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Strategic Environmental Assessment (SEA)

For:

“Reforestation, Sustainable Development and Carbon Sequestration project in Kenyan Degraded Lands”

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1. Executive Summary

On 11th June, 2009, the Minister for Finance tabled the 2009/10 Budget to parliament. The Budget whose theme was **‘Overcoming today’s Challenges for a Better Kenya tomorrow’**, was premised on the need to urgently overcome the socio-economic challenges that we face today. It was expected that the implementation of the budget would not only restore the confidence of Kenyans in their country and its institutions, but would also jump start the return of the economy back to a long term growth path, while at the same time, providing the impetus for building a cohesive, equitable and prosperous Kenya while restoring our degraded lands and improving ecological conditions and the environment.

Towards achieving this goal, the Government proposed an Economic Stimulus Programme (ESP) as a short to medium term, high intensity, high impact programme aimed at jumpstarting the economy towards long term growth and development, securing the livelihoods of Kenyans and addressing the challenges of regional and inter-generational inequity. The Economic Stimulus was anchored within the principles of the Government’s blueprint ‘Vision 2030’ and recognition of global concerns on environmental sustainability.

The Economic stimulus focused on sectors that would generate maximum benefit, restore confidence of Kenyans and assist the business community to weather the storm, while also protecting the environment, livelihood of the poor and creating employment for the youth. The economic stimulus programme was deliberately designed to cover all parts of the country as a bold step to address the existing imbalances in regional development. Some of the activities covered under the programme included expansion of irrigation-based agriculture, construction of wholesale and fresh-produce markets, fish ponds and ‘Jua Kali’ sheds and tree planting among other activities that are core to the mainstay of our rural and urban population. Other projects included construction of social infrastructures such as schools, health centers and roads, as well as tapping into our

human capital resources to contribute to social welfare improvement and achievement of the Millennium Development Goals (MDGs).

The proponent proposes to expand the restoration of degraded lands by exploiting the following options;

- Tree planting by 4,200 Primary Schools to fast track reforestation initiative;
- Improvement of market centers in rehabilitating 210 “jua-kali” sheds and 200 hospitals through a beautification initiative of landscaping by planting grass, flowers and trees;
- Minimize soil erosion around 200 fish ponds and promote effective use of water in irrigation for improved agriculture productivity in Bura, Hola, Pekera, Tana Delta, Kibwezi, Ahero, west Kano, Bunyala, Mwea, and South West Kano;

The reforestation of degraded lands option shall study the reforestation technological and land use inputs for the proposed expansion of restoration of the ecosystem that shall facilitate meet current and future forestry service demands for Kenya. The proponent with the advice of the Lead Expert has settled on the carbon sequestration of ecosystem restoration for the Economic Stimulus programme as it was considered to be economical in term of resources and technological input. The fish ponds will consist of excavations, breaking soil, dumping soil and treading on biodiversity. The potential environmental impact of the fish ponds will be release of stored carbon dioxide (CO₂) gas a Greenhouse Gas from below the ground.

The Environmental Experts examined the long, medium and short term potential impact of the proposed option of rehabilitating market centers and hospitals project on the immediate environment, surroundings and the larger catchments area with due respect to all the phases from construction, mending up, commissioning, supply and operation. The study encompassed all aspects pertaining to the physical, ecological, socio-cultural, socio-economic, land use, aesthetic, health and safety conditions at project sites and its environs during and after the project. The study was based on laid down scientific qualitative studies including survey, geo-technical investigations, and procedures with the most recent methodologies and analysis required while conducting an EIA. Attention was paid

to ensure strict adherence to the relevant legislative framework governing the Water sector. Reference was also made to EIA reports dealing with similar projects within Kenya and even internet references to projects from other parts of the world.

A brief outline of the anticipated Environmental and Social Management and Monitoring Plan for the identified potential environmental impacts of the proposed project is provided in table 1 below.

Component	Potential Impacts	Mitigation Measures
Destruction of Physical Environment	<ul style="list-style-type: none"> • Soil erosion and compaction • Increased dam sediments • Obstruction of natural water channels 	<ul style="list-style-type: none"> • Develop soil erosion management measures • Limit the circulation of heavy machinery to minimal areas • Locate access roads perpendicularly or diagonally to the slope rather than along steep slopes • At the end of drilling works, level off the soils and facilitate plant regeneration. • Plan work in sections to avoid opening up areas that are left undeveloped
Waste Management	<ul style="list-style-type: none"> • Increased waste deposits and blockage of open sewers • Decreased oxygen levels in the fish ponds 	<ul style="list-style-type: none"> • Encourage separate treatment for industrial and domestic effluent • Conduct awareness on need of appropriate waste management practices including reduction, reuse, recycle, segregation ,pre-treatment among others • Avoid open dumping of solid waste on wind ward side of the fish ponds • Construction of waste screens and sediment traps
Increased Water Demand/Supply & Water Quality	<ul style="list-style-type: none"> • Reduced amount of water flow downstream • Increased irrigation operations • Reduced water quality including contamination with heavy metals and nutrients • Diversion of water 	<ul style="list-style-type: none"> • Observe the Water Act 2007 and the 30% water rights for downstream users • Use of metering methods including v-notches and sluices • Construction of sediment traps • Keep natural water channels free from obstruction • Conduct water quality monitoring at river recharge points • Incorporate biological treatment methods in fish ponds to improve water quality • Develop monitoring strategies and penalties for

