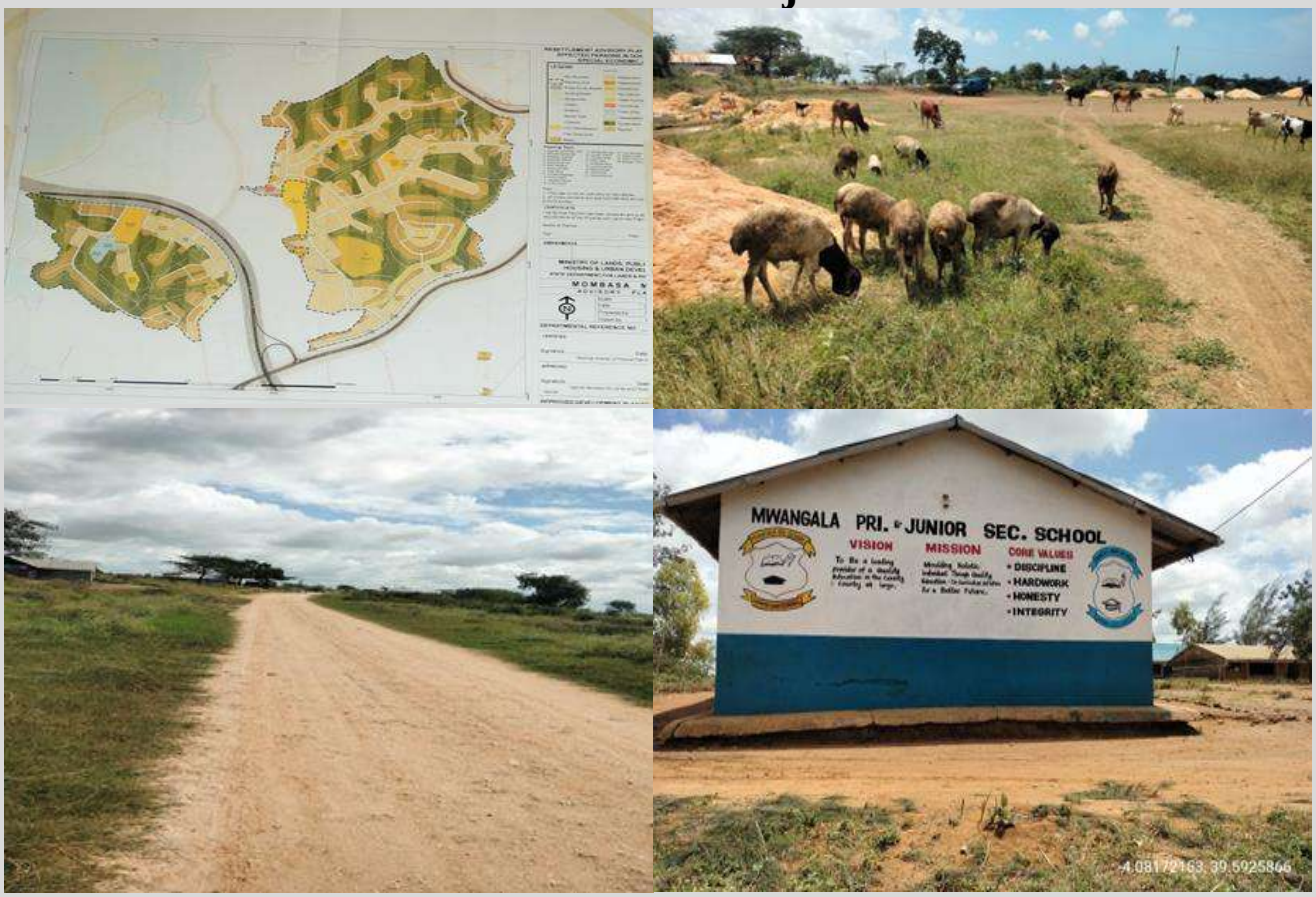
Kenya Ports Authority
KPA

Environmental and Social Impact Assessment Study Report for the proposed Mombasa Special Economic Zone Resettlement Site Infrastructure Project



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December 2023

DECLARATION

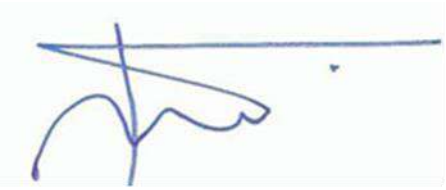
DECLARATION BY LEAD EXPERT

I certify that the Environmental and Social Impact Assessment Study Report for the proposed resettlement site in the Mombasa Special Economic Zone Project within Mbuta location, Likoni sub county of Mombasa county was prepared under my careful watch and supervision and that the report conforms to the requirements of the (i) Environmental Management and Coordination Act, (cap 387 laws of Kenya (ii) the Legal Notice No. 101 of June 2003 (Environmental Impact Assessment and Audit Regulations) and (iii) Legal Notice No.31 (2019) , amendment on the second schedule of EMCA (Cap 387 laws of Kenya) (iv) Legal Notice No. 32 on environmental (assessment and audit) (amendment) regulations (2019) and the NEMA regulations on conduct of EIA/EAs during the COVID-19 pandemic and MOH' COVID-19 containment protocols.

The information contained in this report is true to the best of my knowledge and reflects the true findings of the Environmental and social impact assessment as was carried out on the project area. I therefore wish to submit the report to the authority for review, approval and issuance of the project license

On behalf of the consultant
Mr. Michael Wairagu
REPCON Associates
1104 Shelly Beach road, Likoni
P.O Box 79605-00200
Nairobi
Lead expert no.

SIGNED:



DATE: 18th December 2023

DECLARATION BY PROPONENT

The Environmental and Social Impact Assessment (ESIA) study for the proposed resettlement site in the Mombasa Special Economic Zone Project within Mbuta location, Likoni sub County of Mombasa County commissioned under the attached terms of reference by the Kenya Ports Authority as the proponent. The KPA approves the process and the methodology utilized by the consultant in the whole process of Environmental and Social Impact Assessment and therefore

submits the study report to the National En Environment Authority for review and necessary action.

On Behalf of the Proponent
Mr. Daniel Githinji
(for) The Managing Director
Kenya Ports Authority
P.O Box 95009-80104
Mombasa, Kenya

SIGNED

DATE: 18th December 2023

EXECUTIVE SUMMARY

The Mombasa Special Economic Zones

Since 2013, the Government of the Republic of Kenya has been developing the Mombasa Special Economic Zone with a view to attracting Foreign Direct Investment in Port related enterprises and in the process create employment and boost export-based revenue thus providing a firm underpin to the Economic Pillar of Kenya Vision 2030. In 2013, the MSEZ underwent a Feasibility Study under auspices of the Ministry of Industrialization and Enterprise Development with support of JICA, leading to development of the Master plan for the Mombasa Special Economic Zone which targets the 3006-acre property in Dongo Kundu-Likoni sub-County owned by the Kenya Ports Authority.

Implementation of the Masterplan however required resolution of land access challenges occasioned by presence of squatters who have settled on and converted the 3006-acre Dongo Kundu property into a rural settlement boasting of 1648 land owners, a resident population totaling 2639 people (579 Households) and 2585 built structures distributed in the six Villages of Dongo Kundu, Mbuta, Mwangala, Kaya Mtongwe, Mrongondoni and Tembo Siji all of which together make the Mbuta Location. The Community also boasts of one Primary School at Mwangala, a Health Center at Mbuta, an Administrative Complex at Dongo Kundu, seven churches, four mosques and fourteen Kayas of which, six are major.

The MSEZ Resettlement Site and Infrastructure Project (MSEZ-RSIP)

Towards resolution of the squatter problem, a Resettlement Action Plan–RAP was commissioned by the KPA in 2018 and later on validated by the National Land Commission (NLC) in 2020. In their determination, the NLC observed that the MSEZ land belongs to the government and was therefore not eligible for compulsory acquisition, in which case, NLC made provision to only pay compensation for developments to land leaving the government to find a solution to the land issue. A Compensation Policy Framework (CPF) which provides for internal resettlement of the squatters through creation of two resettlement sites within the SEZ was developed by the KPA and later adopted by the government in 2010. Under the Policy, each of the 1648 MSEZ Squatters will be allocated an eighth-acre plot for settlement while the NLC pays compensation for all developments on the land as per the RAP, upon which, they will surrender currently occupied lands for development of the SEZ.

As conceived, the Mombasa Special Economic Zone Resettlement Project unveiled in this Chapter comprises two main components namely:-

The Resettlement Sites: Design of the entire Mombasa Special Economic Zones Resettlement project (MSEZ-RSIP) was executed by the State Department for Lands and Physical Planning (SDLPP) on behalf of the Kenya Ports Authority. The Resettlement Area comprises two sites designated Resettlement Area A and Resettlement Area B in which, each of the 1624 PAPs will receive either eighth or a third-acre plot for housing. The KPA property at Dongo Kundu comprises 4 pieces of land totaling 1223ha (Table ES 01). The lands targeted for resettlement fall under MSA/MS/Block IV/250 and MSA/MS/Block IV/251. All plots are held on a 99 years lease with effect from 1987.

The Infrastructure Component: The Infrastructure component comprises facilities to be installed within the Resettlement Area namely:-

- Internal Roads (33.98Km) and Drainage (18.50 Km)
- Water Supply Infrastructure (Pumping station-1 No., Water transmission pipeline-5.4 Km, and Water Kiosk-5 No.)
- Health Centre (1 No.)
- Market (1 No.)
- Cemetery (2 No.)

The total cost in driving the infrastructure component based on the Bills of Quantities is Ksh 663,104,460 (Kenya Shillings, six hundred and sixty-three million, one hundred and four thousand, four hundred and sixty only). Of this amount, the roads component is significant as it accounts for 72.4% of the entire cost.

Progress and scope of the ESIA Study

The ESIA Study for MSEZ-RSIP was undertaken in full compliance to the Environmental Management and Coordination Act-EMCA-1999 (Cap 387) and its 2015 Amendment. In line with Regulation 11(1) of LN 101 of EMCA, The Mombasa Special Economic Zones Resettlement Project was scoped following which Terms of Reference for this ESIA Study were prepared for review by NEMA. The TORs were thereafter approved vide NEMA TOR 624 thus paving the way for the full cycle ESIA Study to proceed. A full cycle ESIA Study entailing Scoping, Detailed Investigations, Public Review and Final Report Stage activities was designed and undertaken.

Core outcomes of the ESIA Process

Activities of the Detailed ESIA Stage followed the Study work-plan approved as part of the Scoping Report and progress has been achieved as follows:-

Review of baseline data: Available data and reports for the Mombasa Mainland South and Dongo Kundu was reviewed so as to assemble a profile of the baseline pre-project scenario.

Documentation of the Project Intervention: Towards documentation of Project Intervention, both the Land Use Advisory Plan developed by the State Department for Lands and Physical Planning and the Design Report for Infrastructure Component were reviewed alongside the Compensation Policy Framework. Each intervention proposed under the infrastructure project was analyzed and documented in terms of scope, scale, resource requirements including target site. It is the potential interaction between project intervention and prevailing baseline that is likely to occasion adverse impacts.

- Documentation of the Policy, Legal and Institutional Framework: All these were reviewed and documented so as to set the legal limits of the ESIA Study.
- Execution of baseline studies: Baseline studies were executed with the objective of documenting then pre-project baseline against which future monitoring will take place. Stand-alone reports were generated from studies as follows:-
- Baseline socio-economic survey for the entire Dongo Kundu households

- Stratification surveys with special interest groups;- vulnerable PAPs, school going children, herbalists, diviners and healers, etc
- Floral mapping survey for the Resettlement Sites
- Mapping Survey for the Dongo Kundu Kayas
- Bird counts for the entire Dongo Kundu area
- Air quality surveillance on nine sites within the proposed resettlement areas
- A Climate Change Mitigation Plan
- Stakeholder Engagement and Public Participation:

Stakeholder engagement applied diverse means including entry point meetings with leaders, public Baraza with potentially displaced community, dissemination seminars, Focus Group Discussions with special Interest groups (widows, widowers, herbalists, Kaya Elders, Religious Leaders, school going children), Key Informant Interviews with lead Agencies among others.

Data analysis and impact prediction: Upon data analysis, potential environmental impacts (both positive and adverse) were predicted based on available tools. The magnitude, significance, and acceptability of predicted impacts were evaluated with a view to determining whether observed adverse impacts are significant enough to warrant mitigation. The potential environmental impacts were described in both quantitative and qualitative terms through application of existing body of knowledge, checklists, flow charts, and monographs and from input from diverse stakeholders. In particular, impact prediction in this study drew heavily on five documents namely:-

- The Third Schedule to Legal Notice 101
- JICA Guidelines for Environmental and Social Considerations (2010)
- The World Bank Safeguard Policies
- The Checklist of Environmental Characteristics developed by the Department of Environmental Affairs of the Republic of South Africa and,
- The Reference Guidelines for Environmental Assessments (which incorporates the Leopold Matrix) developed by USAID / REDSO / WCA–Abidjan.

Formulation of an Environmental and Social Management Plan: Measures or interventions necessary to minimize, reduce, avoid, or offset identified adverse impacts were evaluated and presented in form of an Impact Mitigation Plan for the proposed development. Such evaluation also included an assessment of Project Alternatives. The ESMP also identified modalities for monitoring and evaluation to ensure compliance in implementation of proposed mitigation measures. This involved development of monitoring indicators and procedures for continuous generation of project monitoring data and information.

Reporting procedure: The ESIA Study methodology as described above culminated with production of a Draft Environmental and Social Impact Assessment Study Report formulated in line with Regulation 18 of Legal Notice 101 of EMCA.

Core findings from the Baseline Mapping Studies

Climatic Potential: Rainfall occurrence in Kenya's coast region is associated with the semi-annual passage of the Inter-Tropical Convergence Zone (ITCZ) and the monsoons – the North Easterly Monsoon (NEM) from December to March and the South Easterly Monsoon from May

to October. Mean annual rainfall in the MSEZ area is 1031mm. Most of the rainfall occurs between the monsoons when convection activity is enhanced. Annual rainfall is delivered in one long season lasting from March to July and a minor one in October and November. With a long-term average of 275 mm, May is the wettest month in the project area while the period between January and mid-March is the driest. Long-term climate ranges from transitional semi-humid to semi-humid.

Dominant Ecosystems: Vegetation of the Dongo Kundu site of the proposed MSEZ was once part of the East African coastal forests-ecologically important and highly threatened centres of endemism for plants (c 550 spp.); mammals (6 spp.); birds (9 spp.); reptiles (26 spp.); frogs (2 spp.); butterflies (79 spp.); snails (>86 spp.); and millipedes (>20 spp.). However, on account of many factors mainly anthropogenic, the original vegetation was systematically lost and will only be found in a few dwindling patches of forests called Kayas, locally revered as centers for traditional worship.

Bush fallow is apparently the most dominant cover type within the target resettlement area accounting for 55.8% of the land followed by secondary thicket at 31.5%. Closed canopy forests and associated woodlands (Kaya Miongani) account for only 12.7% of the land area. Thus, vegetation at the resettlement site is largely dominated by bush fallow comprised of abandoned grasslands and farmlands followed by secondary thickets at diverse stages of regeneration and only broken by scattered homesteads at the ridge tops. The once flourishing closed canopy forest that connected the Shimba hills forest to the mangroves on the Indian Ocean Coastline has now been reduced to isolated patches mainly within the Kaya enclaves accounting for a partly 2.3% of the land area.

Secondary thickets have the highest species diversity in the MSEZ Area followed by woodlands while closed canopy forests, farmlands and bush fallow follow closely. Trees are the dominant growth form across all vegetation types followed mainly by shrubs, crops or grass depending on the vegetation type. As such, and contrary to expectation, secondary thickets and woodlands harbor the highest species diversity in Dongo Kundu Area compared to closed canopy forests with woodlands even displaying a much higher count of tree species compared to the closed canopy forests.

A total count of 210 vascular plants as recorded in the study area compares favourably with the count of 203 observed for the area (Pakia, 2015) but compares very unfavourably with the count of 2489 species observed for the entire coastal region. Trees remain the most dominant growth form with a count of 120 equivalent to 57.14% of the total species recorded, followed by shrubs, herbs and lianas with a combined count of 58 equivalent to 27.62% with grasses coming a distant third at 10.48%. An over-dominance of species diversity by trees followed by Shrubs and lianas is an indication of a once thriving forest formation which has been degraded through selective exploitation and conversion to farmlands and settlements, a trend confirmed by the high presence of crops which, at 22 account for 10.48% of the floral diversity.

20.5% of the entire floral biodiversity of 210 vascular species are introduced (exotic) while the bulk, at 79.5% are indigenous to the area. The stocking density counted for all the 210 vascular species recorded in the Study Area, is 98,837 standing trees most of which are juvenile to medium sized. However, the top six most stocked tree species are all exotic accounting for 27.8% of all wood stocks in the area with both the Neem *(Azadirachta indica)* and Jujube tree *(Zizuphus mauritania)* being dominant. Given that most of the trees are saplings, it is apparent that regeneration of forests in the Study area is dominated by exotic colonising tree species

which have been known for similar tendencies in other areas of the coast region especially in Kilifi County.

Each of the 210 individual species identified were analyzed for conservation status through screening against the IUCN Red Data Local Tools. A total of 15 species were found to be of conservation interest with five (5) being near threatened; Eight (8) being Vulnerable and Two (2) being endangered. Fig. 5.6 presents a map of their distribution in the Study area.

Occurrence of Birds: A total count of 136 bird species was recorded out of which, 11 species are observed to feature in the AEWA checklist. One bird species *(Ciconia microscelis)* is Near Threatened and another one *(Polemaetus bellicosus)* is classified as Endangered as per the IUCN Red Data listing.

Core findings from Stakeholder Engagement Process

A total of 67 meetings were conducted under auspices of this ESIA Study for the MSEZ-RSIP through which a total attendance of 6,567 participants was netted. Core concerns were expressed as follows:-

Local Employment: Consultations with different stakeholders brought out the need of the local community to be priority in job opportunities in the project area.

Size of Plots to be allocated: Though landed PAPs will be provided with titled plot, they expressed their dissatisfaction with the size of plot noting that the plot was inadequate to accommodate more than one household. PAPs expressed their fear on where to take their livestock saying that the provided plots have no room for livestock keeping nor farming activities. This concern was also aired by religious groups which deemed the size of plot too small to accommodate their developments and plan for future developments.

Additional land: This was brought about by the fact that the majority of residents in the project area are non-landed raising the question of where they will be resettled considering the 1/8 plot cannot accommodate many households. The need for additional land was evidenced by the number of PAPs who flock the resettlement office requesting for additional land after then Cabinet Secretary for trade and Investment, Hon. Moses Kuria, opened a window for registration.

Inadequate Compensation: Concerns were raised about awards provided to development owners by National Lands Commission. The amount awarded was termed inadequate by PAPs who aggrieved that the money is not enough to construct standard structures. PAPs were awarded based on their individual effort and the type of development they owned during inventory. However, there is a concern that the resettlement area will be converted into a slum as there will be no standard structures.

Allocation of cemeteries in both resettlement areas: Stakeholders consulted felt that land for cemeteries should be provided in both resettlement areas.

Benefits of MSEZ: The project will open up the area and improve the local economy and country at large. It is expected that there will be numerous employment opportunities and that priority will be given to the PAPs. However, the skills and competencies will be a necessity in a competitive job market.

The Plight of Herbalists and Traditional Healers: On their part, the herbalist and traditional healers expressed major difficulty in relocating their shrines (Mbuyu) and fitting operations on an eighth acre plot and feared that, they could lose their public-shy customers.

Salient Impacts of the Project

The overall impression from impact analysis is that the Resettlement Project and backup infrastructure is itself an intervention in mitigating would be displacement impacts of the wider MSEZ and is therefore immensely beneficial. As with most civil works, adverse impacts largely manifest at the construction stage but are however short-lived, ceasing once construction activity is ended. This is the scenario with the MSEZ Resettlement Site and Infrastructure Project.

Cost to the landscape and natural biodiversity: Construction stage impacts will mainly be felt through clearing of natural vegetation and stripping of top soil in land preparation for both developments of infrastructure and construction of PAP dwellings.

Short-term nuisances and pollution during civil works: Construction activity mainly for the roads sector is likely to be associated with numerous disturbances including those associated with an influx of job seekers, hazards associated with operation of plant and equipment, effluent from the contractor's camp, land degradation from material sourcing and transport among others.

Possible siltation threat to the Port Reitz Creek Ecosystem: A core concern in implementation of the civil works component is the threat of potential sediment spillage into the Port Reitz Creek from cut and fill activities including stockpiling. Given that the Volume of Cut far exceeds demand for fill leaving a surplus 224,511 cubic meters of soil which will require to be disposed off, siltation threats to this ecosystem are very real.

Loss of means to food production: Majority of the PAPs currently are subsistence farmers growing crops and keeping animals such as goats and cows. Once settled in the Resettlement Areas, PAPs will henceforth loose all access to their former lands and will therefore lose any agricultural based food and income security. For aged and vulnerable PAPs who cannot secure employment, this move will render them both food and income insecure.

Long-term degradation of natural vegetation by settlers: At a pa capita daily firewood consumption of 1.5Kg, the 579 households currently resident within the MSEZ consume about 4.34 tonnes of biomass energy daily which is sourced from their farmlands and surrounding bushes. Once settled, residents of the new settlements are likely to exert pressure in surrounding bush lands and thickets in search of their daily demand for household energy. This would further aggravate losses already accrued from land preparation and would pose a threat to the conservation of special interest trees already flagged out.

Erosion and further siltation from change in local hydrology: Concentration of housing and density of roads will immediately change the hydrology of the resettlement sites with most of the rainfall naturally converting into surface runoff which will be evacuated into natural drainage through the roads. Such runoff is likely to erode soil along its course and could end up depositing its sediment load into the Port Reitz Creek.

The Environmental and Social management and monitoring Plan-ESMMP

An ESMP has been prepared to guide and monitor mitigation of impacts by respective actors. Core strategies at mitigation have been identified as follows:-

- The ESMP will be integrated into the Final Design Report will be provided for in the BOQs to ensure funding allocation for environmental and social mitigation
- Clauses binding parties to affirmative action on the ESMP will be integrated into Contracts for Construction to ensure that the contractor is legally bound to implement impact mitigation.
- Upon commissioning, all facilities will be promptly handed over to the County Government of Mombasa so as to put in place management structures required in implementation of the ESMP.
- On its part, the KPA will put in place, a governance system to take charge of all non-settled land for purposes of enhancing conservation. This should include lobbying relevant Authorities towards gazzetment of all Kayas within the SEZ.

Viability of Mitigation: Majority of impacts have readily available means for mitigation while some of the negative impacts will acquire positive effects after mitigation. Thus, upon application of the Impact Mitigation Programme, majority of the impacts are dispensed with and the project is likely to achieve an overwhelming net positive effect.

Responsibility for mitigation: As per the ESMP, responsibility for mitigating impacts of civil works falls on the contractor under the supervision of the KPA or his appointed representative. At the Operation Stage, each subcomponent will be handed over to the Mombasa County Government for both Management and Oversight with KPA retaining the right and responsibility of monitoring activities of resettled PAPs. Particularly, KPA has a huge responsibility to preserving their reserve land from encroachment by both current and new PAPs. .

Costs in environmental mitigation and monitoring: The sums of Ksh 112,998,520.00 (Read Ksh One hundred and Twelve Million, Nine Hundred and Ninety Eight Thousands, Five Hundred and Twenty) will be required in implementing mitigation.

Conclusion and Recommendations

A major observation in this ESIA Study is that the MSEZ-RSIP is in itself an action in mitigation with a very positive profile even before mitigation. Majority of impacts are costs on the local biodiversity associated with land preparation to build the PAPs dwellings and to lay the infrastructure. However, by implementing an effective mapping and preservation of special interest trees coupled with a massive reforestation programme, such impacts can easily be countered. Further, the long-term concern of PAPs losing their means to livelihood and thus being driven further into poverty will be countered through implementation of the LRP which among others is aimed at ensuring that that the bulk of PAPs are gainfully integrated into activities of the MSEZ.

In the impression of this study, the MSEZ-RSIP meets the bar of being technically viable, economically sustainable and socially acceptable more-so, given that it will unlock the SEZ land for investment to the benefit of both the local and national economies.

The recommendation here is for the MSEZ-RSIP to be granted an EIA Licence to enable it move to the next phase.

