The predicted environmental impacts and their mitigation measures are compared with the field observations and also with the existing environmental regulations and analysis made by the study team. We also pinpoint gaps stemming from unforeseen consequences, lack of enforcement of mitigation measures and environmental regulations as well as inadequate regulation and monitoring.

### Anticipated Problems and Proposed Mitigation Measures

The study cites two positive environmental impacts from the NTHIP- the reduction of vehicular emissions from idling traffic and the reduction of spills because of fewer accidents on the new highway. Note that these impacts depend on air quality monitoring which does not exist and also a proper traffic accident surveillance system which is not yet in place. A number of negative environmental impacts were targeted in the EIA by Aquaclean Services/CES which proposed mitigation measures (CES 2007). The following paragraphs describe the predicted and observed impacts of the construction project and the proposed mitigation measures found within the EIA report and note the relevant legislation governing these impacts. More in-depth analysis of some of the relevant legislation can be found in Appendix 2.

- **Siltation and discharge of pollutants** into streams crossing the road and wetlands could negatively impact human health downstream. Specific attention is on Ruiru, Ndarugu and Chania Rivers that provide water for public supplies within the road reserve (ESIA Report 2007, pg 56).

*Proposed mitigation measure by CES (2007pg 56):* Control earth-moving activities or have them carried out with special care near the rivers, stream and wetlands, with specific attention to Ruaraka, Ruiru, Theta, Thiririka, Ndarugu, Chania and Thika Rivers that are water sources for the dependent communities downstream.

*Relevant Regulations:* According to the 2009 EMCA (Wetlands, River Banks, Lake Shores and Sea Shores Management) Regulations, the local government in consultation with NEMA will establish laws regulating waste entering into waterways. Although this project cuts across three local authorities of Nairobi City Council, Ruiru Municipality and Thika Municipal Council, there was no clear guidance on who was supposed to supervise the execution of this legal requirement. The municipalities were not involved.

- **Removal of Vegetation** such as trees, riverine vegetation, grass cover and shrubs along the route could have adverse affects. Specific attention should be paid to the young seedlings planted by the City Council of Nairobi and the mature tree along the median of Thika Road. However, no forest or sensitive environmental features are thought to be found in the project areas (CES, 2007, pg 56).

*Proposed Mitigation Measures:* No trees should be planted in the median or close to the carriage way and large vegetation should not be planted along the road reserves upon completion, to

avoid obstruction to motorist and risks to off-road vehicles. Such sections should be planted with shrubs or ornamental plants. Trees could be planted in the wider road reserve, at least 20m away from the carriageway.

*Relevant Regulation:* The Physical Planning Act of 1999 empowers the relevant local authorities such as Ruiru Municipality to reserve and maintain all land planned for open spaces, parks, urban forests, and green belts. It was not clear how involved the municipalities were in this process in relation to the highway improvement project.

- **Loss of soil through erosion** through run off along the steep slopes, specifically in the drift zones of Ruaraka, Ruiru, Theta/Thiririka basins and Ndarugu Rivers where basins comprise loosened soils and bare platforms on both sides of the road is a danger (CES, 2007, pg 56).

*Proposed mitigation Measures:* Drainage outfall channels will be designed such that they do not carry hydraulic pressures that may cause soil erosion or destruction of vegetation and other items along the flow path. Appropriate dam checks and speed control devices should be in place. Specific attention should be paid at Murang'a Road, Ruaraka, Githurai, Juja area and all drifts (CES, 2007, pg 56).

*Relevant Regulations:* Land Acquisition Act, 1968<sup>4</sup>: As a major expansion of an existing road the NTHIP was in need of land adjacent to the original road to complete the project. Additionally, the NTHIP, being a mega transport project, was in need of a large amount of material (stone and dirt), which could be found on land near the construction site, but was not owned by the GoK. The Land Acquisition Act provides regulations that the GoK must follow in asserting eminent domain, and when temporarily taking control of land used to mine stone or dirt.

- **Air Pollution** in the form of dust emissions and discharge of exhaust gases from construction machinery, material sites, asphalt and bitumen preparation plants, and vehicles among other sources is likely. Increased traffic volume was also seen as a potential source of higher gaseous emissions, particularly towards the windward direction.

*Proposed Mitigation Measures:* Maintain earth road diversions wet at all times, while dry materials are stored moist, or covered, especially within residential areas. Construction vehicles should be maintained in good conditions. Other specific emissions could be controlled through law enforcement.

*Relevant Regulations:* EMCA (Fossil Fuel Emission Control) Regulations, 2006 (Appendix 2) aims to regulate air quality standards but does not explicitly set any air quality standards. The regulation provides guidelines on the use of clean fuels, use of catalysts and inspection procedures for engines and generators. This is important because the contractor is expected to

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<sup>4</sup> The Land Acquisition Act of 1968 was repealed by the Land Act of 2012. During the time the NTHIP was acquiring land for the project the original 1968 Act was in effect. In-depth descriptions of both pieces of legislation can be found in Appendix 2.

use vehicles and equipment that depend on fossil fuel as their source of energy. However, since neither air quality standards nor a monitoring system is in place it is unlikely that specific emissions will be controlled through law enforcement.

- **Alteration of Topography** drainage patterns and general hydrological characteristics, including stream flow trends that may result from increased surface runoff, realignment of surface drains in some areas, as well as siltation of some streams was observed during field visits. This will be pronounced upon commissioning of the road.

*Proposed Mitigation Measures:* Culverts can be designed to accommodate peak runoff from the catchment and direct all the surface runoff to existing natural drains.

*Relevant Regulations:* The Local Government Act, Cap. 265, sections 160 (a) and 201 gives the Local Authorities powers to formulate by-laws in order to manage waste (mainly sewage and solid waste and to address issues of drainage among others. Bylaws on drainage and sewerage state that every new facility shall be provided with an effective drain to be constructed in accordance with the council requirements. The maintenance of all drains and all drainage works is the responsibility of the owner of the facility-in this case the GoK- and must always be in an efficient condition. The council may construct the drainage works in agreement with the owner so that the owner pays the construction cost of the works. Other charges include supervision charges. The role of the council includes supervision of excavation for the laying of the drains, testing of drainage works, and examination of drains. In this case, once again it seems like the local government did not play a role or engage in its area of responsibilities or perhaps, was not listened to by the central government.

- **Material Sites (quarries, borrow pits- gravel sand, hard stones) and sources of construction water** could get degraded unless suitable mitigation measures are undertaken. Special attention needs to be paid to water sources and modes of abstraction.

*Proposed Mitigation Measures:* Undertake specific environmental assessments on the material sites and develop appropriate mitigation measures that are appropriate. Such actions will be undertaken for sources identified outside the project area. Ensure no sensitive environmental features are selected for construction work (such as near material holding sites, preparation sites, and machinery servicing the yards) so that no environmental features are at risk. Such sites include hard stone crashing machinery, asphalt cement preparation, and fuel storage point workshops.

*Relevant Regulations:* Relevant regulations include the Land Acquisition Act, 1968<sup>5</sup> and the Water Act, 2002.

- **Decommissioning of Service Stations** could contaminate surrounding soil and water sources within the area. Specific focus should be at service stations at Ngara, Murang'a Road, Panani, Ruaraka, Near KBL, Ruiru and Juja areas.

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<sup>5</sup> The Land Acquisition Act of 1968 was repealed by the Land Act of 2012. During the time the THIP was acquiring land for the project the original 1968 Act was in effect.

*Proposed Mitigation Measure:* Supervise excavations and management of earth materials at service stations or sections of the same to be decommissioned for isolation and safe disposal and/or remediation.

- **Demand for Natural Resources** including construction water, soil, gravel, hard stones, labor and fuel among others.

*Proposed Mitigation Measures:* Appropriate resource use permits should be obtained from relevant authorities. The public should take priority on resources such as water.

## **Field Observations and Findings**

We compared our actual field observations and water analysis with the anticipated impacts and mitigation measure in the CES report. Our findings are below.

### ***Air quality and Noise levels***

The trucks used to transport various building materials from their sources to the project site contribute to increases in emissions of CO<sub>2</sub>, NO<sub>2</sub>, and fine particulates along the way as a result of diesel combustion. Such emissions can cause a number of negative consequences, including global warming and negative human and public health problems. Since large quantities of materials are required, emissions released can be enormous and may affect a much wider geographical area than anticipated. In addition, the impacts of such emissions can be greater in areas where the materials are sourced and at the construction site as a result of frequent rumbling of vehicle engines, frequent vehicle turning, and slow vehicle movement in loading and offloading areas. These impacts may be experienced during the construction phase, and are therefore, short term. However, the anticipated exhaust emissions along the rehabilitated route will be enormous given the likely exponential growth in vehicular traffic. It is possible that this consequence was not given serious consideration during the road design stage.

Dust was found to be a serious problem on sections of the highway where vehicular traffic was very heavy for instance, along University Way, within Roysambu roundabout, and near Ruiru flyover. Most diversions consisted of dusty stretches. Dust was also generated at the concrete batching plant at the Globe Cinema. The study team did not come across any attempt to quantify particulate matter and how it affects air quality on the road by the contractor (See plate 1 below).

The EMCA Act (Noise and Excessive Vibrations Pollution - Controls) Regulations, 2009 stipulates that noise and excessive vibrations should be minimized to the largest extent possible and that they should not exceed 60 decibels. There was no evidence of an attempt to quantify the noise levels at the nearby residential buildings from the excessive vibrations due to the blasting of boulders and stones at the construction site. In addition, it appeared that no measurements were taken to monitor the vibrations from heavy vehicle movements at day time. The Chief Resident Engineer in charge of the THIP stated in an interview with the study team that the noise pollution and vibrations along the route were reduced because of the use of hydraulic pressure technology to break up rocks instead of blasting them with explosives.



However, a number of residents contacted to Kara to complain about the use of explosives and damage to their homes (Kara 2012 pg 51).



*Plate 1: Section of the road on Lot 3 with a lot of dust posing health problems to the motorists and neighboring communities*

### ***Over-Abstraction of Water***

Surface water is abundant in the project area, and 15 main streams and rivers cross the project road. Approximately 75% of water consumers in the project area get their water from public supply systems; Nairobi Water and Sewerage Company serves the Nairobi area and selected areas along the pipeline route (running along the road project), delivering water from Thika Dam in Thika District. Ruiru town is supplied by the Ruiru River whose water intake and treatment plant are located within the road reserve (KM 22+900); Ndarugu water intake and treatment plant is on Ndarugu River about 50m downstream of the project road at KM 33+500 and supplies Juja town and its surroundings; and Thika water supply intake and treatment plant is located on Chania river downstream of the project road at KM 41+500. The Ruaka, Ruiru, Theta, Thiririka, Ndarugu, Komu, Chania and Thika Rivers support rural communities for domestic water requirements, general irrigation, and agro-industrial activities. Others have low economic value due to either inadequate flows or are highly polluted (the latter being the main problem for streams close to the city of Nairobi).

