

ENVIRONMENTAL AND SOCIAL IMPACTS ASSESSMENT & MITIGATION MEASURES

7.1 Introduction

This Chapter presents the assessment of the issues likely to arise as a result of implementation of the proposed project. For each issue, the analysis is based on its nature, the predicted impact, extent, duration, intensity and probability, and the stakeholders and/or values affected. In accordance with best practice, the analysis includes issues relating to the project's environmental and social sustainability. Appropriate Impact Rating has been presented for the situation without mitigation.

7.2 Definition and Classification of Environmental Impact

An environmental impact is any change to the existing condition of the environment caused by human activity or an external influence. Impacts may be:

- Positive (beneficial) or negative (adverse);
- Direct or indirect, long-term or short-term in duration, and wide-spread or local in the extent of their effect.

Impacts are termed cumulative when they add incrementally to existing impacts. In the case of the Project, potential environmental impacts would arise during the construction and operation phases of the Project and at both stages positive and negative impacts would occur.

7.3 Impact Significance

The purpose of this ESIA Report is to identify the significant impacts related to the Project under consideration and then to determine the appropriate means to avoid or mitigate those which are negative. Significant impacts are defined, not necessarily in order of importance, as being those which:

- Result in Loss of property and of livelihood.
- Relate to protected areas or to historically and culturally important areas;
- Are of public concern and importance.
- Trigger subsequent secondary impacts.
- Elevate the risk to life threatening circumstances.
- Affect sensitive environmental factors and parameters.

7.4 Impact Scoring and Rating Criteria

The potential impacts associated with the proposed development have been assessed as presented in the matrix below. Precautionary principle was used to establish the significance of impacts and their management and mitigation i.e. where there is uncertainty or insufficient information, the Environmentalist erred on the side of caution.

Table 7.1 below summarizes the Impact Rating Criteria adopted in the Study.

Table 7.1: Environment Impact Scoring and Rating Criteria

Severity of Impact	Rating	Scoring
Insignificant / non harmful/less beneficial	-1/+1	Very Low
Small/ Potentially harmful / Potentially beneficial	-2/+2	Low
Significant / slightly harmful / significantly beneficial	-3/+3	Medium
Great/ harmful / beneficial	-4/+4	High
Disastrous/ extremely harmful / extremely beneficial	-5/+5	Very high
Spatial Scope of the Impact	Rating	Scoring
Activity specific	-1/+1	Very Low
Right of way specific	-2/+2	Low
Within Project area 5km radius	-3/+3	Medium
Regional / County	-4/+4	High
National	-5/+5	Very high
Duration of Impact	Rating	Scoring
one day to one month	-1/+1	Very Low
one month to one years	-2/+2	Low
Within Project construction period	-3/+3	Medium
within the Project life	-4/+4	High
at decommissioning	-5/+5	Very high

Example of Cumulative Impact Scoring

- +3, +2, +5, +4, +4, +1=+4 (the weight that occurs more becomes the overall rating)
- +2,+2, +5,+4, +4,+1=+3 (if two scores or more tie, then an average of the scores shall be adopted)

7.5 Positive Impacts during the Construction Phase

7.5.1 Creation of Employment and Business Opportunities

During the construction period, new employment opportunities will be created in the form of skilled and unskilled labour. The majority of unskilled labour will be sourced from estates around the project site which include town Estates of Homa Bay Municipality, Sofia, Makongeni and Shauri Yako. Business and employment Opportunities will also be created for Suppliers, Sub-Contractors and other small businesses such as food kiosks that may be set-up near the contractor's camps

Based on the Scope of Works for the construction of the fire station in Peri Urban and Informal Settlements, it is estimated that the following employment opportunities will be created during the Construction Phase:

Table 7.2: Estimate of Jobs Created by the Project

Casual Labourers	50
Skilled Staff	10
Plant Operators / Drivers	5
Managerial Staff	5

In the Operation Phase of the project more job opportunities will arise, staff and personnel will be required to work at the station, other sectors of the economy such as the transport industry, commerce and trade. Taken together, job creation will help to reduce the problem of unemployment with attendant improvement in income for the workers' household and revenue.

The Impact Rating for Creation of Employment and Business is given in **Table 7.3** below.

Table 7.3: Impact Rating for Creation of Employment

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+3
Overall score	+3
Impact Rating	Medium - Beneficial

7.6 Positive Impacts during Operation Phase

7.6.1 Minimize loss of lives and property associated with fires.

The station once commissioned will reduce time taken by fire engines from Oyugis or Mbita Municipalities to arrive at fire outbreak scene in the Municipality of Homa Bay. These regions are characteristic by heavy traffic throughout the days and also poor road infrastructure. The station once commissioned will significantly decrease in the number of casualties and damage to property.