Table ES001: Matrix for Environmental and Social Management and Monitoring Plan (ESMP)

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
Project design phase	Field surveys and public particpation meetings	Creation of forums for public expression						
		Creation of shorrterm employment						
		Capacity building for Leadership Structures						
		Generation of new data on the project area						
Relocation and reconstruction of PAP dwelings	Demolising of current PAP dellings	Generation of rubble and other waste	Recoverly for re-use and sale	Individual PAPs	Compensation proceeds	KPA	No debri left behind	Daily
	Pressure on natural resources-wood, water, mud etc in housing construction	Degradation of of the natural environment and natural resources	KPA to deploy scouts to control local soucring of building wood and soil resources	KPA	1080000	KPA	Guards hired, Monthly Incidence Reports	Monlthy
			KPA to lobby KFS to gazette all ain Kayas into Forest Reserves under Forest Act 2013	KPA	Inbuilt	KPA	Periodic progress reports	Periodic
			KPA to undertake fencing and refforestation in Kaya Miongani, Ngombeni and Mwanakuku combined area of 8.5ha	KPA	3000000	KPA	Field progress reports	Monthly
	Destruction of site vegetation in land preparation for PAP housing construction	Loss of cover vegetation, natural habitat and climate amerioration impact	KPA to issue guidelines for site layout and conservation	KPA	Ongoing	KPA	No. of sites built as per plan	Quarterly inspections
		Threat on vulnerable	Insitu mapping of	Contract for	Ongoing	KPA	Mapping Report	Quarterly

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
		and enadangered flora and fauna resources	endangered flora for preservation.	Services			submitted	inspections
	Relocation of vulnerable PAPs	Vulnerable PAPs could be rendered destitute and exposed to suffering	Implementation of the Vulnerable Peoples Management Plan	Contract for Services	Ongoing	KPA	Implementation Reports	Daily
	Challenges in accomodating large familes on eighth acre plots	Cross family strive and conflict	No feasible solution unless additional land is identified					
	Alteration of local hydrology of resettlement area through generation of roof runoff	Erosion hazards from non mananaged roof runoff	KPA to promote technology for low-cost water harvesting and storage	KPA	3,200,000	KPA	Training Report	Monthly
Construction of Internal Roads, Water Supply, Public Market, Dispensary and Cemeteries	Opportunities for shorterm bussiness in constrcution and supplies	Cash income to both local and other bussinessment						
	Opportunities for employment in consttruction	Cash income for local population						
	Secondary benefits form contracts in construction	Opportunities for small scale bussiness in catering for construction workers, provision of housing , sale of food etc						
	Potential conflict in labour sourcing	Local community could resent influx of speculators	Negotiated job placement to ensure employing the locals, gender equity and	PAPs Commi ittee	720,000	KPA	Minutes of PAPs Committee	Monthly

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
			equality (apply Kenya Constitutional Requirement on gender throughout the project) to be observed and considering of People living with disabilities					
	Potential escallation of labour costs	Escallation of constrcution costs for PAPs who will be building at the same time	Early compensation and relocation of PAPs	KPA Compensation Budget	Committed	KPA	Resettlement Report	Monthly
	Stripping of cover vegetation and top soil in land preparation; stockpiling of stripped soil	Loss of biodiversity and habitat	Reuse of stripped soil in landscaping.	Cotract for works	Inbuilt	KPA	Approved Contruction Report	Monthly
			Refforestation with indigenous species	Each of 1648 PAPs to plant 20 trees to mark boundaries on individual plots	3,296,000	KPA	Total trees planted	Monthly
				Contractor for roads to plant 13588 on either side of 33.97 Kilometers of roads	4,076,520	KPA	Total trees planted	Monthly

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
				Contractor for Market, Dispensary and Cemeteries to plant 100 trees each	90,000	KPA	Total trees planted	Monthly
				Contractor for water to plant 20 trees on each of 7 Water Kiosk sites	42,000	KPA	Total trees planted	Monthly
		Threat of dust emmissions from earthworks	Perioding wet curing of the soil	Contract for works	Inbuilt	KPA	Approved Contruction Report	Monthly
		Possible spillage of sediment into natural drainage including the Port Reitz Creek	Proposed stockpile site for Road contractor to undergo ESIA Study separate	Contract for Works	1,250,000	KPA	EIA License for tockpile site	Quarterly
	Land degradation in material sourcing and transport sites	Destruction of the landscape, loss of habitat and hazzards to life	Sourcing from NEMA licensed suppliers, quarries and borrow sites	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Monthly
	Hazards posed to other motorists and pedestrians	Potential injury, loss of life and unnecessary expenses	Contractor for roads to Implement an aggressive road safety campaign	Contracts for works	2,500,000	KPA	No of drivers trained and sensitized	Monthly
	Hazzards of introdcution of additional invasive species with	Further degradation of local biodiveristy	Contracor for roads to hire environmentalist who will screen all sources before supply	Contract for Works	2,500,000	KPA	Approved Site Screening Reports	Quarterly

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
	building material							
	Hazards associated with operation of contractor and labour camps	Pollution from waste oils and spares	Maintenance only in designated garages for recoverly and disposal	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Monthly inspections
			proper segregation of bins, licensed waste handler, the contractor to prepare a site waste management plan and responsibility	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Monthly inspections
		Sanitation concerns for workers	Always provide at least 10 gender segragated washroom facilities for construction workers	Contract for Works	5,824,000	KPA	Approved Construction Report	Quarterly inspections
		Proliferation of social vices	Local sourcing of labour coupled with strict surveillance	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Daily
		Threat of spread of HIV&AIDs	Aggressive counselling, voluntary testing and continued sensitization.	Contract for Works	2424000	KPA	Periodic Reports	Monthly
		Threats of fire hazzard	Contrctor to implement approved Fire Control Plan	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Quarterly inspections
	Occupational Health and Safety Hazards in operating Plant and Equipment	Hazzards of potential injury and loss of life including injury from expossure todust, noise,	Contrators site to be registered as ***A Place of Work*** under OSHA 2007	Contract for Works	Inbuilt	KPA	Registration Certificate from DOSH	Once

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
		fumes and vibrations	Provide adequate barriers, information, signage and reflective tapes all construction area and material site	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Once
			Deploy sober qualified staff under competent supervision	Ditto	Ditto	Ditto	No of accidents reported	Daily
			Provide adequate and appropriate PPEs for staff estimated at 100	Contrct for Works	3,000,000	KPA	No of staff wearing appropriate PPEs	Daily
			Mount an aggressive safety campaign	Contract for Works	Same vote with Road Safety	KPA	No of Staff trained	Monthly
			Contractor to deploy only serviceable plant and equipment	Contract for Works	Inbuilt	KPA	Service records for Plant and Equipment	Monthly
			Plant Operators to work only for stipulated hours daily	Contract for Works	Inbuilt	KPA	Staff Deployment Records	Monthly inspections
Commissioning and operation phase	Settling-in of PAPs in the Resettlement Areas	Gains to the National Economy through implementation of the MSEZ	Long-term					
		Opportunity to start life again						
		Benefits associated with owning a Titled Plot						
		Creation of new neigbourhoods						
		Expossure to new opportunities and means						

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
		to livelihoods						
		Loss of means to food production upon resettleing	Implementation of the Livelihood Restoration Proframme including skills upgrading training as per CPF	KPA	80,000,000	KPA	No of PAPs trained	
			Priority job placement in the SEZ for PAPs	PAPs Committee	Same vote as for Negotiated Job Placement	KPA	Number Youths employed in SEZ	Monthly
			KPA to grant PAPs continued access to non utilised SEZ land under lease aggreements	KPA	Inbuilt	KPA	Number of Lease Agreements signed	Quarterly
		Over-explotation of wood resources in search of biomass energy and associated loss of habitat and biodiversity	KPA to mount a programme to promote alternative sources of Household energy as per LRP	KPA	2420000	KPA	Number of PAPs using implroved cookstoves	Monthly
		Incompatibility of some aged PAPs to urban livestyles	KPA to mount aggressive counselling and outreach programme through MCG as	KPA/MCG	Ongoing Contract for Services	KPA	Number of Vulnerable PAPs counselled	Monthly
		Breakup of exisiting social networks upon resettlement	Part of LRP				Number groups reenergised through mobilization	

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
	Commissioning and operation of the road network	Ease of access and means to doing bussiness	Long-term					
		Opportunities for investing in the transport sector	Long-term					
		Change in local hydrology dues to creation of impervious surfaces	Safe disposal and harvesting of runoff into water pans (6No.)	Contract for Works	6 000000	KPA	Approved construction reports	Monthly
		Increased expossure to hazzards of road accidents	Contractor to Install adequate safety features (speed control bumps, warning signage, etc)	Contract for works	Inbuilt	KPA	Approved Design Report	Quarterly
			Promopt handover of completed roadds to the County Government of Mombasa	Contract for Works	Inbuilt	KPA/MCG	Handing over reports	Once
			Residents to mount an aggressive road safety programme	Contract for Services	Ongoing	KPA/MCG	Periodic Reports	Periodic
	Commissioning and operation of the Public market	Stabilization of food security	Long-term					
		Opportunities for trade in food supply	Long-term					
		Solid and liquid effluent from garbage and market refuse	Market to be prompltly handed over to MCG who will deploy a market supritendant and cleaner	Contract for Works	Inbuilt	KPA/MCG	Handing over reports	Monthly inspections

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
			A Market management Committee to be formed	Contract for Services	Ongoing	MCG	Periodic Reports	Periodic
			One of the conservation groups to be mobilised to undertake recoverly, recycling and composting applying the Rs principle	Contract for Services	Ongoing	MCG	Periodic Reports	Periodic
		Opportunity for revenue generation for County Government	Long-term					
		Opportunities for employment in the trade	Long-term					
		Creates a forum for social enagement and bonding	Long-term					
	Commissioning and operation of the water supply system	Health benefits asociated with easy supply of clean potable water	Long-term					
		Opportunity for limited kitchen gardening for diestary and nutritional security	Long-term					
		Saving on time spent fetching water from long distance source	Long-term					
		Improved security and quality of life for the girl-child	Long-term					

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
		Employment creation in runiing water kiosks and associated infrastrcuture	Long-term					
	Commissioning and operation of the Public Dispensary	Increased efficiency in responding to medical emergencies	Long-term					
		Provision of a forum for disseminating public health information and services	Long-term					
		Threats posed to public health by medical wastes	Dispensary to be promptly handed over to the Mombasa County Government	Contract for works	Inbuilt	KPA	Handing over reports	Once
			County Government to immdedeately deploy professional staff who will operate the facility	County Government Revenue	Internal to MCG	MCG	Routine Reports	Monthly inspections
			Segregation of waste for appropriate disposal					Daily
		Creation of job opportunties at the dispensary	Long-term					
	Christian and Muslim Cemeteries	Provision of a designated site for resting the departed	Long-term					
		Long-term leakage of pollutatnts into local water bodies	No known measure for mitigation					
Total Budget in implementing the ESMMP					**112,998,520**			

ACRONYMNS AND ABBREVIATIONS

ACK	Anglican Church of Kenya
AEWA	African-Eurasian Migratory Waterbird Agreement
AQG	Air Quality Guidelines (from the WHO)
BMU	Beach Management Unit
BSF	Black Soldier Fly
BSFL	Black Soldier Fly larvae
CBO	Community Based Organization
CECM	County Executive Committee Member
CEMC	County Environment Management Committee
CGoM	County Government of Mombasa
CHW	Community Health Worker
CIDP	County Integrated Development Plan
CITES	Convention on International Trade in Endangered Species
CMS	Convention on Migratory Species
Conc.	Concentration
CRP	Community Resource Person
CSEB	Compressed Stabilized Earth Blocks
CWWDA	Coast Water Works Development Agency
DBH	Diameter at Breast Height
DCC	Deputy County Commissioner
DFID	Department for International Development
DOSHS	Directorate of Occupational Safety and Health Services
ECDE	Early Childhood Development Education
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
ESC	Environmental and Social Considerations
ESMP	Environmental and Social Management plan
FCMA	Forest Conservation and Management Act
FGD	Focus Group Discussions
FRH	Fundamental Rights Holders
GHGs	Green-House Gases
GoK	Government of Kenya
GPS	Geographical Positioning System
GRC	Grievance Management Committee
GRM	Grievance Management Mechanism
Ha	Hectares
HAQI	Health Air Quality Index
HDPE	High Density Polyethylene
IOSEA	Indian Ocean and Southeast Asia
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KALRO	Kenya Agricultural and Livestock Research Organization
KEMFRI	Kenya Marine and Fisheries Research Institute
KeNHA	Kenya National Highways Authority
KETRACO	Kenya Electricity Transmission Company
KFS	Kenya Forest Service
KI	Key Informant

KNBS	Kenya National Bureau of Statistics
KPA	Kenya Ports Authority
KPLC	Kenya Power and Lighting Company
KTBH	Kenya Top Beehive
KURA	Kenya Urban Roads Authority
KWS	Kenya Wildlife Service
LMH	Legal Mandate Holders
LN	Legal Number
MEAs	Multilateral Environmental Agreements
MOU	Memorandum of Understanding
MOWASCO	Mombasa Water Supply & Sanitation Company
MSEZ	Mombasa Special Economic Zone
MSEZ-DK	Mombasa Special Economic Zone - Dongo Kundu
MSEZ-RSIP	Mombasa Special Economic Zone – Resettlement Site Infrastructure Project
MSMEs	Micro, Small and Medium Enterprises
MT	Metric Tonne (1000 kg)
NAFIS	National Farmers Information Service
NEC	National Environment Council
NECC	National Environmental Complaints Committee
NEMA	National Environment Management Authority
NG-CDF	National Government - Constituency Development Fund
NGO	Non-Governmental Organisation
NLC	National Lands Commission
Nm3	Normal cubic meter of air
NMK	National Museums of Kenya
OSH	Occupational Safety and Health
PAP	Project Affected Person
PLWD	Persons Living With Disability
PM	Particulate Matter
PPM	Parts Per Million
RA	Resettlement Area
RC	Regional Commissioner
RH	Relative Humidity
ROI	Return On Investment
RPF	Resettlement Policy Framework
SAGA	Semi-Autonomous Government Agency
SEZ	Special Economic Zone
SEZA	Special Economic Zones Authority
SHG	Self-Help Groups
TOT	Trainer Of Trainers
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNCPWCNH	United Nations Convention on the Protection of World Cultural and Natural Heritage
UNDP	United Nations Development Programme
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention for Climate Change
WCMA	Wildlife Conservation and Management Act
WHO	World Health Organization
WRA	Water Resources Authority

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DEFINITION OF TECHNICAL TERMS

When used in this report, the following terms will retain the meaning assigned to them hereunder:

Adjudicate	Means to make a formal judgement on a disputed matter
Agricultural Value Chains (AVC)	The people and activities that bring a basic agricultural product like maize or vegetables or cotton from obtaining inputs and production in the field to the consumer, through stages such as processing, packaging, and distribution.
Air quality	The degree to which the air is suitable or clean enough for humans or the environment. Good air quality means the air is free from harmful substances.
Apiculture	The science and practice of beekeeping
Biodiversity	The variety plant and animal life in the world or in a particular habitat; includes animals, plants, fungi, and microbial organisms like bacteria and protozoans
Blue Economy	the "sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystem."
Boar	Intact male pig, over the age of six months typically used for breeding
Briquette	A household and institutional fuel made by compacting/solidifying combustible biomass waste. They can be produced with a range of raw materials including sawdust, bagasse, coffee husks, maize cobs, wheat/beans/barley straws and paper.
Carbonization	It is a process in which an organic compound (e.g., a biofuel) is converted into carbon or carbon-containing residue by the thermal decomposition method. It usually works in an anaerobic situation or in the presence of a lesser amount of oxygen.
Coliform bacteria	Microbial organisms present in the environment and the feces of all warm-blooded animals including humans. They do not cause illnesses but their presence in drinking water indicates that diseases causing organisms could be in the water system
Consultation	The act of exchanging information and opinions about something in order to reach a better understanding of it or to make a decision.
Crude protein	protein content in feeds. In animal feeds, crude protein is calculated as mineral nitrogen x 6.25 (the assumption is that proteins of typical animal feeds contain an average of 16% nitrogen).
Dependency ratio	The dependency ratio relates to number of children (0-14 years old) and older persons (65 years or over) to the working-age population (15-64 years old).
Diameter at Breast Height	The standard method of expressing the diameter of the trunk or bole of standing trees
Ecology	a branch of biology that deals with the relations of organisms to one another and to their physical environment
Ecosystem	The biological community of interacting organisms and their environment
Endemic	This is the distribution of a species limited to a small geographic area and restricted to a limited area space.
Exotic species	Species of flora or fauna that occur in areas outside of their natural geographic range. They are also referred to as alien, non-native, non-indigenous, or introduced species

Fauna	Means all the animal life present in a particular region or time.
Financial capital	Financial sources which are available to people e.g., savings, credit supplies, regular remittances, or pension.
Flora	This is all the plant life present in a particular region or time.
Food insecurity	The lack of consistent access to enough food for an active and healthy lifestyle.
Food security	when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.
Gender	Refers to the characteristics of women, men, girls, and boys that are socially constructed; includes norms, behaviors and roles associated with being a woman, man, girl or boy, as well as relationships with each other. As a social construct, gender varies from society to society and can change over time.
Gender roles	Refers to the activities ascribed to women and men based on their perceived differences. Gender roles are socially determined, change over time and space and are influenced by social, cultural and environmental factors characterizing a certain society, community or historical period.
Gilt	A female pig that has not produced a litter of piglets yet or is being used to grow out and finish to butcher.
Gulley	Means a trench originally created on the earth surface by running water. When it rains, water runs through gulley as a natural drainage. They are a form of severe soil erosion
Habitat	The natural home or environment of an animal , plant or microbial.
Heliculture	The process of farming or raising edible land snails for human consumption.
High value crops	These are crops that provide higher net returns per hectare to the farmer. These may include hybrid maize, potatoes, vegetables local and indigenous, spices, and fruits.
Household	A group of people, often a family, who live together under one roof and share meals together
Household head	The primary provider of income and food in the household
Human capital	The skills, knowledge, ability to labour and good health to pursue livelihood strategies
Impact	To have strong effect on someone or something; Any change to the environment whether adverse or beneficial resulting from a facility' activities, products or services. It is the effect that people actions have on the environment within which they are done.
Incinerator	Refers to an apparatus used for burning waste material especially hospital waste at very high temperatures until it is reduced to ash
Indigenous vegetation	This is the native vegetation which historically has naturally occurred in the local area.
IUCN red list	These are categories and criteria based on IUCN for the classification of species at high risk of global extinction
Kaya	When used in this report, the term kaya (plural makaya) refers to a sacred site of the Mijikenda people of the coastal region of Kenya. Always located within forests, kayas are considered to be an intrinsic source of ritual power, and origin of cultural identity. It literally means "home"
Kaya	This is a sacred site of the Mijikenda people in the former Coast Province of Kenya. It is often located within sacred forests
Livelihood	Means of securing the basic necessities (food, water, shelter and clothing) of life". Livelihood is defined as a set of activities essential to everyday life that are conducted over one's life span.

Livelihood assets	Refer to the resource base of the community and of different categories of households.
Livelihood capitals	Refer to the natural, social, financial, physical, and human capital needed to maintain living or obtain development
Livelihood strategies	Livelihood strategies are "the range and combination of activities and choices that people make in order to achieve their livelihood goals." On the basis of their personal goals, their resource base and their understanding of the options available, different categories of households - poor and less poor - developed and less developed.
Medical waste	"Medical waste" covers all wastes produced in health-care or diagnostic activities.
Meeting	An event in which a group of people come together to discuss things or make decisions.
Mental health	Includes psychological, emotional and social wellbeing of a person. It affects our thinking, feeling and acting
Mitigation	Means reducing risk of loss from the occurrence of any undesirable event.
Natural capital	Natural resources stock from which resources flow useful for livelihoods are derived from e.g. land, water, wildlife, biodiversity, environment resources.
Open bush defecation	The practice of defecating in the open fields, bushes, forests, water bodies, and etc.
Peri-urban areas	Zones of transition from rural to urban land uses located between the outer limits of urban and regional centres and the rural environment.
Physical capital	Basic infrastructure - transport, shelter, water, energy, communication and production equipment - that enable people pursue livelihoods
Placenta pit	Placenta pits allow pathological waste to degrade naturally. Around 90% of the waste is liquid, which will soak away into the ground. The rest will degrade though a complex and variable mixture of biological and chemical processes.
Point of lay	Means that the chicken is at the age where they are about to begin laying eggs
Public road	Any road which the public had the right to use immediately before the commencement of the act or all proclaimed roads and thoroughfares being in existence on any land sold or leased or otherwise held under the East Africa land regulations (1897) the crown lands ordinance (1902) or the government lands act at any time before the commencement of this act and all roads and thoroughfares hereafter reserved for the public use.
Return on Investment (ROI)	The ratio of net profit over the total cost of the investment. ROI is most useful to your business goals when it refers to something concrete and measurable, to identify your investment's gains and financial returns.
Sanitation	The science and practice of effecting health and hygienic conditions that help prevent diseases through services such as drinking water and management of wastewater. It is the focal point of all public health initiatives. It is related to safe collection, removal and disposal of human excreta
Shoat	Sheep and goats together
Social capital	Social resources - networks, membership to groups, relationship of trust, access to wider institutions of society - which people draw in pursuit of livelihoods
Stakeholder engagement	The systematic identification, analysis, planning and

	implementation of actions designed to influence stakeholders.
Sustainability	It is development that "meets the needs of the present without compromising the ability of future generations to meet their own needs".
Table banking	A group based funding system where members of a group meet weekly and make weekly savings to form a kitty from which members can borrow.
Taxonomist	This is a professional who specializes in classifying and sorting of information based on an established system.
Taxonomy	This is the science of classification, but more strictly the classification of living and extinct organisms
Urban agriculture	T*he cultivation of crops and rearing of animals for food and other uses within cities.* Urban agriculture refers to various practices of cultivating, processing, and distributing food in urban areas. The term also applies to the area activities of animal husbandry, aquaculture, beekeeping, and horticulture in an urban context.
Urban poor	The overflow of the rural poor who had migrated to urban areas in search of alternative source of livelihood. They may include casual laborers, self-employed, and sellers of diverse products along the roads
Vulnerability	The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of change or hazards.
Waste recycling	*Recycling* is the process of converting *waste* materials into new materials and objects
Water pan	Refers to a small reservoir created by excavating the ground to collect and store surface runoff from farms, hillsides, roads rocky areas

CHAPTER ONE: INTRODUCTION

1.1: Background

1.1.1: The Mombasa Special Economic Zone

Since 2013, the Government of the Republic of Kenya has been developing the Mombasa Special Economic Zone as a Flagship Project to the Economic Pillar of Kenya Vision 2030. In 2013, the Ministry of Industrialization and Enterprise Development with support of JICA, undertook a Feasibility Study leading to development of the Master plan for the Mombasa Special Economic Zone which targets the 3006-acre property in Dongo Kundu-Likoni sub-County owned by the Kenya Ports Authority and later gazetted as a Special Economic Zone on 26th July, 2019 under the Special Economic Zones Act of 2015.

In developing the Mombasa Special Economic Zone, the Government targets to attract Foreign Direct Investment in Port related enterprises and in the process create employment and boost export-based revenue thus providing a firm underpin to the local and national economy whose core driving force is poverty reduction. Implementation of the Masterplan however required resolution of land access challenges occasioned by presence of squatters who have settled on and converted the 3006-acre Dongo Kundu property into a rural settlement boasting of 1648 land owners, a resident population totaling 2639 people (579 Households) and 2585 built structures distributed in the six Villages of Dongo Kundu, Mbuta, Mwangala, Kaya Mtongwe, Mrongondoni and Tembo Siji all of which together make the Mbuta Location. The Community also boasts of one Primary School at Mwangala, a Health Center at Mbuta, an Administrative Complex at Dongo Kundu, seven churches, four mosques and fourteen Kayas of which, six are major.

1.1.2: Background to the Mombasa Special Economic Zones Resettlement Site Infrastructure Project (MSEZ-RSIP)

Towards resolution of the squatter problem, a Resettlement Action Plan–RAP was commissioned by the KPA in 2018 and later on validated by the National Land Commission (NLC) in 2020. In their determination, the NLC observed that the MSEZ land belongs to the government and was therefore not eligible for compulsory acquisition, in which case, NLC made provision to only pay compensation for developments to land leaving the government to find a solution to the land issue. A Compensation Policy Framework (CPF) which provides for internal resettlement of the squatters through creation of two resettlement sites within the SEZ was developed by the KPA and later adopted by the government in 2022. Under the Policy, each of the 1648 MSEZ Squatters will be allocated an eighth-acre plot for settlement while the NLC pays compensation for all developments on the land as per the RAP, upon which, they will surrender currently occupied lands for development of the SEZ.

The Compensation Policy Framework was disclosed and extensively discussed with all stakeholders to the MSEZ land, inclusive of sessions with the squatters themselves following which, it was unanimously adopted, thus paving the way for the Kenya Ports Authority to develop and implement the Mombasa Special Economic Zones Resettlement Site Infrastructure Project (MSEZ-RSIP).

1.1.3: About this Report

The Mombasa Special Economic Zones Resettlement Sites and Infrastructure Project (MSEZ-RS&IP) seeks to create and develop a infrastructure in the site set aside for further settlement by PAP who currently claim land within the KPA-owned land targeted for development of the MSEZ.