A project of this magnitude requires huge quantities of water for material compacting and to keep certain road sections wet. This is a serious environmental problem in a water-scarce nation like Kenya. The reviewed documents do not clearly indicate the sources of water for this particular project, leaving speculation around water use from domestic water sources and underground aquifers which could lead to over abstraction of the water resources. This has environmental and social impacts and may cause conflicts with the local neighboring communities depending on these sources of water and should be better monitored in future projects.

### ***Water Pollution***

Many chemicals used during construction, including solvents, paints, oils, fuels (such as gasoline, diesel oil, kerosene, and lubricating oils), and grease have the potential to pollute water sources. When used or stored improperly, most of these chemicals will adhere to the soil and sediment particles, possibly becoming mixed with storm water, and get carried into local water

courses as runoff. Standard erosion and sediment control techniques can control for this. By storing such chemicals in the appropriate manner, however, and applying them in a proper manner, pollution problems can be further reduced.

The study team observed serious water degradation with a substantial amount of waste dumped in rivers. There was evidence of silting in some areas as a result of earth material being moved during construction. This was particularly noticed along Nairobi River at Museum Hill intersection, Globe Cinema roundabout, and Thiririka River in Kiambu County.

Table 1 below shows evidence of water quality variations in the following parameters: apparent color 65 to 90, true color 60 to 80, conductivity from 542 to 554, turbidity from 3.1 to 4.0, total hardness from 112 to 136, total alkalinity from 160 to 175, fluorides from 0.6 to 0.88, sulphates from 5 to 10, a marked increase in suspended solids from 10 to 120, and total dissolved solids from 480 to 580. All these increases indicate serious impacts of the construction work on surface water in the project area. There is also a marked decrease in dissolved oxygen from 4.9 to 4.2. This indicates that the level of oxygen required by aquatic organisms is decreasing, thereby threatening their survival. The study team was not able to establish from the ESIA Report (2007) and other relevant reports reviewed whether any laboratory analysis to measure the level of pollution was undertaken (See Plate 2, 3 and 4). Water quality of Nairobi River at the Globe Cinema was compared with both the NEMA and World Health Organization (WHO) permissible levels for various indicators (Table 1). NEMA appears to have limited water quality standards, and it is unclear if the agency in fact did any monitoring at all.

**Table1: Water Quality and Sediment Analysis of Nairobi River at the Globe Cinema**

Parameters	Unit	Concentration		NEMA Limits	WHO Limits	Remarks
		Upstream	Down stream			
Ph	pH Scale	7.74	7.21	6.5 – 8.5	6.5-8.5	Permissible
Sulphates	mgSO/l	5	10	-	400	Permissible
Nitrates	mgNO/l	0.1	4.1	10	10	Permissible
Turbidity	NTU	3.1	4.0	-	<500	Permissible
Apparent Color	-	65	90	-	-	-
True Color	-	60	80	-	-	-
Total Hardness	mgCaCO/l	112	136	-	500	Permissible
Chlorides	mgCl/l	185	191	-	250	Permissible
Fluorides	mg/l	0.64	0.88	1.5	1.5	Permissible
Iron	mgFe/l	0.8	0.8	-	0.3	Not permissible
Total Dissolved Solids	mg/l	480	580	1200	1000	Permissible
Total suspended Solids	mg/l	10	120	-	-	Permissible

Source: Department of Civil Engineering, UON, 5th January, 2012



*Plate 2: Blocked Chiromo River threatening aquatic life forms at junction Museum Hill intersection*



*Plate 3: Dumped waste and debris, a threat to the life forms and ecological health of Nairobi River at the Museum Hill Roundabout*



*Plate 4: Severly degraded Nairobi River channel at globe Cinema round about*

### ***Drainage Problems***

Good drainage design and construction in the development of roads is critical to the success of road construction. If drainage is inadequate, maintenance costs can be increased, the life span of the road can be reduced, and adverse impacts on the environment and local communities can result (such as increased health risks, damage to food and water supplies, and depletion of natural resources). Many of these problems can be avoided if consideration is given to the design, construction and maintenance of adequate road drainage. The time and expense needed to implement adequate road drainage more than off-sets the greater costs of trying to mitigate problems after construction, and is much more effective in the long term (plate 20).

The study team found that whenever it rains, certain sections of the rehabilitated road get flooded with storm water stalling and not draining away freely. This was particularly evident on November 23<sup>rd</sup>, 2011. This went on for about 12 hours or so. This may be a serious problem in the future, as pooling water may cause the road to age more quickly than normal. The box culverts used for drainage were left exposed and this presents environmental hazards as pedestrians may accidentally fall into them (Plate 5). They should never be left uncovered as we observed.



*Plate 5: Uncovered culvert along the University Way posing risks to the pedestrians*

### ***Destruction of Vegetation***

The study team observed trees along the road have been cut, and grass and other vegetation cleared, leaving bare surfaces susceptible to soil erosion. The contractor says that, as a mitigation measure, trees and grass will be planted as part of a beautification project along the road.

### ***Scenic Beauty/Aesthetics***

The old road provided excellent views of undulating terrain as one drove towards Thika. Now the road is punctuated with flyovers and monotonous high-speed sections of the super highway. This not only affects the scenic beauty of the landscape along the route, but also has potential risk of an increase in accidents and injuries to motorists and pedestrians. Some engineers feel that the new topography means better visibility which may improve safety but this effect may be offset by the higher speed possible.

### ***Land and Soil Degradation***

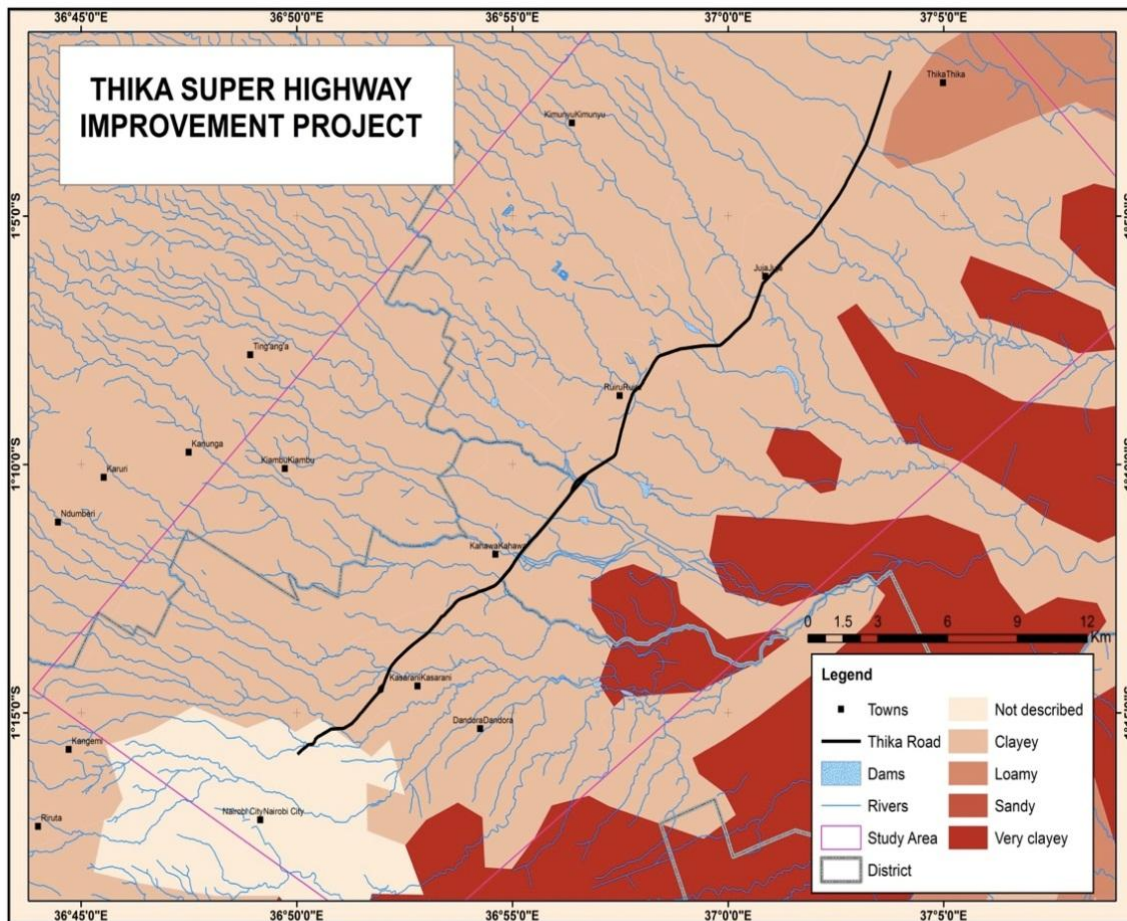
Preliminary site visit observations indicated soil disturbance and compaction by earth movers along the route. This has a potential negative impact of loss of soil through erosion, land degradation through soil pollution, and landscape alteration through cuttings and material extraction. The impacts on land and soil degradation were likely to affect the neighboring agricultural areas through excessive siltation and runoff. Although this particular aspect was captured in this study, very little was done by the road contractors to mitigate these impacts.