The Impact Rating for reduced number of casualties and loss of property in the in the Project Area is as shown in **Table 7.4** below.

Table 7.4: Reduced number of casualties and loss of Property

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
Overall score	+4
Impact Rating	High – Beneficial

7.6.2 Ambulance Services to the Community

The station once commissioned will have an onsite ambulance complete with trained emergency response personnel, this ambulance will be involved in both fire related emergencies and also other common emergencies like medical and accidents.

The Impact Rating for available ambulance services at the stations is as shown in **Table 7.5** below.

Table 7.5: Ambulance Services to the Community

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
Overall score	+4
Impact Rating	High – Beneficial

7.6.3 Water Pumps on Site within the Station

The station once commissioned will involve equipping the station with high head water pumps, these water pumps are necessary and are required during drawing of water from deep wells, the pumps will also be essential during emergency situation associated by drowning of community members in wells.

The Impact Rating for Importance of Water Pumps at the stations is as shown in **Table 7.6** below.

Table 7.6: Importance of Water Pumps

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
Overall score	+4
Impact Rating	High – Beneficial

7.6.4 On site Borehole and Elevated Tanks

The station will be supplied with water from Homa Bay Water and Sewerage Company (HOMAWASCO) network, however due to rampant water shortage experience in some parts of Homa Bay Town, the proposal is to drill and equip a borehole on site. This borehole once completed will provide water to the fire station and also to the neighboring community living in Homa Bay Municipality and its environs.

The Impact Rating for a borehole drilled at the stations is as shown in **Table 7.7** below.

Table 7.7: Importance of Borehole Drilled on Site.

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
Overall score	+4
Impact Rating	High - Beneficial

7.6.5 Emergency Towing Trucks

The station once commissioned will have a towing lorry on site; this towing lorry will be used by the station and also the community at emergency situations involving road accidents and also collapse of building among other emergencies.

The Impact Rating for available towing services at the stations is as shown in **Table 7.8** below.

Table 7.8: Importance of Available towing trucks.

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
Overall score	+4
Impact Rating	High - Beneficial

7.6.6 Employment opportunities creation.

The station once commissioned will create employment for fire engine drivers and fire fighting personnel. This will reduce the number of unemployed youth within the area. The Impact Rating for creation of employment in the Project area is as shown in **Table 7.9** below.

Table 7.9: Creation of employment

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
Overall score	+4
Impact Rating	High - Beneficial

7.6.7 Spark economic growth.

More investors will be attracted to the area without fire of property destruction caused by fire outbreaks which take long to be put out. This will lead to increased investment rate that will in turn spark economic growth.

The Impact Rating for a spark in economic growth rate in the Project area is as shown in **Table 7.10** below.

Table 7.10: Spark in economic growth

Severity of Impact	+4
Spatial Scope of the Impact	+3
Duration of Impact	+4
Overall score	+4
Impact Rating	High - Beneficial

7.6.8 Reduced poverty level

Generally, in the event of a fire outbreak, property for example houses and business premises are burnt down leading to massive destructions which impoverish owners. Construction of the fire station will ensure timely response to fire outbreaks which will lead to significant reduction in property destruction hence reduction poverty levels.

The Impact Rating for Reduced poverty level is as shown in **Table 7.11** below.

Table 7.11: Impact Rating for Reduced poverty level

Severity of Impact	+3
Spatial Scope of the Impact	+3
Duration of Impact	+4
Overall score	+3
Impact Rating	Medium - Beneficial

7.7 Potential Negative Impacts and Mitigation Measures during the Construction Phase

The Project Construction Phase shall involve the following activities among others:

- Delivery of Construction Equipment and Materials to the Project Site including Contractor's Equipment, iron bars cement and Fittings, etc.

- Site Clearance and Excavation activities;
- Temporary stockpiling of soils, sub-soils and rock when digging up the foundation.
- Construction Works including construction of pillars, walls and pavements.
- Ground Reinstatement

These activities will be associated with less significant negative impacts to both human and natural environment, this impacts and proposed mitigation measures are described in the sub chapter below.

7.7.1 Negative Impacts to the Biophysical Environment and Mitigation Measures

7.7.1.1 Contamination of Surface Water Sources by Effluents from Construction Plant and Equipment

The assessment identified that no water resource is located within close proximity to the proposed Project area; therefore, chances of pollution of water resources are less significant.