		individuals diverting water from main sources
Destruction of Flora and Fauna & Wildlife-Human Conflict	<ul style="list-style-type: none"> • Avoid interference with animals drinking points • Loss of vegetation cover/Deforestation • Destruction of indigenous tree species in the forest • Perturbation of terrestrial, aquatic and avian wildlife • Increase in poaching due to non-resident workers • Derangement of terrestrial, aquatic and avian wildlife (competition for food and water resources) 	<ul style="list-style-type: none"> • Avoid constructing at animals water drinking points • Avoid selecting sites sheltering or frequented by wildlife • Preserve migration corridors for wild and domestic animals. • All trees uprooted to pave way for weir and access construction should be replanted • Avoid interference with wildlife breeding sites • Control introduction of invasive plants and animals species in forest, sewage ponds and water bodies • Promote the development of community nurseries. • Environmental conservation measures should be instituted
Air/Noise	<ul style="list-style-type: none"> • Degradation of air quality and ambient noise due to excavations operations • Degradation of air quality by vehicles emissions and dust during constructions • Interference with domestic and wildlife due to excessive and destructive noise • Evolution of odours and green house gases from stagnant waters 	<ul style="list-style-type: none"> • Operate equipments with air pollution control systems • Insulate noisy machines when working near animal habitats • Maintain vehicles and machinery in good condition in order to minimize gas emissions and noise. • Ensure continuous maintenance of sewage treatment plant and develop appropriate sludge handling procedures • Avoid construction of fish ponds on the windward side to avoid spread of dust emissions, odours
Social and Economic Concerns	<ul style="list-style-type: none"> • Migration • Communicable diseases • Resources competition • Loss of cultural heritage • Destruction of private property including farm produce and other investments • Loss of land • Gender equity 	<ul style="list-style-type: none"> • Conduct continuous public awareness and encourage participation throughout the project span to discuss contentious issues including compensation of Project Affected Persons • Communicate on project progress to community members and alert on sections to be developed to reduce destruction and interference • Accord local community employment and business opportunity as a priority • Implement HIV/AIDS and other communicable

		<p>diseases programmes in conjunction with line ministries</p> <ul style="list-style-type: none"> • Establish labour camps at reasonable distance from villages. • Where possible offer women equal employment opportunities to men • Develop secondary uses of fish farming to generate income
Occupation and Public Health & Safety Concerns	<ul style="list-style-type: none"> • Injuries and accidents to workers • Communicable diseases • Suffocation • Poisoning • Floods • Disease Vectors • Cultivation along fish ponds and water supply lines 	<ul style="list-style-type: none"> • Complying with work place legal requirements • Provision of Protective Professional Equipments • Employment of competent work force • Instituting Safety drills, disaster preparedness and management programmes • Develop appropriate structure of the that meet recommended standards • Control disease vectors using appropriate methods • Conduct education and awareness on effects of cultivating using sewage water, interference with water supply etc.

Kenya forests are depleted and only cover about 1.7% a decrease from 2% in less than 10 years. The impact of declining forests is evident with severe weather patterns. For example, the country experiences moderate droughts and floods every three to four years period and major droughts every about ten years. The pattern of droughts and floods is driven by weather patterns affecting coastal settlements, urban areas, river valleys, and most part of Western Kenya including the shores of Lake Victoria as well as the droughts affecting most parts of the country. About 80% of the country is arid and semi-arid land. Water continues to be scarce in the country and the current developed potential is estimated at 15% of available safe water resources. Demand for water and sanitation has been increasing rapidly as a result of increases in population and growing needs for irrigated agriculture, urban and rural populations, industries, livestock, and hydro power.

Continuous degradation of the land impacts water resources, sanitation and slow rate of economic growth in the country linked to financial and technological resource

constraints. The decline in forestry affects water resources with serious consequences for water allocations required for domestic, commercial and agricultural uses.. Most vast land in the country is severely degraded as a result of: deforestation, poor agricultural practices, overgrazing, excessive abstraction of surface waters (rivers, lakes, wetlands) and groundwater; soil erosion and resultant turbidity and siltation, high nutrient levels, causing eutrophication (oxygen depletion) of lakes and pans; and, toxic chemicals, including agricultural pesticides and heavy metals. All these consequences directly contribute to climate change threatening economic potential of the country.