**Material Sites (quarries, borrow pits)**

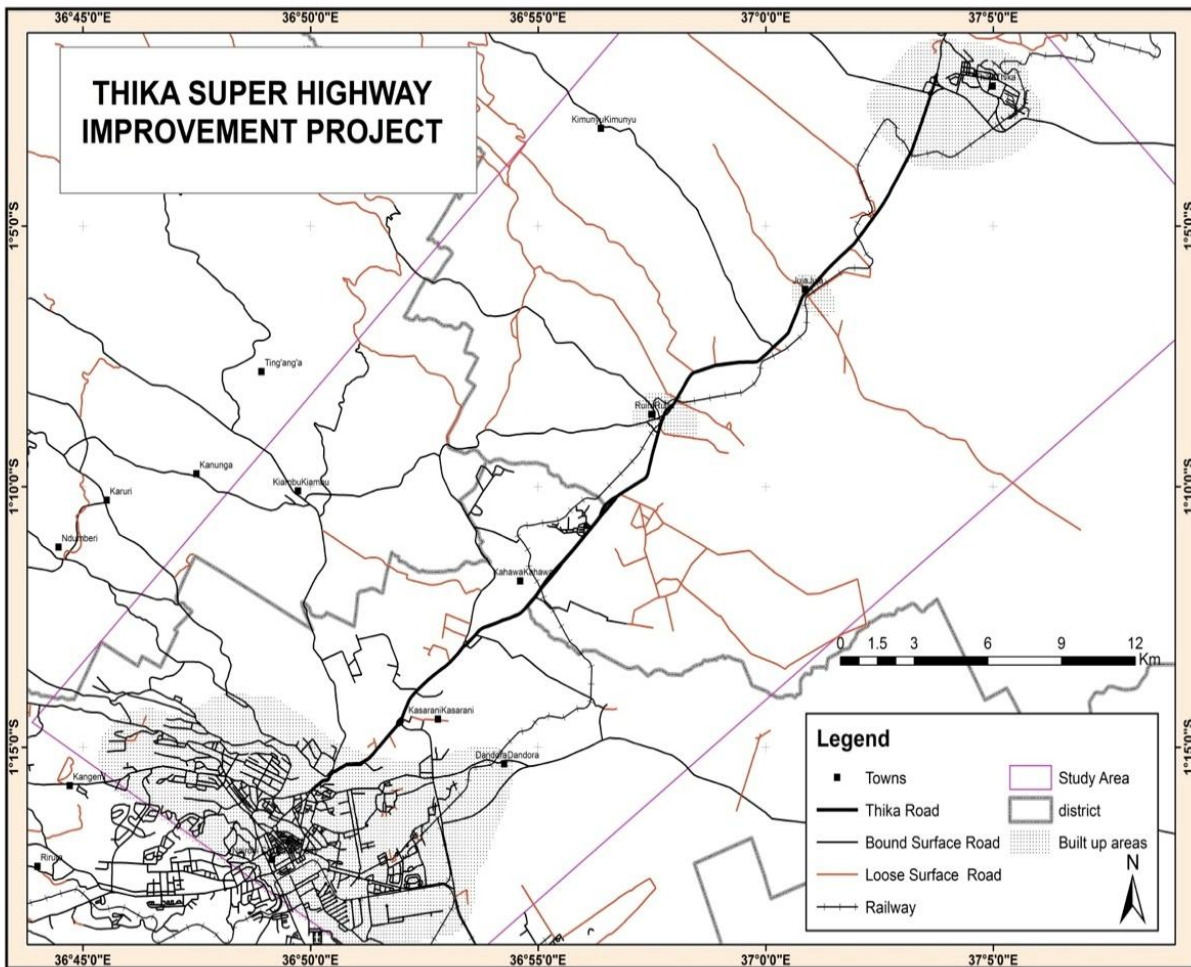
The Nairobi-Thika Highway Improvement Project required huge quantities of materials such as ballast, murrum, stones, conglomerates, sand, gravel, and soil, among others. The input of these materials is well-documented in the preliminary project documents such as the EIA, though their sources were not clearly identified. The contractors had put several material camp sites as well as a batching plant, whose impacts were clear on the environment, especially with smothering vegetation species around the camp sites. Project documents proposed several measures to be undertaken after decommissioning of the sites, though it is not clear what concrete steps are being taken by the contractors to manage waste material from road construction. Field visits to the sites for obtaining gravel, ballast and other road construction materials found that by 5<sup>th</sup> of March 2012, borrow pits had not yet been rehabilitated. They were left open and created environmental hazards for the local residents. Map 2 shows areas with good soil (mainly clay), where some of the borrow pits are located. Some of the participants at the Kara workshop held on the 25th of November 2011 complained that fertile soil suitable for agriculture was lost this way. The participants also complained that the feeder roads used by construction trucks when obtaining soil, gravel, stone, and other construction materials were badly damaged and should be rehabilitated. Map 3 shows the road network in the study area.

**Map 2: Areas with good soil (mainly clay) for preparation of road bed**



Source: Study team original research data

**Map 3: The road network in the study area.**



Source: Study team original research data

### **Noise Pollution and Vibration**

Noise pollution and vibrations, especially during the day, due to movement of heavy vehicles and blasting of rocks within the site tended to affect project workers, residents, passers-by, domestic animals, and other persons within the vicinity of the project site. Vibrations caused by rock blasting tended to damage buildings nearby. There is little evidence of any regulation.

### **Night Glare**

The study team received complaints from various residents living near the road that the glare from vehicles was causing disturbances at night and interfering with their sleep. This problem is likely to be greater in the future as vehicular traffic is set to increase several fold. The problem of glare was not factored in the contractor's initial EIA report.

## Chapter Four: Conclusion and Recommendations

### Recommendations

- **Need for more public consultation and attention to public safety throughout the project cycle**

In carrying out an environmental assessment on large scale transport projects with significant environmental impacts such as the Thika Highway Improvement Project, it is imperative to maintain a system of public consultation. As pointed out in the Kara forum and research report, the EIA undertaken for Thika Highway involved five public meetings and an initial survey but after this, there was a lack of routinized meetings and systematic release of relevant information.

Public safety needs to be a higher priority. Construction sites create numerous environmental hazards especially for children. For example, quarry/borrow pits discussed in this report should be rehabilitated by the contractor through supervision of NEMA and/or KeNHA. This was an issue raised at the Kara meeting and forum, in which participants complained about the environmental hazard posed to them. They argued that in the past, some contractors had left open gulleys and destroyed lands without rehabilitation, thus exposing the local community members, especially children and animals, to dangerous sites where they could fall and/or drown and in fact, some children did die this way.

- **Need to involve local governments and for local government to take their responsibilities seriously**

We noted a lack of adequate consultation with local government and often an assumption that local government would address issues in their jurisdiction or enforce by-laws. However, engagement by local government was missing and they were not involved as genuine partners in the process. With the new constitution and county governments, more partnership (and mutual monitoring) between local and county government and the relevant central government agencies will be important.

- **More Inter-disciplinary EIA teams**

The EIA should be undertaken by interdisciplinary teams with the right expertise. To be most useful as both a decision-making and a planning tool, the EIA should be based on up-to-date environmental information, which can best be provided through local experts drawn from different disciplines. These can be drawn from the public and private sectors, including universities. The EIA for Thika Road was carried out mainly by engineers and besides the hired consultants from Aquaclean Services Ltd, the contribution of other local environmental experts appears to be minimal.



- **Improve the EIA system**

As long as the EIA remains the responsibility of the contractor/developer, the primary objective of the EIA may not be completely fulfilled. This is because those carrying out the EIA are doing so at the direction of the contractor or developer, not necessarily keeping the broader public interest in mind. Thus, the EIA is often constructed in the proponent of a project's favor (See EMU Office of the Prime Minister 2010 and also Barczewski 2013 for details). Given the opportunities afforded by the new constitution which gives greater powers to citizens (Sang 2013), a need exists to explore how the EIA process can be strengthened.

- **Improved Water Quality Standards and implementation of Air Quality Standards and investment in monitoring systems**

We found that while this project claimed positive impacts on air quality, there are no legal air quality standards. An air quality monitoring system does not exist. This is important on highly populated roads like the Nairobi-Thika Highway. While water standards exist, they need review and improvement. Monitoring of the environmental impacts of the road should be carried out on a regular basis. For instance, frequent water samples from certain sites, with the river crossing points, need to be taken to be able to detect and address any negative effects on the water courses. Efforts should be made to disseminate available information to the public. There is an assumption by the project environmental auditors that the relevant water testing will be done by the relevant agencies but it appears like this did not happen or if it did, the results were not made public. Overall, much more investment needs to take place on creating robust systems for monitoring the quality of air and water essential to the health of citizens.

- **More Engaged Role for Financial Institutions in Supporting Better Environmental Regulation and Monitoring**

Financial institutions, such as the African Development Bank (AfDB), the World Bank and the China Development Bank, that fund road projects in Kenya should not only be concerned with the formality of seeing EIA reports produced, but concern themselves more with strengthening the EIA process and capacity. They should also be interested in ensuring that the recommendations in the EIA are implementable and that the local capacity to conduct research into environmental impacts and monitor the implementation is in place.

## **Conclusions**

Improving the Nairobi-Thika highway will most likely bring a range of benefits, both directly and indirectly, to the economy by reducing travel time at least in the short term, reducing vehicle operation costs and also by encouraging investments, among others possible spin offs. The tremendous cost of improving the road has been justified by the fact that it is the main highway linking Central Province, Northeastern Province, and parts of Eastern Province to Nairobi. In addition, it is the main link by land to the neighboring countries of Ethiopia and Somalia. Transportation of goods and people into and out of the city could be enhanced by an improved highway, hence encouraging more trade and investment. In addition, the road had not received any major rehabilitation since its construction more than thirty years ago and clearly needed some upgrading. However, these economic benefits may be overtaken by the environmental costs of a construction process that fails to be context sensitive and to recognize and design for the human and natural environment as well as for vehicles. The appropriate mitigation measures must be carefully specified, addressed and monitored to ensure the Thika Highway will not only benefit the Kenyan economy, but also not harm the resource base on which the economy and health of citizens depend.

### **About the University of Nairobi, Department of Geography and Environmental Studies**

The [Department of Geography and Environmental Studies](#) at the University of Nairobi is one of the oldest and largest in all public universities in Kenya. It started as the Department of Geography, Royal Technical College in 1956 but has recently expanded to be the Department of Geography and Environmental Studies. The department offers a wide range of academic courses and programmes leading to Diploma, B.A., BSc, B.Ed, M.A., MSc, M.Ed and PhD degrees. The mission of the department is to be a leading centre of excellence in the pursuit of development, dissemination and preservation of knowledge in Geography and Environmental Studies; to be committed to the values of truth, quality and relevance; and to contribute to socio-economic development at national, regional and international levels. Our vision is to provide dynamic leadership in teaching, research, consultancy and extension services in Geography and Environmental Studies

### **About CSUD**

Founded in 2004, CSUD is one of eight Centers of Excellence focused on sustainable transportation and is part of this global network of centers. For the last nine years, CSUD has worked in Nairobi, seeking out partnerships with Nairobi-based think tanks and researchers to deepen its understanding of how to facilitate sustainable urban development, with a key focus on land use, transport and planning institutions within the Nairobi Metropolitan Region (NMR). CSUD's collaborative efforts take a strategic policy network approach. This involves undertaking action research to build networks while at the same time conducting cutting edge research into pressing issues around urbanization. We then use this research and the networks formed to inform policy and practice. This approach has been central to numerous projects, including our involvement in the Nairobi Metropolitan Region spatial concept competition. We invite you to visit our website <http://csud.ei.columbia.edu/> and blog Nairobi Planning Innovations: <http://nairobiplanninginnovations.com/>

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## References

- AfDB's Integrated Environmental and Social Assessment Guidelines (October 2003).
- Abmad, Y. J., and G. K. Sammy. 1985. Guidelines to Environmental Impact Assessment in Developing Countries. *Sponsored by the United Nations Environment Programme*.
- ACTS-UNEP.2001. The Making of a framework Environmental Law in Kenya. Acts press, Nairobi, Kenya.
- Barczewski, Ben and CSUD. "How Well Do Environmental Regulations Work in Kenya?: A Case Study of the Thika Highway Improvement Project" June 2013.
- Consulting Engineering Services (CES) (2007): The Environmental and Social Impact Assessment (ESIA) Report of Thika Highway Improvement Project.
- Efficiency Monitoring Unit. Office of the Prime Minister. Management Audit Report for the National Environmental Management Agency. Nairobi: Government of Kenya, 2010.
- Environmental Impact Assessment and Audit Regulations, 2003: Legal Notice No.101. Factories Act, Cap 514.
- Environmental Management and Coordination Act, No. 8 of 1999.
- Environmental (Impact Assessment and Audit) Regulations, 2003
- Environment Management and Coordination Act (Waste Management) Regulations, 2006.
- Environment Management and Coordination Act (Fossil Fuel Emission Control) Regulations, 2006.
- Environment Management and Coordination Act (Wetlands River banks, Lake Shores, and Sea Shore management) Regulation, 2009.
- Environment Management and Coordination Act (Noise and Excessive Vibrations Pollution - Controls) Regulations, 2009.
- Health Act, Cap 242. Factories (Building, Operations and Works of Engineering Construction) Rules of 1984. Legal Notice No. 40.
- Kenya Alliance of Residents Associations (Kara) and the Center for Sustainable Urban Development (CSUD). 2012. "A Social/Community Analysis of the Thika Highway Improvement Project" unpublished policy report.
- Maidment, D. R. 1993. Handbook of Hydrology.