However, effluents from Construction Plant and Equipment (oils, grease, hydro-carbonates) are potential point pollutants. This can occur during cleaning, repair of the equipment as well as through leakages during normal operation of the equipment. These effluents can further contaminate the surface water channels within the project areas and eventually pollute adjacent water resources.

The Impact Rating is as shown in **Table 7.13** below.

Table 7.13: Impact Rating for Surface Water Pollution

Severity of Impact	-2
Spatial Scope of the Impact	-1
Duration of Impact	-3
Overall score	-2
Impact Rating	Low – Negative

Mitigation

The risk of surface water pollution by discharges from Construction Equipment is low and will be further minimized by ensuring Construction Equipment is well maintained and serviced according to manufacturers' specifications to prevent oil leaks, Cleaning / repair of Construction Plant and Equipment to be carried out at designated yards and the Contractor to have designated storage areas for oils, fuels etc. that is protected from rain water and away from nearby surface water courses

7.7.1.2 Soil Erosion Resulting to Loss of Top Soil

Site clearance, excavation and ground leveling activities during construction can cause the top soil to be loose and susceptible to agents of erosion which include wind and water. This impact applies only to the public land that was targeted under this assessment.

The Impact Rating for Soil Erosion is as shown in **Table 7.14** below.

Table 7.14: Impact Rating for Soil Erosion

Severity of Impact	-2
Spatial Scope of the Impact	-2
Duration of Impact	-3
Overall score	-2
Impact Rating	Low – Negative

Mitigation

- (a) Minimize the areas to be cleared and leave as much vegetation as possible to filter runoff water from the site
- (b) Divert uphill water around the building site with stabilized banks and channels
- (c) Avoid stock piling topsoil, sand and other building materials on foot path, roads and drainage channels.
- (d) Fill and compact trenches immediately after services have been laid down.

7.7.1.3 Solid Wastes Generation from Construction Activities

Construction activities at the sites and Contractor's Camps will generate some solid wastes such as plastic containers, used tyres, metal parts, plastics and cables, etc. Such wastes can lead to pollution of nearby water courses and blockage of drainage and sewerage systems if not properly handled and disposed of. This impact applies to the targeted public land under this assessment.

The Impact Rating for Pollution by Solid Wastes is as shown in **Table 7.15** below.

Table 7.15: Impact Scoring for Solid Waste Generation

Severity of Impact	-3
Spatial Scope of the Impact	-2
Duration of Impact	-3
Overall score	-3
Impact Rating	Medium – Negative

Mitigation Measures

- Construction wastes (residual earth, debris and scrap materials) to be collected at designated points and Contractor to dispose to designated Solid Waste Dumping Sites approved by the Homa Bay County Government
- Contractor's Camps and Construction Sites to have designated waste collection points,
- Environmental Management, Health and Safety Training Programmes to be conducted for Contractor's Staff to create awareness on proper solid wastes management

7.7.1.4 Air Pollution and Dust Generation.

Air Pollution can be caused by emissions from Construction Plant and Equipment and Vehicles. Dust can be generated by vehicles travelling on unpaved roads and tracks, and dust from exposed, non-vegetated surfaces. Some dust will also be generated during excavation works, by blowing from dump truck loads, and possibly from project borrow pits and quarries. This impact applies to the public land under this assessment.

The Impact Rating for Air Pollution and Dust Generation is as shown in **Table 7.16** below.

Table 7.16: Impact Scoring for Air Pollution and Dust Generation

Severity of Impact	-3
Spatial Scope of the Impact	-2
Duration of Impact	-3
Overall score	-3
Impact Rating	Medium - Negative

Mitigation Measures

- The contractor shall comply to the provisions of EMCA 1999 ammended 2015 and (Air Quality Regulations 2024)
- Workers shall be trained on management to fair pollution from vehicles and machinery. All construction machinery shall be maintained and serviced in accordance with the contractor's specifications
- The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilized as soon as practically possible
- The contractor shall not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds
- Vehicles delivering construction materials and vehicles hauling excavated materials shall be covered to reduce spills and windblown dust
- Water sprays shall be used on all earthworks areas within 200 metres of human settlement especially during the dry season.

7.7.2 Negative Impacts to the Socio-Economic Environment and Mitigation Measures

7.7.2.1 Increased Influx of Workers.

The Project will attract new people to the Project area seeking employment during the construction period. In the event that the construction contract is awarded to an international Contractor, the contractor will mobilize technical personnel from foreign country as well. Labour influx to the Project area could result to various social vices which include, discrimination, sexual abuse, drug and alcoholism, child labour among others

The Impact Rating for influx of workers is as shown in **Table 7.17(b)** below.