2. Description of the proposed project.

The Economic Stimulus Program (ESP) aims at rehabilitating at least 10,000 ha of degraded land in the country. The efforts of the Program will utilize at least 20 schools in each constituency to plant native adaptive trees to local conditions in all the constituencies, construct 200 fish ponds with vegetation reinforcement to minimize soil erosions in 141 constituencies, build one “jua-kal” shelter in each constituency with landscaping and beautification of health and sanitary services in all the constituencies. It is estimated that about 4,200 schools and 4000 families will directly benefit from the program. The schools will enhance their income revenues through tree seedlings and commercial values from planted trees. The families will benefit from employment, income generation activities and improved social being. The program has no effect on the environment as native adaptive species will be used for planting in degraded areas, natural regeneration process will be applied in existing forests to allow for continuous reforestation with no interference of the biological diversity, and protecting indigenous species. In addition, no local population within the project area will be resettled as the project is targeting degraded inhabitable areas.

The Government of Kenya is committed to increasing the forest cover in line with revitalizing the economy and bringing it back on the medium to long term economic growth projections to alleviate poverty and sustainable management of the environment. The Government in association with development partners, the World Bank Group, African Development Bank and other development partners are committed to the 2009/2010 Medium Term Economic Fiscal Budget and fully adopt and support the 2008 Kenya Joint Assistance Strategy (KJAS) realigned

to Vision 2030. The African Development Bank's Country Strategy Paper (CSP) 2008-2012 is in alignment with the country's Medium Term Plan (MTP), and focuses broadly on economic growth and employment creation as a basis for poverty reduction and building on lessons learnt from the post-election crisis of 2008. The ESP intervention is necessary to promote economic growth with linkages to addressing income disparities among poor households and regions in the country and supporting good governance and institutional strengthening essential to policy sustainability and infrastructure development integrating initiatives on Afforestation and reforestation necessary to address climate change problems

The area of tree planting is relatively degraded and thus water has to be used for seedlings in dry regions by pumps or cans or by *gravity*. The supply is for raw water from the dam, rivers, lakes or open water pans to storage tanks. The second is to pump clear water to clear water balancing reservoir. Due to high level of turbidity in the raw water a lot of chemicals are used in the treatment process. In addition the water supply uses a lot of electricity energy for the second stage pumping. Consequently, this water supply is having very high operational and maintenance costs to the extent of threatening the financial sustainability of the project. It is desired that the electro-mechanical installations could be useful.

The Strategic Environmental Assessment (SEA) shall evaluate the impacts of all project components and develop an Environmental Management Plan (EMP) for their effective management and monitoring.

2.1 Tree Planting Operations

Enhancing operation efficiency of tree planting District Forest Officers (DFO) and District Environmental Officers (DEO) have been identified as the most crucial local technical experts in tracking reforestation initiatives in self-reliance approach by the schools. The tree planting in ESP programme operates below budget with each school handling about KES 60,000 being accounted for seedlings. Majority of the community members neighbouring the schools and using the natural resources do not have the tree planting budget thus making it impossible to quantify the amount of trees that will be planted in local areas.

The project comprises of the following components:-

- Tree Seeds and Tree Nurseries
- Seedlings
- Saplings
- Tendering
- Transportation of seedlings, caring, protection and prevention from destruction by termites, goats, cows, wild animals, kids among others

The forest and vegetation currently covers approximately 1.7% in the country and is over stretched due to:-

- Increasing demand along the rising population and the dependence on fuel-wood in rural areas;
- Frequent disasters including droughts and floods that reduce forest vegetation covers

It is for this reason that BEA International is conducting studies to review the current situation and come up with adequate strategies and mitigation measures that can sustain the reforestation project.

2.2 Problem Statement

Most rural areas in Kenya are facing acute fuel wood shortage due to increased energy demand caused by increase in population, urbanisation and lack of accompanying improvement of forest cover. This has lead to the forest services being overwhelmed with demand and more so in the proposed project area located within an Arid-Semi-Arid area. The increased fuel wood demand has lead to individual community members cutting trees directly from the main conservation areas thus reducing the forest cover making the ecosystem not sustainable. The situation has been worsened with deterioration of the economic standards in the country and lack of rainfall which has mainly affected the rural majority. The economic stimulus programme was designed to serve a small population

but now the strain is increased due to use of natural resources for domestic purposes like energy, irrigation, and livestock feeding among others.

All regions served by the ESP Project are areas facing acute fuel wood shortages since they are located within the Arid-Semi-Arid areas. The areas receive erratic rains in two short seasons and lack storm water harvesting technology and conservation structures thus the water scarcity and low vegetation cover. The community lacks forest both for domestic and livestock use, and have to walk an average of 3km to reach the vegetation with water points which leaves many people and especially rural people with inadequate time to engage in other socio-economic productive activities. The situation gets worse in the year as expected long and short rains do not fall.

Despite the area being in a semi-arid area it has potential for dry land agricultural production alongside being open to trade corridors joining both Central and Coastal regions of Kenya. The areas are also experiencing rapid increase in population and thus needs clear policies to address poverty, create employment and wealth.

Development of the forest sector in the region shall play a major role in improving the socio-economic status of the area. Lack of quick accessibility to the resource has led to a number of major drawbacks including:-high prevalence of nutritional disease, increased poverty levels, lack of employment increase in school dropout rates etc. The supply of fuel wood to domestic level in the area shall tremendously help reduce time wasted in search of fuel wood which will be in turn used for other productive activities like fodder, construction materials, fencing poles, tree farming, and improved school attendance.