Towards development of the MSEZ-RSIP, the KPA has retained the services of the State Department of Lands and Physical Planning (SDLPP) to among others identify a 385-acre portion from its 3006-acre property at Dongo Kungu, demarcate and develop a Land Use Advisory Plan to guide utilization if the property including resettlement of PAPs.. Simultaneously, the KPA has retained the services of Nippon Koei to undertake feasibility Study and detailed design for facilities and infrastructure to be provided within the Resettlement Area.

Thus, when complete, the MSEZ-RSIP comprises of a Resettlement Area and basic infrastructure as will be unveiled in Chapter two below. This Project is the subject of the Environmental and Social Impact Assessment (ESIA) Study that was commissioned and conducted in line with Terms of Reference (Appendix 1.1) previously approved by NEMA. This Report highlights salient social and environmental issues associated with the design, construction, and operational aspects of the Project. The Report has been prepared under contract by Lead Experts from Repcon Associates; an Environmental Firm of Experts duly registered and licensed by NEMA (NEMA Registration No. 0002) and other Government of Kenya (GoK) agencies (Appendix 1.2). Profiles of the key staff who undertook the study is presented in the Appendix 1.3.

1.2: Scope of the ESIA Study

1.2.1: Geographical Scope

A full disclosure of the Project is provided in Chapter Two below. The project targets development of a resettlement site on a 468-acre plot to be carved out of the 3006-acre Dongo Kundu Property owned by the KPA. As at the time of writing this report, a Land Use Advisory Plan has been developed by the State Department for lands and Physical Planning.

1.2.2: Legal Scope in the ESIA Study

Conduct of ESIA Studies in Kenya is legally anchored in the Environmental Management and Coordination Act (EMCA) Cap 387 and its 2015 Amendment. Section 58 of EMCA as amended in 2015 requires all projects proposed for implementation in Kenya be subjected to integrated environmental impact assessment as directed by NEMA. The Second Schedule of EMCA as amended by Legal Notice 31 of 30th April 2019 specifies projects that require to be subjected to EIA studies and particularly lists criteria under section 1 (General) as follows:-

(a) an activity out of character with its surrounding;

(b) any structure of a scale not in keeping with its surrounding; and

(c) major changes in land use.

Legal Notice 31 of EMCA categorises large-scale resettlement under High Risk Category Projects, in which case, the proposed MSEZ-RSIP is deemed to require a full cycle Environmental Impact Assessment Study in line with Part III of LN 101 of EMCA. Regulations deemed necessary to this study stipulate as follows:-

- Regulation 11 (1) requires that an environmental impact assessment study shall be conducted in accordance with terms of reference developed during the scoping exercise by the proponent and approved by the Authority.

- Regulation 11 (2) requires that the terms of reference shall include matters required to be considered in the making of an environmental impact assessment as may be contained in the Second Schedule to these Regulations and such other matters as the Director General may in writing require.

- Regulation 12. (1) stipulates that an environmental impact assessment study shall be conducted in accordance with the general environmental impact assessment guidelines and sector environmental impact assessment guidelines set out in the Third Schedule to these Regulations.

- Regulation 13(1) requires that a proponent shall, on the approval of the terms of reference under regulation 11, submit to the Authority the names and qualifications of the impact assessment experts appointed to undertake the environmental impact assessment study and authorized so to do in accordance with section 58 (5) of the Act.

- Regulation 13(2) requires that every environmental impact assessment study shall be carried out by a lead expert qualified in accordance with the criteria of listing of experts specified in the Fourth Schedule to these Regulations.

Regulation 11(1) of Legal Notice 101 of EMCA, the MSEZ-RSIP was scoped following which Terms of Reference were submitted to NEMA for approval. The rest of the study was undertaken in line with standards for full cycle ESIA Studies as regulated by NEMA.

1.2.3: Contractual Scope

Contractual Scope of the ESIA Study is defined by the Study Terms of Reference –TORs (Appendix 1.1) which stipulate two broad Study Tasks as follows:-

Task One- Preparation of ESIA Study

Task 1.1-Carry-out Baseline Survey
Task 1.2-Conduct Alternative Analysis
Task 1.3-Legislative and Regulatory Framework
Task 1.4-Identification and assessment of impacts caused by the proposed activities
Task 1.5-Occupational Health and Safety Concerns
Task 1.6-Development of Management Plan to Mitigate Negative Impacts
Task 1.7-Development of Monitoring Plan
Task 1.8-Identification of Procedures for Closing of the Construction Activities
Task 1.9-Public Consultation and Stakeholder Engagement
Task 1.10-Preparation and Submission of ESIA Report to NEMA

Task 1.11-Conduct Public Disclosure

In sections below, specific approach to the 11 Tasks stipulated for the ESIA Study is unveiled. Chapter Three below provides an exposition of measures taken to ensure conformity with Task 1.3 which requires that the ESIA Study be conducted in line with prevailing Legislative and Regulatory Framework which is deemed to include Kenyan

legislation for environmental management and the JICA Guidelines for Environmental and Social Considerations.

1.2.4: Thematic Scope of the Study

The substantial focus and scope of ESIA Studies is stipulated in the Third Schedule to Legal Notice 101 of EMCA. The following issues may, among others, be considered in the making of environmental impact assessments.

1. Ecological Considerations -

(a) Biological diversity including -
(i) effect of proposal on number, diversity, breeding habits, etc. of wild animals and vegetation;
(ii) gene pool of domesticated plants and animals e.g., monoculture as opposed to wild types.

(b) Sustainable use including -
(i) effect of proposal on soil fertility;
(ii) breeding populations of fish, game or wild animals;
(iii) natural regeneration of woodland and sustainable yield;
(iv) wetland resource degrading or wise use of wetlands; and

(c) Ecosystem maintenance including -
(i) effect of proposal on food chains;
(ii) nutrient cycles;
(iii) aquifer recharge, water run-off rates etc;
(iv) a real extent of habitants; and
(v) fragile ecosystems.

2. Social considerations including -
(a) economic impacts;
(b) social cohesion or disruption;
(c) effect on human health;
(d) immigration or emigration
(e) communication - roads opened up, closed, rerouted
(f) effects on culture and objects of culture value

3. Landscape -
(a) views opened up or closed;
(b) visual impacts (features, removal of vegetation, etc;
(c) compatibility with surrounding area;
(d) amenity opened or closed, e.g recreation possibilities.

4. Land uses -
(a) effects of proposal on current land uses and land use potentials in the project area.
(b) possibility of multiple use.
(c) effects of proposal on surrounding land uses and land use potentials.

5. Water:
Important aspects to consider are the effects of the proposal on:
(a) water sources (quantity and quality):-
(i) rivers;
(ii) springs;
(iii) lakes (natural and man-made);
(iv) underground water;
(v) oceans;

(b) drainage patterns / drainage systems;

In designing the scope of investigations under the ESIA Study for the MSEZ-RSIP, this Third Schedule to EMCA formed a fundamental technical and legal checklist.

1.3: Approach to ESIA Study

Essentially, a full cycle ESIA Study entailed four major stages namely; - Scoping, Detailed Investigations, Public Review and Final Report Stage activities under which are briefly highlighted in sections below.

1.3.1: Scoping Stage

In line with Regulation 11(1) of LN 101 of EMCA, The Mombasa Special Economic Zones Resettlement Project was scoped following which Terms of Reference for this ESIA Study were prepared for review by NEMA. The TORs were thereafter approved vide NEMA TOR 624 thus paving the way for the full cycle ESIA Study to proceed.

1.3.2: Chronology of execution of Detailed ESIA Stage Study Tasks

Activities of the Detailed ESIA Stage followed the Study workplan approved as part of the Scoping Report and entailed the following:-

(i) Review of secondary data and documentation of project interventions

Each intervention proposed under the infrastructure project was analysed and documented in terms of scope, scale, resource requirements including target site. It is the potential interaction between project intervention and prevailing baseline that is likely to occasion adverse impacts.

(ii) Stakeholder Engagement and Public Participation:

Chapter Eight to this ESIA Report provides an in-depth account of the stakeholder engagement process mounted towards securing public participation and informed consent in implementing the Resettlement Process inclusive of the Infrastructure. Stakeholder engagement applied diverse means including entry point meetings with leaders, public Baraza with potentially displaced community, dissemination seminars, Focus Group Discussions with special Interest groups (Widows, widowers, Herbalists, Kaya Elders, Religious Leaders, School going children, Key Informant Interviews with lead Agencies among others.

(iii) Baseline Monitoring Studies:

Baseline survey in the context of ESIA was understood to mean Baseline characterization studies inclusive of Flora and fauna mapping, catchment characterization, climatic data, social mapping among others all aimed at defining the Pre-Project Baseline. Progress was achieved as follows:-

Baseline Socio-economic Survey for PAPs: The baseline survey was conducted in May 2023 and concluded in early June. Data entry and cleaning took place whole of June upon which analysis and write up is slated for July 2023.

Air Quality Monitoring: Eleven sites (Plate 3.1) within Resettlement Area A (8 No) and Resettlement Area B (3 No) were selected and subjected to air quality monitoring. Data analysis and report compilation is ongoing.

Flora and Fauna Mapping: Mapping of vegetation was designed to cover the entire resettlement sites inclusive of the 100m corridor surrounding the settlements. Through the use of a GPS and designated GPS quadrants, (100 by 100m) the experts would establish the GPS points on the actual ground. Under the guidance of the local expert on local plants, he would help the Repcon experts identify the local names of different plants/vegetation within the quadrants followed by processing.

From 6th June, an ornithologist was brought on board to undertake bird counts in the entire MSEZ area but with special emphasis on all unique ecosystems and the sites targeted for resettlement. Bird counts were conducted on 18 sites.

Mapping of Kaya Forests: Preparations for the survey: As part of baseline mapping under ESIA, it was a requirement to conduct a biodiversity mapping exercise within each of the 13 Kayas. Since these Kayas are sacred sites, it was important to follow certain procedures before accessing them. Following this, a meeting was convened with the Kaya elders in order have an understanding on what procedures to follow before and during the mapping exercise. On the day of the survey, the team would meet outside the entrance of the Kaya accompanied by two Kaya elders, Shaban Fugiza and Aula Lago who is the Kaya chairman. The whole team would then be requested by Shaban to take off anything that would disrupt the peace of the spirits. In this case they would take off their hats/cap or watches. The team would then be requested to form a circle where Shaban would pray in Digo and Aula would respond. The prayers were meant to explain to the spirits why the team was there and that they were not there to cause any harm to the species.

After all that was done, the team would then proceed to enter the Kaya. The Kaya elders would lead and the team would follow. Once the team approached the area where the sacrifices were done (centre of the Kaya) Shaban would pray again in order to appease the spirits. Once the data is collected, the whole team would exit the Kaya.

Catchment and climatic characterization: This study firstly employed desktop study to generate secondary data on the climatic potential, topographic and drainage maps, cover vegetation among others and where possible, the data was supplemented by on the ground observations especially on land use and local drainage patterns. Climatic and hydrological modeling was then undertaken to determine the catchment response to storm events and long-term rainfall. Findings provided in summary form in Chapter Four.

(iv) Data analysis and impact prediction

Upon data analysis, potential environmental impacts (both positive and adverse) were predicted based on available tools. The magnitude, significance, and acceptability of predicted impacts were evaluated with a view to determining whether observed adverse impacts are significant enough to warrant mitigation. The potential environmental impacts were described in both quantitative and qualitative terms through application of existing body of knowledge, checklists, flow charts, and monographs and from input from diverse stakeholders. In particular, impact prediction in this study drew heavily on five documents namely:-

- The Third Schedule to Legal Notice 101
- JICA Guidelines for Environmental and Social Considerations (2010)
- The World Bank Safeguard Policies
- The Sectoral checklists for the Water Sector developed by the World Bank;
- The Checklist of Environmental Characteristics developed by the Department of Environmental Affairs of the Republic of South Africa and,
- The Reference Guidelines for Environmental Assessments (which incorporates the Leopold Matrix) developed by USAID / REDSO / WCA–Abidjan.

Impacts were further screened for occurrence and significance of residual (those which cannot be mitigated satisfactorily) and cumulative impacts with a view to providing a basis of making recommendations on the way forward for the project.

(v) Formulation of an Environmental and Social Management Plan

Measures or interventions necessary to minimize, reduce, avoid, or offset identified adverse impacts were evaluated and presented in form of an Impact Mitigation Plan for the proposed development. Such evaluation also included an assessment of Project Alternatives as reported in Chapter Nine below. The ESMP also identified modalities for monitoring and evaluation to ensure compliance in implementation of proposed mitigation measures. This involved development of monitoring indicators and procedures for continuous generation of project monitoring data and information.

(vi) Reporting procedure

The ESIA Study methodology as described above culminated with production of a Draft Environmental and Social Impact Assessment Study Report. The study was formulated in line with Regulation 18 of Legal Notice 101 of EMCA which requires that:-

(1) A proponent shall submit to the Authority, an environmental impact assessment study report incorporating but not limited to the environmental following information:-

i) the proposed location of the project;
ii) a concise description of the national environmental legislative and regulatory framework, baseline information,
iii) and any other relevant information related to the project; the objectives of the project;
iv) the technology, procedures and processes to be used, in the implementation of the project;
v) the materials to be used in the construction and implementation of the project;

vi) the products, by-products and waste generated project;
vii) a description of the potentially affected environment;
viii) the environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated;
ix) alternative technologies and processes available and reasons for preferring the chosen technology and processes;
x) Analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies.
xi) an environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the cost, time frame and responsibility to implement the measures;
xii) provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the cause of carrying out activities or major industrial and other development projects;
xiii) the measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies;
xiv) an identification of gaps in knowledge and uncertainties which were encountered in compiling the information;
xv) an economic and social analysis of the project;
xvi) an indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures; and such other matters as the Authority may require.

1.3.3: The ESIA Study Team

This Environmental and Social Impact Assessment study was undertaken by a multi-disciplinary team bringing together skills as follows:-

- James Kitonga Mutisya-Environmentalist/Team Leader
- Mr. Michael Wairagu- Environmental and Social Safeguards expert
- Richard Nganga- Environmental Chemist
- Joseph Ruhiu Mungai- Flora/Fauna Biodiversity Expert
- Gift Karisa-Taxonomist
- Edwin Obadha-Biometrician
- Monicah Nyang-Socio-economist
- Jediddah Nderitu-Sociologist
- Caroline Wakoigia – Sociologist enterprises
- Alex Mwalimu-Ornithologist

CVs for this Team are attached as Appendix 1.5 to this report.

1.4: Presentation of this Report

This report is (Volume One) presented in Twelve Chapters which integrate the content for ESIA Study Reports as stipulated in Regulation 18 of LN 101. The Chapters have further been lumped in three Sections for ease of handling as follows:-

- Chapter One (this chapter) outlines the background and procedure to the ESIA Study Process;
- Chapter Two provides a description of the project as proposed by KPA;
- Chapter Three reviews relevant policies,
- Chapter Four analysis legal, regulatory and administrative frameworks governing conduct of environmental assessment in Kenya;
- Chapter Five provides the pre-project baseline environment;
- Chapters Six and Seven report on the outcome of empirical characterization based on measurements and studies;
- Chapter Eight reports on the outcome of stakeholder consultations;
- Chapter Nine provides an analysis of alternatives in project development
- Chapter Ten analyses potential impacts of the project;
- Chapter eleven provides the Environmental / Social Management and Monitoring Plan (ESMP) developed for the project; and
- Chapter Twelve provides the conclusion and recommendations of this Environmental and Social Impact Assessment Study.

Volume Two: Appendices to the Study

CHAPTER TWO: PROJECT DESCRIPTION/DISCLOSSURE

2.1: Project Jurisdiction

2.2.1: Project ownership

The Mombasa Special Economic Zones Resettlement Project is an undertaking of the Kenya Government through the Kenya Ports Authority with the support of JICA. For purposes of the ESIA Study, the Kenya Ports Authority is the designated Project Proponent who will provide institutional housing and reference for the ESIA and other relevant Studies. Statutory details of the KPA as a corporate body are attached as Appendix 2.1 to this report.

Other agencies that have legal relevance to the MSEZ Area of Jurisdiction are listed in Table 2.1 below. Their respective legal mandates will be analysed in Chapter Eight below.

Table 2.1: Other Agencies relevant to the MSEZ-RSIP

SN	Institution	Relevance
1.	Kenya Port Authority	Designated Project Owner and Proponent to the ESIA Study
2.	The Special Economic Zones Authority-SEZA	Has legal jurisdiction on account of the MSEZ area being gazetted a Special Economic Zone
3.	NEMA	Environmental Regulator who will police the ESIA Process
4.	National Lands Commission	Will handle and manage compensation to MSEZ Project Affected persons
5.	State Department for Lands and Physical Planning	Has been charged with responsibility of developing the Land Use Advisory Plan for the KPA Property.
6.	County Governments of Mombasa	Has planning jurisdiction over the project area
7.	Ministry of Interior and Coordination of National Government	Have coordination function over all GOK agencies
8.	Road Agencies-KENHA and KURA	Have mandate for management of road such as road to be established in the MSEZ-RSIP

Source: This Study

2.2.2: Administrative jurisdiction

The MSEZ-RSIP is restricted to the KPA owned property in Dongo Kundu which falls under the administrative jurisdiction of the Likoni sub-County of County 001 (Mombasa). Within Likoni, the two villages covered by the proposed Resettlement Area fall under the Mtongwe Ward of Likoni Constituency (Table 2.2).

Table 2.2: Administrative and political jurisdiction of MSEZ-RSIP

SN	Section	Village	Location	Ward	Sub-County/ Constituency	County
1	Resettlement Area A	Dongo Kundu	Bububu	Mtongwe	Likoni	Mombasa
2	Resettlement Area B	Mwangala				

Source: Thus Study

2.2.2: Socio-economic baseline

The People and ancestral history:
The Mombasa South Mainland area in Likoni and beyond is ancestrally a Miji Kenda enclave previously dominated by the Digo Community who are is still deeply entrenched in the area. From timeline analysis studies undertaken as part of this ESIA, the pre-colonial Dongo Kundu (DK) area was inhibited by 20 Digo families who had established permanent settlements long before Mombasa became an urban settlement. Main economic mainstay was fishing and growing of cashewnut and coconut trees dominating the landscape. Legendary Digo families still represented in the area include: Fungiza, Mwakutema, Mwadende, Rashid Mwakulonda, Njao, Mwatsenga, Mwachuphi, Mkanyanya, Mwakilingo, Fatuma, Mwamhunzi among others.

During the colonial era in Kenya which lasted 68 years from 1895 to independence in 1963, the colonial government developed interests in DK area (1950-1963) mainly targeting the lush natural forests and natural fish landing areas.

In 1954 the villagers in DK secretly killed and buried a white lady in Siji Village. This triggered a war between the British and the community. Because the community could not withstand the colonial power, they revealed the identity of the two killers and the burial site out of fear. The identified killers (Mwakilingo and Mwarere) were arrested and hanged by the colonial government. Also hanged was the Siji Village headman for not reporting the killing and burial in his area of administration.

In the same year (1954) after hanging the killers the Colonial government continued brutalizing the community save to the intervention of one influential Arab man named Sir Ali bin Ali who negotiated for a land deal between the colonial government and the oppressed Digo community. Beaconing, fencing and eviction of Digo community in 3006 acres of land by the colonial government were the consequences of the land deal brokered by the Arab leader. The 3006 acres land is the current SEZ land. The evicted families settled at the peripheries of the fenced land.

Between 1954 to 1957: The colonial government rented out the acquired 3006 acres land to two white settlers named John & Becks. The embarked on cutting trees which they burned for charcoal purpose which was by then used as a source of fuel for the ships. The two stayed for 4 years and left having contributed greatly to the deforestation in Dongo Kundu.

Between 1957-1964: After John and Becks came other two settlers, Major Eugas and Roy - Bingle who constructed a farm house in Tembo Siji and a residential house in Dongo Kundu Village. The two capitalized on the good vegetation thus introducing intensive dairy farming in DK area. The two were also tea farmers in Eldoret. They stayed in DK area for 7 years and left after independence.

After Kenya achieved independence in 1964, the Kenya Government rented-out the DK land to a local entrepreneur from the Coast Region who advanced the dairy farming by introducing goat and poultry farming and further brought in electricity to DK land. He left in in 1968 after which, the government did not rent out the land again. During the President Kenyatta administration and in absence of occupation by government agents, people who

were chased away from DK during colonial period and were living in the periphery of the fenced land, went back to the areas they were occupying before eviction to reconstruct their social and cultural life's and were not disturbed.

From 1978, when President Moi came into power, he allowed and encouraged people to go back to DK and cultivate the land as an affront against the 1980 famine that had hit the country. Many people moved to DK area during that period to cultivate land and support food production to enhance community food security.

Realizing that they (the community) have stayed in DK land for over 20 years and KPA had already been awarded the land user rights, in 2000 the people in DK area mobilized money and visited the Ministry of Land in Nairobi to ask the Ministry to issues the land ownership to the communities. Although they were promised to be given the entire Siji village, the government down played the community and did not award any land to the people. In return, the government provided them with a school in Mwangala Village, a health Centre in Mbuta Village and police administrative unit in Dongo Kundu Village. The government further improved road networks within the villages.

Population and settlement patterns:
A detailed social-economic profile for Dongo Kundu (the receiving area) is provided in Chapter Seven below. The 3000 acre property is a rural settlement currently hosting a community of 2792 settlers comprised of 579 Households currently served by an Administrative Compound, the Mbuta Heath Centre, Mwangala Primary and ECDE School, Seven Churches, 4 Mosques and a total of 13 Community Kayas. Other services include a network of three-phase grid power supply, an obsolete water pipeline terminating at Mwangala Primary School, several natural springs and wells among others.

From available information, the resident population of 2792 persons comprises of 579 households resident in the six villages that make the Dongo Kundu Settlement (Table 2.3). Out of these, Dongo Kundu commands the highest tally of people-839 equivalent to 30.1% of the entire population followed by Mbuta at 24.9% and Mwangala at 15.9% respectively. This is the population which will be partly relocated to the Resettlement Areas so as to pave way for development of the Mombasa Special Economic Zone as proposed by the KPA.

Table 2.3: Settlement Patterns in the MSEZ area

Village	**Area (square kilometres)**	**Total households**	**Total Population**	**Share (%)**	**Population Density (pers. km^{-2})**
Dongo Kundu	3.9	165	839	30.1	213.3
Mwangala	2.5	101	445	15.9	180.7
Mbuta	1.8	132	695	24.9	386.8
Kaya Mtongwe	2.1	77	306	11.0	148.5
Mrongondoni	1.0	89	423	15.2	439.3
Siji	0.9	15	84	3.0	92.6
Total	**12.1**	**579**	**2792**	**100**	**230.3**

Source: This Study

In terms of settlement density, Mrongondoni Village which is the second smallest village commanding only one square kilometer area, hosts a huge population of 423 and therefore has the highest settlement density of 439.3 persons per square kilometer in the entire MSEZ

area. Average population density in the MSEZ area is 230.3 persons per square kilometer which is typical of medium density rural settlements.

Population Structure:

From a Baseline Survey conducted as part of this Study (Chapter Six Below) and which is partly summarised in table 2.4 below, it emerged that 59.8% of the population is of Primary School Age and below and when the 14.3% that are of High School going age (14-18yrs) is added, then it emerges that the bulk (74.1%) of the Dongo Kundu Population of 2792 comprises of young people, majority of whom are still dependent. This has huge implication particularly in terms of impact on Education and other youth related services.

Table 2.4: Structure of the Dongo Kundu Population

Village	**Pre-school**		**Primary School**		**High School**		**College**		**None**	**Total**
	In	*Out*	*In*	*Out*	*In*	*Out*	*In*	*Out*		
Dongo Kundu	46	12	210	245	39	49	11	19	208	839
Mwangala	26	5	107	131	26	31	17	22	80	445
Mbuta	47	5	137	177	55	79	15	15	165	695
Kaya Mtongwe	18	4	80	87	17	36	4	6	54	306
Mrongondoni	10	1	131	138	19	33	1	7	83	423
Siji	3	0	20	31	7	7	0	0	16	84
Total	**150**	**27**	**685**	**809**	**163**	**235**	**48**	**69**	**606**	**2792**
Share (%)	5.4	1.0	24.5	29.0	5.8	8.4	1.7	2.5	21.7	100
Share (%)	6.4		53.5		14.2		4.2		21.7	100.0

Key: In-currently enrolled; Out-already completed

Dominant means to livelihood:

From available information (Fig 2.1below), of the 448 households that reside in Dongo Kundu and responded to the livelihoods survey, 356 equivalent to 79.5% rely on employment as the main means to earning a livelihood while another 15.4% are self-employed (probably in trade, fishing, among others) with only 23 respondents- accounting for 5.1% of households identifying farming as their only means to livelihood. While an in-depth analysis of livelihood systems in Dongo Kundu area is provided in Chapter Six below, of special note here is the emergent dominance of employment as the dominant occupation for Dongo Kundu residents with implication that, the same is not likely to be severely impact by change of residence through relocation to the Resettlement Site.

