REPUBLIC OF KENYA

KCSAP
Kenya Climate Smart Agriculture Project

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR THE AEKUMI ROCK CATCHMENT RAIN WATER HARVESTING PROJECT

MARAGWA LOCATION GATUNGA WARD THARAKA NORTHSUB COUNTY

THARAKA NITHI COUNTY

Project site before intervention

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ENVIRONMENTAL MANAGEMENT PLAN FOR AEKUMI ROCK CATCHMENT

Description of the project

The project entails collection of the runoff from the rock outcrop and subsequent storage. The scope of work of the proposed AEKUMI rock catchment is as follows;

i. Rock cleaning
ii. Rock guttering and construction of collection box
iii. Piping
iv. Construction of masonry storage tanks
v. Water distribution

GPS Coordinates latitude -0.236190 S
Longitude 38^0.108667 E

Justification of the project

The community has no piped water and they fetch water from River Tana which is 10km away using donkeys to ferry the water. The project will contribute to healthy livestock of 8000 shoats and 2000 cattle in Nchegeni village. Collection of the rain water will reduce soil erosion. The tie spent by women walking long distances to fetch water will be used for other economic activities.

Potential impacts and mitigation measures

Rainwater does not deplete groundwater resources hence considered not to cause negative environmental impacts. However there are minimal impacts which occur during construction phase, operation and decommissioning phase of the project. These impacts are as follows;

Positive Impacts

- Water availability
- Creation of employment
- Increase in productive time
- Improved living standards
- Community integration

Negative Impacts and mitigation measures

i. Soil erosion - land degradation

Site preparation, movement of construction materials, excavation and vegetation removal for construction of masonry tank is expected to induce soil loss, reduction in vegetation cover, dust storms and this will expose soils in the affected areas and leave them vulnerable to erosion by heavy rainfall and surface run-off.

Mitigation measures

Controlling soil erosion

- Cover exposed soils with appropriate ground cover as soon as possible.
- Monitor areas of exposed soil during periods of heavy rainfall throughout the construction phase of the project to ensure that any incidents of erosion are quickly controlled.
- Leveling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil
- Building of physical barriers to prevent mass movement where necessary.

ii. Construction works noise - auditory nuisance

Although not expected to create a significant negative impact, removal of weathered rocks and foreign materials, the use of vehicular activities during construction and building works will inevitably generate noise, which may create a nuisance for nearby residents, particularly the immediate neighbours.

Mitigation measures

Control of Construction works noise

The following will be done to reduce noise pollution impact:

- Restrict noisy construction activities to normal working hours (8am - 5pm).
- Workers operating equipment that generate noise should be equipped with noise protection gear including ear muffs and plugs.
- All trucks and construction equipment should be regularly inspected and serviced.

iii. Vegetation loss

The construction of masonry tanks will lead to tree cutting and grass clearing for space. This will lead to reduced tree cover.

Mitigation measures

Management of Vegetation loss

Biodiversity at the proposed site shall be managed by retaining and restoring as much of the original vegetation, as is practical on the site. This would be achieved by:

- Set a replanting and landscaping programme.
- Ensure proper demarcation of the project area to be affected by the construction works. This will be aimed at ensuring that any disturbance to flora is restricted to the actual project area and avoid spillover effects on the neighbouring areas.

iv. Construction wastes

Wastes from used cement bags, timber, metals, ballast and sand is likely to contaminate the environment if not well managed.

Mitigation measures

Management of Construction Waste

- A site waste management plan should be prepared by the contractor prior to commencement of construction activities. This should include designation of appropriate waste storage areas, collection and removal schedule, identification of approved disposal site, and a system for supervision and monitoring.
- Preparation and implementation of the plan must be made the responsibility of the building contractor with the system being monitored independently.

- Special attention should be given to minimizing and reducing the quantities of solid waste produced during site preparation and construction.
- Any vegetation and combustible waste must not be burned on the site.
- Reusable inorganic waste (e.g. excavated soils, cement bags) should be stockpiled away from drainage features and used for in filling where necessary and/or possible.
- Unusable construction waste must be disposed of at an approved dumpsite.

v. Increased water demand

Construction work will increase water use and demand

Mitigation measures

Management of water demand

The proposed development will increase water demand throughout the construction phase. Increase in water demand can be minimized by;

- Implementing appropriate water conservation measures

vi. Dust emissions

Dust generated from movement of vehicles, rock cleaning and construction works will cause air pollution.

Mitigation measures

Control of Dust Emissions

The main contractor will be required to train workers on appropriate methods for minimizing dust emission during construction phase. Proposed methods for minimizing dust emission include;

- Covering of all haulage vehicles carrying blocks, sand, aggregate and cement
- Stockpiles of fine materials (e.g. sand and ballast) should be wetted or covered with tarpaulin during windy conditions.
- Access roads and exposed ground must be wetted in a manner and at a frequency that effectively keeps down the dust.

- Rock should be wetted before cleaning
- Workers in dusty areas on the site should be issued with dust masks during dry and windy conditions

vii. Exhaust/Gaseous emissions

Gaseous emissions from the vehicles delivering materials at the cause air pollution.

Mitigation measures

Control of gaseous emissions

Gaseous emissions will be managed by:

- Proper engine tune up
- Regular inspection and maintenance of construction equipment
- Reduce machines and vehicles idling time
- Avoid burning of solid waste at the site

viii. Spillage of hazardous materials

Vehicles spilling fuel and grease at the site.