3. Need of Strategic Environmental Assessment (SEA)

It has for a long time been the intention of policy makers to direct efforts towards economic development without due regard to the environmental resource base on which this developments depends on. This has over time led to significant environmental effects resulting in unsustainable development. This state of affairs has however changed and all projects are nowadays required to be critically examined to evaluate the effects they would have on the environment and resources thereon. Strategic Environmental Assessment (SEA) study has been used as a tool to achieve sustainable development. For

Kenya, the Environmental Management and Coordination Act (EMCA) 1999 stipulate the procedure of carrying out an EIA/SEA and the types of projects for which an EIA/SEA is mandatory. EIA/SEA identifies both negative and positive impacts of proposed project and gives mitigation measures for the potential negative impacts.

The EMCA is supported by its subsequent supplements the Environmental (Impact Assessment and Audit) Regulations 2003, Environmental Management and Coordination (Solid Waste Management) Regulations 2006, Environmental Management and Coordination (Water Quality) Regulations 2006 and Emissions Regulations 2007 and other pertinent International Environmental Regulations.

The aim of the SEA is to conduct a detailed project life cycle analysis bringing out all known and/or foreseeable impacts which can be positive or negative and develop mitigation and management measures to ensure sustainability of the reforestation project. Each of project objective and component shall be studied in details and a management plan shall be developed to enhance their positive impacts and reduce the negative impacts to acceptable standards.

3.2 Methodology of Conducting SEA

The following procedures were followed to assess and analyze the potential negative impacts of the proposed project and come up with workable mitigation measures.

- i. Environmental screening. The project is identified as one that needs a SEA as is indicated in schedule 2 of EMCA 1999.
- ii. Scoping of impacts.
- iii. Literature review, consultation and interviews with the proponent, consultants, the local community and other stakeholders.
- iv. Field visits and physical inspection of the sites and its environs
- v. Data analysis
- vi. Report writing.

The consultant undertook environmental screening and scoping to avoid unnecessary data. The data collection was carried out through questionnaires/ standard interview

schedules, use of checklists, observation and photography, site visits, desktop environmental studies and scientific tests as specified in the Environmental (Impact Assessment and Audit) Regulations, 2003.

3.3 Scope objectives and terms of reference (TOR) of the study

The key objectives of the SEA/EIA include:

- i. To develop the baseline information of the area describing the current state of environment population
- ii. To determine the compatibility of the proposed project with the local environment conditions.
- iii. To identify and evaluate the significant environmental impacts of the proposed project.
- iv. To assess the environmental costs and benefit of the proposed project to the local and national economy.
- v. To evaluate and select the best project alternative from the various options.
- vi. To incorporate environmental management plans and monitoring mechanisms during implementation and operation phases of the project

In accordance with good practice design criteria will attempt to address the following specific issues which shall play a major role in mitigating and managing environmental impacts:

- i. Degree of tree planting in degraded lands by selected schools;
- ii. Reduction of soil erosions around fish ponds and in agricultural areas by enhancing vegetation and binding soils;
- iii. Provision of adequate beautification in market centers and hospitals through proper landscaping, tree planting and flowers;
- iv. Consideration of gravity vs pumping options or economic mix of both to reduce power consumption and costs thereto with objective of improving economics and benefit cost ratio of the utility infrastructure providing water for irrigation;

- v. Improvement of O&M of fish ponds through provision of tools and equipments support;
- vii. Provision of ICT for enhancing O&M monitoring of fish ponds and community revenue collection to improve utility sustainability

The scope of the study covers the physical extent of the project site and its immediate environment, implementation works of the proposed development, proposed project alternatives and other facilities required for the project to function optimally. The project will comprise of the following components:

- Boosting the country's economic recovery and return the economy back to the envisioned medium term growth path by engaging poor local communities;
- Invest in long term solutions to the challenges of food security;
- Expanding economic opportunities in rural areas for employment creation;
- Promoting regional development for equity and social stability;
- Improving infrastructure and the quality of education and healthcare for all Kenyans;
- Investing in conservation of the environment, renewable energy and food security; and,
- Expanding the access to, and building the ICT capacity of our people in order to expand their economic opportunities and accelerate economic growth

3.4. Reconnaissance Visit to Site

A reconnaissance site visit was conducted on 24-31 May 2010 by the BEA International team and a further detailed study was conducted by a team of environmental experts and associates on 19-30 August 2010. The investigation examined the project details and its potential impact on the immediate surroundings with due regard to the public opinions. All the phases of the project were assessed and their impacts to the environment evaluated. The assessment encompassed all aspects pertaining to the physical, ecological,

socio-cultural, socio-economic health and safety conditions at the current project site and the proposed project on its environs during and after construction.