Ministry of Transport: Sessional Paper on Integrated National Transport Policy, 2010, Republic of Kenya, Nairobi.

Republic of Kenya (1999) Population and Housing Census, Vol. 1. Central Bureau of Statistics.

Republic of Kenya, Ministry of Roads and Public Works (2007). Environmental and Social Impact Assessment Study report. Consulting Engineering Services (India) in association with Apec limited, Nairobi.

Republic of Kenya, National Development Plan, 1997-2001.

United Nations Environment Programme. 1996. Environmental Impact Assessment: Issues, Trends and Practice.

Water Act of 2002. Water Resources Management Authority (WRMA) Rules and Regulations, 2007.

World Bank 1991. Environmental Assessment Sourcebook. Volume I. Policies, Procedures and Cross-Sectoral Issues. *Environment Department*. Technical Paper No. 139.

World Bank. 1991. Environmental Assessment Sourcebook. Volume II. Sectoral Guidelines. *Environment Department*. Technical Paper No. 140.

World Bank. 1991. Environmental Assessment Sourcebook. Volume III: Guidelines for Environmental Assessment of Energy and Industry Projects. *Environment Department*. Technical Paper No. 154.

World Bank. 1993. The World Bank and the Environment.



## Appendix 1: Additional Information on Thika Road

(from the Ministry of Roads-Republic of Kenya website accessed May 2012 at [http://www.roads.go.ke/index.php?option=com\\_content&view=article&id=14&Itemid=27](http://www.roads.go.ke/index.php?option=com_content&view=article&id=14&Itemid=27))

### 1. Expansion of Nairobi – Thika Road (A2)

Nairobi – Thika Road is part of international trunk road connecting Nairobi City with Ethiopia to the north and is located in Nairobi and Central Provinces of Kenya. It starts in Nairobi on Uhuru Highway at three points namely Haile Selassie Avenue, University Way and Museum Hill Roundabout and converges at Pangani Roundabout on Thika Road. It then proceeds to Thika via Muthaiga, GSU, Kasarani, Githurai Roundabouts, Kenyatta University, Ruiru Town, Juja Town and ends at the bridge near Blue Post Hotel. The total project length is 50.4 km.

The traffic flow along Nairobi – Thika Road has been marred by traffic jams, hence the need for expansion of the road. The road is being improved from the current 4 (four) lanes up to 8 (eight) lanes including provision of cycle tracks and footpaths.

From the Design, the traffic capacity of the Nairobi – Thika will be increased by expanding the roads as follows;

- **Juja – Thika:** 2 lanes dual carriageway including service roads, cycle tracks and footpaths.
- **Kasarani – Juja:** 3 lanes dual carriageway including service roads, cycle tracks and footpaths.
- **Muthaiga – Kasarani :** 4 lanes dual carriage way including service roads, cycle tracks and footpaths.
- **Pangani – Muthaiga:** 4 lanes dual carriageway including cycle tracks and footpaths.
- **Museum Hill – Pangani :** 3 lanes dual carriageway
- **Ring Road Ngara – Kariokor – Pangani :** 2 lane carriageway

The contracts for the works have been awarded as follows

Lot No.	(km)	Contractor	Contract Sum (Kshs.)
LOT 1: City Arterial Connectors	12.4	M/S China Wu Yi Company Ltd.	8,030,386,596.64
LOT 2: Muthaiga – Kenyatta University	14.1	M/S Synohydro Corporation Ltd.	8,690,568,489.73
LOT 3: Kenyatta University - Thika	23.9	M/S Shengli Engineering Construction Group Co. Ltd.	9,441,732,008.29

The construction will include the improvement of all intersections through interchanges, overpasses and underpasses.

**The Proposed improvements include:**

- Four lane flyovers at Globe Cinema, Museum Hill and Limuru Junction
- Six lane flyovers at Muthaiga, Survey of Kenya, KahawaSukari, Kasarani, Githurai, Kimbo, Ruiru Bypass Junction, Gatundu and Mangu.
- An underpass at Pangani.

The works for the three project lots commenced on 28<sup>th</sup> January 2009 with periods of 30 months. The whole project completion date is 27<sup>th</sup> July 2011.



## **Appendix 2: Selected Frameworks for Regulating Environmental Impacts**

Any project as large and complex as the Thika Highway Improvement Project will be subject to a complex mix of legal and institutional frameworks governing how the project ought to be planned, funded, constructed and monitored. The following chapter reviews the most important pieces of legislation that regulate how the GoK and the contractors ought to realise the project. This chapter will focus mainly on the environmental and social regulations, to which the GoK and the contractors must adhere. The chapter will also highlight the environmental policy implications of the new Constitution of Kenya (2010). This chapter is broken-up into six sections: legislation and institutions, pre-construction, water and waste management, noise and vibration regulations, social regulations, and the proposed Constitution. The reviewed regulations and policies are:<sup>6</sup>

- Ministry of Transport: Sessional Paper on Integrated National Transport Policy, 2010;
- The Environmental Management and Co-ordination Act (EMCA), 1999;
- Environmental (Impact Assessment and Audit) Regulations, 2003;
- AfDB's Integrated Environmental and Social Assessment Guidelines (October 2003) (International Guidelines);
- The Physical Planning Act, 1998;
- The Land Acquisition Act, 1968;
- Water Quality Regulations, 2006;
- EMCA (Wetlands River banks, Lake Shores, and Sea Shore management) Regulation, 2009;
- The Water Act, 2002;
- EMCA (Waste Management) Regulations, 2006;
- EMCA (Noise and Excessive Vibrations Pollution - Controls) Regulations, 2009;
- The Public Health Act ;
- The Kenya Roads Act, 2007;
- Public Roads and Access Act, 1920; and
- The Environmental and Social Impact Assessment (ESIA) of Thika Highway Improvement Project, 2007.

### **I. Legislation and Institutions**

#### **Environmental Concerns in the Sessional Paper on Integrated National Transport Policy**

The draft Integrated National Transport Policy notes sustainable environmental policies have not been adequately incorporated into Kenyan road transport infrastructure management policies, resulting in pollution and environmental degradation. Factors such as soil erosion, management of gravel pits and road run-off, noise pollution and gaseous emissions by road motor vehicles, and the possible contribution to global warming and climate change have not been adequately addressed (Ministry of Transport: Sessional Paper on Integrated National Transport Policy, February 2010, 81).

The policy also explains that for roads to be environmentally acceptable, Environmental Impact Assessments (EIAs) should guide planning for their development and maintenance. Issues that

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<sup>6</sup> For a review of additional legislation see Appendix (?)

the policy considers include environmental impacts, energy conservation, and the transportation of hazardous substances as well as aspects of conservation and infrastructure building materials.

It argues that enforcement of the Environmental Management and Coordination Act of 1999 and the Physical Planning Act of 1998 should be observed to ensure that environmental issues are explicitly part of multiple criteria decision-making systems. The policy recommends current guidelines on environmental issues should be expanded to include road transport infrastructure development indicators in the overall environmental management. In addition, the “polluter pays” principle should be enforced at all times.

### **Environmental Management and Co-operation Act, 1999**

The Environmental Management and Co-ordination Act (EMCA) of 1999 came into being in response to the chaotic regulatory regime of the early 1990’s. EMCA was enacted in order to streamline the confusing conglomeration of statutes and acts that composed the regulatory regime at the time. In 1993, the National Environmental Action Plan (NEAP) was finalized under the Ministry of Environment and Natural Resources. The NEAP’s major objective was to address environmental and conservation challenges through the appropriate legislative and institutional measures.

In 1996, NEAP guided the drafting of the Environmental Management and Co-ordination Bill, which was enacted into law as the Environmental Management and Co-ordination Act, 1999. The main objective of the Act was to provide for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya. The Act further aimed to improve the legal and administrative co-ordination of the diverse ministerial initiatives in the field of environment so as to enhance the national capacity for its effective management. In addition, the Act harmonized the 77 sector specific laws touching on the environment in a manner designed to ensure greater protection of the environment in line with national objectives and the sustainable development goals enunciated in Agenda 21 of the Earth Summit held in Rio de Janeiro in 1992. The ultimate objective was to provide a framework for integrating environmental considerations into the country’s overall economic and social development. Over the course of the following decade, Parliament enacted a number of subsidiary acts under the umbrella of the original EMCA legislation. These are intended to strengthen and clarify regulations on specific aspects of the environment.

EMCA’s most important contribution to environmental regulation in Kenya was the creation of two entities, one responsible for setting environmental policy, the National Environmental Council and the other for enforcing the regulations passed by Parliament, the National Environmental Management Authority.

### **National Environmental Council**

The National Environmental Council (NEC) formulates national policies, goals, and objectives and determines policies and priorities for environmental protection. The NEC is also tasked with promoting co-operation among all the players engaged in environmental protection programs.

The Minister for Environment and Natural Resources chairs the council with membership from all relevant ministries.<sup>7</sup>

### **National Environmental Management Authority**

Administered as part of the Ministry of Environment and Natural Resources, the National Environmental Management Authority (NEMA) is the institution responsible for the administration and enforcement of environmental regulations in Kenya. The President appoints NEMA's head, the Director General, which after the adoption of the new Constitution in 2010 must be approved by the National Assembly. NEMA's functions include the co-ordination of various environmental management activities, initiation of legislative proposals, and submission of such proposals to the Attorney General, research, investigations, and surveys in the field of environment. According to the Environmental Management and Co-ordination Act of 1999, NEMA enhances environmental education and awareness of the need for sound environmental management. In addition, NEMA advises the Government on regional and international agreements Kenya should be party to and issues an annual report on the state of environment in Kenya. NEMA is also responsible for coordinating and directing the activities of other ministries and agencies that could affect the environment. Section 12 of EMCA, 1999 gives NEMA the power to compel any lead agency to perform duties in compliance with EMCA or any other law pertaining to the environment. According to section 58 of EMCA, NEMA is charged with the responsibility of the review of Environmental Impact Assessments (EIA), granting licenses for development, enforcing the EIA's agreed-upon provisions and monitoring the project impacts. The Authority's average annual budget, including GoK funding and license fees, is about 560 million Ksh (\$6.7 million)<sup>8</sup>, and it reviews about 1600 EIA license applications per year.<sup>9</sup>

## **II. Pre-Construction: Planning, Licensing, Funding and, Land Acquisition**

Before the Thika Highway Improvement Project (THIP) began the proponents of the project were required, by a number of different regulations, to submit an EIA to NEMA and the African Development Bank (AfDB) as well as applications for licenses from the local governments that have jurisdiction over the planned construction areas. The EIA report submitted to NEMA is to ensure that the project will not have undesirable environmental and social consequences while the EIA report submitted to the AfDB is to ensure that the funding the AfDB provides does not go toward environmentally damaging projects. The THIP proponent (the Kenya National Highways Authority) is also required to notify the owners of the property it intends to acquire for the project, and fully compensate them for the property.