Table 7.17: Impact Rating for Increased Transmission of HIV/AIDS

Severity of Impact	-2
Spatial Scope of the Impact	-3
Duration of Impact	-3
Overall score	-3
Impact Rating	Medium - Negative

Mitigation Measures

The contractor and the supervising engineer should ensure that the personal on site are protected as provided for under the Worker Injures and Benefits Act (WIBA 2007). The standard aims to ensure:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers.

- To establish, maintain, and improve the worker-management relationship.
- To promote compliance with national employment and labor laws.
- To protect workers, including vulnerable categories of workers such as children

7.7.2.2 Increased Transmission of HIV/AIDS

The Project will attract new people to the Project area seeking employment during the construction period and this can lead to increased transmission of HIV/AIDS and other sexually transmitted diseases (STDs). This impact applies to the settlements under this assessment

The Impact Rating for Increased Transmission of HIV/AIDS is as shown in **Table 7.17 (b)** below.

Table 7.17: Impact Rating for Increased Transmission of HIV/AIDS

Severity of Impact	-2
Spatial Scope of the Impact	-3
Duration of Impact	-3
Overall score	-3
Impact Rating	Medium - Negative

Mitigation Measures

- HIV/AIDS Awareness Program to be instituted and implemented as part of the Contractor's Health and Safety Management Plan to be enforced by the Supervising. This will involve periodic HIV/AIDS Awareness Workshops for Contractor's Staff
- Access to Contractor's Workforce Camps by outsiders to be controlled
- Contractor to provide standard quality condoms to personnel on site

7.7.2.3 Increased Crime and Insecurity

Influx of persons to the project area may lead to increased insecurity and incidences of crime.

The Impact Rating for Increased Insecurity is as shown in **Table 7.18** below.

Table 7.18: Impact Scoring for Insecurity

Severity of Impact	-2
Spatial Scope of the Impact	-2
Duration of Impact	-3
Overall score	-2
Impact Rating	Medium - Negative

Mitigation Measures

- Contractor and Supervision Team to liaise regularly with the Local Administration and Police Service to address any security and crime arising during project implementation.
- Contractor to provide 24 hours' security to Workforce Camps, Yards, Stores and to the Supervising Team's Offices

7.7.3 Negative Impacts on Occupational Health and Safety and Mitigation Measures

7.7.3.1 Noise and Excessive Vibrations.

Noise and Excessive Vibrations are caused by operation of construction plant and equipment and activities such as excavation and rock breaking. This impact poses a health and safety risk to both the communities living in the project area and construction workers. This impact applies to the settlements under this assessment.

The Impact Rating for Noise and Excessive Vibrations is as shown in **Table 7.19** below.

Table 7.19: Impact Rating for Noise and Excessive Vibrations

Severity of Impact	-3
Spatial Scope of the Impact	-1
Duration of Impact	-3
Overall score	-3
Impact Rating	Medium - Negative

Mitigation Measures

- Contractor will comply with provisions of EMCA 2015 (Noise and Excessive Vibrations Regulations of 2009)
- The Contractor shall keep noise level within acceptable limits (60 Decibels during the day and 35 Decibels during the night) and construction activities shall, where possible, be confined to normal working hours in the residential areas
- Hospitals and other noise sensitive areas such as schools shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity
- Any complaints received by the Contractor regarding noise will be recorded and communicated to the Supervising Engineer for appropriate action

7.7.3.2 Risk of Accidents at Work Sites

Accidents during construction activities may occur due to failure to use Personal Protective Equipment (PPE) by workers on site and members of the public illegally accessing the work sites. Accidents may result in injuries or even death of workers or members of the public. This impact applies to all settlements under this assessment

The Impact Rating for Risk of Accidents at Work Sites is as shown in **Table 7.20** below.

Table 7.20: Impact Rating for Risk of Accidents at Work Sites

Severity of Impact	-4
Spatial Scope of the Impact	-3
Duration of Impact	-3
Overall score	-3
Impact Rating	Medium - Negative

Mitigation Measures

- Construction Workers and the Supervising Team to be provided with Personal Protective Equipment including gloves, gum boots, overalls and helmets. Use of PPE to be enforced by the Supervising Engineer.
- Fully stocked First Aid Kits to be provided within the Sites, Camps and in all Project Vehicles

- Adequate Ablution Facilities to be provided at the Camps and Work Sites and cleanliness maintained
- Isolate the site for access by the local communities during the construction for their safety and health
- Contractor to provide a Healthy and Safety Plan prior to the commencement of works to be approved by the Supervising Engineer.
- Camps and Work Sites to be fenced off and Security Guards provided to restrict access to members of the public.