The team visited the listed offices and existing project sites:

- Athi-River Primary school, DEO, DFO
- Naivasha and Laikipia Primary Schools, DEO, DFO
- Ahero and Bondo Primary Schools, DEO, DFO
- Nambale and Funyula Primary Schools, DEO, DFO, Fisheries, Local Government
- Kitui and Mwingi Primary Schols, DEO, DFO

- Garissa Primary school, DEO, DFO
- Nyeri and Murang'a Primary Schools, DEO, DFO
- Kwale and Kilifi Primary Schools, DEO, DFO

The environment team visited the above mentioned areas and also conducted a socio-economic due diligence in all the major trading and hospital centers to be served by the project.

During the same visit the Lead Expert and Associate held in-depth interviews with:-

- (a) District Environmental Officers and District Forest Officers in project locations
- (b) Town Planners and local government on the proposed market centers
- (c) Fisheries Officials on the proposed fish ponds
- (d) Primary School Heads on the tree planting initiatives in degraded lands



The environmental team also visited the following offices for collection of data:-

- a) Ministry of Education, Department of Basic education to get information about involvement of the Primary Schools in tree planting and provisions made for awareness and training;
- b) Department of Resource Surveys and Remote Sensing to get information on specific project sites and integrated GIS;
- c) District Development Officers office in project locations to get District Plans, reports, population data and its distribution
- d) District Livestock Office for livestock population data
- e) District Education Office for data on Educational Institutions

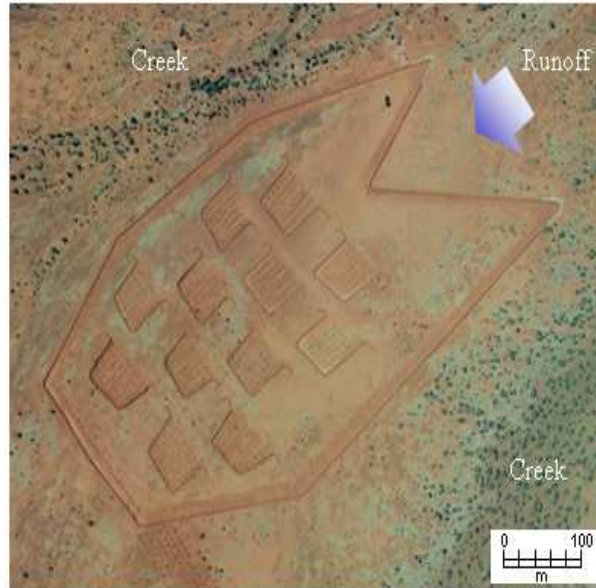
- f) District Environment Officers on environmental, conservation practices in project locations
- g) District Forest Officers on data on forestry, indigenous species, accessibility of tree seedlings, availability and affordability of the seedlings by local communities



3.5. Project analysis from field findings:

- 4,200 Primary schools are involved in the tree planting initiative. Most of the planting will be done in degraded lands within and or around schools. Some schools for example Funyula, Naivasha and Ahero have taken the tree planting initiative with excitement and doing much more with their own internal resources to sustain the process. Other project

sites with tree planting, landscaping, beautification include: hospitals, market centers and around fish ponds. However, inadequate seedlings impact tree planting and not easy to obtain indigenous species.



- Water demand far exceeds water sources production capacity and only up to 30% of daily water demand is met from existing facilities. This creates need for expansion of the water sources for the project sites. Since timing for the rains is unpredictable and some seedlings may dry out
- Potential future water source includes rain harvesting, water dams and boreholes that would support irrigation schemes and sustain the growth of trees.
- The fish ponds are situated near river banks and shores of the lakes. The water levels in the ponds require continuous aeration to maintain presence of the oxygen and free circulation. Some ponds due to in-sufficient water could stagnate, while others too much un-regulated water could result into water borne diseases such as bilharzia, typhoid, malaria. The diagram below provides a model structure of the fish ponds to be established.