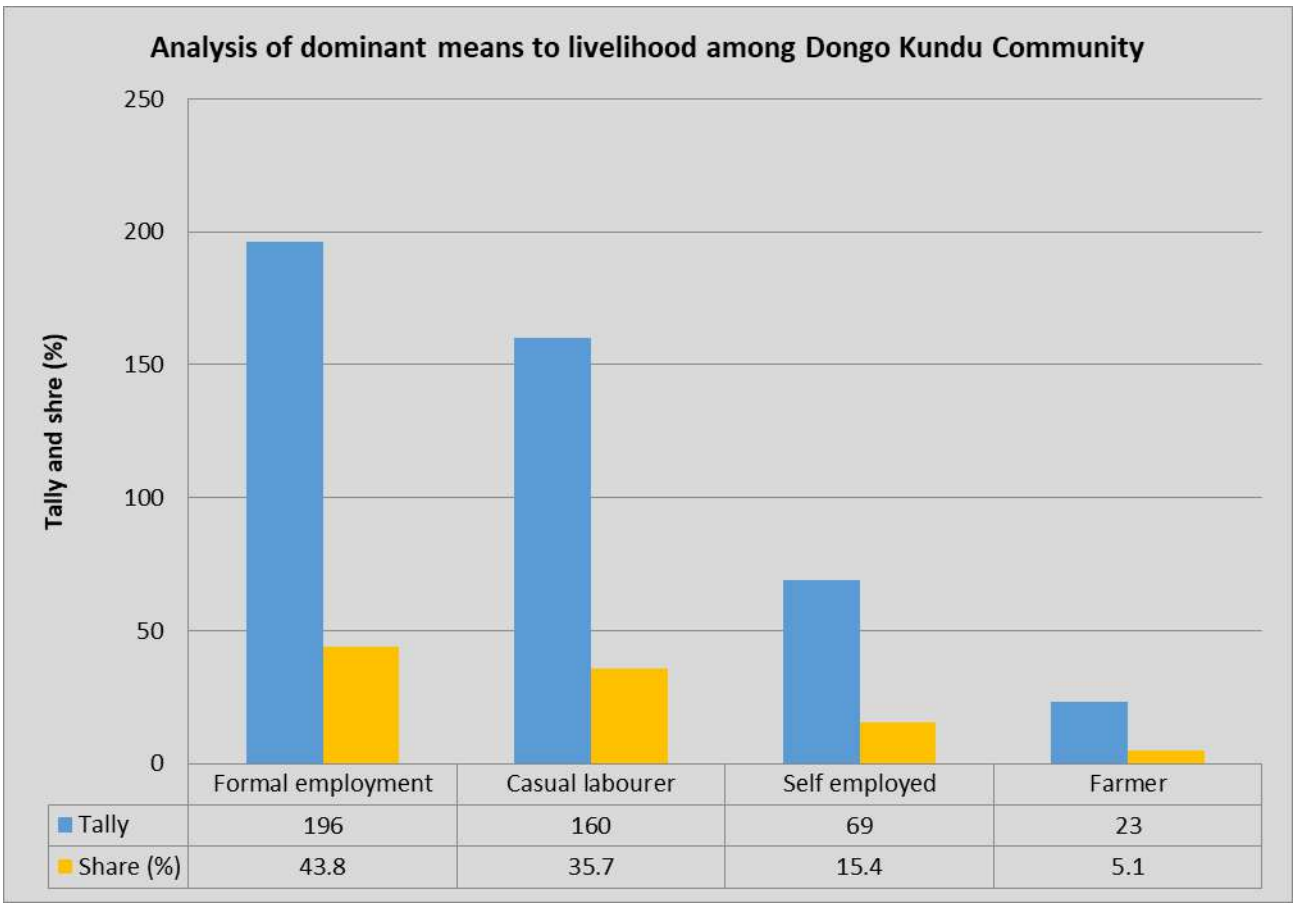


Figure 2.1: Analysis of dominant means to livelihood in the Dongo Kundu Area

Source: This study

2.2.3: Conceptual Framework of the MSEZ-RSIP:

As conceived, the Mombasa Special Economic Zone Resettlement Project unveiled in this Chapter comprises two main components namely:-

1. The Resettlement Site and,
2. The Infrastructure component comprised of facilities to be installed within the Resettlement Area comprises five sub-components listed below whose locations are illustrated in Fig. 2.3.
    - Internal Roads (33.98Km) and Drainage (18.50 Km)
    - Water Supply Infrastructure (Pumping station-1 No., Water transmission pipeline-5.4 Km, and Water Kiosk-5 No.)
    - Health Centre (1 No.)
    - Market (1 No.)
    - Cemetery (2 No.)

Design details for each sub-component are highlighted in sections below.

2.3: The Resettlement Component

2.3.1: Provisions of the Compensation Policy Framework

The Compensation Policy Framework targets to integrate residents into the MSEZ in order to strategically position then as the first line beneficiaries on the development. Thus, under

the CPF, Dongo Kundu residents likely to be affected by the MSEZ will be entitled to a compensation package entailing the following:-

An 1/8 Acre or 1/3 Acre plot for all landowners: Each of the 1624 land owners that will be relocated, are entitled to receive an eighth acre titled plot within a designated area of the MSEZ for purposes of resettlement. Where a PAP is allocated land on slightly sloping ground, they will be entitled to a third acre plot to cushion against losses associated with grading the land and this land allocation comprises the Resettlement Component of the MSEZ-RSIP. In order enable PAPs to easily relocate and establish homes on the new sites, they are entitled to a backup compensation package as follows:-

- *Payment of a transitional allowance of Ksh. 67,500/- for each acre of land surrendered:* This component was introduced as a way of compensating PAPs surrendering bigger plots of land and it is pegged at 10% of the market value of land computed at Ksh 450,000 in 2019 rates.
- *Payment of a Vulnerability Allowance:* All persons deemed vulnerable on account of diverse criteria (old age, orphaned, terminally ill, physically challenged, documented poor, etc) will be entitled to a one off payment of Ksh 10,000 (ten thousand Ksh).
- *Compensation by the NLC for houses, trees, graves and other:* Every property owner will be compensated at .valuation rates to be decided by the National land Commission.
- *Both Mwangala Primary School and Mbuta Health Center to be retained:* Both public institutions will be retained and other new ones created in order to sustain provision of quality service to resettles.
- *Preservation of Kayas:* In recognition of their role as cultural heritage passed down through generations, all 13 Kayas (Fig 2.1) functional within the MSEZ will be retained and preserved intact.
- *Livelihood Support:* At Construction stage, priority job placement will be given to displaced PAPs and the same will be sealed through clauses in the contracts for works. At implementation/ operation stage, to give the priority to work for the port as well as freeport under KPA's authority, and industrial park under SEZA's authority.
- *Livelihood Restoration:* This will entail:-
    - ✓ Compensation for loss of business (income) if the same is not adequately covered by the NLC.
    - ✓ Compensation for Beach Management Units (BMUs).
    - ✓ Relocation assistance (moving cost included in 15% disturbance allowance).
    - ✓ Money Management Training to avoid wasting compensation money.
    - ✓ Vocational training for 1 person/vulnerable household who need to change jobs due to relocation and need a new skill.

Provision of basic infrastructure: Project design includes provision of basic infrastructure to operationalize the Resettlement Sites and this forms the second component of the MSEZ-RSIP as unveiled under section 2.3 below.

2.3.2: Location and Layout of Resettlement sites

Design works to operationalize the Resettlement Project will be undertaken and achieved at three levels namely:-

Design for layout of resettlement areas and facilities: Design of the entire Mombasa Special Economic Zones Resettlement project (MSEZ-RSIP) was executed by the State Department for Lands and Physical Planning (SDLPP) on behalf of the Kenya Ports Authority. Fig 2.1 provides a layout of the Resettlement Sites within the Mombasa Special Economic Zone area as issued and approved by the State Department for Lands and Settlement. The Resettlement Area currently comprises two sites designated Resettlement Area A and Resettlement Area B (Fig 2.1). The numerous clustered polygons in Figs 2.1 and 2.2 represent the eighth and third acre plots already sub-divided for allocation to PAPs numbering 1624 as per the Resettlement Action Plan of 2019.

Detailed Design for infrastructure and facilities: The detailed design for infrastructure and facilities (internal roads and drainage network, market, dispensary, cemeteries, water supply and pump house, water kiosks) was entrusted to a consortia led by Nippon Koei of Japan. Their output is provided in section 2.4 below.

Design of land-use at individual plot level: This will be left to the individual plot owners under direction of the KPA and County Government of Mombasa.

2.3.3: Status of the land targeted for Resettlement

The KPA property at Dongo Kundu comprises 4 pieces of land totalling 1223ha (Table 2.5 and Fig 2.2). The lands targeted for resettlement fall under MSA/MS/Block IV/250 and MSA/MS/Block IV/251. All plots are held on a 99 years lease with effect from 1987.

Table 2.5: Composition of the KPA Property at Dongo Kundu

Land Parcel	Sub-County	Ownership	Area (Ha)	Remarks
MSA/MS/Block IV/247	Likoni	Kenya Ports Authority (KPA)	325.9	99 yrs. lease w.e.f. 1/10/1987 Squatters on the ground
MSA/MS/Block IV/248	Likoni	Kenya Ports Authority (KPA)	16.8	99 yrs. lease w.e.f. 1/10/1987 Squatters on the ground
MSA/MS/Block IV/249	Likoni	Government of Kenya	6.07 Ha	Existing Ministry of Agriculture offices/ Land earmarked for Likoni District Headquarters
MSA/MS/Block IV/250	Likoni	Kenya Ports Authority (KPA)	451.4	99 yrs. lease w.e.f. 1/10/1987 Squatters on the ground
MSA/MS/Block IV/251	Likoni	Kenya Ports Authority (KPA)	422.6	99 yrs. lease w.e.f. 1/10/1987 Squatters on the ground
Total			**1223 ha (2996 acres)**	

Source: This study

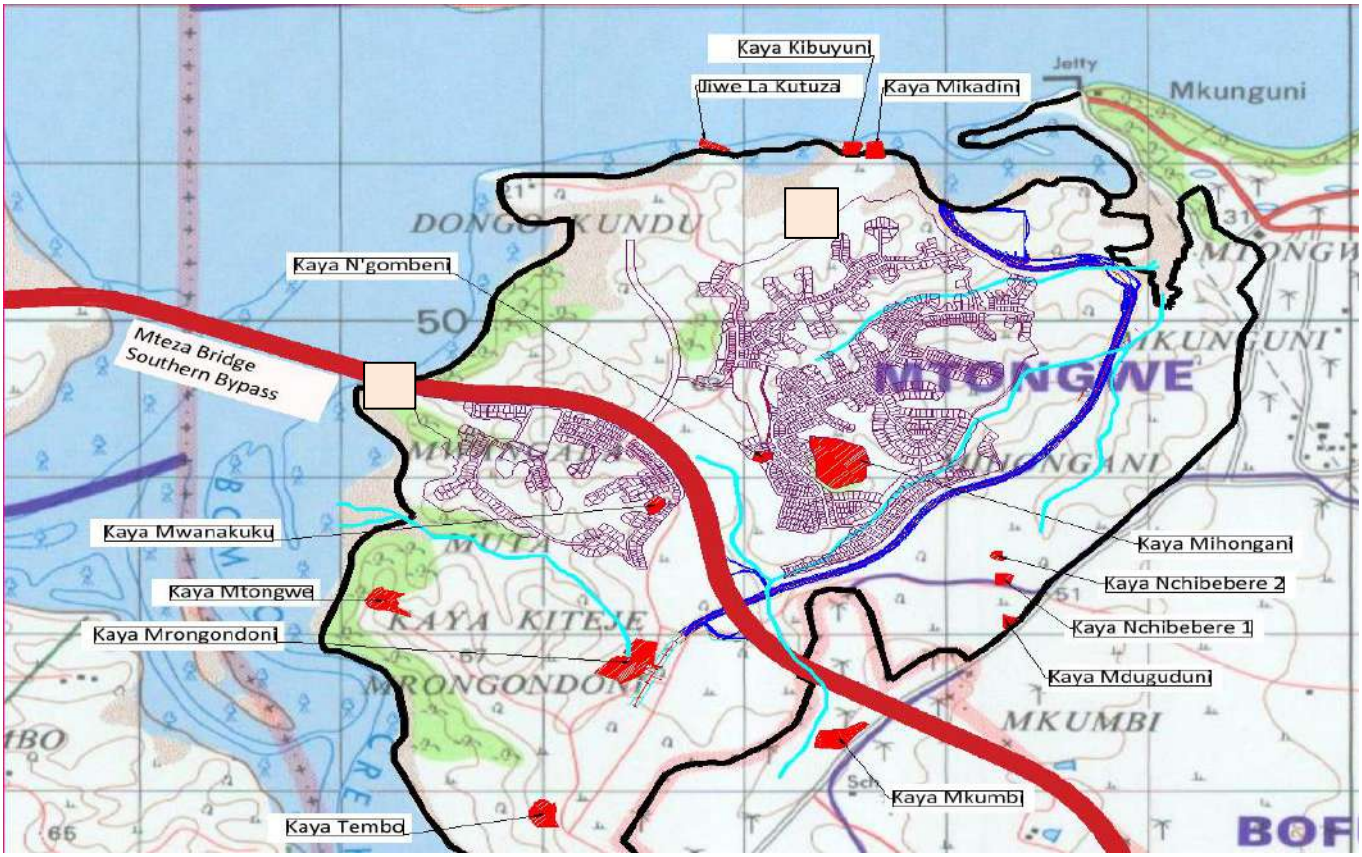


Figure 2.2: Layout of the proposed MSEZ-RSIP within Likoni sub-County

Source: This study

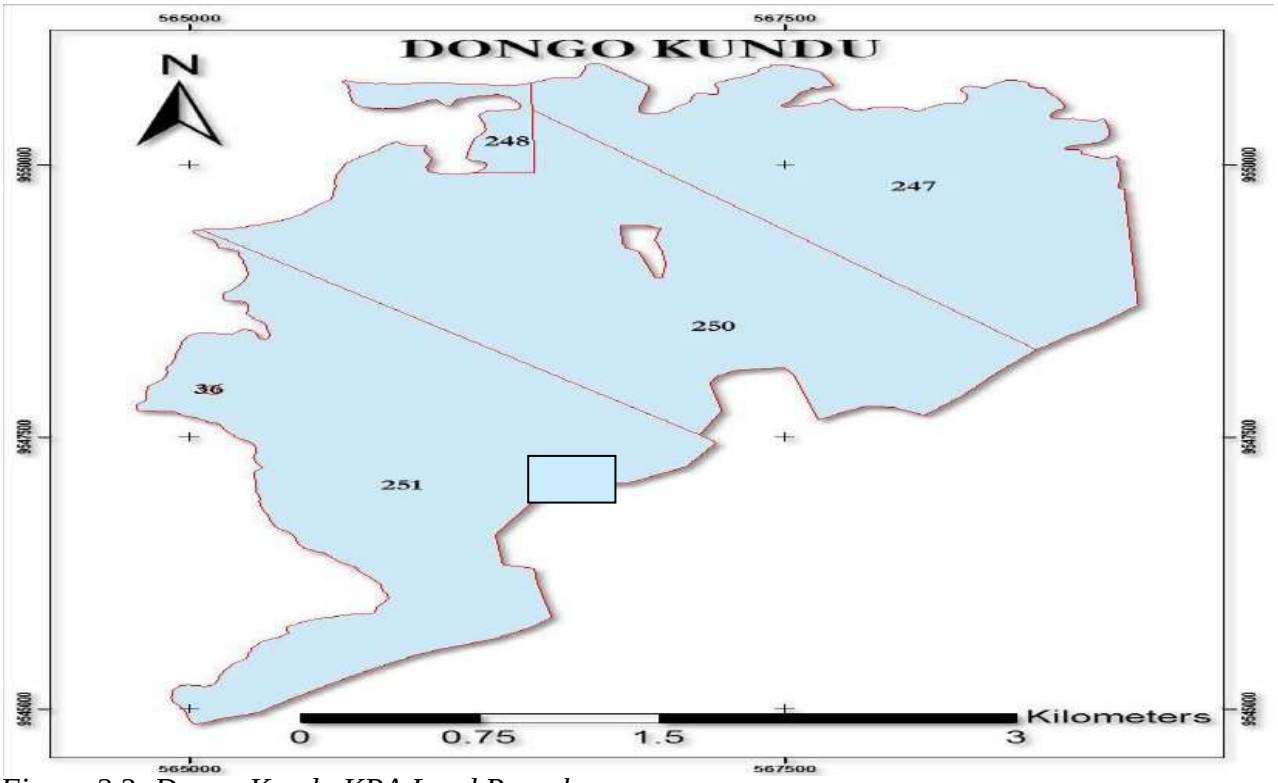


Figure 2.3: Dongo Kundu KPA Land Parcels

Source: This study

2.3.4: Mode of occupation

Relocation to and occupation of plots in the resettlement area follows principles already negotiated and agreed upon with the PAP Community during Public Hearing and dissemination meetings. Details as follows:-

Plots to be allocated through secret balloting:
Allocation of all 1624 plot will be through secret balloting conducted by the State Department for Lands and Physical Planning. The exception to this rule will include:-

- All families already resident within the designate Resettlement areas
- All churches and mosques which will benefit from direct allocation
- All vulnerable persons who instead, will undergo double balloting in order to pick a twin ballot for themselves and designated care givers. The latter will ensure that none of the vulnerable persons are separated from designated care givers.

PAPs to relocate upon issuance of a Title Deed and compensation by the NLC:
Based on consensus already established with potentially affected community, PAPs will only be required to relocate to the Resettlement Area upon receipt of a Title Deed to their allocated Plot and upon payment of compensation due from the National Land Commission. In-spite of such overriding principle, PAPs can make personal arrangements with prospective investors wanting to move in prior to completion of the compensation and land allocation process.

The Notice to Vacate:
A Notice to vacate will be issued to each PAP once the land allocation and requisite compensation have been completed.

Utilization of individual plots will follow guides to be issued by the KPA:
PAPs will be shown their plots publicly to ensure minimum boundary and ownership disputes upon which, every allotee will be required to fence off his boundaries. Each PAP upon taking occupancy of the plot, will then plan their land-use and building plan based on plot utilization and zoning guidelines to be developed by the KPA in consultation with relevant Lead Agencies. Such guidelines will cover important aspects such as recommended location for sanitation facilities, internal storm runoff drainage, procedure in citing and excavating shallow wells, among others. Generally, PAPs are expected to constructed houses that are of better quality than those currently owned.

2.3.5: Construction and occupation of homesteads by PAPs

Nature of structures to be constructed:
The RAP Report of 2019 identified a total of 2585 structures within the MSEZ Area (and Dongo Kundu and the same were validated by the NLC in 2020 paving the way for processing of compensation. Assuming that the NLC pays compensation for the structures as tallied (Table 2.6), the expectation is that the landscape will be dotted by 1,705 semi-permanent and temporary structures, 415 permanent structures and another 465 non-descript

structures constructed by PAPs seeking to re-establish their dwellings. Indeed, granted that each of the 1624 plots will now be required to build a toilet where previously none existed, the number of structures to be built is likely to be very high. However, it should be noted that reconstruction of dwellings is sorely an affair of the PAPs other than the Project.

Table 2.6: Breakdown of structures by nature of build

SN	Villages	Permanent Buildings	Semi-permanent buildings[1]	Temporary Buildings	Other Structures	Total	Share (%)
1	Dongo Kundu	107	234	184	137	662	25.6
2	Mwangala	130	227	133	82	572	22.1
3	Mrongondoni	65	139	97	54	355	13.7
4	Kaya Mtongwe	11	158	126	30	325	12.6
5	Mbuta	89	183	162	135	569	22.0
6	Siji	13	32	30	27	102	3.9
	Total	**415**	**973**	**732**	**465**	**2585**	**100.0**
	Share (%)	*16.1*	*37.6*	*28.3*	*18.0*	*100.0*	

Source: This Study

Nature and quantities of materials required in housing construction:

Appendix 2.1 provides an analysis of materials to be required in the reconstruction of 2585 PAP dwellings in the Resettlement Sites while a summation of environmental resources to be consumed in the process provided in Table 2.7 below. Clearly, very huge quantities of forest resources, water, and earth among others require to be mobilized in reconstruction and an analysis of potential impacts is provided Chapter Nine below.

2.3.6: Decommissioning of current livelihood systems

Decommissioning of current homesteads and dwellings:

All 2585 structures that comprise the current dwellings of Dongo Kundu residents will require to be demolishing and removing as people move to resettlement in the new sites. Also to be demolished are churches which have been reallocated plots in the resettlement area and in the process, ruble will be generated some of which (stones, concrete debris, iron sheets etc) will be recovered while others such as plastering earth and thatch will remain behind as waste. Other decommissioned facilities such as pit latrines will remain as gaping openings on the earth's surface with known hazards to both people and livestock.

Table 2.7: Natural resources required in reconstruction of MSEZ PAPs dwellings

Item	Unit	Quantity	Forest resource equivalent		
			Vol (m^3)	Stems	Forest area (Ha)
Stones	Lorry	5188			
Sand	Lorry	1660			
Ballast	Lorries	1660			
Water	10m^3 reservoirs	499			
Walling Mud	Lorry	2919			

[1] For purposes of the 2019 RAP, a semi-permanent structure as one with mud wall, GI roof, earthen and screed floor while a temporary structure has thatched roof with mud or thatched wall.

Wooden doors	Pc	1245	53	44	0
Door Frames	Rft	4164	74	61	0
2x2 Timber		1037500	816	680	1
3x2 Timber		622500	734	612	1
6x2 Timber		373500	881	734	1
Poles	Pc	194600		48650	30
Rafters	Pc	219600		54900	34
Doors	Pcs	2919	49	41	0
2X2 Timber	Rft	2432500	1913	1594	3
3x2 Timber	Rft	1459500	1722	1435	3
6x4 Timber	Rft	875700	2066	1722	3
Poles	Pc	146400		36600	69
Rafters	Pcs	219600		54900	104
Sticks	bundle	10980			7
Boriti	Pcs	29280		7320	5
Thatch	bundle	29280			
Totals				**209, 294**	**263**

Source: This Study

Decommissioning of basic infrastructure:

Both the Mwangala and Dongo Kundu Villages targeted for resettlement are served by murram roads and grip electric power transmitted by power lines aligned to the current roads. According to the Land Use Advisory Plan prepared to guide resettlement at Dongo Kundu, entirely new road corridors have been earmarked implying that current roads will be abandoned and issued to PAPs as plots. By the same breath, all power lines aligned to the existing roads will require realigning to conform to the new public reserves. Any decommissioned road pavement reallocated as a plot to PAPs will pose huge challenges in utilization on accounted of the limited options. Indeed, such surface may be entirely unsuitable for cropping and will require heavy investment even in excavation for construction.

Decommissioning of farm-based livelihoods:

Residents of both Dongo Kundu and Mwangala villages currently involved in farming and livestock keeping will be required to give up such farming as their lands are reallocated to other settlers. Such decommissioning will pose challenges as crop farmers may find it difficult to part with economic tree crops while owners of the 700 plus livestock will immediately start grappling with challenges of housing and grazing for their animals. The probability of conflict ensuing between settlers and the host community over access to and control of resources is quite real.

Decommissioning of graves:

As at time of the 2019 RAP Inventory, there were a total of 188 graves within the Dongo Kundu area and the tally keeps on growing, given the inevitable. And though the RAP Process will entail compensation for all declared graves, PAPs relocating to the new sites are likely to face challenges leaving behind graves of departed loved ones. Some PAPs have demanded that graves be relocated to the new identified cemetery area.

Decommissioning of ethno-botanical enterprises and services:
A Baseline Mapping Survey recently undertaken for Dongo Kundu under auspices of this ESIA Study un-earthed a deeply entrenched culture of reliance on alternative medicine with a total of 36 practitioners turning up for a one day seminar. Most practitioners admitted to practicing within auspices of ancient indigenous groves called Mibuyu (Baobab groves) where their resource base is domiciled and where therefore, they meet and attend to clients. Herbalists talked to in this study expressed potential difficulty in decommissioning their practices on account of inability to relocate the Mbuyu. Others are worried that customers may in future shy off from approaching them once relocated to the congested and largely open resettlement sites.

2.3.7: Establishing and moving-on in the new settlement

Once PAPs are resettled in the new sites, they will have to learn and get accustomed to life in an entirely new environment and surroundings. In other words, relocated PAPs will have to adapt to changed lifestyles and ways of getting along. Highlights as follows:-

Adaptation to life with new neighbours:
On account of plot allocation through random balloting, PAPs are likely to lose their current neighbours with whom they have co-existed for prolonged periods of time, some even stretching to over 60years. Such PAPs will therefore have to lean to adapt to the new neighbours and their styles of living and may require capacity building to cope with challenges associated with diversity.

Adaptation to life in a confined plot:
The practice of fencing out property or homesteads is not common in Dongo Kundu where residents are generally observed to live openly with no clear physical delineation of the homestead boundary. However, upon relocation to the resettlement area, each allotee will be required to fence out their boundaries so as to forestall disputes and for ease of identification and in the process, will effectively cut themselves off from the rest of the world in an entirely new experience. Henceforth, all personal and family activities will be restricted to within their plot which is quite contrary to current practices.