7.8 Potential Negative Impacts and Mitigation Measures during the Operation Phase

7.8.1.1 Risk of pollution by the agents used in fire extinguishers.

The risk of environmental pollution by agents used to extinguish fire for example wastes from dry chemicals, carbon dioxide and dry powders if not properly disposed.

The Impact Rating is as shown in **Table 7.21** below.

Table 7.21: Impact Rating for Pollution from expired Fire Prevention agents

Severity of Impact	-3
Spatial Scope of the Impact	-2
Duration of Impact	-4
Overall score	-3
Impact Rating	Medium– Negative

Mitigation Measures

- Ensure carbon dioxide is stored in appropriate cylinders that are in good condition to avoid leakages
- Recycle empty fire extinguishers.
- Dry chemicals and foams should be disposed in sealed drains to avoid contaminating ground water
- Ensure incorporation of ABC dry powders into landfills preferably in sealed containers

7.8.1.2 Impact related to vehicle garage

Maintenance of vehicles will lead to oil spills in the garage area as well as wastes associated with vehicle maintenance such as used oil and used oil filters and oiled rugs and air filters, old tyres and tubes, broken wind-screens, driving mirrors, abandoned old vehicles and others.

Table 7.22: Impact Rating for Impact related to vehicle garage

Severity of Impact	-3
Spatial Scope of the Impact	-2
Duration of Impact	-4
Overall score	-3
Impact Rating	Medium– Negative

Mitigation Measures

- Collect the used oils and re-use, re-sell, or dispose of appropriately using expertise from NEMA licensed waste handlers;

- Immediately institute clean up measures in case of an oil spill using sand and saw-dust for eventual disposal by the NEMA licensed handler
- Sell off recyclable wastes like used tyres from the garage for manufacture of other products, if applicable
- Avoid abandoning old vehicles in the garage and dispose off as scrap for reuse
- Dispose off used oil rags, used oil filters, used air filters and other used spare parts wastes using the licensed waste handler
- Used cartons to be re-used or disposed off by the licensed handler

7.8.1.3 Risk of increased runoff water

There is a risk of increased runoff water from the roof of the fire station when it rains.

The Impact Rating is as shown in **Table 7.22** below.

Table 7.22: Impact Scoring for Risk of Increased Surface Run-off

Severity of Impact	-2
Spatial Scope of the Impact	-2
Duration of Impact	-4
Overall score	-3
Impact Rating	Medium - Negative

Mitigation

- Contractor should ensure that good quality gutters are installed to cover the entire surface of the roof to collect all the water when it rains. The water can be stored either in ground or underground tanks for future use.

Tables 7-1, 7-2 and 7-3 present the ESMMP for the proposed fire station Project during the construction, operation and decommissioning phases respectively wastes and debris holding sites will be cleared with maximum re-use of the debris either on surfacing the passageways or other grounds such as schools and church compounds.

Table 7-1: Construction Phase: Environmental and Social Management and Monitoring Plan

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
Seeking approvals from NEMA for ESIA and Approval of plans from County government and National Construction Authority	Delay in implementation of the Project due to objections and stop orders	Low	- The Contractor shall ensure that all pertinent permits, certificates and licences have been obtained prior to any activities commencing on site and are strictly enforced/ adhered to; - The Contractor shall maintain a database of all pertinent permits and licences required for the contract as a whole and for pertinent activities for the duration of the contract	All the Project components <u>Responsibility</u> CGH and Contractor	Number of approvals / permits issued	~Included in BoQ
Construction campsites	Environmental degradation risks	Medium	- Isolate through fencing the camp sites from access by the public for their safety - Preferably to be located on land already cleared land wherever possible - The Contractor's Camp layout shall take into account availability of access for deliveries and services and any future works	Campsites <u>Responsibility</u> Contractor(s)	Number of public grievances due to accidents	~included in BoQ
Access to campsites and construction sites	Environmental degradation risks	Medium	- Utilize to the extent possible the existing public roads to avoid social and economic disruption - Ensure road safety measures for the construction vehicles to the extent possible by observing all traffic regulations	Access Roads <u>Responsibility</u> Contractor(s)	- Cases of private land required - Accidents occurrence	No direct cost associated
Environmental and Social Training and Awareness	Risks of Environmental and Social degradation risks and occupational health and safety related accidents	High	- The Contractor and sub-contractors shall be aware of the environmental requirements and constraints on construction activities contained in the provisions of the ESMMP - The Contractor will be required to provide for the appropriate Environmental Training	All Workers <u>Responsibility</u> Contractor(s)	- Number of Trainings Held - Availability of Training reports - Attendance	KShs.50,000