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<sup>7</sup> Full membership of the NEC is: Minister of Environment (chair); Permanent Secretaries (see schedule 1 of EMCA) (Agriculture, Economic Planning and Development, Education, Energy, Environment, Finance, Fisheries, Foreign Affairs, Health, Industry, Law, Local Gov, Natural Resources, Public Admin, Public Works, Research and Technology, Tourism, Water Resources); two representatives of public universities; two representatives of specialized research institutions; three representatives of the business community (one being a representative of oil marketing companies); two representatives of non-governmental environment organizations; the Director General (secretary); and any number of other people who "from time to time may be co-opted to be members of the council." Note: The Minister of Environment makes all representative appointments.

See: EMCA 1999, Section 4

<sup>8</sup> 1 USD = 83.5 Ksh. This exchange rate will be used throughout

<sup>9</sup> Both the average annual budget and the average annual number of EIA application submitted to NEMA are from a conversation with Gerphas Opondo, former senior legal counsel for NEMA and currently regional coordinator of the East African Network for Environmental Compliance and Enforcement, 11 July 2012

## **NEMA Environmental Impact Assessment**

Under section 58 of EMCA of 1999, all new enterprises and projects, like the THIP, must conduct and submit an EIA to NEMA. The Act further requires that any person being a proponent of a project shall, before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced with, carried out, executed or conducted by another person, undertake or cause to be undertaken at his own expense an environmental impact assessment study and prepare a report thereof for consideration by the Authority. Only lead experts who are registered by NEMA may conduct EIAs.<sup>10</sup>

Schedule 2 of EMCA of 1999 further stipulates which projects ought to undergo an EIA in addition to a project report. The projects to undergo an Environmental Impact Assessment cut across a wide range of areas including, urban development, transport, development of water resources, mining, forestry, agriculture, industries, electrical infrastructure, waste disposal, natural conservation areas, nuclear reactors, biotechnology, and the petroleum sector. A large highway project like the THIP clearly requires an EIA under this Act.

In order to clarify the EIA process Parliament passed The Environmental (Impact Assessment and Audit) Regulations of 2003. These regulations guide the procedures of conducting an EIA study by detailing the parameters to be evaluated during the study. They also provide guidelines on the payment of the EIA license fees, conduct for environmental audits, and development of project monitoring plans. The additional regulations also bifurcate the licensing process, by only requiring a project report for projects, which are not expected to have much impact on the environment. NEMA then reviews the proponent report and when satisfied that the proposed project has put in place adequate mitigation measures, an Environmental Impact Assessment (EIA) License is issued. For projects like THIP, which is likely to have significant negative impacts on the environment, further measures are required. NEMA will direct the proponent of the project to undertake at his or her own expense an EIA study and prepare an EIA study report. The proponent is required to publish such reports in one national newspaper and on one national radio station, and call at least three public meetings to invite comments from the public before NEMA decides to issue an EIA license (EIA Regulations, 2003 section 7). The proponent is also required to publicize the project and its effects in the immediate vicinity of the project (EIA Regulations, 2003 section 7). The EIA submitted to NEMA by the Ministry of Roads for the THIP contains the sample newspaper advertisement, a list of participants and locations of public meetings and a sampling of public comment submissions in annexes IV, V and VI respectively (Environmental And Social Impact Assessment Study Report, 2007).

The proponent is further required to submit copies of the EIA report to the relevant lead agencies that could be affected by the project (EIA Regulations, 2003 sections 19 & 20). Once the lead

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<sup>10</sup> Qualifications for a lead expert are as follows: A Doctorate degree or equivalent in any field plus training in environmental impact assessment from a recognized institution, with 3 years experience in environmental impact assessment related activities. A Doctorate, Masters or Bachelors plus 5 years experience in environmental impact assessment related research consultancy or teaching and at least two relevant publications in referred journals. Or, a Masters degree or equivalent in any field plus training in environmental impact assessment from a recognized institution, with 5 years experience in environmental impact assessment related activities. Or, A Bachelors degree or an equivalent in any field plus training in environmental impact assessment from recognized institution, with 8 years experience in environmental impact assessment related activities.

See: The Environmental (Impact, Assessment and Audit) Regulations 2003, Fourth Schedule.

agencies and the public have commented on the EIA, NEMA is free to issue an EIA license, or require the proponent to address concerns raised by the public or lead agencies before issuing a license (EIA Regulations, 2003 section 23(3)). Nevertheless, NEMA may also suspend or revoke the license where there is substantial change in the project or where environmental threats not earlier foreseen have emerged (EIA Regulations, 2003 section 28(1) (b)). The EIA study and report are to be conducted by NEMA licensed lead experts; however the proponent of the project, not NEMA, employs the lead experts to conduct the EIA study. Once the project has begun, NEMA is required by the 2003 regulations to conduct periodic monitoring of the project to ensure the approved EIA mitigation techniques are being employed and that no new environmental issues have presented themselves (EIA Regulations, 2003 section 31).

Be that as it may, NEMA's ability to implement and enforce the EMCA legislation is crippled by a number of factors. The first factor is the financial relationship between a project proponent and the lead expert, who is pressured to overlook some of the environmental impacts of the proposed project. Indeed, conversations with James Gachanja, a former NEMA licensed lead expert and a currently practicing licensed lead expert, confirmed this uneven relationship. Both agreed that the financial relationship between the proponent of a project, who would like the project to be planned as efficiently and as cost-effectively as possible, and the lead expert creates a conflict of interest for the lead expert. The lead expert is required to be impartial, but stands to gain financially if some of the environmental impacts of the project are downplayed. If the lead expert were to submit a report that finds that serious mitigation techniques are required or a major change to the project is needed to protect the environment, or protect the interests of the public, payment from the proponent could be withheld, and a new lead expert hired.<sup>11</sup> There is no direct evidence of this occurring with the THIP, yet conversations with the two licensed lead experts confirmed this practice as common.

The paltry budget NEMA is afforded by the GoK and its licensing fees does not allow for proper investigation, review and monitoring of the proponent's EIAs. Former NEMA legal counsel, Gerphas Opondo, and Murefu Barasa, a renewable energy consultant explained that NEMA is chronically underfunded, and thus does not have enough staff to fill all of the District Environment Officer posts.<sup>12</sup> Those that are filled often lack the staff required to review the large number of EIAs that are submitted.<sup>13</sup> Inadequate staff also impacts NEMA's ability to monitor projects effectively and means that the agency lacks the ability to conduct the large-scale scientific tests required for some projects like the THIP. Some monitoring can be done on some projects, but without more funding and staff not all projects can be monitored. In these cases self-monitoring is encouraged, but it is difficult to know how faithfully project proponents adhere to monitoring standards.

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<sup>11</sup> A NEMA employee familiar with EIA review revealed that some lead experts are known to copy information from a previously approved EIA so he or she does not have to go in to the field and conduct studies and tests.

<sup>12</sup> Interview Opondo, 11 July 2012 and Barasa 2 July 2012

<sup>13</sup> In 2010 NEMA began to decentralize some of its powers, giving DEOs the ability to grant EIA licenses in addition to conducting review, audit and monitoring activities. Originally this power was only exercised at the NEMA HQ. The move has further increased the strain on the already understaffed DEOs, who now handle an EIA from submission to licensing to audit to monitoring.

## **African Development Bank Environmental and Social Impact Assessment Guidelines**

The African Development Bank, which is a major source of funding for the THIP, has developed a set of guidelines that a proponent of a project must follow in order to receive funding for the project. As a recipient of AfDB funds and the THIP proponent, the Government of Kenya must comply with these guidelines. The AfDB requires that all projects seeking to receive funding from the bank submit an environmental and social impact assessment. The Bank's Environmental and Social Assessment procedures show how to proceed to integrate environmental and social issues in the project cycle (African Development Bank Integrated Environmental And Social Impact Assessment Guidelines, October 2003 <http://www.afdb.org/en/topics-and-sectors/sectors/environment/>). The Integrated Environmental and Social Impact Assessment Guidelines provide detailed requirements for any specific project such as road construction. The AfDB integrates environmental considerations into major transportation projects exceeding 50 km in length and needing major rehabilitation or upgrading. They are classified as Category I projects which require detailed ESIA investigations. This ESIA investigation is required to address how the project will affect or improve poverty, environment, population, health, gender and participation. The AfDB framework on environmental policy has been anchored in the concept of sustainable development.<sup>14</sup> Therefore, according to the AfDB, the ESIA report for the THIP was carried out considering sustainable development of the road project, while identifying possible negative and positive impacts on natural and human environment.

The AfDB ESIA procedures are remarkably similar to NEMA's procedures for an EIA study (African Development Bank Environmental and Social Assessment Procedures for African Development Bank's Public Sector Operations, June 2001 <http://www.afdb.org/en/topics-and-sectors/sectors/environment/>). The AfDB requires that borrowers for category 1 projects retain his or her own independent social and environmental experts to prepare the ESIA. During the preparation of the ESIA the borrower is tasked with engaging primary and secondary stakeholders, taking their comments into account when finalizing the project. Primary and secondary stakeholders include beneficiaries, affected groups, civil society organizations and local authorities. The borrower must then compose a non-technical executive summary that will be released to the public. The THIP executive summary was made public on the AfDB's website. Consultation with stakeholders should continue as necessary throughout the construction process and the operation of the finished project to ensure that stakeholder concerns were addressed (African Development Bank Environmental and Social Assessment Procedures for African Development Bank's Public Sector Operations, June 2001 pg. 16). The results of the consultations must be reported to the bank in the borrower's quarterly reports to the Bank. A progress report detailing the status of the project as well as its attainment of project objectives should be publicly disclosed on the Bank's website.<sup>15</sup> The ESIA must also conform to the feasibility study and terms of reference that were initially accepted by the Bank during the initial

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<sup>14</sup> The African Development Bank describes sustainable development as, "the acquisition, transformation, distribution, and disposal of resources in a manner capable of sustaining human activities without any reduction in the aggregate natural resource stocks. It also assumes that the ecological regenerative and assimilative capacities of the natural ecosystems will be maintained," (African Development Bank Group's Policy on the Environment, February 2004, pg. 12).