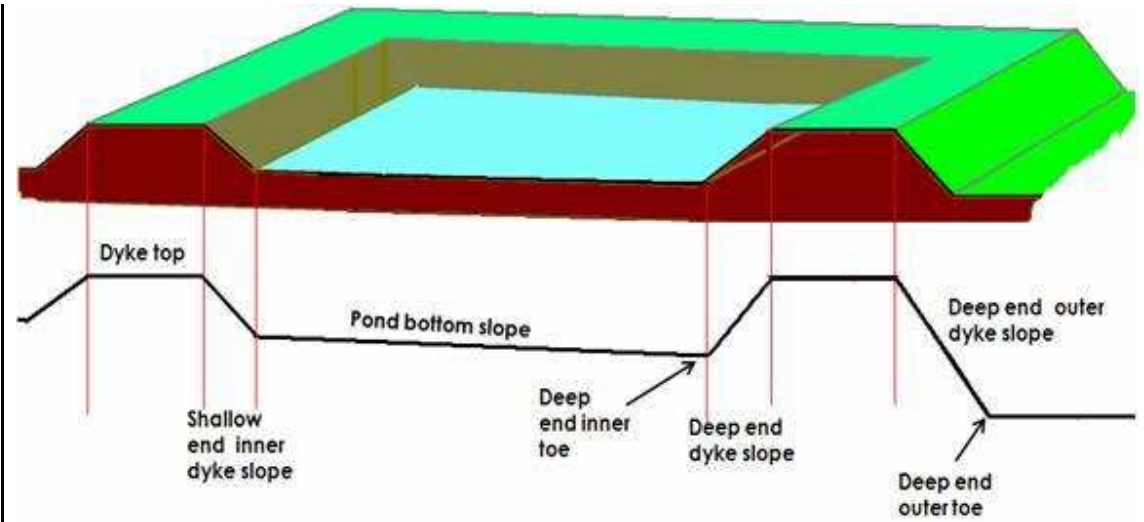


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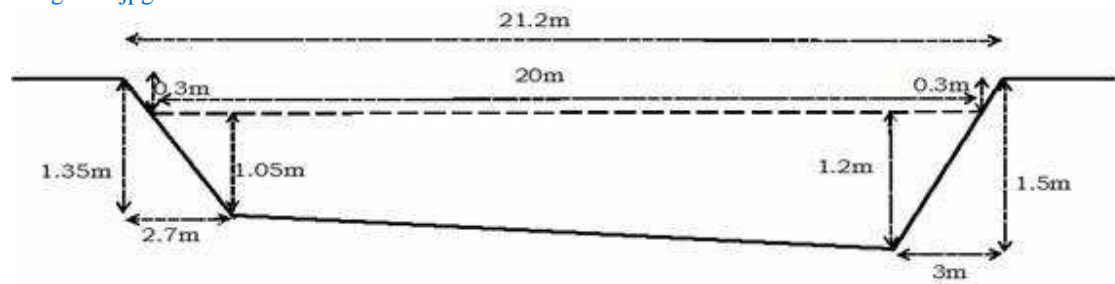


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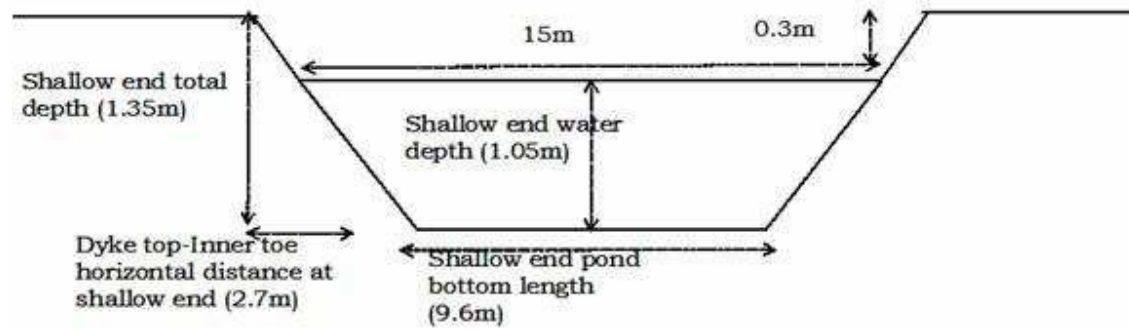


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- On environmental and social perspective all the community members interviewed are in support of the project and sited it as long overdue.

3.6. Potential Identified Environmental Impact from Field Observations

Public participation was conducted throughout the project areas and community members voiced their concerns on the proposed project activities. All those consulted gave their names, contacts and other identification numbers as evidence of participation. The participants at the project rallies all stated that they are eagerly waiting for the project to start operating and raised the following issues to be considered during project implementation.

- Resource conflict: Issues of livestock was raised with almost all community members commenting that they would like to be considered proportionately if the communal infrastructure will interfere with operations of project activities. They noted the proponent should also take into consideration destruction to existing pasture, crops, structures among other farm inputs;
- Supply of fuel-wood to communities living along the main project boundaries: Majority of the community members felt left out of the project as the existing boundaries passes through their area and yet they do not have access to fuel wood. They suggested that communities be allowed to prone trees and leaves for fuel-wood and fodder for the livestock.
- Irrigation: The community members requested that untreated water be availed for irrigation. They further stated that Eastern Province is an ASAL and thus receives very limited rainfall making food production to be very low; coupled with lack of sources of income the community is normally left without food year round. They then suggested that the proponent should take into consideration the need of water for development of vegetable gardens. They noted the local authority is encouraging them to grow trees yet they are not allowed to irrigate the trees with the water supplied. Any use of water for irrigation leads to disconnection of community members from the water supply network thus they wonder how to manage the trees

which they have bought with their own money with the aim of improving their environment to combat climate change.

- **Private Storage Participation:** The community commented that they are not allowed to use fish ponds with un-recommended fish species and if found they also get stopped from accessing the benefits. They stated this is a great challenge to them since water supply is not reliable in most areas and some fish may not survive dirt water. They added this makes it difficult for them to coordinate their activities as they do not know when they shall receive fresh water next. To add on they stated that on average they leave a minimum distance of 3 to 7km from exiting water points which means a whole day can be used to search for water. The water points are also not reliable as the river beds are dry most of the time, the few earth dams existing in the area are silted and at the same time they compete for the little water on the livestock
- **Marketing:** The community members stated that the standards of the market centers currently being used are questionable due to the frequent congestions, lack of public services, pipe bursts being experienced. They suggested appropriate support services to be used though comments from the district office suggested more often than pipe burst are intentionally done by community members in order to get water for livestock and domestic use.