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
			and Awareness as described in this ESMMP in his costs and programming An initial environmental awareness training session shall be held prior to any work commencing on site, with the target audience being all project		list of participants during the trainings sessions	
HIV/AIDS awareness and prevention campaign	Risks of Increased HIV and Aids transmission in the area	Medium	- The Contractor shall institute HIV/AIDS awareness and prevention campaign amongst his workers for the duration of the contract, contracting and implementing organization, with preference for an organization already working on this issue in the Project area; - The campaign shall include the training of facilitators within the workers, information posters in more frequented areas in the campsite and public areas, availability of promotional material (T-shirts and caps), availability of condoms (free), and theatre groups	All Workers <u>Responsibility</u> Contractor(s)	- Number of Trainings Held - Availability of Training reports - Attendance list of participants during the training sessions - Local health clinic statistics	KShs.80,000
Local Labour / Employment	Delay in Project implementation due to opposition from aggrieved community members	Medium	- Wherever possible, the Contractor shall use local labour, and women must be encouraged to be involved in construction work - The contractor shall ensure compliance to the gender balance as required by the 2/3 gender rule - The contractor shall comply to the provisions of WIBA 2007 - The contractor must ensure there are no minors employed at the site.	All the Project Lots <u>Responsibility</u> Contractor	- Number of workforce employed from the local community - Number of female employed	No direct costs associated
Earth moving and	Health and Safety	Medium	Provide notices, signage and	All work areas	Accidents	

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
excavations (Vegetation clearance, channeling and site preparations)	risks - Air pollution - Social nuisance		information to the public for their safety at all locations - Install barriers along walkways, crossings and public places affected by the works for public safety - Where there are potential for nuisance from dust generation, ensure earth moving is under damp conditions (consider watering where necessary) - Inform immediate communities or stakeholders of the activities.	<u>Responsibility</u> Contractor(s)	occurrence incidences Cases of respiratory complication at nearby health center	~KShs. 50,000
	- Vegetation Cover destruction - Loss of biodiversity	Low	Construction activities will be limited to Project sites which already exist therefore limited destruction to vegetation cover	All work areas <u>Responsibility</u> Contractor(s)	Soil erosion extend and intensity on site	No direct cost
	loss of top soil	Low	Stock piling of top soil, construction material and wastes should be done only at designated sites approved by the supervising engineer, erosion prevention through berming of loose soil sites should be done in all areas susceptible to agents of erosion	All work areas <u>Responsibility</u> Contractor(s)	Soil erosion extend and intensity on site	No direct cost
	- Public Health and safety risks - Worker Occupational safety risks	Medium	- Notify public the intent to cut sections of the road for safety precautions - Provide signage and safety information in all work areas - Ensure compliance by workers with safety safeguards including the OHS, provision of safety gear and enforcement of application	civil works areas <u>Responsibility</u> Contractor(s) Supervision	Accidents occurrence incidences	KShs. 50,000
	Disruption of amenities (access roads, services lines and driveways) causing	Medium	- Notify other services providers and - Open small sections that can be reinstated within the shortest period to avoid public disruption	civil works areas <u>Responsibility</u> Contractor(s)	Number of complaints from community	No direct costs

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
	inconveniences to the community		Mark the lines to avoid conflicts with other activities	Supervision	due to lack of certain services	
Material Sourcing from burrow pits and quarries delivery and storage	Environmental and Safety risks associated with burrowing and opening up of new quarry sites	High	- The Contractor will be responsible for ensuring that appropriate authorization to use the proposed borrows pits and quarries has been obtained before commencing activities - Topsoil shall be stripped prior to removal of borrow and stock piled onsite. This soil shall be replaced on the disturbed areas once the operation of the borrow site or quarry is complete - Construction material sources should be environmentally sustainable (approved accordingly) - Delivery routes and modes of transport should be approved - Material storage on site not to be internal or external nuisance	Burrow Pits and Quarry Site <u>Responsibility</u> Contractor(s) Supervision	- Environmental Status of reinstated burrow pits - Complains from the community on burrow pits and material transportation	KShs.50,000
Concrete / cement batching plant	Risks associated with water resource pollution, noise and vibration and air pollution from dust this could lead to respiratory problems	High	- Where required, a Concrete batching plant shall be located more than 20m from the nearest stream/river channel; - Top soil shall be removed from the batching plant site and stockpiled - Contaminated storm water and wastewater runoff from the batching area and aggregate stock piles shall not be permitted to enter streams but shall be led to a pit where the water can soak away - Suitable screening and containment shall be in place to prevent windblown contamination associated with any bulk cement silos, loading and batching	Concrete / cement batching plant <u>Responsibility</u> Contractor(s) Supervision	Number of incidence of Environmental pollution around the plant	No direct cost