<sup>15</sup> This could not be found on the AfDB's website as of July 25, 2012

review of the project. The ESIA is then reviewed by the Bank and the agreed upon terms of the ESIA (resettlement plans, monitoring, mitigation techniques) are written into the loan document.

Once the Bank approves the ESIA, a copy of the ESIA must be released to the public in an accessible place in the country where the project is being developed. The ESIA is also to be posted on the AfDB's website and made available through the Bank's Public Information Center. The THIP ESIA could not be found on the AfDB website as of July 25, 2012. The AfDB, like NEMA, provides for monitoring after the ESIA has been approved, however unlike NEMA monitoring is left to the responsibility of the borrower. Results of the monitoring activities must be reported to the Bank in the borrower's quarterly report. The Bank reserves the right to do a full-scale audit on the project to ensure it is in compliance with the loan documents. If the Bank discovers the borrower is not in compliance or unexpected impacts arise the Bank will request that the borrower review the agreed upon management plan in collaboration with stakeholders and resubmit the changes to the Bank for approval.

In the end the Bank's oversight capacity is limited. Justin Eccat, an employee in the Bank's environmental department, explained that the Bank's guidelines are only in place to provide a stopgap for borrowers who are operating in countries without strong or complete environmental regulatory regimes.<sup>16</sup> The Bank is not equipped and does not want to be another level of domestic regulation, but it will increase monitoring and auditing efforts in countries without their own measures in place. For countries with a decently strong regulatory regime the Bank stresses to borrowers compliance with domestic regulations.

A joint report between The Kenya Alliance of Resident Associations (Kara) and The Center for Sustainable Urban Development (CSUD) published in May 2012 raises issues with the public awareness mechanisms that are mandated by both NEMA and the AfDB. The report's study team held six meetings between August and September of 2011 in various locations between Nairobi and Thika, and found that a large majority (112/147) of the 147 people surveyed had "no idea about the project period and cost," (*Thika Highway Improvement Project: The Social/Community Component of the Analysis of the Thika Highway Improvement Project*, 11). This calls into question the effectiveness of the public awareness regulations put in place by NEMA and the AfDB, as well as the implementation of the existing framework.

### **Physical Planning Act, 1998**

In addition to the NEMA EIA license and funding approval by the AfDB, the Kenya National Highways Authority (KeNHA) was required to get approval of the THIP by the local governments through which the new highway passes. The THIP passes through the towns of Thika, Ruiru and the City of Nairobi. Each is governed by its own town or city council, from which the GoK must receive approval before construction.

These local authorities are empowered by section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests, and green belts. The same section, therefore, allows for prohibition or control of the use and development of land and buildings in the interest of proper and orderly development of an area. Section 30 states that without development permission granted by the respective local authority, no other licensing authority shall grant

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<sup>16</sup> Interview in Nairobi on 20 July 2012

licenses for commercial or industrial use or occupation of any facility. The local authority is not empowered to act alone however. Section 30 stipulates that the Director of Physical Planning must also approve any application for development. The section lastly states that any person who carries out development without permission will be required to restore the land to its original condition.

Finally, section 36 states that if, in connection with a development application, the local authority is of the opinion that the proposed development activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an EIA report. EMCA, 1999 echoes the same by requiring that such an EIA is approved NEMA.

Through conversations with the Nairobi City Council Engineer, the study team responsible for this report discovered that his department was not informed about the THIP or involved in any way with the project (see below: chapter 3). The Ruiru local government was similarly not informed about the THIP.<sup>17</sup> That being the case, the Act appears to be aimed at regulating proponents of private developments, and not public works projects like the THIP. If that is the case KeNHA, as part of the GoK would not have had to apply for permission from local authorities since KeNHA and the local authorities are part of the GoK. Still, it would have been important for these discussions to take place.

### **Land Acquisition Act, 1968<sup>18</sup>**

As a major expansion of an existing road the THIP was in need of land adjacent to the original road in addition to the road reserve to complete the project. Additionally, the THIP, as a major construction project, was in need of a large amount of material (stone and dirt), which could be found on land near the construction site, but was not owned by the GoK. The Land Acquisition Act provides regulations that the GoK must follow in asserting eminent domain, and when temporarily taking control of land used to mine stone or dirt.

Under Part II of the Act, any government minister that believes there is a need to acquire land for government purposes, which include defense, public safety, public order, public morality, public health, town and country planning or the development or utilization of any property, can compulsorily acquire the land (Land Acquisition Act, 1968 Part II Section 6(1)(a) & (b)). Before the GoK acquires the land, however, section 3 stipulates that it must first publish its intention to acquire the land in the Gazette and notify all of the people who appear to be interested in that land, meaning those who have some ownership stake in the land. Those interested in the land are required by section 8 of the Act to be fully compensated for the land that is acquired by the GoK. Nevertheless, the following sections tie the price of the land to an inquiry made by the Commissioner of Lands. This inquiry must also be published in the Gazette. All those interested in the land then must write to the Commissioner to claim compensation for the land in order to receive payment for the property. The inquiry deciding compensation is, for all intents and purposes, a court hearing adjudicated by the Commissioner. In this hearing the Commissioner, as well as those interested in the land being acquired, are allowed to present evidence and call witnesses.

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<sup>17</sup> Interview with officials in Ruiru on 19 July 2012

<sup>18</sup> The Land Acquisition Act of 1968 was repealed by the Land Act of 2012. During the time the THIP was acquiring land for the project the original 1968 Act was in effect.



In conversations with Kara, it was discovered that the GoK is not inclined to compensate residents and business owners who lost property on the road reserve in the construction of the THIP.<sup>19</sup> The GoK has argued that the businesses and residents were occupying land illegally. The GoK argues that it set aside the land along the highway as a road reserve, and thus, argues, even though the Ministry of Lands, may have issued those titles, any title given to residents, business owners, farmers, etc. that area was not a valid title. Clearly, this issue is made complex by the massive irregularities in the Ministry of Lands.<sup>20</sup> The ESIA submitted to NEMA proposed a relocation of hawkers and small scale traders, including those at the Githurai market, to public markets that were constructed by the local authorities away from the highway. No one is allowed to trade on the highway (Environmental and Social Impact Assessment Study Report, 2007 pg. 66). That being the case the relocation deprived the hawkers and traders of their customers; the commuters that drive on the Thika Road, and this is thus a negative social impact that required mitigation.

The process for acquiring land temporarily for the THIP's extraction of dirt and stone is much the same as the process for acquiring the land permanently. However, Part III, section 24 bars the GoK from possessing the land for more than five years. There is also no provision for a compensation hearing; rather, under section 25 the Commissioner is charged with offering a fair amount of compensation in light of whatever the circumstances might be. Once the contract for the land has expired the land reverts to its original owners, and according to section 26 of the Act, the land must be restored to its original state. The GoK is thus compelled to rehabilitate any borrow pits that may have been used to mine stone and dirt for the project. Yet, preliminary site visits to the borrow pits have revealed that they have not yet been rehabilitated and constitute a public health hazard (see below: chapter 4 section 2.8).

### **Limitations of Actions Act**

There is no law in Kenya which provides for the compensation squatters who lost property (physical structures) due to forced removal. The Limitations of Actions Act does provide for a path to ownership for the squatter. If he or she can prove in a court of law that he or she has occupied the land for twelve years or more without interruption, the rightful owner of the land can no longer sue to remove the squatter (Limitations of Actions Act, section 7 and 11). Section 41 however exempts anyone from gaining title of public land in the manner described above. As this applies to the THIP, squatters on the road reserve, which is public land, have no right to compensation. But squatters who happened to be on private land for twelve or more years were entitled to compensation.

### **Land Planning Act, 1968**

The Development and Use of Land Regulations, a subsidiary part of the Land Planning Act of 1968, stipulates in section 10 that anyone planning to begin a development project must get the consent of an interim planning authority at the local level, or if there is no interim planning authority, consent must come from the Central Authority, which is administered by the Ministry

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<sup>19</sup> Interview with Kara was on 18 July 2012 in Nairobi

<sup>20</sup> Republic of Kenya. 2004. *Report of the Commission of Inquiry Into the Illegal/Irregular Allocation of Public Land*. Nairobi: Government Printers.

of Lands. This Act creates a bottom-up process meant to apply to private developers. The THIP is a large top-down project administered by KeNHA, and so the application of this Act to the THIP is probably minimal. KeNHA most likely operated at the ministerial level, by-passing the interim planning authorities and the Central Authority in favor of communicating directly with the Minister of Lands.

### **III. Water and Waste Management**

The THIP is in need of large amounts of water, mainly to keep dust levels low. Runoff from the large-scale water use is also of concern as well as the health of the 15 waterways that the highway traverses from its origin in Thika to its terminus in Nairobi. In order to ensure sustainable abstraction methods and protect the health of riparian environments the GoK has enacted a series of regulations. Most notably Parliament enacted the Water Quality Regulations of 2006, the Water Act of 2002, the EMCA (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations of 2009, and the EMCA (Waste Management) Regulations of 2006. Along with some local by-laws, these regulations govern the abstraction and dumping measures of the THIP.

#### **EMCA (Water Quality) Regulations, 2006**

The overriding objective of these regulations is to enhance sustainable management of water resources in Kenya. The regulations under section 12 require industries to apply for an effluent discharge permit annually for discharging processed wastewater either into the environment, water bodies or sewers. Noncompliance with any provision of the regulation carries a penalty of not more than 500,000 Ksh (about \$6,000). Further, the regulations specify discharge limits for various environmental parameters. These parameters are based on NEMA and WHO standards. Schedule 4 of the legislation provides for monitoring of specific chemicals that are likely to be discharged into surrounding waterways by road construction, including oil and grease. Under Part III section 12 and 14 of the regulations, the proponent of a project that is licensed by NEMA to emit effluent is responsible for monitoring the quantity of effluent and the quality of the waterway/s being affected. NEMA is then charged with verifying that the license holder is, in fact, conducting monitoring, and that the effluent is within safe parameters. As the THIP was being constructed large amounts of dirt and stone were used to construct various parts of the new road. In addition, 60 tons of water were used a day in order to keep dust producing surfaces damp (see below: chapter 3 “water use”). The runoff from the daily water use and the movement of large amounts of rock and dirt increased the danger of siltation, as well as minerals leeching into the 15 waterways that the highway traverses. The study team conducted water quality tests, and found that water quality around the construction site was within NEMA and WHO standards (see below: chapter 4 section 2.3).

#### **EMCA (Wetlands, River Banks, Lake Shores and Sea Shores Management) Regulations, 2009**

Siltation is further addressed in these regulations, however safe levels of siltation are not provided. Part III section 16(d) states that one of the goals of the regulations is to prevent siltation of Kenya’s waterways. While part IV section 24(1) and (2) require local governments in consultation with NEMA to establish laws regulating waste entering into waterways.<sup>21</sup> The ESIA submitted by the THIP lead experts plan to mitigate the danger of siltation from runoff and earth

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<sup>21</sup>Nairobi bylaws can be found in this Appendix on page 48, section VII.

moving activities by taking special care near waterways (see below: Chapter 4 section 1). As was mentioned above, water quality tests did not reveal waterways to be outside NEMA permissible levels. However, neither the GoK nor local governments publish siltation standards, nor this is a major gap in the regulatory framework.