Adaptation to new routes of access to services and supply lines:
Relocation will bring change in the way PAPs access facilities such as water supply, sanitation, goods and services, churches and mosques etc in which case, they (PAPs) will require adjusting. PAPs will require identifying new water sources, new sources of firewood, and new routes to the market, new churches, new mosques and the new cemetery in case of need.

School-going children will require adapting and changing:
Majority (72%) of children in Dongo Kundu attend Mwangala Primary with some especially those in Mbuta Village attending Bububu Primary School while those in Siji attend both Mkumbi and Kiteje Primary schools located across the border in Kwale County. Upon relocation to the Resettlement Sites, all children will possibly require to transfer to Mwangala Primary School and will henceforth have to learn and get accustomed to new

routes of getting to school, adjust to a new school including acquiring new uniforms, among others. Such children will also have to discover new ways of performing their household chores including fetching water and firewood; discover new shops and markets, new churches, madrassa and mosques among others.

The physically challenged and infirm will need to adapt to change:
The Dongo Kundu area has a total of 256 Physically Challenged Persons (PCPs). The latter category of PAPs normally survives on the goodwill of others especially family and neighbours given their limited capacity to get along on their own. Such individuals take comfort in being able to reach and be reached by their network of caregivers especially neighbours who are normally the first line of response.

Physical relocation to new surrounding is likely to re-orient PCPs who are also likely to lose their support networks and will therefore have to adapt to new neighborhoods and re-establish networks of first-line caregivers. More pertinently, such persons will require developing new means for accessing services such as sanitation, medicare among others as part of settling down in the new dwellings. The entire process of relocation for PCPs therefore becomes a critical stage requiring very intense monitoring by all concerned Agencies.

Domestic animals too will require to adopt change:
The process of period of transition is also likely to disorient domestic animals some of which are known to master their surroundings to the point of getting along on their own. With massive relocation as proposed for the MSEZ-RSIP, domestic animals are likely to lose orientation and may face difficulties finding their way around. Specifically, all the 9730 plus domestic animals currently found in Dongo Kundu (Table 2.8) inclusive of 2254 sheep and goats , 656 cows, 495 cats and 210 dogs are likely to wreak havoc if left to roam around the resettlement sites unattended. Thus, part of resettlement process will include careful management of domestic animals so as to avoid disputes.

Table 2.8: Tally of domestic animals found in the MSEZ (Dongo Kundu) Area

Village	**Cattle (No)**	**Sheep and goats (No)**	**Poultry (No)**	**Pigs (No)**	**Donkeys (No)**	**Dogs (No)**	**Cats (No)**	**Total Animals**	**Share (%)**
Dongo Kundu	202	623	1043	0	17	57	94	2036	20.9
Mwangala	110	565	1392	0	0	57	89	2213	22.7
Mbuta	179	281	1826	25	0	35	134	2480	25.5
Kaya Mtongwe	31	451	701	0	1	37	87	1308	13.4
Mrongondoni	88	206	956	0	0	14	75	1339	13.8
Siji	46	128	154	0	0	10	16	354	3.6
Total	656	2254	6072	25	18	210	495	9730	100.0
Share (%)	*6.7*	*23.2*	*62.4*	*0.3*	*0.2*	*2.2*	*5.1*		

Source: This Study

Social groups and networks may need to reorganize:
As at the time of inventory for the 2029 RAP Study, a total of 20 social network groups were identified within the Dongo Kundu Area (Table 2.9), all based in different villages. As part of settling down, the diverse groups will require to re-strategize, regroup and devise new ways of doing things including venue for meetings among others.

Table 2.9: Village level groups active in Dongo Kundu

SN	Group Name	Village	Male	Female	Total
1	Dongo Creek Transformation Self Help Group	Dongo Kundu	5	12	17
2	Dongo Kundu Kuku Kienyeji Self Help Group	Dongo Kundu	6	8	14
3	Dongo Kundu Fishermen Group	Dongo Kundu	52	23	75
4	Wambu Self Help Group	Dongo Kundu	16	8	24
5	Wave of Coast Women Group	Dongo Kundu	0	12	12
6	Mwangala Mazingira Self Help Group	Mwangala	3	25	28
7	Mwangala Beach Management Unit	Mwangala	216	186	402
8	Umoja Wa Wazee ni Nguvu	Mwangala	38	0	38
9	Neemani Self Help Group	Mwangala	14	16	30
10	Mwangala Makinika Women Group	Mwangala	0	11	11
11	Coast Sea Defenders Self Help Group	Mrongondoni	19	33	52
12	Mrongondoni Bidii Water Project	Mrongondoni	14	6	20
13	Tushirikiane Mrongondoni Women Group	Mrongondoni	0	15	15
14	Kaya Mtongwe Environmental Group	Kaya Mtongwe	7	5	12
15	Kaya Mtongwe Women Group	Kaya Mtongwe	0	15	15
16	Jitenge Mbuta Women Group	Mbuta	0	15	15
17	Hulamkeni Mbuta Women Group	Mbuta	0	11	11
18	Mbuta Mazingira Conservation (MMC)	Mbuta	6	11	17
19	Nashukuru Women Group	Mbuta	0	20	20
20	Magoda Community Development Group	Mbuta	6	6	12
	Total		**402**	**438**	**840**

Source: This Study

A new administrative set-up will be put in place:
The Mombasa Special Economic Zones Area is currently administered through the six villages of Dongo Kundu, Mwangala, Mrongodoni, Mbuta and Kaya Mtongwe which fall under the Bububu Location of Likoni Sub County while, and Tembo/Siji-the sixth Village is administered from Kiteje sub-location of Ngombeni Location of Kwale County. While the first four villages vote under the Mtongwe Ward of Likoni Constituency, Tembo/Siji votes under the Waa ward of Matuga Constituency.

Each of the six geo-political villages are administered through a government appointed Village Elder who coordinates activity and mobilization on behalf of the government and who is therefore the Chief's focal point for all government-related issues. Though Village

Elders are not on government payroll, they none-the-less benefit from recognition and any levies paid in compensation for their time and engagement; which they stand to lose once the position is lost.

Once PAPs are however reallocated plots within the Resettlement Areas through secret balloting, the geopolitical setup of six villages will automatically lapse and the village elders will be rendered irrelevant which will occasion the need to reorganize the administrative setup afresh. The same will apply for voter registration for the Tembo/Siji voters.

Some churches will fold up and re-establish elsewhere:
Out of seven churches recorded in the MSEZ area during the 2019 inventory, five (5) are located within the Resettlement Area and will therefore not require relocation. However two churches fall outside and will therefore be folding up operations in the current sites so as to relocate to new sites as already balloted. Dongo Kundu churches have tendency to draw membership from their immediate neighborhood in which case, dispersal of both the church and congregants through secret balloting will completely dismember the existing congregation. Such churches will therefore have to restart and probably attract new congregations.

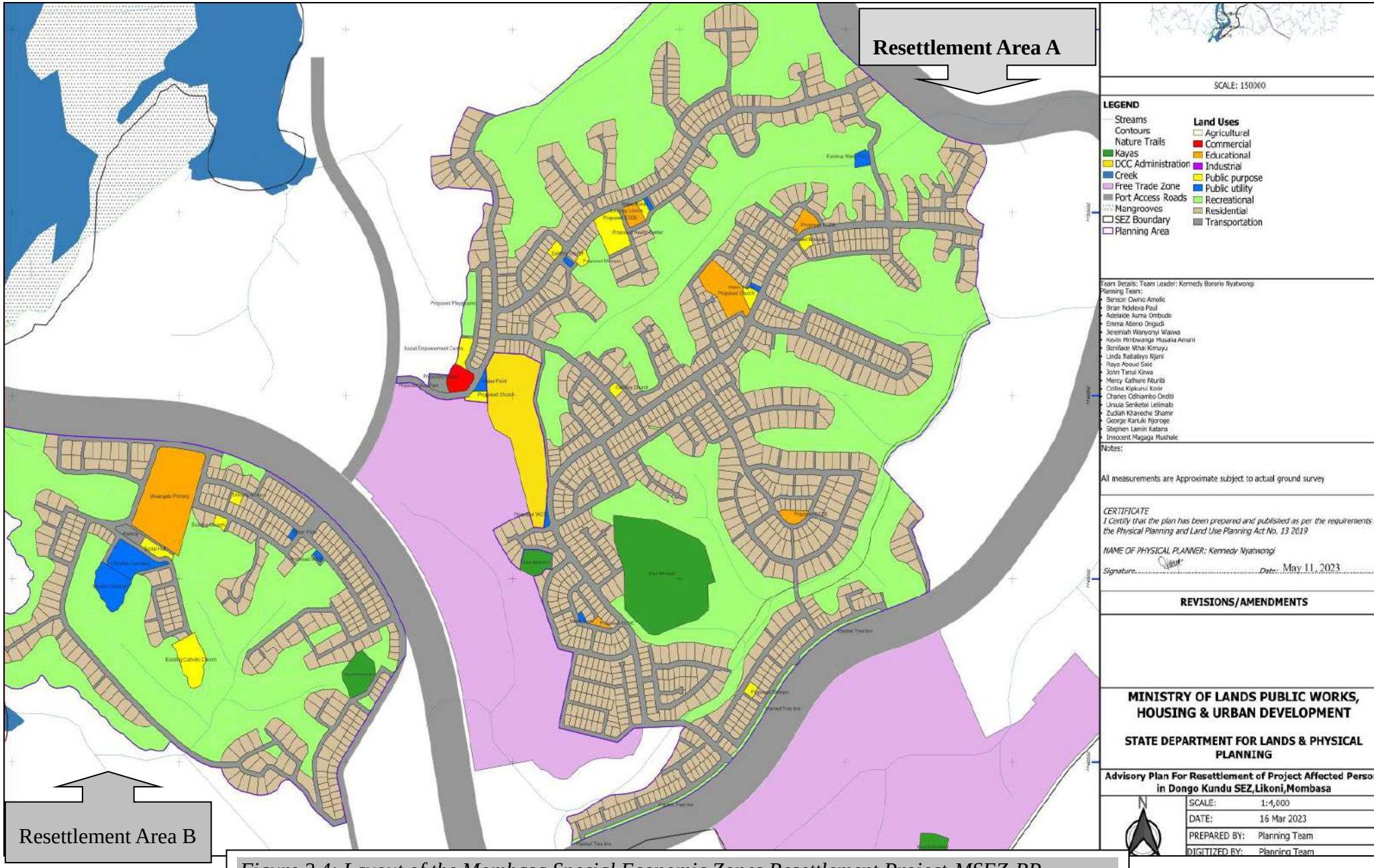


Figure 2.4: Layout of the Mombasa Special Economic Zones Resettlement Project-MSEZ-RP
Source: State Department of Land and Physical Planning

2.4: Internal (Gravel) Roads and Drainage Sub component

2.4.1: Internal Roads

Target standard:

The entire MSEZ area is currently served by the newly constructed Mombasa Southern Bypass Road which traverses the property. From the Bypass Road, the MSEZ is currently accessed through a network of murram and earth grade roads (Plate 2.1) feeding into the Bypass. The Internal Roads Component seeks to upgrade and expand the existing network of access roads to an all-weather murram grade standard.

Plate 2.1: The murram surface access road to MSEZ will be upgraded to better grade murram standard

Source: This Study

Size distribution

A closely knit network of internal roads has been designed to provide access to all the 1624 plots and other facilities which make the MSEZ-RSIP. A total of 131 interconnected roads ranging in size (ROW) from 40m, 18m, 15m, 12m, 9m and 6m and totalling 33.97 Km (Fig 2.3 and Table 2.10) will be developed. All roads proposed are rural and therefore fall under the Rural Roads Category which, in future will be named and classified at the discretion of the County Government of Mombasa. For now, the roads are only labelled RD A or RD B depending on the target resettlement site. Thus, 91 roads totalling 24.1 Km fall under resettlement area A-Dongo Kundu with the other 40 roads totalling 9.9Km falling under Resettlement Area B-Mwangala.

Figs. 2.5/2.6 and Table 2.10 below provide the general layout and distribution of the 131 roads proposed for development in the MSEZ-RSIP. All roads are very small in size, ranging from 43.3metres for RD-B37 to 2.64 Km for RD-A13. Indeed, with the exception of 12 roads (Fig 2.3), all others are below 500m length and only 43 exceed a length of 250m. In Fig 2.4, target roads are shaded red, green, yellow, blue, brown and clear to signify ROW (road reserve) width categories of 40, 19, 15, 12, 9 and 6 metres respectively. In terms of distribution, the ROW categories of 12, 15 and 18 metres are the majority accounting for 28.02 Km equivalent to 82.5% of the total road length of 33.97 kilometres.

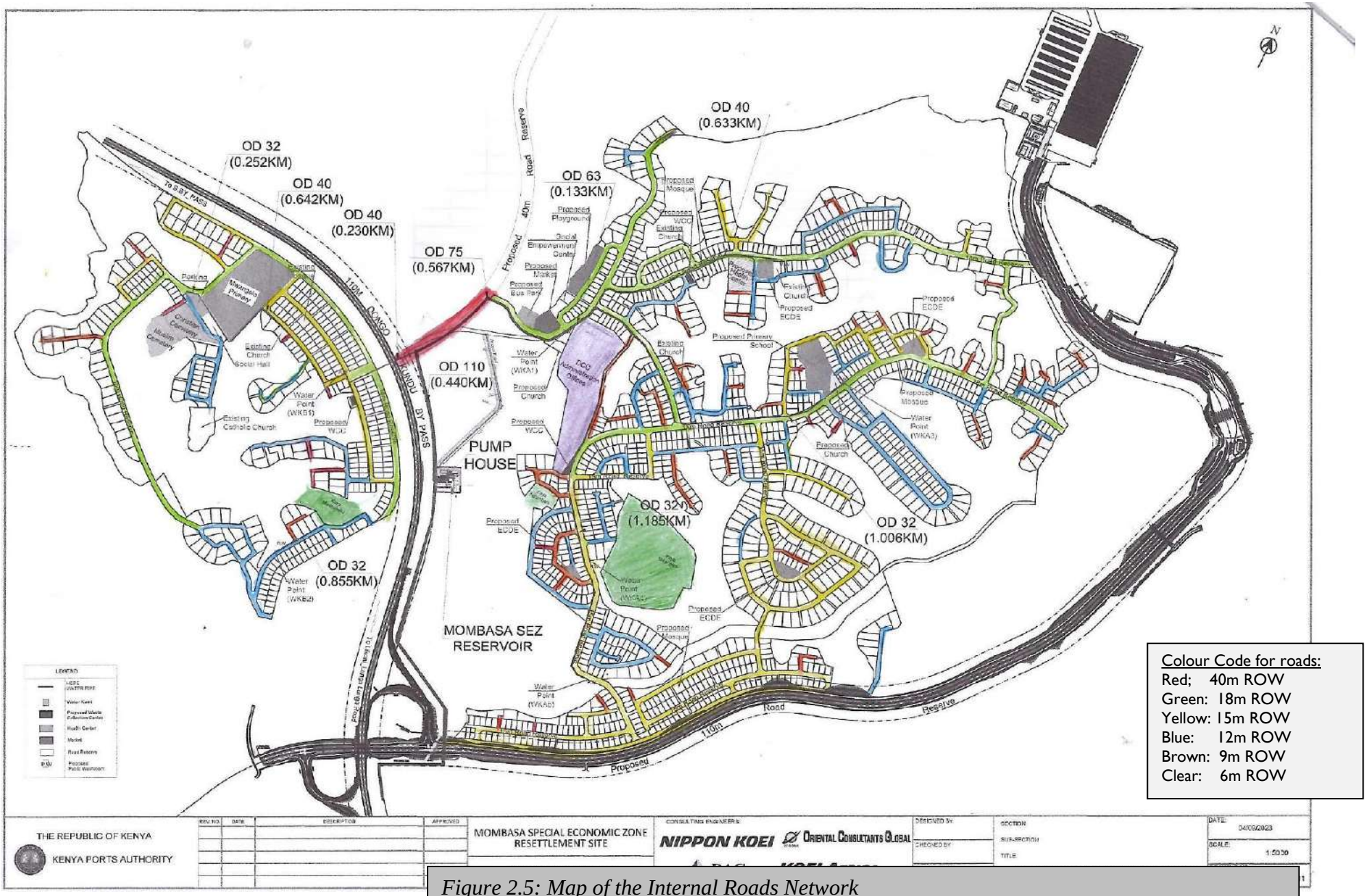


Figure 2.5: Map of the Internal Roads Network
Source: Nippon Koei- Design Team

Table 2.10: Summary data for the MSEZ-RSIP Internal Roads

SN	Road Name	Start Station	End Station	Length		SN	Road Name	Start Station	End Station	Length
1.	RD- A1	0+000.00	0+705.662	705.7		68.	RD- A68	0+000.00	0+100.926	100.9
2.	RD- A2	0+000.00	0+486.863	486.9		69.	RD- A69	0+000.00	0+081.836	81.8
3.	RD- A3	0+000.00	1+374.957	1,375.0		70.	RD- A70	0+000.00	0+053.461	53.5
4.	RD- A4	0+000.00	0+357.876	357.9		71.	RD- A71	0+000.00	0.084.300	84.3
5.	RD- A5	0+000.00	1+052.553	1,052.6		72.	RD- A72	0+000.00	0+088.381	88.4
6.	RD- A6	0+000.00	0+288.971	289		73.	RD- A73	0+000.00	0+047.788	47.8
7.	RD- A7	0+000.00	0+200.207	200.2		74.	RD- A74	0+000.00	0+065.751	65.8
8.	RD- A8	0+000.00	0+448.745	448.7		75.	RD- A75	0+000.00	0+128.542	128.5
9.	RD- A9	0+000.00	0+271.436	271.4		76.	RD- A76	0+000.00	0.095.011	95
10.	RD- A10	0+000.00	0+422.764	422.8		77.	RD- A77	0+000.00	0+103.947	103.9
11.	RD- A11	0+000.00	0+273.914	273.9		78.	RD- A78	0+000.00	0+095.280	95.3
12.	RD- A12	0+000.00	0+289.029	289		79.	RD- A79	0+000.00	0.098.194	98.2
13.	RD- A13	0+000.00	2+636.417	2,636.4		80.	RD- A80	0+000.00	0+100.482	100.5
14.	RD- A14	0+000.00	0+466.787	466.8		81.	RD- A81	0+000.00	0+151.664	151.7
15.	RD- A15	0+000.00	0+239.924	239.9		82.	RD- A82	0+000.00	0.064.066	64.1
16.	RD- A16	0+000.00	0+941.049	941		83.	RD- A83	0+000.00	0+495.982	496
17.	RD- A17	0+000.00	0+710.050	710.1		84.	RD- A84	0+000.00	0+073.271	73.3
18.	RD- A18	0+000.00	0+993.359	993.4		85.	RD- A85	0+000.00	0+218.792	218.8
19.	RD- A19	0+000.00	0+381.296	381.3		86.	RD- A86	0+000.00	0+498.542	498.5
20.	RD- A20	0+000.00	0+343.035	343		87.	RD- A87	0+000.00	0+630.447	630.4
21.	RD- A21	0+000.00	0+161.520	161.5		88.	RD- A88	0+000.00	0+099.215	99.2
22.	RD- A22	0+000.00	0+254.037	254		89.	RD- A89	0+000.00	0+087.519	87.5
23.	RD- A23	0+000.00	0+518.349	518.3		90.	RD- A90	0+000.00	0+081.133	81.1
24.	RD- A24	0+000.00	0+300.865	300.9		91.	RD- A91	0+000.00	0+086.301	86.3
25.	RD- A25	0+000.00	0+182.054	182.1		Sub-total (m)				24,103.8
26.	RD- A26	0+000.00	0+140.431	140.4		92.	RD- B1	0+000.00	1+806.714	1,806.70
27.	RD- A27	0+000.00	0+070.31	70.3		93.	RD- B2	0+000.00	0+678.543	678.5

SN	Road Name	Start Station	End Station	Length		SN	Road Name	Start Station	End Station	Length
			5							
28.	RD- A28	0+000.00	0.092.360	92.4		94.	RD- B3	0+000.00	0+459.919	459.9
29.	RD- A29	0+000.00	0+134.348	134.3		95.	RD- B4	0+000.00	0+508.312	508.3
30.	RD- A30	0+000.00	0+099.820	99.8		96.	RD- B5	0+000.00	0.117.214	117.2
31.	RD- A31	0+000.00	0+279.095	279.1		97.	RD- B6	0+000.00	0+407.649	407.6
32.	RD- A32	0+000.00	0+311.671	311.7		98.	RD- B7	0+000.00	0+268.384	268.4
33.	RD- A33	0+000.00	0+077.219	77.2		99.	RD- B8	0+000.00	0+974.260	974.3
34.	RD- A34	0+000.00	0+074.261	74.3		100	RD- B9	0+000.00	0+067.860	67.9
35.	RD- A35	0+000.00	0+064.439	64.4		101	RD- B10	0+000.00	0+152.786	152.8
36.	RD- A36	0+000.00	0.101.457	101.5		102	RD- B11	0+000.00	0+154.871	154.9
37.	RD- A37	0+000.00	0+154.468	154.5		103	RD- B12	0+000.00	0+061.213	61.2
38.	RD- A38	0+000.00	0+045.00	45		10 4	RD- B13	0+000.00	0+078.692	78.7
39.	RD- A39	0+000.00	0+217.739	217.7		105.	RD- B14	0+000.00	0+077.319	77.3
40.	RD- A40	0+000.00	0+117.499	117.5		106	RD- B15	0+000.00	0+347.952	348
41.	RD- A41	0+000.00	0+160.610	160.6		107	RD- B16	0+000.00	0+078.126	78.1
42.	RD- A42	0+000.00	0+074.996	75		108.	RD- B17	0+000.00	0+074.350	74.4
43.	RD- A43	0+000.00	0+075.00	75		109	RD- B18	0+000.00	0+077.946	77.9
44.	RD- A44	0+000.00	0+184.800	184.8		110	RD- B19	0+000.00	0+152.584	152.6
45.	RD- A45	0+000.00	0+175.010	175		111.	RD- B20	0+000.00	0.242.278	242.3
46.	RD- A46	0+000.00	0+371.186	371.2		112.	RD- B21	0+000.00	0+035.870	35.9
47.	RD- A47	0+000.00	0+240.577	240.6		113.	RD- B22	0+000.00	0+074.697	74.7
48.	RD- A48	0+000.00	0+121.733	121.7		114.	RD- B23	0+000.00	0+0629.745	629.7
49.	RD- A49	0+000.00	0+227.574	227.6		115.	RD- B24	0+000.00	0+099.167	99.2
50.	RD- A50	0+000.00	0+196.620	196.6		116.	RD- B25	0+000.00	0+093.022	93
51.	RD- A51	0+000.00	0+386.813	386.8		117.	RD- B26	0+000.00	0+344.743	344.7
52.	RD- A52	0+000.00	0+046.254	46.3		118.	RD- B27	0+000.00	0+094.581	94.6
53.	RD- A53	0+000.00	0+233.411	233.4		119.	RD- B28	0+000.00	0+197.273	197.3
54.	RD- A54	0+000.00	0+273.489	273.5		120.	RD- B29	0+000.00	0+167.257	167.3

SN	Road Name	Start Station	End Station	Length		SN	Road Name	Start Station	End Station	Length
55.	RD- A55	0+000.00	0+072.812	72.8		121.	RD-B30	0+000.00	0+419+176	419.2
56.	RD- A56	0+000.00	0+054.040	54		122.	RD-B31	0+000.00	0+088.651	88.7
57.	RD- A57	0+000.00	0+131.327	131.3		123.	RD-B32	0+000.00	0+054.929	54.9
58.	RD- A58	0+000.00	0+110.531	110.5		124.	RD-B33	0+000.00	0+0104666	104.7
59.	RD- A59	0+000.00	0+080.684	80.7		125.	RD-B34	0+000.00	0+265.505	265.5
60.	RD- A60	0+000.00	0+124.383	124.4		126.	RD-B35	0+000.00	0+046.686	46.7
61.	RD- A61	0+000.00	0+098.585	98.6		127.	RD-B36	0+000.00	0+059.084	59.1
62.	RD- A62	0+000.00	0+133.788	133.8		128.	RD-B37	0+000.00	0+042.254	42.3
63.	RD- A63	0+000.00	0.094.407	94.4		129.	RD-B38	0+000.00	0+078.722	78.7
64.	RD- A64	0+000.00	0+100.239	100.2		130.	RD-B39	0+000.00	0+078.234	78.2
65.	RD- A65	0+000.00	0+128.812	128.8		131.	RD-B40	0+000.00	0+058.832	58.8
66.	RD- A66	0+000.00	0+094.495	94.5		132.	RD-B41	0+000.00	0+046.946	46.9
67.	RD- A67	0+000.00	0+198.907	198.9		Sub Total (m)				9,867.0
						Gross Total (m)				33,971.0

Source: Nippon Koei- Design Team

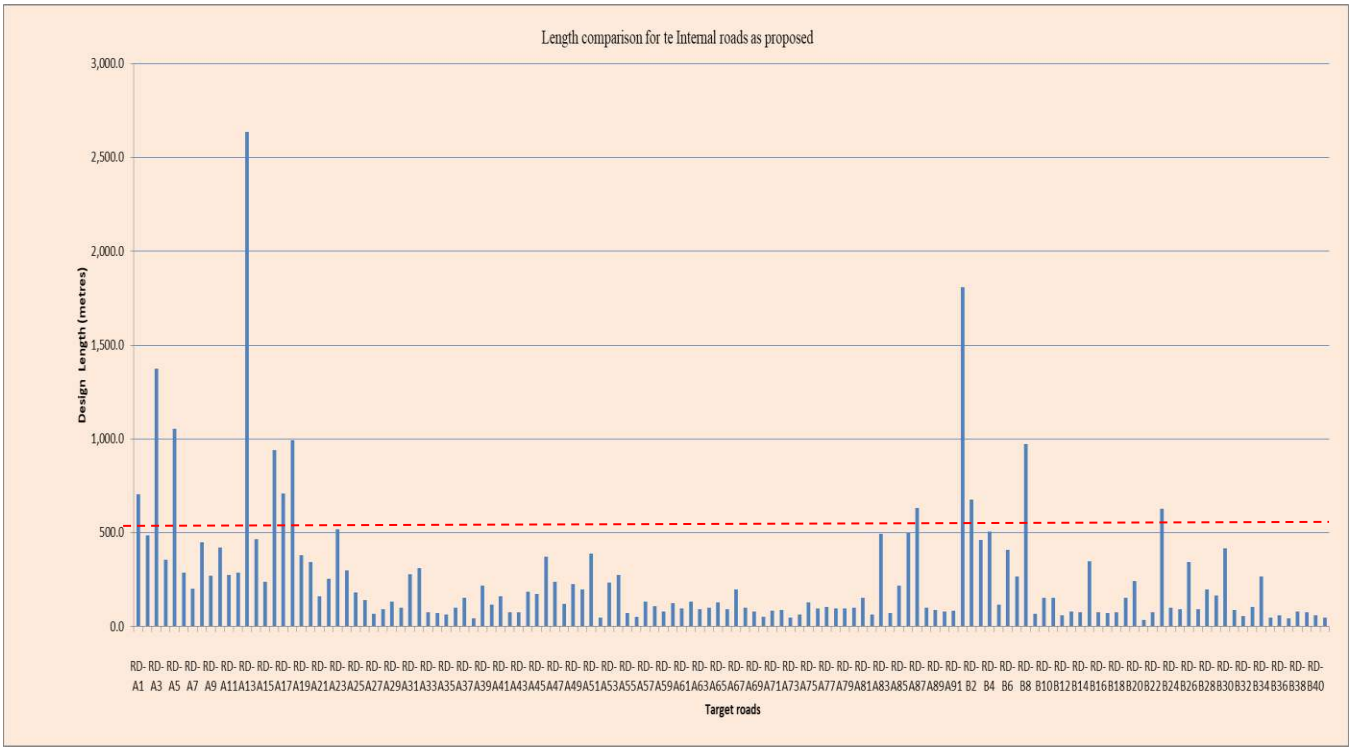


Figure 2.6: Size (length) distribution for Internal Roads as proposed for MSEZ-RSIP

Source: Nippon Koei- Design Team

Design Features in pavement construction

Fig. 2.7 below provides a typical cross section for internal roads as proposed within the MSEZ-RSIP. By design, all roads enjoy a generous reserve of 40, 18, 15, 12, 9 and 6 metres while the widest carriage way is designed for 8metres width implying that huge reserves will be left on either side of the pavement.