3.7 Project Alternatives

The proposed project technological input has been chosen due to the viable and sustainable cost-benefit analysis results. The use of indigenous tree species adapt to local conditions, use less water and survive local conditions. However, the fish ponds may be a source of methane a Greenhouse Gas. It is advisable to aerate the fish ponds though this shall increase running costs through increased use of electricity and equipments purchase and maintenance. The main fish ponds have been designed to be laid along the river banks, lake shores and the distribution will be laid and spread on private land. This routing is considered the most feasible as it shall involve minimum costs to the public due to land acquisition.

4. Environmental Policy, Legal and Institutional Framework

The national EIA regulations are applied in accordance with the provisions of the Environmental Management and Coordination Act (EMCA) of 1999. Kenya passed the EMCA in 1999. The main function of the EMCA is to provide for the establishment of an appropriate legal and institutional framework for the management of the environment and implemented by the National Environmental Management Authority (NEMA). The proposed project shall be conducted under the guidance of Government of Kenya laws including policies, regulation, legal and institutional framework including;

Policy Framework

- National Environmental Action Plan (NEAP)
- Environmental and Development Policy (Sessional Paper No.6 1999)
- The World Commission on Environmental and Development (The Brundtland Commission Of 1987)
- Structure plans and local physical development plans (LPDP)
- The national poverty eradication plan (NPEP)
- The poverty reduction strategy paper (PRSP)

Legal Framework

- Environment (Impact Assessment and Audit) Regulations (2003), Legal Notice No. 101
- Environmental management and coordination act no 8 of 1999
- Factory act cap 514
- Public health act cap 242
- Malaria Prevention Act Cap 246
- Physical Planning Act, 1999
- Land Act
- Building code 2000
- Water act (2002)
- The penal code (cap 63)
- The local government act (cap 265)

Institutional Framework

- District Environmental Officer
- District Forest Officer
- District Education Officer
- District physical planning officer
- Town and County Council by-laws and regulation
- National Environment Management Authority (NEMA)

Other laws that govern protection of the environment and executed by different arms of the law include;

- The Agriculture Act, and the Agriculture (Basic Land Usage) Rules, 1986
- The Factories and Other Places of Work Act, -as revised 1990
- The Forestry Act-as revised 1992
- The Food, Drugs and Chemical Substances Act –as revised 1992
- The Government Lands Act
- The Wildlife Conservation and Management Act .Cap 376, Laws of Kenya and Amendment Act No. 16 of 1989 (KWS)
- The Tourist Industry Licensing Act (TILA), Cap 381, Laws of Kenya
- The Hotels and Restaurant Act (HRA), Cap 494, Laws of Kenya

5. Potential Impacts and Environmental Management/Monitoring

The consultants evaluated the potential negative and positive impacts that will be associated with the tree planting, rehabilitation of hospitals and market centers and the construction of fish ponds and likely water borne diseases. The impacts have been categorized into three distinct phase namely; construction/project implementation, operation and decommissioning phases. The construction impacts will be related to activities carried out during project construction phase. The operational phase impacts will be associated with the activities carried out by the community members and maintenance team from the division office or the service providers while decommissioning will be associated with the project obsolete phase.

The impacts of the project during each of its life cycle (construction, operation and decommissioning) can be categorized into: impacts on the biophysical environment; health and safety impacts; and socio-economic impacts. An overview of anticipated impacts during the project phases are outline below

The major environmental impacts anticipated from the project activities are:

5.1 Negative Environmental Impacts of Construction Activities

- Increased demand of lad
- Physical Environmental Destruction due to extraction and use of building Materials
- Dust Emissions
- Exhaust Emissions
- Noise and Vibration
- Risks of Accidents and Injuries to Workers
- Interference with wildlife habits
- Clearance of Vegetation
- Increased Soil Erosion
- Solid Waste Generation
- Increased Demand for Sanitation
- Increased energy consumption
- Landslide and rock falling
- Increased water abstraction

5.2 Positive Environmental Impacts of Construction Activities

- Creation of Employment Opportunities
- Provision of Market for Supply of Development Materials and other secondary markets
- Increased Business Opportunities

5.3 Negative Environmental Impacts of Operational Activities

- Over abstraction of water from the rivers and lakes
- Water Use Conflicts among community members, livestock and tree planting
- Solid Waste Generation
- Increased stagnant waters
- Accidents and injuries
- Increased Demand for tree seedlings
- Interference with Water Quality and Air Quality
- Disturbance of Private Properties

5.4 Positive Environmental Impacts of Operational Activities

- Increased area of coverage and number of community members with improved micro-climate conditions
- Employment Opportunities and development of socio-economic activity in the local areas
- Increased food security
- Reduced poverty levels and incidences of water borne diseases
- Revenue to National and Local Governments
- Development of industries and increased visitation to the area
- Development of cash crop industry and agricultural industry including horticulture, diary farming