### **The Water Act, 2002**

In addition to the license required by the Water Quality Regulations, the Water Act, as it applies to THIP, adds another level of permitting to water usage and wastewater disposal. The Act creates the Water Resource Management Authority (WRMA), which is administered under the Ministry of Water. The Act under Part III of section 8 vests WRMA with the authority to determine the viability of applications for water use, and monitor that use to ensure it is in accordance with the conditions of the permit. The THIP under section 25 of the Act is also required to get a permit for water use from any source, including abstraction from boreholes. As stated above, the THIP requires 60 tons of water per day. Most of that water was drawn from boreholes near the construction site. The fourth schedule of the Act provides a series of regulations for abstraction. The contractor constructing the well must notify and get approval from WRMA to construct a well, as well as report to WRMA about measurements taken during the drilling of the well. WRMA is also granted the authority to have free access, inspect and take samples from the permitted well.

WRMA is also vested with the power to regulate the quality of water from adverse impacts. Under section 25 of the Act, WRMA has the authority to issue permits the discharge of a pollutant into any water resource. Therefore, the KeNHA needed to apply to WRMA for an additional license in order to commence construction of the project.

Both the permit for water abstraction, as well as the permit for effluent are, under section 29(4), subject to public consultation and, if the Authority deems necessary, an EIA. This EIA must be in accordance with the regulations set down in EMCA of 1999 and reviewed by NEMA.<sup>22</sup> The ESIA filed by the proponent of the THIP claims that in order to ensure the sustainable use of water the project will apply for the required permits and give the public first priority on water resources in order to not deprive the public of clean water (see below: chapter 4 section 7).

### **EMCA (Waste Management) Regulations, 2006**

The THIP did not generate large amounts of waste. It did however generate a considerable amount of granular material. This was disposed of on neighboring farms on land leased by the contractors (see below: chapter 3 section four). There are however a few provisions in these regulations that pertain to the THIP. Section 6(1) mandates that any owner of a facility that produces waste must adopt clean production principles by conserving raw materials and energy and reducing emissions. Section 7 of the regulations requires that NEMA license any vehicle used for waste transportation. This means that the granular waste generated by the THIP required

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<sup>22</sup> Section 33 of this same act allows for issuance of a permit without public consultation in exceptional circumstances. Exceptional circumstances are determined by WRMA. This permit however is only valid for up to one year and cannot be renewed to extend it past one year.

licensed vehicles to transport it.<sup>23</sup> Additionally, under section 18, the means of disposal of the granular waste generated by the THIP was required to be approved by NEMA.<sup>24</sup>

#### **IV. Noise and Vibration Regulations<sup>25</sup>**

##### **EMCA (Noise and Excessive Vibrations Pollution – Controls) Regulations, 2009**

The noise and excessive vibrations regulations of 2009 require that noise and excessive vibrations should be minimized to the largest extent possible and that noise levels should not exceed 60 decibels. The first schedule of the regulations provides for maximum sound level limits for both day and night time activities based on activity location, and zoning. If the sound source is expected to exceed 60 decibels, section 16 of the regulations provides guidance for submitting a license to NEMA in order to gain a permit to emit noise and vibration in excess of the typical regulations.

The contractors (hired by the GoK's KeNHA) who carried out the THIP construction used a large number of heavy machinery as well as vibration producing explosives when quarrying stone for the project. While the contractors of the THIP were bound by the noise and vibration regulations, field observations by the study team revealed that there was no attempt to quantify noise levels at the construction site (see below: chapter 4 section 2.1). Vibrations and noise were supposed to be kept under control through the use of hydraulic pressure technology to break-up rocks, rather than using explosives. Nevertheless, a newspaper article in *The Standard* entitled *Powerful explosives disrupt the harmony of Thika Road residents* and published on August 20, 2011, reveals that explosives were used in constructing the THIP, which caused damage to nearby structures. Residents of a housing development, Canaanland estate, situated along the Thika Road, identified cracks in the foundations of their homes after the use of explosives in the construction of the THIP. The newspaper was cited in a joint report from the Kenya Alliance of Resident Associations (Kara) and The Center for Sustainable Urban Development (CSUD) entitled *Thika Highway Improvement Project: The Social/Community Component of the Analysis of the Thika Highway Improvement Project*.

#### **V. Social Impact Regulations**

A project as large as the THIP is bound to have a number of social impacts on the immediate and national community. The construction of the project is governed by a number of regulations that endeavor to shield the local community from the adverse effects of such a large construction project, and protect their rights to their property, health and livelihoods.

##### **The Public Health Act**

The construction of the THIP has the potential to cause major health issues for the community in proximity to the construction sites. Borrow pits and quarries, when left unattended, are dangerous to public health, increasing the possibility of serious injury if someone were to fall into the quarry or borrow pit. Indeed, during a number of focus group discussions held by Kara

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<sup>23</sup> The City of Nairobi requires a separate permit for waste transportation in addition to the NEMA permit

<sup>24</sup> For a broader discussion of the Waste Management Regulations see section VII of this Appendix.

<sup>25</sup> Air quality regulations have not yet been enacted in Kenya. NEMA has draft regulations, but approval of Parliament has not yet occurred. The GoK has however passed the EMCA (Fossil Fuel Emissions Control) Regulations. These have only a slight bearing on the THIP since this legislation only regulates emissions from internal combustion engines.

residents living in close proximity to the borrow pits raised concerns that the pits would become mosquito breeding grounds in the rainy season (*Thika Highway Improvement Project: The Social/Community Component of the Analysis of the Thika Highway Improvement Project* 15). Part IX section 115 of the Act states that no person shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires local authorities to take all lawful, necessary and reasonably practicable measures to maintain a clean and sanitary jurisdiction in order to prevent occurrence of nuisance or conditions liable for injury or dangerous to human health. Such nuisances or conditions are defined under section 118 as waste pipes, sewers, drains or refuse pits in such a state, situated or constructed as in the opinion of the medical officer of health to be offensive or injurious to health. According to the ESIA, and in accordance with the Land Acquisition Act, borrow pits and quarries are to be rehabilitated so the land can be safely used in the future.

These provisions in the Act also give local authorities the power to compel the contractor to address drainage issues. Inadequate drainage has plagued parts of the highway (see below: chapter 4 section 2.4), creating possible health issues arising from contaminated water entering into businesses near the highway, as well as the dangers of motor vehicles crossing flooded areas. According to the Chief Engineer of KeNHA the drainage issue is ongoing, but plans are underway to rectify the problem.<sup>26</sup> The Municipality of Ruiru was able to address some of the drainage issues during the construction of the THIP. The municipality was able to successfully compel KeNHA and the THIP contractor to redirect drainage from the roadway away from properties fronting the road. The contractor installed culverts to direct drainage away from properties. However, some drainage issues are still unresolved.

In addition to the Water Quality Regulations and the Water Act, this Act gives local authorities another piece of legislation to control the cleanliness of its water resources. On the responsibility of the local authorities, Part XI section 129 of the Act states in part “It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes, and purifying such supply so polluted,” (The Public Health Act Cap. 232, section 129). Section 130 provides for making and imposing on local authorities and others the duty of enforcing rules with respect to prohibiting use of water supply or erection of structures draining filth or noxious matter into the water supply as mentioned in section 129. The local authorities in addition to NEMA are empowered to pay close attention to the siltation or effluent flow from the THIP into the waterways under its jurisdiction.<sup>27</sup>

### **The Kenya Roads Act, 2007**

During the construction of the THIP it was necessary for sewage and water lines to be moved. Yet the joint study published by Kara and CSUD found that residents along the Thika Highway were not informed how those utilities would be restored (*Thika Highway Improvement Project: The Social/Community Component of the Analysis of the Thika Highway Improvement Project*, 12). According to section 27(2) of the Kenya Roads Act the KeNHA is responsible for alerting

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<sup>26</sup> Drainage issues are also addressed by the Nairobi bylaws, which can be found in this Appendix on page 48, section VII.

<sup>27</sup> Ruiru bylaws regulating water usage can be found in this Appendix on page 49, section VIII.

the owner of the utilities that the construction of a road requires their removal. The section further states that upon a written request by KeNHA to remove the utilities the utility owner is responsible for relocating the utility that satisfies KeNHA at no cost to KeNHA. It is not known to what extent this was undertaken by KeNHA and the local Ruiru-Juja Water and Sewerage Company (RUJAWASCO).

### **Public Roads and Roads of Access Act, 1920**

Section 8 and 9 of the Act provides for the dedication, conservation or alignment of public travel lines, including construction of access roads adjacent to lands from the nearest part of a public road. Additionally, the owner of land that does not have access to the closest public road, he or she may apply to the local district to construct a road to connect his or her land to the public road. Section 10 requires that land owners who own land in the path of the proposed access road be notified by the district road board that a right to construct an access road has been granted. Yet, according to an article that appeared in *Business Daily* on October 26, 2011, businesses along the Thika Highway claimed that the new road cut-off their access to the road, thereby negatively impacting their livelihoods. The business owners applied to the government to be granted permission to build access, but the government denied their applications (*Thika Highway Improvement Project: The Social/Community Component of the Analysis of the Thika Highway Improvement Project*, Appendix IX). In a conversation with the KeNHA Chief Engineer, he explained that low-speed access roads were installed along the length of the highway, however ramps connecting the access roads to the main high-speed section of the highway were only every few kilometers. The ESIA submitted to NEMA noted that some, not all, structures that now have the highway as frontage have rear access roads (Environmental and Social Impact Assessment Study Report, 2007, 66).

### **VI. The Proposed Constitution, 2010**

In August of 2010 Kenya ratified a new constitution and is currently in the process of formulating and implementing a wide array of new laws that will impact on large-scale projects like THIP. The new constitution was aimed at resolving the political and structural issues that came to a head after the 2007 presidential election. The new Constitution enshrines political, social and environmental rights in a prominent place in the Constitution. While the new Constitution gives prominence to environmental, none of the legislation that guided the planning and construction of the THIP was enacted under the old Constitution, therefore the existing legislation must be submitted to a review by the GoK to decide whether it is congruent with the Articles and sentiment of the new Constitution.

In the new Constitution, even before the structure of the national government, environmental rights are addressed. Under Article 42 under the fundamental rights and freedoms granted to all Kenyans, the Constitution stipulates that the government of Kenya must ensure a “clean and healthy environment,” and to maintain the environment in such a way as to benefit both current and future generations. The provisions to ensure such an environment are laid out in Article 69.