Mitigation measures

Managing Spillage of Hazardous Materials

Spillage of hazardous materials shall be managed by implementing the following measures;

- All hazardous materials to be stored in appropriately bonded containers and placed on concrete floor.
- Training of workers on spill response and management.

ix. Fire outbreak

Incidents of fire outbreak

Mitigation measures

Containing Fire outbreak

Fire incidents shall be managed by implementing the following measures;

- Provide adequate number of appropriate firefighting equipment and Post 'No smoking signs' where flammable materials will be stored.
- Train staff on the use of the available firefighting equipment
- At least one person trained on handling firefighting techniques should be available through-out the construction phase of the project.
- Develop and post at the site, fire emergency and evacuation procedures

x. Accidents

Workers may get accidents at the site.

Mitigation measures

Workers Health & Safety

- Engaging only those workers that are trained to operate specific machines and equipment.
- Proper signs on site to warn workers of safety requirements as regards machines with moving parts and other equipment at site.
- Provide a First Aid box and have a trained person to handle site emergencies and incidences.
- Display in the site telephone numbers of ambulances or provide a site vehicle to specifically transport the injured to hospital.
- Provide fire-fighting mechanism at site. Display emergency call numbers that can be used in case of a site fire.
- Provide safe scaffoldings and railings at heights.
- Provide washing (enclosed bathroom) and toilet facilities at site with both drinking and washing water. The number of workers engaged determines the number of the toilets and bathrooms provided.
- Providing safety helmets, safety masks (welders), safety shoes (loaders), uniforms and hand gloves to the workers.
- Using well-maintained equipment by qualified personnel.

xi. Effluent/sewage

From workers during construction and operation

Mitigation measures

Management of sewage

- Providing adequate sanitary facilities for workers with appropriate sanitary arrangement.
- Sensitize workers on the rationale of using the sanitary facilities.

Environmental and Social Management Plan

This section outlines in tabular format of the key impacts associated with the development and mitigation measures.

Environmental impact	Recommended mitigation measures	Responsible party	Time frame	Cost Ksh
Soil erosion	1.-Control construction activities especially in the rain season. 2.-Plant trees and other soil conserving structures. 3.-Ensure that construction vehicles are restricted to certain areas to avoid soil compaction. 4.-Ensure that any compacted areas are ripped to reduce run off 5.Re-surface open areas after completion of the project and introduce appropriate vegetation. 6-source building materials from known sustainable sites to minimize extraction impact	Contractor/ Community	Construction and operation phase	50,000
Noise pollution	7-Ensure engines and machinery is switched off when not in use. 8-Ensure regular servicing of equipment and	Contractor/ Community	Construction phase	20,000

	machinery 9-Enforce workers discipline on site. 10-Programme work to take minimum time 11-Construction works to be done during day time. 12-Provide appropriate personal protective clothing to the working crew and enforce their use			
Vegetation loss	13-Clear only the areas that require development. 14-Plant vegetation cover after the construction phase. 15-Maintain the vegetation regularly to avoid depletion.	Contractor/ Community	Construction and operation phase	20,000
Construction wastes	16-Ensure separation of solid waste generated. 17-Ensure recycling of usable material.	Contractor/ Community	Construction phase	10,000
Water demand	18-Sensitize all the workers on the need to utilize the water on site efficiently	Contractor/ Community	Construction phase	50,000
Dust emission	19-Control earth work. 20-Wet all rock surface before working on it	Contractor/ Community	Construction phase	30,000

	21-Use of appropriate PPE by construction workers - 22Scaffold and side netting on elevation works -23Control speed and movement of construction vehicles. -24Sensitize the employees on sound environmental management. -25Stockpiles of fine materials (ballast, sand and cement) to be covered with tarpaulin.			
Exhaust/ gaseous emission	- 26Control of vehicles idling - 27Do not burn waste on site	Contractor/ Community	Construction phase	No extra cost
Spillage of hazardous materials	-28Proper handling, storage and disposal of oil wastes. -29Repair of vehicles must be carried out at services station or designated garage. -30Adopting good housekeeping practices and standard operating procedures.	Contractor/ Community	Construction phase	50,000
Fire outbreaks	-31Provide firefighting equipment's on site - 32train workers on fire fighting	Contractor/ Community	Construction phase	20,000

Accidents-workers safety	-33Provide appropriate personal protective clothing to the working crew -34Hiring of competent staff with previous work experience to perform works -35Follow proper work guidelines -36Ensure there is no spilling of petroleum products, no smoking, no source of ignition -37All the project participants should have functional insurance work men's compensation -38There should be presence of fully equipped first aid kit at site. -39To have emergency preparedness plans in place. -40Strict adherence to the building plans and building code to avoid collapse of the structures and consequential injury	Contractor/ Community	Construction phase	50,000

Effluent/ sewage	-41Waste water shall be disposed in compliance with the provision of the environmental management and coordination, (water quality), regulation 2006. -42The water from flush toilets to be channeled to septic tanks	Contractor / Community	Construction and operation phase	10,000

Conclusion

The analysis of the impacts and mitigation measures of AEKUMI rock catchment as detailed above indicates that the project will have minimal impacts on the environment since it's a small project. The environmental management plan has to be adhered to.

Decommissioning/Abandonment Plan

At the end of the design life, the rock catchment shall be decommissioned and abandoned. A comprehensive plan shall be prepared for the restoration and subsequent protection of the ecosystem. The decommissioning and abandonment activities shall comply with laws and regulations in place.