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
			Cleaning of equipment and flushing of mixers shall not result in pollution of the surrounding environment			
Waste generation and disposal	Risks of contaminating surface and underground water resources	High	- Construction wastes (residual earth, debris and scrap materials) to be removed for safe disposal - Encourage recycling where possible (concrete debris for access road surfacing), - Contaminated organic matter in the work areas to be isolated for safe disposal - Material residuals to be disposed off in accordance with established regulations	Construction area <u>Responsibility</u> Contractor(s) Supervision	Number of complaints from community not happy with waste management of the contractor	KShs.25,000
Spoil Storage site	Risks of solid waste mismanagement leading to pollution	Medium	- Preferably to be located on land already cleared wherever possible. Communities shall be involved in the site location to avoid conflict - The need to be more than 20 meters from water courses and in apposition that will facilitate the prevention of storm-water runoff from the site from entering the watercourse - Contouring of spoil site to approximate natural topography and drainage and/or reduce erosion impacts on the site - The Contractor shall ensure that the placement of spoil is done in such a manner to minimize the spread of materials and the impact on surrounding vegetation and that no materials' creep' into 'no-go' areas	Construction area <u>Responsibility</u> Contractor(s) Supervision	Number of complaints from community not happy with waste management of spoil material	Contractor best management practice
Occupational Health and Safety	Risks of Accidents, Injuries or death of workers or community	High	Provide construction workers with personal protective gear (gloves, gum boots, overalls and helmets),	All work areas	Accidents occurrence incidences	KShs.25,000

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
	member		- Provide temporary toilets and bathrooms for the construction workers at the work sites - Provide onsite first aid kit accessible by the workers on need, - Isolate the site for access by the local communities during the construction for their safety and health - Contractor to provide a Healthy and Safety Plan prior to the commencement of works to be approved by the resident engineer.	<u>Responsibility</u> Contractor(s) Supervision		
Storage of fuel oils, lubricants, chemicals and flammable materials	Hazards of fire outbreak, oil and chemical spills.	High	Follow specifications of the Occupational Health and Safety Act, EMCA 1999 and others in the development and operation of stores.	All work areas <u>Responsibility</u> Contractor(s) Supervision	Incidence of reported cases of fuel leaks and fire incidences	No direct cost associated
Sanitation issues resulting from both solid and liquid wastes on site.	Risks associated with water borne diseases exposed to community and workforce	Medium	- The Contractor shall comply with all laws and any by-laws relating to public health and sanitation - All temporary/ portable toilets or pit latrines shall be secured to the ground to the satisfaction of the RE to prevent them from toppling over - A wash basin with adequate clean water and soap shall be provided alongside each toilet. Staff shall be encouraged to wash their hands after use of the toilet, in order to minimize the spread of possible disease	All work area areas <u>Responsibility</u> Contractor(s) Supervision	Incidence of reported cases of water related diseases among the workforce and neighbor community	No direct cost associated
Noise and Vibration control from plant and equipment	Risk to health and safety of community and workers	Medium	The Contractor shall keep noise level within acceptable limits 55dB (A) at day time and 35dB(A) at night and construction activities shall, where possible, be confined to normal working hours in the residential areas	civil works areas and access roads <u>Responsibility:</u> Supervision engineer	Reported complaints from neighbor community and institutions	No direct cost associated