Article 69 outlines the specific duties of the GoK to protect the environment and ensure the rights laid out in Article 42 become a reality. Article 69 declares that the State (the GoK) is responsible for sustainable exploitation, utilization and conservation of the environment and natural resources. It is to maintain tree cover of at least ten percent of the land area of Kenya,

encourage public participation in the management and protection of the environment, establish systems of environmental impact assessments as well as auditing and monitoring systems.

With the realization that environmental rights are easily abrogated Article 70 gives Kenyan citizens the right to petition a court for redress if those rights are infringed upon. Under this Article a court has the power to prevent or stop any act or act of omission that is harmful to the environment, which includes compelling public officers to fulfill the court's holdings. The Article also empowers the court to grant monetary restitution to the wronged party. Indeed, the new Constitution under Articles 162.2(b) and 165 create a special court for land and environment that will hear issues specifically pertaining to land and environmental rights granted to Kenyan citizens. The Court was recently created by Parliament through The Environment and Land Court Act of 2011, which establishes qualifications for the Judges on the court as well as the Court's jurisdiction. To our knowledge, it has yet to start operations.

Related to the environmental rights and obligations, the proposed constitution stipulates correct uses of land. Article 60 states "land in Kenya shall be held, used and managed in a manner that is equitable, efficient, productive and sustainable" (Proposed Constitution of Kenya 2010 Article 60). Subsection (e) further stipulates that land should be used with the principle of "sound conservation and protection of ecologically sensitive areas" (Proposed Constitution of Kenya 2010, Article 60(e)). In order to set policy and manage land use the proposed constitution makes a provision for the creation of the National Land Commission in Article 67. Legislation to create the National Land Commission was passed in May 2012. The NLC is not yet set up and hence the policies it is obligated to create have not yet been formulated although a new National Land Policy exists that reinforces many of the principles outlined above.

It is yet to be seen if legislation enacted under the EMCA regulations, as well as the other pieces of legislation mentioned in this chapter, will be found to carry the spirit and follow the letter of the new Constitution. It is likely that after review some or all of the regulations mentioned in this chapter will have to be re-written or repealed.

### **The Local Government Act**

The Local Government Act, Cap. 265, sections 160 (a) and 201 gives the Local Authorities powers to formulate by-laws in order to manage waste (mainly sewage and solid waste). The following is a typical by-law outlining the general features appearing in the Nairobi by-laws.

## **VII. Nairobi City Bylaws**

### **Solid Waste/Refuse Management**

The municipal refuse receptacles and collection by-laws state that the removal of the contents of all the refuse receptacles within market and urban centers shall be carried out by the council or any other authorized person. The provision and maintenance of refuse receptacles within the council is the responsibility of the occupiers of the premises, who are also required to deposit the refuse into the refuse receptacle and properly cover it until such a time that it is removed by the municipal council staff.

The by-laws further prohibit the burning of materials which are likely to cause fire, deposition of any liquid or solid matter likely to cause injury to any person, deposition of refuse on public or private property, and accumulation of refuse on premises.

### **Sewage and Sewerage Management**

The by-laws require all new buildings to be provided with effective sewer connections within the recommended distance. If no such public sewer exists within the recommended distance or if it is not practical to connect with such sewers, then the drain should empty into septic buildings or soakage ways or as the council may direct. Section 8 of the by-laws prohibits the emptying of sewage into a cesspool, septic buildings or elsewhere other than a sewer whereby a public sewer exists and it is practical to connect to such a sewer.

### **Waste Water**

The City by-laws require that where any facility is without adequate provision for conveying waste water from there to surface water or where such provision has fallen into disrepair, the owner of such facility shall, on receipt of notice from the Town Clerk requiring him to do so, and within such reasonable time shall be specified therein, provide guttering or down pipes or execute such other works as may be necessary to any distance water sewer, which is within the recommended distance of 70 yards or, if there is no surface water sewer within that distance or if it is not practical to connect to such, a sewer may otherwise dispose of such water to the satisfaction of the council.

### **Drainage**

The by-laws on drainage and sewerage state that every new facility shall be provided with an effective drain to be constructed in accordance with the council requirements. The maintenance of all drains and all drainage works is the responsibility of the owner of the facility and must always be in an efficient condition. The council may construct the drainage works in agreement with the owner so that the owner pays the construction cost of the works. Other charges include supervision charges, among others. The role of the council includes supervision of excavation for the laying of the drains, testing of drainage works, and examination of drains.

## **VIII. Ruiru Bylaws**

### **Effluent Discharge**

The by-laws require that any person looking to discharge effluent into sewers, underground aquifers, well boreholes, surface water courses, or within the municipality without permission from the Ruiru Town Council. The Council may attach conditions, and can revoke the permit as it sees fit.

### **Development**

Any person planning to develop a project within the Ruiru jurisdiction must apply to the Council for permission to build such a development. The Council must also approve the plans of the development, ensuring it is within the building regulations of the municipality. The Council is also obliged to ensure that the building materials are sufficient and safe for the type of development planned.



### **Factory and Other Places of Work Act**

This Act requires that before any premises are occupied or used, a certificate of registration should be obtained from the chief inspector. The occupier must keep a general register with provisions for health, safety and welfare of workers on site. This Act provides guidelines on the safety of workers at the work place and regulates and evaluates working conditions. Factors considered in the Act that requires implementation during project development are:

- Provision of protective clothing and firefighting equipment to the workers;
- Provision of clean and sanitary working conditions;
- Provision of quality and quantity wholesome drinking water; and
- Protection of moving parts of machine and equipment among other safety measures.

The overall objective of the Act is to ensure safety at the work place. It is recommended that the objective of the Act be upheld during the construction and routine maintenance of the project to ensure that the health and safety of both the workers and the general public is safeguarded. The study team observed that in most of the site visits, road construction workers were provided with protective clothing and metal helmets to ensure their safety.

### **Occupational Health and Safety Act, 2007**

The Act applies to all workplaces where any person is at work, whether temporarily or permanently. The Act seeks to secure the safety, health, and welfare of persons at work, and to protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons. Part 9 states that the occupier or employers shall establish a health and safety committee where twenty or more people are employed and such an employee shall prepare a written statement of his general policy with respect to the safety and health at the work place. Further, the occupier shall prepare annual safety and health audits by a qualified person.

### **The Standards Act**

This Act is implemented by the Kenya Bureau of Standards, who provides standards on the requirements of equipment and project materials. Standards regulating security and safety of the public also have to be observed during the design phase of the project. The proponent is required to implement the requirements of this Act especially those on standardisation of project input and equipment in order to reduce waste and pollution.

### **The Penal Code**

Section 191 of the Penal Code states that any person who voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use, is guilty of an offence. Section 192 of the same act says a person who makes or vitiates the atmosphere in any place to make it noxious to the health of persons in dwellings or business premises in the neighborhood or those passing along the public way, is committing an offence.

### **EMCA (Fossil Fuel Emission Control) Regulations, 2006**

These Regulation aims at eliminating or reducing to acceptable standards emissions generated by internal combustion engines. The regulation provides guidelines on use of clean fuels, use of catalysts and inspection procedures for engines and generators. This regulation is triggered as the proponent will use vehicles and equipments that depend on fossil fuel as their source of energy.

It is recommended the requirements of the regulation be implemented in order to eliminate or reduce negative air quality impacts.

## **Appendix 3: Interview Schedule For The Chief Resident Engineer, Thika Highway Improvement Project**

### **1. Background of the project:**

- Why there was need for improving the Highway ( socio-economic benefits, ecological )
- Funding and any conditionality
- Possible alternatives
- Challenges encountered e.g. land acquisition and compensation, terrain, vegetation

### **2. Anticipated environmental impacts before construction**

- What were the anticipated environmental problems before construction of the road began?
- Are there new environmental impacts being experienced now that were not anticipated in EIA report?

### **3. Mitigation measures for anticipated impacts and new ones if any**

### **4. Sources of building materials**

- Hard core
- Ballast
- Sand,
- Soil

### **5. For building materials on private land, how do you acquire permits to get them?**

- Place to rehabilitate these quarries and borrow pits?

### **6. Main sources of water**

- Rivers
- Streams
- Treatment plant
- Others, specify

### **7. Approximate amount of water abstracted at each source per day?**

### **8. Conflicts over water use with**

- large scale farmers
- small scale farmers
- domestic users
- industrial users

### **9. Drainage**

- Action taken to address storm water

### **10. Biodiversity in the area covered by project**

- Unique biodiversity
- Any adverse effect on identified biodiversity
- Removal of vegetation along the route
- Mitigation measures

### **11. Waste management**

Types of waste from road construction

- Asphalt

- Bitumen/tar
- Oil based wastes/pollutants
- Other

**Management of this waste e.g. who are licensed by NEMA to manage your waste?**

**12. Soil degradation**

- Type of soil and reason
- Source (s)
- Mitigation measures
- Evidence of soil erosion along the route
- Mitigation measures

**13. Aesthetics**

- Landscape changes/change of scenery
- Glare at night

**14. Incorporation of gender in EIA**

- Involvement of women in beautification program
- Any other consideration?

**15. Other environmental impacts e.g. noise, dust and gaseous emissions**

**Thank you very much for your time and cooperation**

**Appendix 4: Site Visit Photographs of Environmental Concerns.**  
*All photographs were taken by the study team.*



Plate 1: Blocked Chiromo River threatening aquatic life forms at junction Museum Hill intersection



Plate 2: Dumped waste and debris, a threat to the life forms and ecological health of Nairobi River at the Museum Hill Roundabout



Plate 3: A Severly degraded Nairobi River channel at Globe Cinema round about



Plate 4: A Section of the road on Lot 3 with a lot of dust posing health problems to the motorists and neighbouring communities



Plate 5: A Section of the road on Lot 3 which will directly impact the riparian vegetation health



Plate 6: A Blocked river channel on Lot 3 of Ruiru River with potential impact of affecting aquatic life forms





Plate 8: Steep cliffs with potential for falling debris on Lot 3



Plate 9: Open quarries and excavations posing health hazards to passer-bys in the area





Plate 10: A Section of the Ruiru River blocked by the soil mounds and debris with potential adverse impacts on aquatic life forms



Plate 11: A section of Thika River badly affected by suspended solids and soil from the road construction on Lot 2



Plate 12: Potential negative impacts on water quality of the riverine ecosystem found on Lot 3



Plate 13: Dust blooms on neighbouring market center along the highway with potential health impacts



Plate 14: Clouds of dust emissions from road construction works with potential impact on human health on Lot 3 at Kenyatta University



Plate 15: A Construction truck parked on the roadside causing visual obstruction on Lot 2 of the Thika Highway



Plate 16: Dust emissions from the road construction settling on the neighbouring buildings with potential negative impact on air quality



Plate 17: Road construction workers spraying water on the road to keep down dust on Lot 2 (Kasarani area)





Plate 18: Construction materials stored on the road side posing risks of theft and accidents



Plate 19: A Severely degraded Nairobi River channel due to dumping of waste into the river



Plate 20: Note: the construction of one of the open drainage systems at Pangani area (Lot 1)