Table 2.11 is an extract from Bills of Quantities listing out the core tasks and works quantities in construction of the 131 murram roads targeted in the MSEZ-RSIP. From the table, core activities in road construction will entail stripping of vegetation and debri from the road reserve (Bill Item 4.01), excavation to remove humic soil from the pavement area (Bill Item 4.02), borrowing soft and hard material (Bill items 5.01/02) which together with natural gravel (Bill Item 10.10) will be compacted to form the road surface. The main items in civil works therefore will entail ground stripping of vegetation and top soil then, borrowing, transportation and application of materials in road pavement formation.

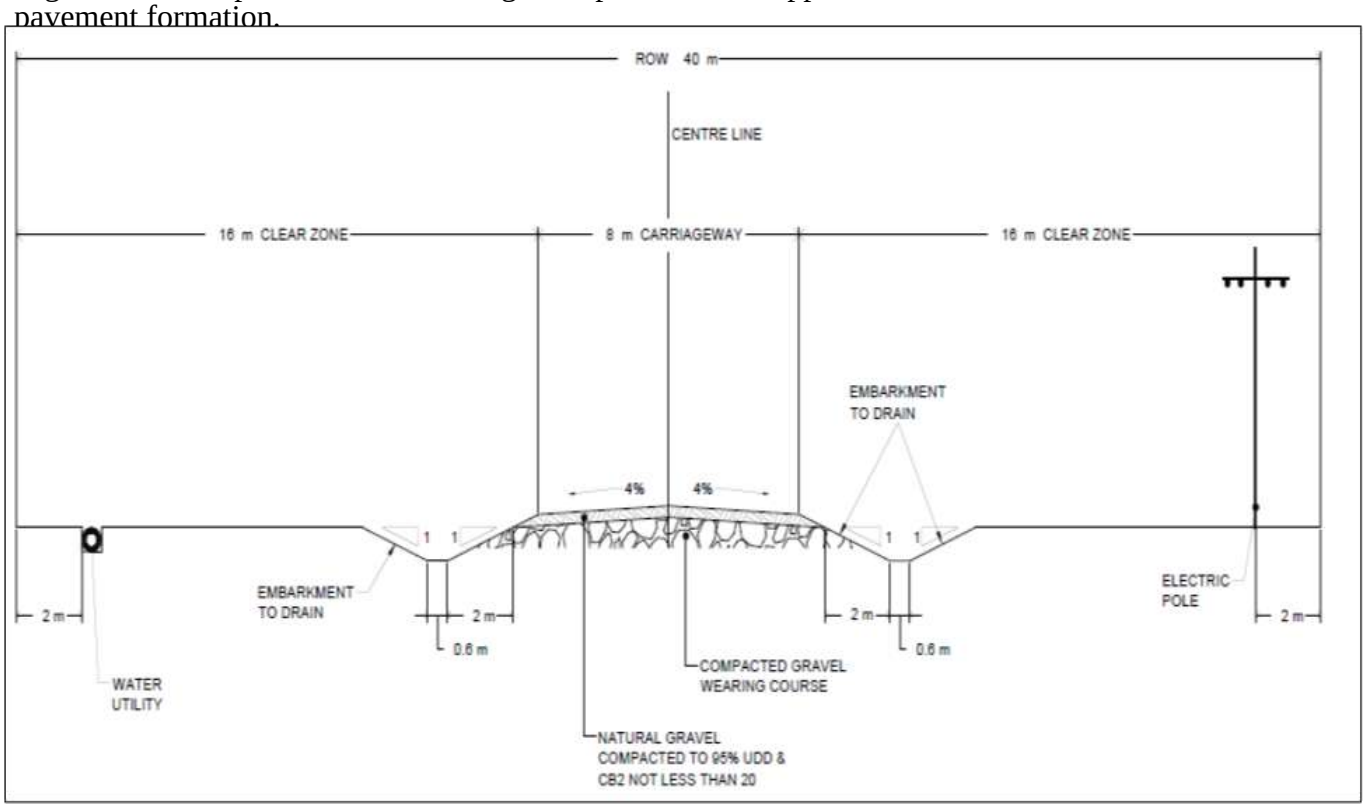


Figure 2.7: Typical Section of a murram surface road as proposed for the MSEZ-RSIP
Source: Nippon Koei- Design Team

Table 2.11: Tasks and quantities in road development

Item No.	Tasks	Unit	Quantity
4.01	Clear site on road reserve by removal of trees, hedges, bushes, vegetation and other deleterious materials.	m^2	451,058.00
4.02	Remove top soil to an approved depth upto a maximum of 200mm and stockpile for reuse as directed by the Engineer.	m^3	46,924.44
5.01	Fill in Soft Material	m^3	159,316.73
5.02	Fill in Hard Material	m^3	15,931.67
5.03	Cut to Spoil in Soft Material	m^3	84,426.16
5.04	Cut to Spoil in Hard Material	m^3	8443
5.06	Compact the top 150 mm layer of existing ground below fills and cuts to 95% MDD (AASHTO T99)	m^3	5620
5.07	Compaction of the 300mm below Formation Level in Cutting to 100% MDD (AASHTO T99)	m^3	5620
5.09	Excavation in Swamps	m^3	105
5.12	Top-soiling	m^2	960
5.13	Plant grass on the slope and inverts of ditches to reduce scour effects, or on slopes to reduce soil erosion and to improve stability.	m^2	960
10.10	Provide, lay natural gravel to `carriageway, water and compact to min 95% MDD and CBR not less than 20	m^3	46,924.44

Source: This study

2.4.2: The Drainage sub-component of Internal Roads

Scope of Drainage Network:

The entire 9.8Km-long network of murram roads will be fitted with drainage canals on either side as per standard procedure (Fig 2.5 above) for purposes of intercepting and removing storm water from the road and settlement areas. The drainage channels will be located on the road wayleave and will be designed based on hydrological modeling factoring rainfall and catchment characteristics. Thus the entire 9.87Km long network of roads (Fig 2.5) will be fitted with a corresponding network of drainage channels estimated at 18.50kilometres. Additionally, the drainage channels will be fitted with concrete and pipe culverts to facilitate crossing and entry into respective plots (Table 2.12 below).

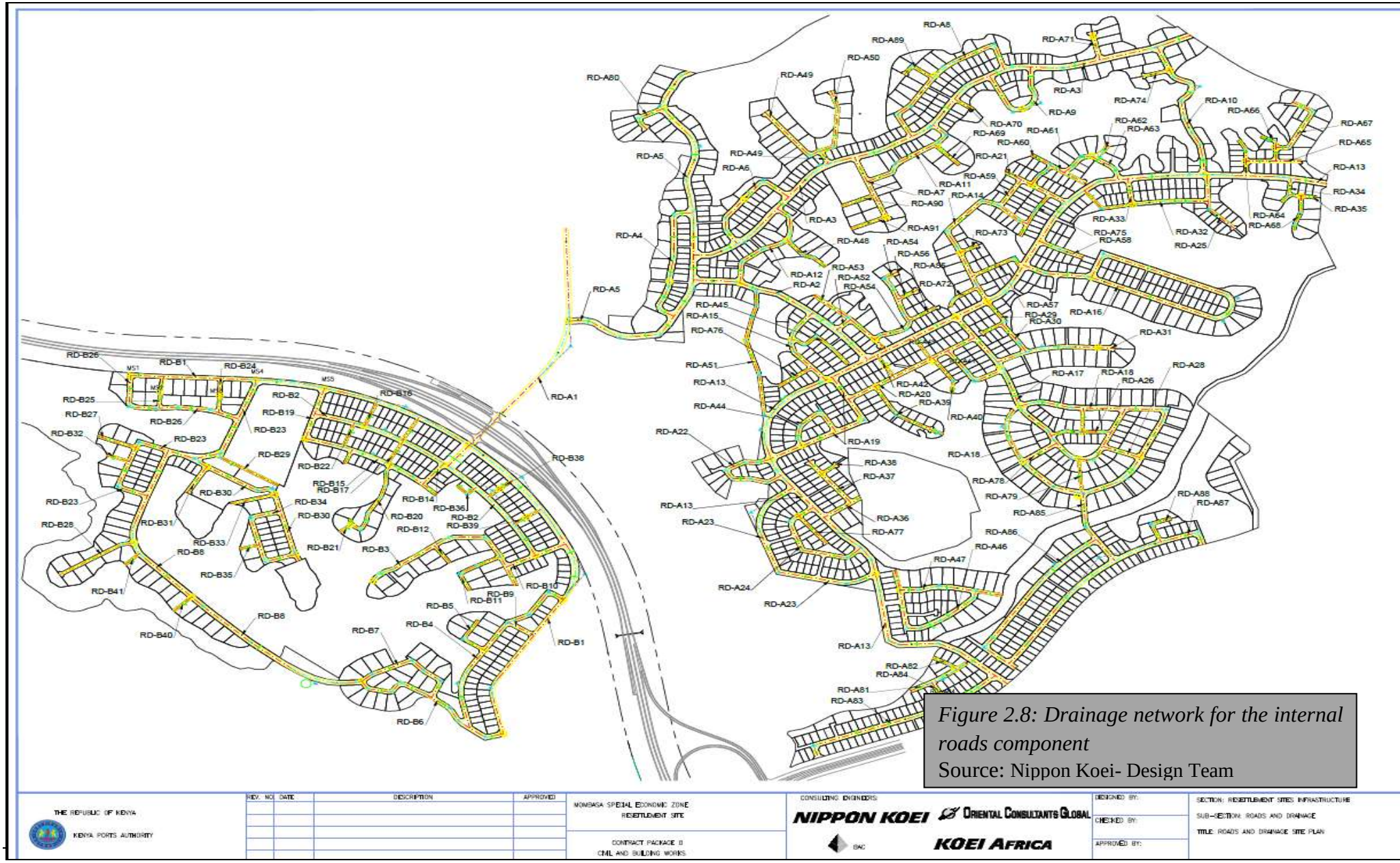


Figure 2.8: Drainage network for the internal roads component
Source: Nippon Koei- Design Team

Core tasks in drainage works:

Excavation for creation of open drainage is covered under Bill Items 5.03, 5.04 and 5.09 of Table 5.11 above. An additional minor excavation of 2295 m^3 for purposes of laying of culverts is itemised in Bill Items 7.01 and 7.04 in Table 2.12 below. Alignment of drainage channels will be carefully laid to ensure highest control of velocity to enable runoff evacuation without scoring and attendant erosion. Additionally, all open side of the drainage will be stabilised with grass (Bill Item 5.13), stone pitching and gabion mesh (Bill Items 7.07, 7.11 and 7.12) as mitigation to soil erosion and bank collapse.

Table 2.12: Excavation for Culverts

Item No.	Description in Excavation & Filling for Structures	Unit	Quantity
7.01	Excavate for Structure in Soft Material		
	(a) 600mm Dia Concrete Pipe to public institutions access	m^3	150
	(b) 600mm Dia Concrete Pipe to road junctions culverts	m^3	950
	(c) 900mm Dia Concrete Pipe Cross Culverts	m^3	860
	(d) 1200mm Dia Concrete Pipe Cross Culverts	m^3	126
7.04	Extra over Item 7.01 for Excavation in Hard Material	m^3	209
7.06	Selected Granular Fill Material	m^3	1650
7.07	Stone Pitching	m^2	9620
7.11	Gabion Mesh	m^2	9600
7.12	Rock fill to Gabions	m^3	1920

Source:This study

Modalities for runoff disposal:

Runoff will be disposed at points where the drainage channel intercepts natural drainage taking care to install anti-scour measures to prevent back erosion and gully development.

2.5: Water Supply Infrastructure

2.5.1: Background

This subcomponent is aimed at supplying water to both Resettlement Areas A and B. The water will be sourced from Boreholes in Tiwi, Kwale County and conducted through a Main Transmission Line up to the MSEZ Storage to be funded and constructed under the JICA supported Project for Infrastructure Development (PID) for MSEZ. This latter Project underwent full cycle ESIA Study leading to grant of EIA License No. NEMA/EIA/PSL/19040 dated 16th May 2022.

Table 2.13 and Fig 2.9 provide a summary of the core components in the Water Supply Infrastructure which essentially comprises two component namely:- (i) The Supply Network and, (ii) The Distribution Network. Details for each system are further elaborated in sections below.

Table 2.13: Core components of the water supply network

SN	Description	Unit	Quantity
1	Water storage tank		
	$50m^3$ Capacity	No	1
	$5m^3$ Capacity	No	11

2	Pumps	No	2
3	Pipeline and connection fittings, bends, gate valves, wash out, air valves, backflow valve, reducers etc.		

Source: This study

2.5.2: The Supply Network

The Supply network will deliver 1447.5m^3 of water daily water from the MSEZ Reservoir in Mrongondoni to the Distribution Tank at DCC Compound. Core components include:-

The Pumping component: An electric motor driven pump will be installed in a pump-house located in the compound of the MSEZ Reservoir for purposes of pumping water to supply the Resettlement Areas.

The Rising Mains: The Rising mains comprises of a 1.02Km-long, 125mm diameter HDPE pipeline through which water will be pumped from the MSEZ Reservoir to the Distribution tank at DCC Compound.

The Distribution Tank: An elevated 50m^3 capacity overhead tank Compound in Mbuta to act as the Distribution Center for water supply to the Resettlement Areas. Both the Tank and its supporting framework will be constructed of Aluminum (Plate 2.1) metal which is ideal for use in water handling systems.

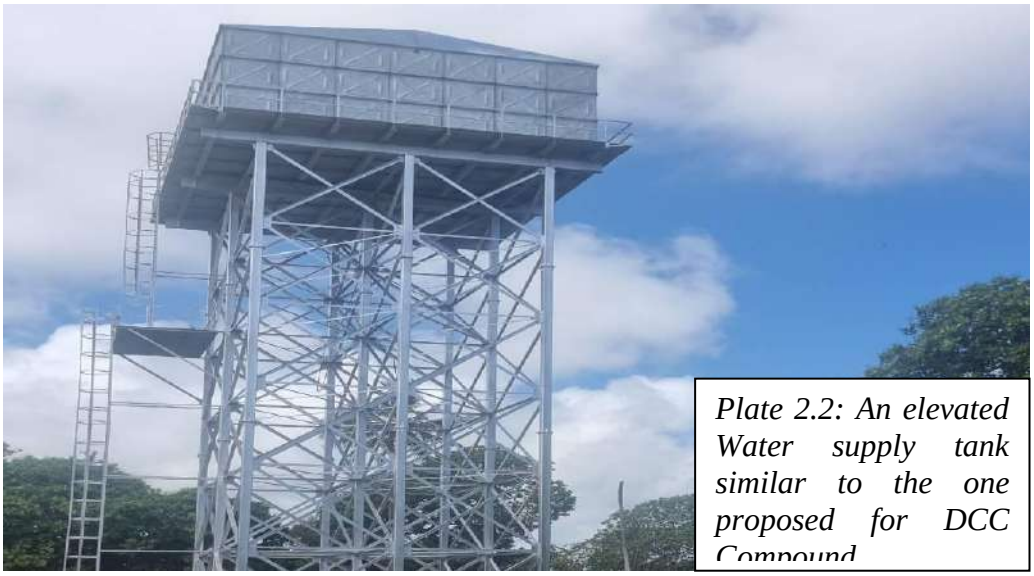


Plate 2.2: An elevated Water supply tank similar to the one proposed for DCC Compound

Plate 2.2: An elevated Water supply tank similar to the one proposed for DCC Compound
Source: ESIA Team

2.5.3: The Distribution Network

Table 2.14 and Fig 2.5 provide summaries in tabular and schematic form for the water distribution network. From the Storage Tank at the DCC Compound, water will be reticulated to diverse consumption points through 25 interconnected HDPE (High Density Polyethylene (HDPE) pipe-lines, designated DL (Distribution Line) A or B to distinguish between those serving consumers in

Resettlement Areas A and B respectively and comprise of diverse diameters depending on the target yield.

The entire distribution network totals 6782.8metres (6.783 kilometers). Water will essentially be supplied to the community through The Market Center, Dispensary, Mwangala Primary School, 7No Water Kiosks, The Christian and Muslim Cemeteries and DCC Compound. A total of 1447.5M3 of water will be supplied daily. Design specifications for Water Kiosks through which community will access water are provided in sections below.

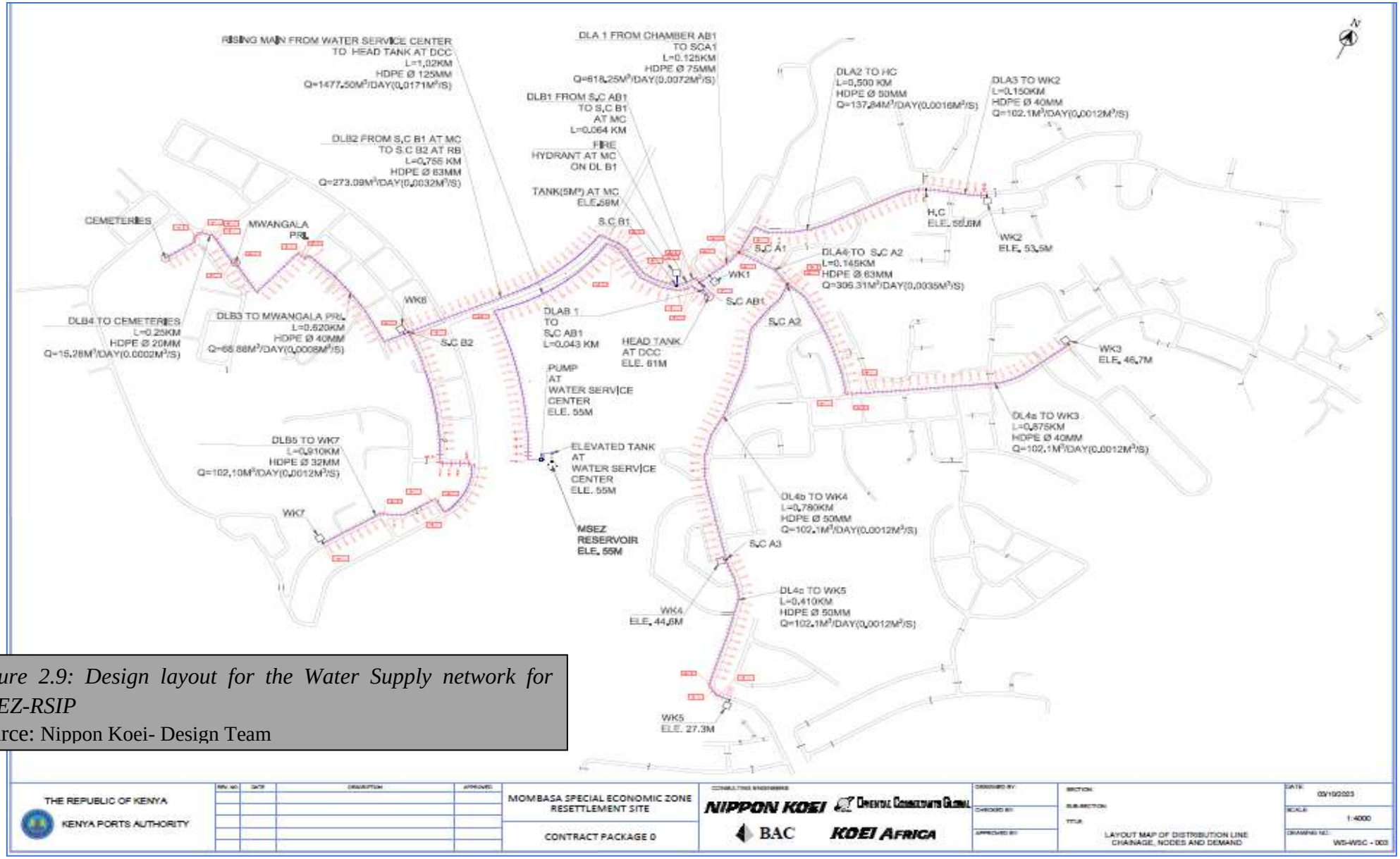


Figure 2.9: Design layout for the Water Supply network for MSEZ-RSIP

Source: Nippon Koei- Design Team

Table 2.14: The Distribution Network and consumption points

SN	Service Area	Item	Material	Flow rate (m^3/day)	Diameter (mm)	Length (m)
1.	WSC - DCC	Transmission Rising Mains from water service to DCC head tank (water tower) -TM	HDPE	1477.5	125.0	1018.3
2.		Distribution line, DLAB 1 to Junction AB1	HDPE	1477.5	110	43.00
3.	RA - A	DLA1 to SCA1	HDPE	546.25	75	121.94
4.		DLA2 to HC	HDPE	137.84	50	497.43
5.		DLA3 to WK2	HDPE	102.10	40	142.00
6.		DLA4 to SCA2- WK3, 4, 5	HDPE	306.31	75	140.76
7.		DLA 4a to WK3	HDPE	102.10	40	872.00
8.		DLA4b to WK4	HDPE	204.21	50	772.83
9.		DLA4c to WK5	HDPE	102.10	50	407.15
10.		Off take to Market	HDPE	17.87	32	25.00
11.		Off take to WK1	HDPE	102.10	32	12.00
12.		Off take to WK2	HDPE	102.10	32	5.00
13.		Off take to WK3	HDPE	102.10	32	5.00
14.		Off take to WK4	HDPE	102.10	32	5.00
15.		Off take to WK5	HDPE	102.10	32	5.00
16.		Off take to HC	HDPE	35.74	32	5.00
17.	RA-B	DLB1 from SCAB1 to SCB1	HDPE	362.96	75	64.0
18.		DLB2 from SCB1 to RB - up to SCB2, WK6	HDPE	273.09	63	812.7
19.		DLB3 to Mwangala Primary		68.88	50	614.7
20.		DLB4 to Cemeteries		15.28	25	237.0
21.		DLB5 to WK 7		102.10	50	902.0
22.		Off take to WK6		102.10	32	5.0
23.		Off take to WK7		102.10	32	5.0
24.		Off take to MC		35.74	32	25.0
25.		Off take to FH		72.00	63	40.0
		Totals				**6782.8**

Source: Nippon Koei-Design Team

2.5.3: Design specifications for Water Kiosks

Design Features for Water Kiosks:

The modality of water access by the Community will be through seven (7) Water Kiosks (coded WK1-WK7) to be developed within Resettlement Areas A (5No) and B (2No). A standard Water Kiosk as proposed in this project (Plate 2.3) comprises of a re-enforced concrete slab supported on RC beams mounted 2.2m above ground level. The chamber underneath the slab can be finished to house the vending chamber complete with a fetching bay in the frontage where water is drawn through taps fed from the overhead tank. The ground in immediate vicinity of the fetching area is finished to smooth slanting surface to allow for cleaning and drainage to a soak pit of vegetable garden.