5.5 Negative Environmental Impacts of Decommissioning Activities

- Landslides and rock falling in poorly maintained and operated fish ponds
- Solid Waste from excavations and constructions
- Lack of water or inconveniences to community members
- Dust emissions
- Noise and Vibration from works

5.6 Positive Environmental Impacts of Decommissioning Activities

- Rehabilitation
- Employment Opportunities
- Reduced air pollutions

- Natural beautification

6. Potential mitigation measures

Mitigation and management measures to minimize and control the generation, occurrence and the magnitude of negative impacts and to ensure compliance with the relevant environmental legislation and management standards shall include those outlined below and should form integral part of the project

6.1 Mitigation Measures for the Operation Phase Impacts

- Efficient sourcing and use of Raw Materials
- Minimize vegetation disturbance
- Control storm water run-off and soil erosion
- Development of Waste Management Strategy
- Control dust emission
- Control Exhaust Emission and other air pollutants
- Manage noise and vibration impacts within recommended limits
- Manage and mitigate against accidents and injuries to workers
- Avoid interference with wildlife habitats
- Control energy and water consumption
- Avoid project conflicts with community members by developing communication platforms

6.2 Mitigation Measures for the Operation Phase Impacts

- Develop appropriate forest management measures
- Ensure water circulation in fish ponds is strategically located
- Use sewage by products to reduce levels of pollution at market centers and hospitals
- Meter water abstraction to ensure it is within the required capacity
- Mitigate against vegetation conflicts among community members
- Develop Solid Waste Management Plan for local centers

- Provide sanitation to project maintenance workers and near communal water points
- Control hazards and risks exposed to workers and community members including odours and air pollution , mosquito breeding sites, invasive aquatic communities
- Develop disaster management plan for fire outbreak, failure of plants

6.3 Budget

According to the designs and project costs estimates it has been deduced that the global Economic Stimulus Program (ESP) project will cost between K22 billion depending on the project options to be implemented throughout the country. However, SEA focuses only on smaller project components that are not environmentally significant. The proposed implementation cost of the EMP during development phase has been estimated to cost KES. 150,000 for a period of 12 months particular to limit noise and dust emissions during excavations; while the cost of implementing the proposed operation phase EMP has been estimated at KES200,000 which shall be reviewed annually to meet the project needs with reference to environmental education, environmental awareness and training. The budgetary allocation for each component to be mitigated is detailed in the SEA report to NEMA. The cost of implementing the decommissioning phase EMP shall be evaluated after the completion of the project when exact extent and quantity of materials used is established.

7. Monitoring Programme

The best way to ensure that the tree planting, fish ponds, hospitals and market centers new operate in a consistent and environmentally sound manner is to provide a rigorous monitoring programme. A testing programme should be established to monitor the performance and efficiencies within the project sites. Raw influent and treated effluent parameters to be monitored on a daily basis including biochemical oxygen demand (BOD), total suspended solids (TSS), COD (as an indicator of BOD), ammonia nitrogen (NH₃-N), trace ammonia as an indicator of nitrification, dissolved oxygen and pH.

In addition, suspended solids measurements of primary effluent, and total dissolved solids (TDS) and faecal coliform counts should be regularly measured in the plant effluent. Sampling for heavy metals should be performed on a monthly basis and the sampling frequency increased if a significant concentration of heavy metals is detected. In this case, sampling of industrial waste-streams should also be pursued to identify the source and to initiate a corrective programme to halt the discharge.

As part of the management and continuous assessment, relevant stakeholders (including Government agencies and local residents) have to be contacted and consulted regarding the working of the projects. The aim of the consultation will primarily be to gauge client satisfaction and identify any anticipated changes early enough. According to NEMA Water Quality Regulations 2006 any effluent discharge should be monitored and a license of the same acquired. requires daily monitoring for ammonia, BOD, coliform bacteria, pH and suspended and settleable solids in market centers and hospitals.

8. Conclusion

The proposed project is a project that shall benefit the community if appropriately implemented. The environmental expert has noted that some minor negative impacts are likely to occur if appropriate measures are not taken into consideration at an early stage. These issues include: landslides, falling rocks from hilly areas, contamination of farms with human waste, land and water conflict, flow of sewage into the environment among others. The proponent needs to address these issues at an early stage with the help of community members and their representatives. Despite the negative impacts, the positive impacts of the project are highly rated and are expected to benefit all stakeholders and the country at large. The project proponents are advised to adhere to implementation of the Environmental Management Plan.

9. Declaration

Patrick Karani, and BEA International certify that the information provided herein is to the knowledge true and correct.

10. Annexes

10.1. Program of Activities (PoA) Site Locations

10.2. List of Discussants

10.3. ESP Strategic Assessment (SA)

10.3. NEMA Approved Terms of Reference

10.4. NEMA Certification

10.5. NEMA Acknowledgement Letter