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
			- Hospitals and other noise sensitive areas shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity - Any complaints received by the Contractor regarding noise will be recorded and communicated to the RE			
Traffic management on site	Risks of Accidents, Injuries or death of workers or community member	High	- Strict use of warning signage and tapes where the trenches are open and active sites - Employ and train road safety Marshalls who will be responsible for management of traffic on site - Contractor to provide a traffic management plan during construction to be approved by the resident engineer	civil works areas and access roads <u>Responsibility</u> Contractor(s) Supervision engineer	Accidents occurrence incidences	No direct costs (integrated in the works costs)
Air Quality Control	Air pollution causing respiratory disorders to human	High	- Workers shall be trained on management of air pollution from vehicles and machinery. All construction machinery shall be maintained and serviced in accordance with the contractor's specifications - The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilized as soon as practically possible - The contractor shall not carry out dust generating activities (excavation, handling and transport of soils) during times of strong winds - Vehicles delivering soil materials shall be covered to reduce spills and wind-blown dust - Water sprays shall be used on all	All Work areas <u>Responsibility</u> Contractor(s) Supervision	Cases of respiratory complication at nearby health center	No direct cost associated with the Project

Activity	Associated Impacts	Impact Levels	Management Actions	Target Areas& Responsibilities	Monitoring Indicator	Budget
			earthworks areas within 200 metres of human settlement.			
Contractor de-mobilization and site reinstatement	Associated risks of environmental degradation	High	- The site is to be cleared of all construction materials, including litter prior to hand over - Fences, barriers and demarcations associated with the construction phase must be removed from the site - Fences, barriers and demarcations associated with the construction phase must be removed from the site - Rehabilitation Activities of Environmental Cases identified must continue throughout the defect liability period	All work areas <u>Responsibility</u> Contractor(s) Supervision	Closeout audit report findings	No direct anticipated
Total Estimated Cost for ESMMP *Include Chance Find Procedures BP OP 4.11 in all contracts *					ESMMP	KES 300,000

Table 7-2: Operational Phase: Environmental and Social Management and Monitoring Plan

No.	Issue	Action required	Monitoring Indicator	Responsibility	Provisional Budget
1	Risk of pollution by the agents used in fire extinguishers	- Ensure carbon dioxide is stored in appropriate cylinders that are in good condition to avoid leakages - Recycle empty fire extinguishers. - Dry chemicals and foams should be disposed in sealed drains to avoid contaminating ground water - Ensure incorporation of ABC dry powders into landfills preferably in sealed containers	Number of complaints from Community members	County Government of Homa Bay	To be established at operation phase and included in the operation of the projects
2	Noise from operation of fire trucks	The station staff should keep the noise levels within acceptable limits and minimize noise during night hours in the residential areas	Number of complaints from Community members	County Government of Homa Bay	To be established at operation phase and included in the operation of the projects
3	Community safety	The fire station vehicles to maintain speed limits	Number of complaints from Community members	County Government of Homa Bay	To be established at operation phase and included in the operation of the projects

4	Vehicle garage	• Collect the used oils and re-use, re-sell, or dispose of appropriately using expertise from NEMA licensed waste handlers; • Immediately institute clean up measures in case of an oil spill using sand and saw-dust for eventual disposal by the NEMA licensed handler • Sell off recyclable wastes like used tyres from the garage for manufacture of other products, if applicable • Avoid abandoning old vehicles in the garage and dispose off as scrap for reuse • Dispose off used oil rags, used oil filters, used air filters and other used spare parts wastes using the licensed waste handler	Standard of housekeeping and cleanliness – use of checklists	Garage supervisor – County Government of Homa Bay	To be established at operation phase and included in the operation of the projects
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No.	Issue	Action required	Monitoring Indicator	Responsibility	Provisional Budget
		Used cartons to be re-used or disposed off by the licensed handler			

7.9 Decommissioning Flow Chart

The Project has been designed to operate effectively for over 20years. In the event that the infrastructure will be required to be overhauled, then the following steps should be considered in order to undertake the procedure in a structured manner with minimum impact to both human and natural environment as illustrated in **table 7-3** below

Table 7-3: Decommissioning Flow Chart

Stage	Action	Actor
Step 1	Initiation Development of an Objective Worksheet and checklist incorporating references, legal and policies Undertake decommissioning audit	Proponent then
Step 2	Prepare Road Map for Decommissioning Design Conduct design review to validate elements of the design and ensure design features are incorporated in the decommissioning design. Public consultations	Proponent then
Step 3	Prepare and Award Contract Prepare a contract that incorporates validated Project Information and award to a contractor as per the Procurement rules.	Proponent then
Step 4	Execute Decommission Works Implement design elements and criteria on the Project in accordance with specifications and drawings. Inspect during decommissioning and at Project completion to ensure that all design elements are implemented according to design specifications.	Contractor
Step 5	Commissioning Environmental Management Plan	Contractor
Step 6	Non-Conformance, Corrective/Preventive Action Determine root cause Propose corrective measures Propose future preventive measures.	Contractor