The entire construction of a Water Kiosk covers an area of 6.4 square meters with a height of 4.25metres inclusive of the overhead reservoir. Such minimal land requirement makes water kiosks quite compatible with facilities suffering land limitation. Consumption of natural resources: Construction of a water kiosk requires very minimal resources. The slab and supporting beams will mainly require ballast, sand, cement and metals bars with water being consumed in both the mixing and curing. Each Water Kiosk will be fitted with a 5000litre plastic tank mounted on the RC slab and served by a 32mm diameter HDPE pipe which connects to the distribution pipeline.

Each Water Kiosk is designed to dispense 102.10 cubic meters of water daily.

Plate 2.3: A model Water Kiosk
Source:https://waterfund.go.ke/toolkit/Downloads/bpk.%20PDF%20Drawings.pdf

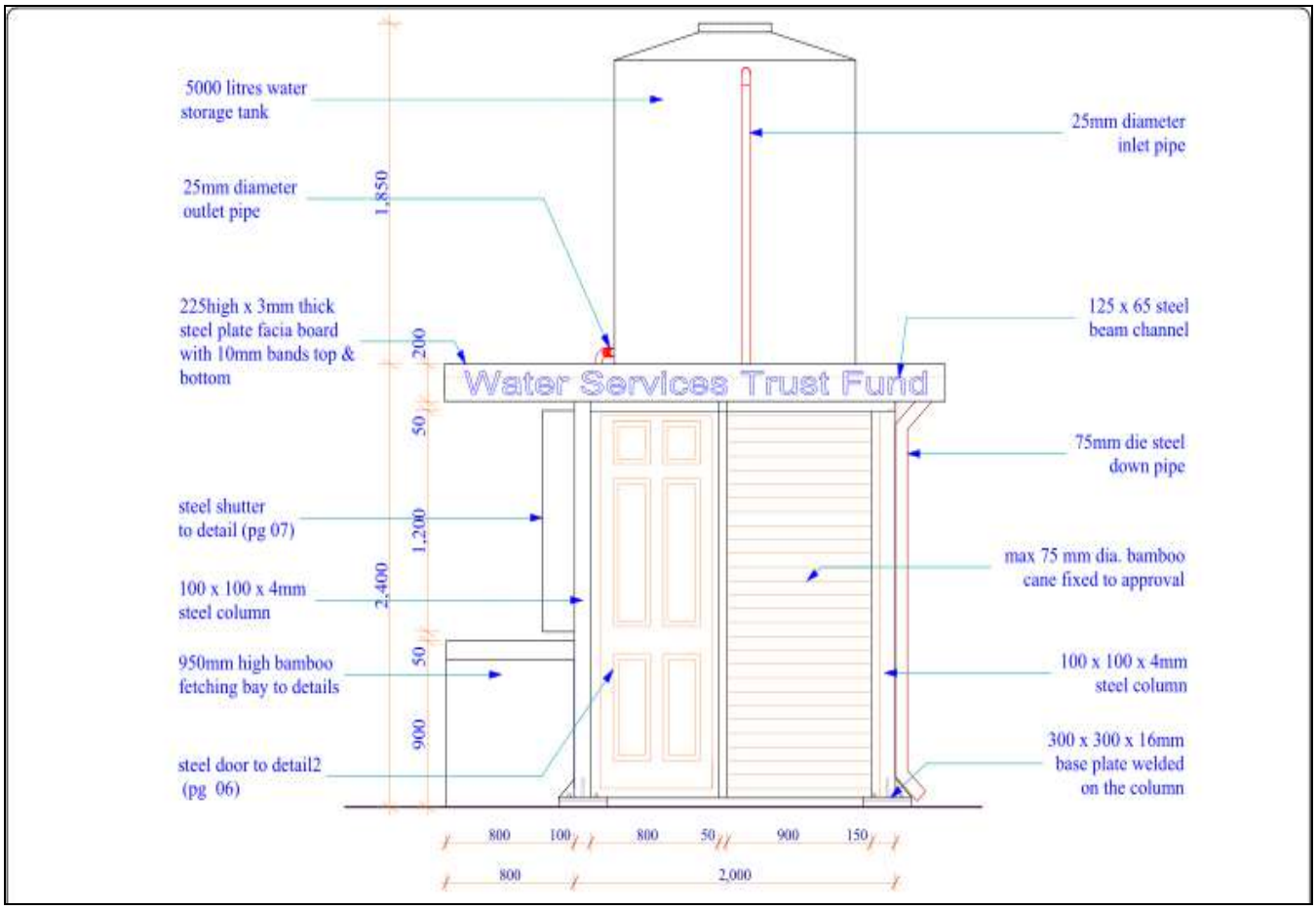
Location/Distribution of Water kiosks:
Table 2.14 provides location details for the seven Water Kiosks proposed for development under the MSEZ-RSIP. Five (5) Water Kiosks have been allocated a plot respectively and will therefore enjoy security of tenure through a title deed while the reminder two will be located within ROWs. Five plots will be located within the RA-A with the reminder two falling within the RA-B.

Table 2.14: Location details for Water Kiosks

SN	Resettlement Area	Water Kiosk	Plot No.	Geo-referenced location
1.	RA-A	WK1	Not available-awaiting release of approved RAM	9549560.2171,566911.3479
2.		WK2		9550042.6658,567396.8394
3.		WK3		9549779.8531,567739.3192
4.		WK4		9548923.2549,567280.4253
5.		WK5		9548598.5143,567451.5762
6.	RA-B	WK6		9549126.0078,566357.7102
7.		WK7		9548547.8373,566424.7226

Source: This study

Modalities for operation and maintenance:
The Water Supply Project for MSEZ-RSIP is being developed by the KPA in capacity of Project Proponent. Upon completion however, the project will be handed over to the MOWASCO who will then put in place structures for Operation and Maintenance in accordance with relevant laws. In the case of Water Kiosks, a management committee will be put in place which will then seek registration as a Water Service Provider by the MOWASCO upon fulfilling requisite legal standards. Key among these will include development of a Facility Management Plan and a Water Supply Agreement to specify cost recovery measures.

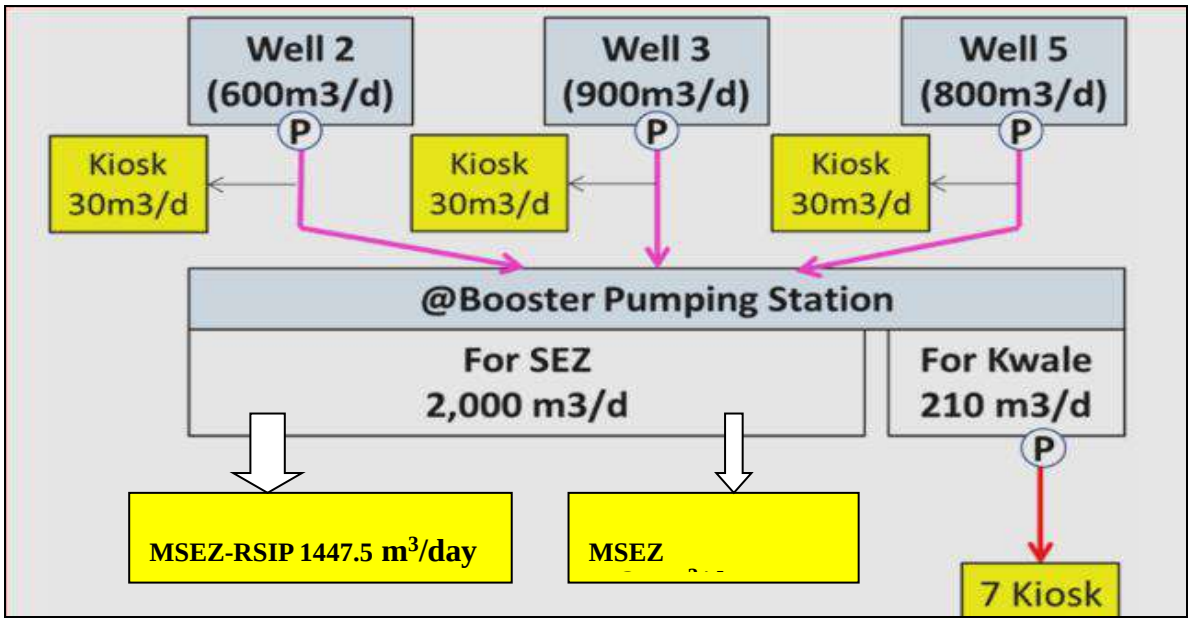


Source:https://waterfund.go.ke/toolkit/Downloads/bpk.%20PDF%20Drawings.pdf

Figure 2.10:Standard Design of a Water Kiosk (After Kenya Water Trust Fund)

2.5.4: The Water allocation Model

Water supplied to the entire Mombasa Special Economic Zone will be sourced from the Tiwi Well Field and delivered to Dongo Kundu through a 26Km long pipeline from where it will be apportioned to diverse consumers. The daily yield of the three boreholes to be exploited for this purpose under a JICA funded Grant Aid Project (PID) is 2300 m^3 per day respectively. From this amount, 2000m^3 will be supplied to the MSEZ while 300m^3 will be supplied to communities in Kwale through 10 Water Kiosks (Fig 2.11).



Source: JICA Study Team for PID

Figure 2.11: Schematic presentation of the water allocation plan (Year 2045)

Of the 2000m^3 supplied to the MSEZ, 1447.5m^3 will be committed to the Resettlement Area with the reminder 552.5m^3 being devoted to activities of the Special Economic Zone. The daily water demand of 1447.5m^3 as used in computations here is only likely to be experienced in year 2045 and beyond when the resettlement areas will be operating at full capacity in which case, initial demand on the Grant Aid Project is likely to be a modest 764.14 m^3 per day, leaving a generous 1235.86m^3 for use in the Special Economic Zone. However, in order to forestall future imbalances on supply and particularly, uncertainties associated with salinization threats in the Tiwi Aquifer, there is need to aggressively pursue alternative sources of water supply to the MSEZ, key among them being the Mwache Dam Source currently under construction.

2.6: Dispensary (1 No.)

A Dispensary is proposed for development along Rd A3 within Resettlement Area A. As designed, the Dispensary comprises of two units namely: -

- The Main Block housing Administrative and Accounting Offices; Patients' waiting area, examination and treatment rooms, Emergency and Counseling rooms etc. complete with restrooms for both patients and the staff.
- Support area comprised of detached Incinerator, Placenta Pit, Compost Pit, Garbage Center, Canteen/Kitchen/Dhobi unit, Generator Room and a Septic tank.

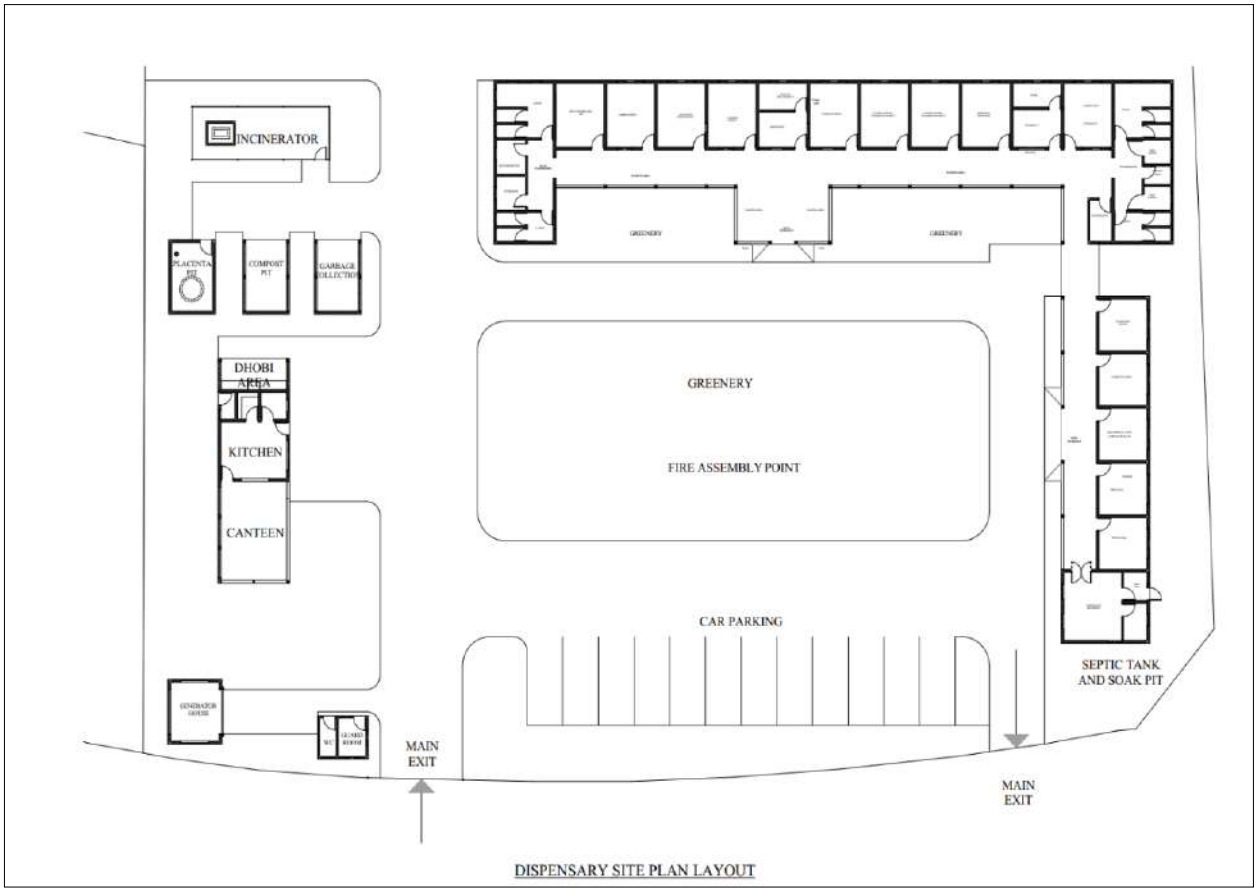


Figure 2.12: Dispensary Site Plan Layout

Source: Nippon Koei-Design Team

2.7: Non- linear Infrastructure

Architectural Drawing for all nonlinear infrastructure namely Market, Dispensary and Cemeteries are provided in the Books of Drawings submitted as Appendix 2.2 while other details are provided in Bills of Quantities in Appendix 2.3. In sections below, we provide brief highlights for each facility proposed.

2.7.1: Dispensary

A Dispensary is proposed for development along Rd A3 within Resettlement Area A. As designed, the Dispensary comprises of two units namely: -

- The Main Block housing Administrative and Accounting Offices; Patients' waiting area, examination and treatment rooms, Emergency and Counseling rooms etc. complete with restrooms for both patients and the staff.
- Support area comprised of detached Incinerator, Placenta Pit, Compost Pit, Garbage Center, Canteen/Kitchen/Dhobi unit, Generator Room and a Septic tank.

Once completed, the Dispensary will be handed over to the County Government of Mombasa for commissioning and operation.

2.7.2: The Market (1 No.)

As designed, the market will have a floor area of 453.2 square meters allocated as provided in Table 2.16 below. Among others, the market provides space (concrete worktops with lockable drawers underneath) for 52 traders, one mini supermarket, two offices, two butcheries, two stores and washrooms for staff and public. One corner of the market is reserved for a temporary storage of garbage before removal while provision is also made for a soak pit and septic tanks.

The Market is proposed for development along Road A3 in Resettlement Area A and will be connected to mains water supply and electricity. The outdoor area is accessed from Road A3 and has parking for merchant vehicles while the rest of the 1-acre compound is also available for open air traders.

Table 2.16: Space allocation plan for the proposed public market

No.	Room/Function	Floor Area (m2)	Capacity (persons
1	Traders section	267	51
2	Cess collection	11.28	3
3	Office	11.28	3
4	Butchery	16.15	1
5	Fish monger	16.15	1
6	Cleaners storage	2.7	
7	Store	4	
8	Washroom		
	• Staff	7	2
	• Gents	20	6
	• Ladies	16	3
9	Open space/services	81.64	
	Total	453.2	53

Source: Nippon Koei-Basic Design Report

2.7.3: The Christian Cemetery

As planned, both cemeteries will be located to the South of Mwangala Primary School and will be approached through Roads B23 and B30 terminating at the Car Parks for both Cemeteries.

Specification for the Christian Cemetery are provided in Table 2.17 and illustrated in Fig 2.13. Basically, the Christian Cemetery will have a capacity for 96 graves to be served by a Prayer Hall and Store all complete with ablution facilities.

Table 2.17: Specifications for the Christian Cemetery

No.	Room/Function	Floor area (m2)	Capacity (persons)
1	Prayer Hall	140.56	
	• Hall	80.7	50
	• Reception	13.12	2
	• Office	16.81	2
	• Ladies Washroom	13.12	3
	• Gents Washroom	16.81	5
2	Store	8.68	
3	Grave yard		960
	Total size	149.24	

Source: Nippon Koei – Basic Design Report

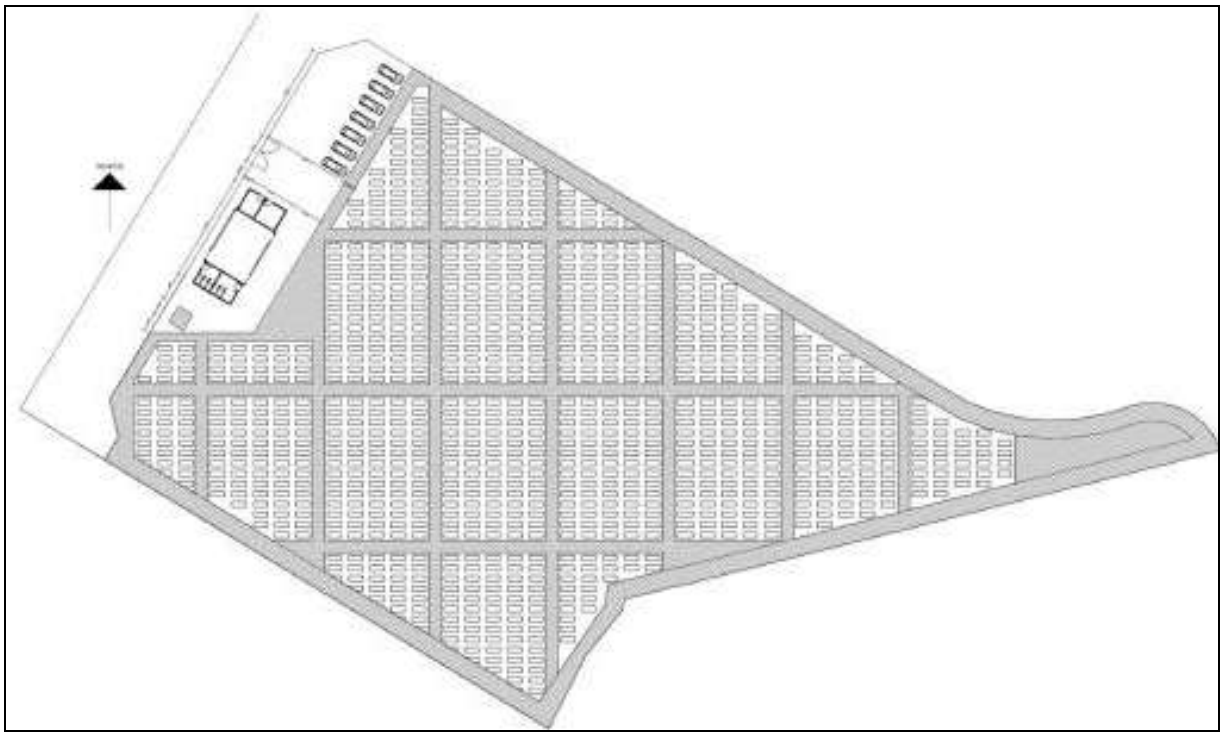


Figure 2.13: Schematic presentation of the Christian Cemetery

Source: Nippon Koei-Design Team

2.7.4: The Muslim Cemetery

The Muslim Cemetery will have a ground are of 213.1 square meters supporting a 920 capacity graveyard, prayer hall and an adjoining Office cum Reception Block (Table 2.18 and Fig 2.14).

Both cemeteries will be operated by the County Government of Mombasa and therefore subject to relevant bylaws and regulations.

Table 2.18: Design specifications for the Muslim Cemetery

No.	Room/Function	Floor Area (m2)	Capacity (persons)
1	Prayer Hall	133.00	
	• Hall	93.62	50
	• Male Ablution	7.69	4
	• Male Washrooms	12.00	2
	• Female Ablution	7.69	4
	• Female Washrooms	12.00	2
2	Office and Reception Building	71.40	
	• Reception	13.86	2
	• Office	12.60	2
	• Body Waiting Room	18.06	1
	• Body Washing Room	14.28	2
	• Store	5.04	
	• Staff Toilet	7.56	1
3	Store	8.68	
4	Grave yard		920
	Total size	213.08	

Source: Nippon Koei – Basic Design Report

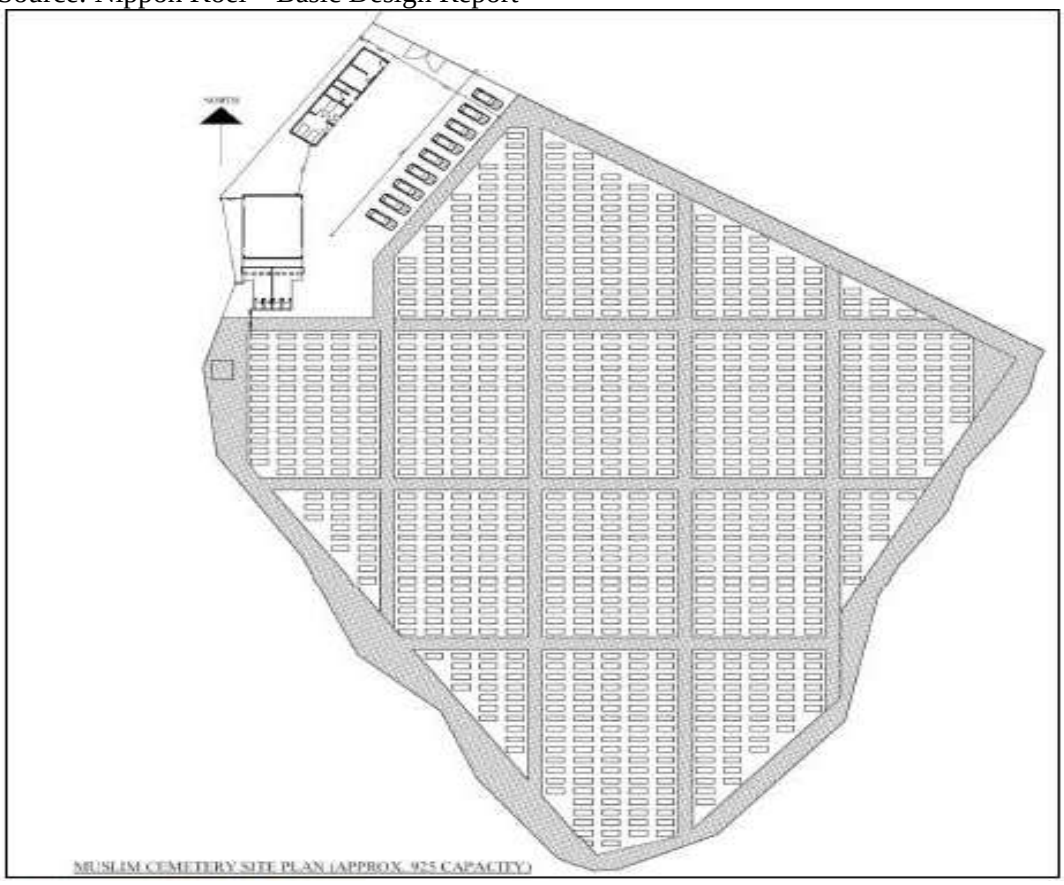


Figure 2.14: Schematic presentation of the Muslim Cemetery
Source: Nippon Koei-Design Team

2.8: Costs and Budget

2.8.1: Costs in Infrastructural Development

Appendix 2.4 provides detailed Bills of Quantities (BOQs) for the Infrastructure Component, a summary of which is provided in Table 2.20. The total Bill is estimated at Ksh 663,104,460 (Kenya Shillings, six hundred and sixty-three million, one hundred and four thousands, four hundred and sixty only). Of this amount, the roads component is significant as it accounts for 72.4% of the entire cost.

Table 2.20: Costs in Infrastructure Development

SN	Cost Item	Cost to Item (Ksh)	Share (%)
1.	Preliminaries and Contingencies	31,576,403	4.8
2.	Dispensary	47,391,948	7.1
3.	Cemetery	23,180,651	3.5
4.	Market	21,642,955	3.3
5.	Water Supply Infrastructure	59,388,346	9.0
6.	Roads and associated Infrastructure	479,924,157	72.4
7.	*Sub-Total*	663,104,460	100.0
8.	Add: V.A.T. 16%	-	
9.	**Projected Cost of Infrastructure development**	**663,104,460**	**100.0**

Source: Nippon Koei-Design Team (BOQs)

2.9: Nature and quantities of wastes anticipated

Diverse wastes are anticipated in development of the Mombasa Special Economic Zones Resettlement Project inclusive of the Infrastructure component. Brief analyses are provided in sections below.

2.10: Wastes from decommissioning of PAP Settlements

A comprehensive analysis of waste output in the project is provided in the Chapter on Impact Assessment below. Decommissioning of PAP settlements will generate waste in term of abandoned construction material;- mud, concrete rubble, waste wood, pieces of iron, piping and cables; obsolete household items-plastics, furniture, tools, scrap metal, tins and utensils; waste paper item-books, newspapers, posters among others.

2.11: Wastes from Construction of PAP Dwellings

Diverse waster will be generated from reconstruction of PAP houses key among these being waste wood and timber, waste concrete rubble, waste packaging, waste nails and metal, waste water, human waste among others.

2.12: Waste from operation of PAP dwellings

Wastes here will include solid waste (garbage), effluent water, sewerage waste, dung and manure, dead animals, among others.

2.13: Soil spoils from cut and fill activity:

A full computation of Cut and Fill volumes for the 132 roads proposed for development under MSEZ-RSIP is provided in Appendix 2.5 with a summary provided in Table 2.21 and Fig 2.15. From such data available, Volume of Cut is likely to largely exceed the Fill Volume for majority Roads; the exception being roads A10 and B9 which require huge volumes of filling. However, even with such huge demands for fill, the net cut volume far exceeds Given that the Volume of Cut far exceed demand for fill leaving a surplus 224,511 cubic meters of soil which will require to be disposed off.

Table 2.21: Summary of Cut and Fill Volumes for MSEZ-RSIP Roads

Resettlement Zone	Cumulative Fill Volume (M^3)	Cumulative Cut Volume (M^3)	Net Volume (Cut-Fill) (M^3)
Zone A	137,904	304,794	166,890
Zone B	108,636	166,258	57,621
Totals	**246,540**	**471,051**	**224,511**

Source: Nippon Koei-Design Team

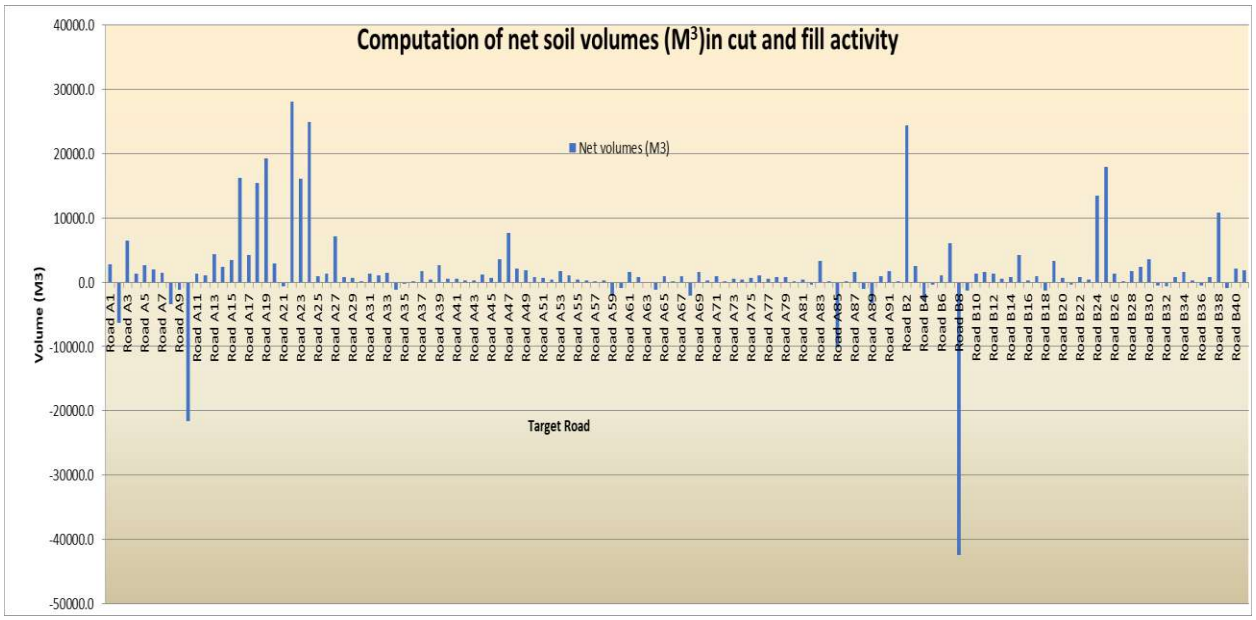


Figure 2.15: Net soil volumes from Cut and Fill Activity

Source: Nippon Koei-Design Team

2.14: Other wastes from Civil works:

Other wastes in road constrcution are likley to include surply murram and stones, wast oils and spares from repair of plant and equipment, effluent/runoff water, concrete ruble, waste wood among others.

CHAPTER THREE: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

Introduction

This chapter defines the policy, legislative and institutional frameworks within which the planning, designing, development, implementation, operationalization of the proposed resettlement will be effected. Development of basic infrastructure within the MSEZ Resettlement Sites as proposed cuts across many sectors of society and economic life of people and is likely to trigger a diversity of local, national, regional and global policy guidelines. The chapter also provides an analysis of the requirements pegged to the tools as part of the ESIA process in order to ensure that the proposed project achieves the goals of (i) social viability (ii) economic viability and iii) technical viability in line with international good practice.

3.1: Policy framework

Sustainable development has been the policy of development followed by all governments in Kenya though it was scattered in over 70 sectoral applications. The policy was finally consolidated into the Environmental Management and coordination act , cap 387 laws of Kenya which has since its enactment become the primary law in matters environment and development in Kenya The Constitution of Kenya (2010) later declared a clean and healthy environment as a constitutional right for every Kenya. Proposed development of infrastructure within identified resettlement sites will be implemented under strict reference to several policies as discussed in this subsection.

3.2: JICA principles on relocation of displaced persons

It is common knowledge that project proponents and borrower countries must bear the greatest responsibility in the management of environmental and social issues related to project implementation. That notwithstanding, JICA applies a raft of environmental and social considerations aimed at preventing, avoiding or minimizing adverse impacts of JICA funded projects on PAPs and the environment thereby ensuring sustainable implementation of development projects especially in developing countries. The borrower countries and the project proponents are expected to comply with the ESCs of JICA in all JICA funded projects. Table 3.1 describes the ESCs principles that govern JICA projects.

Table 3.1: ESCs principles that govern JICA projects

S/No.	Standard	Description
1.	Wide range of Environmental and Social Impacts	JICA recommends that the nature, types and kinds of impacts addressed must cover a wide range of environmental and social issues. This ESIA addressed impacts of the proposed project on the following areas: social, ecological, biodiversity, air quality, heritage cultural, physiographic, health, safety, waste management and sanitation and thus satisfies this principle.
2.	Information disclosure	In order to gain accountability and ensure project sustainability in the long term, JICA in collaboration with the project proponents insists on ESC information disclosure through a thorough stakeholder engagement and participation process. A thorough disclosure process was done during the public participation process where free, honest, accurate and relevant information was provided by the proponent and the consultant. The *consultant moved his office to the site in order to make it easier for*

S/No.	Standard	Description
		*all PAPs and interested parties to access the office easily and receive as much information as they required towards the resettlement exercise. The consultant information sharing policy was to provide **free, honest**, **easy to understand** and **actionable** information to stakeholders and PAPs. This information was (and continues being) provided during leaders meeting, stakeholders consultation meeting, public barazas, FGDs and one-on-one consultations both in the site office and during filed visits.*
3.	Organizational capacity enhancement	JICA will make effort to enhance the capacity of organizations and operations in order for the project proponents to have consideration for Environmental and social factors at all times. JICA environment and social safeguards officers were available for consultation with the consultant and for advice on best approach to manage the ESIA process. Their input in this report in highly valued
4.	Promptness	JICA makes serious attempts on acceleration for the prompt implementation of projects while undertaking environmental and social considerations. The consultant acted promptly on all issues that were raised in the public participation or stakeholder consultation meetings as well as those that were raised by interested groups or individuals who visited the office or made calls through the dedicated line which was provided to the PAPs to call for any issues that required clarification or explanation.
5.	Mitigation measures for environmental and social considerations are implemented from planning to monitoring	JICA will apply a strategic Environmental Assessment, SEA for master plan studies while at the same time encouraging proponents to ensure environmental and social considerations from early stage of project planning to monitoring and evaluation. During this ESIA report the public and stakeholders were engaged from as early as the planning stage. All concerns, opinions, fears and ideas were recorded and used to create a design and methodology which enabled seamless ESIA process with a robust ESMP for sustainability
6.	Stakeholder participation	Robust stakeholder participation and involvement in decision making process as for ESCs. The issues raised by the stakeholders must be responded to adequately and stakeholders are responsible for what they say in meetings. To comply with this principle, the consultant has compiled the chapter on public participation as part of this report and provides details of all the activities of the public participation exercise and how they were managed
7.	Accountability	JICA is responsible for and accountable on all ESC matters when implementing projects. The consultant has advised the proponent that all contractors are bound by accountability processes as demanded by JICA and Kenya legislative and administrative framework of similar projects. This chapter provides the laws, rules and regulations well as institutional framework within which the project will be implemented and with which compliance is expected.

Adapted: JICA ESC guidelines (2010)

3.2.1: Screening proposed project against JICA guidelines

Gaps between Kenyan Environment and Development system vs. JICA development systems

JICA has set standards and principles that require a vibrant examination of social and environmental issues surrounding a proposed project especially those funded by them. This is expected to be undertaken according to the nature of the project and along the procedures of proponents' national law such as EMCA cap 387 the laws of Kenya. Table 4.2 provides an analysis of actions taken by the consultant to ensure compliance with the JICA requirements and principles for Environmental and Social considerations.

Table 3.2: Consultant input for compliance with JICA Principles

Subject	JICA Guidelines	Kenyan situation	Gap
Guiding Principles	▪ Environmental impacts that may be caused by projects must be assessed and examined in the earliest possible planning stage. ▪ Alternatives or mitigation measures to avoid or minimize adverse impacts must be examined and incorporated into the project plan. (JICA Guidelines, Appendix 1.1)	Kenya has not yet created or operationalized a system that could examine impacts, alternatives at early stages	During this ESIA preparation, there was robust engagement with key stakeholders and the expected PAPs in an attempt to identify best site to resettle PAPs and site enhancement mitigation measures.
Information disclosure	▪ EIA reports (which may be referred to differently in different systems) must be written in the official language or in a language widely used in the country in which the project is to be implemented. When explaining projects to local residents, written materials must be provided in a language and form understandable to them. ▪ EIA reports are required to be made available to the local residents of the country in which the project is to be implemented. ▪ The EIA reports are required to be available at all times for perusal by project stakeholders such as local residents and copying must be permitted. (JICA guidelines, appendix 2)	Kenya accepts EIAs written in English which is the official language for the country. -	There is no gap in the language used for project information disclosure because all public participation meetings are organized in the best fitting language for the target public including local vernacular language.

Subject	JICA Guidelines	Kenyan situation	Gap
Requirement for consultation with local project Stakeholders	▪For projects with a potentially large environmental impact, sufficient consultations with local stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans may be examined. The outcome of such consultations must be incorporated into the contents of project plans. (JICA Guidelines, Appendix 1.5 Social Acceptability 1) ▪In preparing EIA reports, consultations with stakeholders, such as local residents, must take place after sufficient information has been disclosed. Records of such consultations must be prepared. ▪Consultations with relevant stakeholders, such as local residents, should take place if necessary **throughout the preparation and implementation stages** of a project. Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared. (JICA Guidelines, Appendix 2. EIA Reports for Category A Projects)	▪ Kenya makes it mandatory to have at least 3 stakeholder meetings on the project affected area. Project information is shared in these meetings, potential impacts are predicted and opinions, ideas, fears and concerns are identified and recorded	Consultations and engagements have been ongoing since early stages of the MSEZ project. The site was determined publicly and the RA identified in consultation with all relevant publics and stakeholders both in government and local community (refer chapter 8)
JICA requires that the scope of impacts should be assessed	▪Assess impacts on (i) human health and safety (ii) natural environment such as impacts that re transmitted through air, water, soil, waste, accidents,, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global ▪Include social impacts such as migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous	▪EIAs in Kenya identify and address wide range of impacts of projects including impacts on the physical environment e.g. air quality, physiography, soils and geology, water quality, ecological impacts such as project impact on biodiversity (fauna, flora and microbial populations) and impacts on landscape, terrain, land use and aesthetics of project area.	All impacts listed under JICA guidelines are addressed in Kenya projects as a requirement by Kenyan law (Environmental Management and Coordination act cap 387 laws of Kenya) in the environmental

Subject	JICA Guidelines	Kenyan situation	Gap
	peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety. (JICA Guidelines, Appendix1.3 Scope of Impacts to Be Assessed 1） ▪In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project. (JICA Guidelines, Appendix1.3 Scope of Impacts to Be Assessed 2）	▪Kenya requires that impacts are classified as direct, indirect, cumulative	impact assessments.
Monitoring, Grievance Mechanism	▪JICA prescribes that project proponents etc. should make efforts to make the results of the monitoring process available to local project stakeholders. (JICA Guidelines, Appendix1.8 Monitoring 3) ▪When third parties point out, in concrete terms, that environmental and social considerations are not being fully undertaken, forums for discussion and examination of counter measures are established based on sufficient information disclosure, including stakeholders' participation in relevant projects. ▪Project proponents etc. should make efforts to reach an agreement on procedures to be adopted with a view to resolving problems. (JICA Guidelines, Appendix 1.8 Monitoring 4)	▪Kenya does not require monitoring of monitoring trees ▪EIA reports are submitted to NEMA which circulates to relevant lead agencies. ▪EIA reports are also published in 2 local dailies inviting any other interested persons to provide input. All issues raised are acted upon by the EIA experts	This ESIA report will be available in NEMA office and at the proponents' office for review by any interested persons.
		▪The government of Kenya has protected	▪There is no gap here. Kenya

Subject	JICA Guidelines	Kenyan situation	Gap
Ecosystem and Biota	Projects must not involve significant conversion or significant degradation of critical natural habitats and critical forests. (JICA Guidelines, Appendix 1.6)	areas under various legislation such as Forest Conservation and Management Act 2013, as well as the Wildlife Management and Conservation Act 2013. ▪ Development is restricted in protected areas and habitats such as wetlands, riparian areas, lakes, shore lines, etc.	maintains a stock of protected areas, ecosystems and habitats within which degradation of whatever means is not allowed. ▪The biodiversity in those areas are protected from poaching, destruction etc. Ecosystems where endemic species of fauna or flora exist are also protected. ▪The ESIA studies are supposed to identify such areas and report them together with the organism that are endemic there
Indigenous Peoples	Any adverse impacts that a project may have on indigenous peoples are to be avoided when feasible by exploring all viable alternatives. When, after such an examination, avoidance is proved unfeasible, effective measures must be taken to minimize impacts and to compensate indigenous peoples for their losses. (JICA Guidelines, Appendix 1.8)	Kayas as indigenous heritages are protected under the Museums and Heritage Act of 2016 which adequately addresses JICA concerns.	No gap observed

Adapted: JICA ESC guidelines (2010)

3.3: Legal framework for environment and development in Kenya

This subsection provides a raft of laws, rules and regulations that will govern the implementation of the project.

3.3.1: The Kenya constitution (2010)

In Kenya, The Constitution (2010) is the supreme law of the Republic and binds all persons and all State organs at all levels of government (national and or county). It provides the broad framework regulating all existence and development aspects of interest to the people of Kenya.

Section 40 (3) of the Constitution of Kenya (2010) declares that the state shall not deprive a person of property of any description or of any interest in or right over ,property of any description unless the deprivation is for public purpose or in public interest and is carried out in accordance with the constitution and any act of parliament that requires prompt payment in full of just compensation to the persons and allows any person who has an interest in or right over that property a right of access to a court of law. The constitution insists that there shall be payment of a full, just and prompt compensation whenever the power of eminent domain is applied on any property by the state.

In its Article 42 of chapter 4, *The Bill of Rights*, confers to every person living within the territory of Kenya the right to a ***"clean and healthy environment***", which includes the right to have the environment protected for the benefit of both the present and future generations through legislative measures, particularly those contemplated in Article 69,(which requires the state to establish systems of environmental impact assessment, audit and monitoring of the environment. and to have obligations relating to the environment fulfilled under Article 70. The PAPs have a right to raise any issue of environmental degradation or pollution which could arise due to the project or any of its activities. This binds the project implementers to ensure that maximum care is put into their actions to (i) avoid legal battles and costs (ii) avoid adverse impacts (iii) minimize effects of any negative impact (iv) reduce effects of negative impacts. Article 69 in detail provides that the state shall:

(a) ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;

(b) work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;

(c) protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;

(d) encourage public participation in the management, protection and conservation of the environment;

(e) protect genetic resources and biological diversity;

(f) establish systems of environmental impact assessment, environmental audit and monitoring of the environment;

(g) eliminate processes and activities that are likely to endanger the environment; and

(h) Utilize the environment and natural resources for the benefit of the people of Kenya.

That notwithstanding, the law requires that citizens should cooperate with state organs and other persons responsible for conservation of the environment for sustainable use of natural resources.

Additionally, article 70 provides for the enforcement of environmental rights and states that: If a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter. On application under clause (1), the court may make any order, or give any directions, it considers appropriate—

(a) to prevent, stop or discontinue any act or omission that is harmful to the environment;

(b) to compel any public officer to take measures to prevent or discontinue any act or omission that is harmful to the environment; or

(c) to provide compensation for any victim of a violation of the right to a clean and healthy environment.

For the purposes of this Article, an applicant does not have to demonstrate that any person has incurred loss or suffered injury.

3.3.2: Kenya Ports Authority Act, 1978

The KPA Act creates the Kenya Ports Authority which is the proponent of the Mombasa Special Economic Zone. Section 13 part 1 (a&b) grants the authority power to acquire land for its own purposes. The 3006 Ha of land where the special economic Zone will be located are owned by the authority. Secondly, part 4 grants KPA the right to surrender its land. The 189.4 Ha parcel of land to be used for the resettlement is part of the 3006 Ha and thus owned by the KPA. It states thus: ***"The Authority may at any time convey, transfer or surrender any land surplus to both its existing and future requirements by a conveyance or a deed of surrender either for, or without, consideration: Provided that land which was public land or trust land shall be surrendered to the Government and shall not be conveyed or transferred to any other person unless the Minister responsible for lands shall consent and so direct".*** KPA as the key stakeholder (the proponent) has been involved in the ESIA preparation from the early stages and has delegated officers who participate in all project related ESIA meetings.

3.3.3: The Environmental Management and Co-ordination Act, EMCA (Cap 387 laws of Kenya)

This is the primary legislation in matters environment in Kenya and overrides decisions made under any other law. It prescribes the legal and institutional framework on environmental protection and management and harmonizes environmental laws previously scattered in about 77 different national laws. EMCA provides safeguards for environmental management and created administrative structures. All requirements from the EMCA are described below.

EMCA requires EIA for all new projects: In its section 58, EMCA requires that an Environmental Impact Assessment is undertaken before commencement of new projects. The level of assessment is pegged on the level of risk the proposed project is expected to cause into the environment and this is explained under the Legal Notice No. 31 and Legal Notice No. 32 of 2019. As per this categorization, the proposed project is high impact and requires a full ESIA study, subject of this report. The methodology of carrying out an EIA is described in the EIA/EA regulations of 2003 which were published by the National Environment Management Authority, NEMA. This ESIA Report has thus been prepared in compliance with this requirement. *EMCA provides for gazettement of Environmental Regulations*: EMCA (CAP 387) created the National Environment Management Authority and empowered it to make rules and regulations to govern environmental management and protection. The proposed resettlement project was screened against the rules and regulations set out by NEMA and the results are presented elsewhere below. The project triggers all nine tools and in diverse ways and mitigations have been proposed. The contracts for the different sub project contractors will have to capture the mitigation measures to ensure sustainable implementation and site enhancement project.

Table 3.3 provides a breakdown of existing rules and regulations that have been formulated by NEMA under the primary environment law in Kenya and their relevance to the proposed project. The objective of these regulations is to enhance environmental protection, conservation and management in all its facets.

Table 3.3: NEMA Environmental regulations derived from EMCA 1999 (Cap 387 Laws of Kenya)

Regulation	Description	Status	Relevance to project
The Environmental Management and Co-ordination (ESIA/EA) Regulations – LN No. 101 of 2003	These rules were developed for successful implementation of section 58 of EMCA, 1999. The rules make it illegal for any proponent to commence any development works without an approved Environmental Impact Assessment and issuance of project license to proceed to implementation. They also prescribe the EIA/ESIA/EA procedure which experts must conform to.	Triggered	This ESIA Study has been commissioned by the KPA in compliance with these regulations. Once Licensed by NEMA, the project will be subject to regular (annual) environmental audits, courtesy to these regulations.
The Environmental Management and Co-ordination (ESIA/EA) Regulations – Amendment Rules LN No. 31 and 32 of 2019	The rules amend the procedure for registering ESIA Studies with NEMA and stipulate Summary Project Reports and Comprehensive Project Reports and Low Risk, Medium Risk and High Risk Category Projects	Triggered	The Project for Infrastructure Development within MSEZ Resettlement Sites was assessed as being a High Risk Category upon which, a Comprehensive Project Report was submitted and approved by NEMA
Environmental Management and Co-ordination (Water Quality) Regulations – LN No. 120 of 2006	These regulations provide for rules related to the use and discharge of water for domestic, agricultural, and industrial purposes. They: (i) provide for the protection of water resources from any manner of pollution (ii) Define water quality standards (iii) regulate unauthorized abstraction and use of water. Specific mention is water use for wildlife and for fisheries. According to these rules NEMA shall monitor the quality of water used for	Triggered	The rules are relevant because the resettlement area will be supplied with water for domestic use from boreholes within in the Strategic Tiwi Aquifer located in Kwale county. The RA is close to the small freshwater Ziwani. The consultant advises against any form of water abstraction from lake Ziwani by the project. It serves the needs of a different community and should not be interfered with. Secondly there is a buffer zone around the RA which stops residents from accessing the shoreline

Regulation	Description	Status	Relevance to project
	domestic purposes while the county government shall monitor discharge of wastewater into the environment.		around Dongo Kundu area and the county government of Mombasa should ensure the ocean waters are not contaminated by any discharge from the settlement. The quality of domestic use water and preservation from project point source pollution of ocean water calls for astute adherence to the rules and regulations. Regular monitoring of discharge routes will ensure compliance
The Environmental Management and Co-ordination (Waste Management) Regulations – LN No. 121 of 2006	These regulations provide rules which guide the management of waste (in general) and more specifically the management of solid waste, industrial waste, hazardous waste ,pesticides and toxic substances ,biomedical waste and radioactive substances They prohibit pollution of public places and require any waste generator to collect, segregate and dispose or cause to be disposed in a manner that is provided by the regulations or even according to cleaner production principles.	Triggered	The regulations are applicable to the proposed project because the project will cause generation of solid waste such as during site clearance for construction of houses and other structures such as roads and markets (including dry vegetation, excess soil, paper waste e.g. cement bags etc.) The proponent shall organize adequate systems for the collection, segregation and disposal of all manner of project generated solid waste according to these rules. Engage only solid waste handlers who are registered and licensed-to -practice by the NEMA
The Environmental Management and Co-ordination (Excessive Noise and Vibrations Pollution Control) Regulations – LN No. 61 of 2009	These regulations provide for measures against noise and vibrations from specific sources and define permissible levels of noise from various activities during construction. Noise producing activities such as construction and mining should be licensed while licensed noise and vibration mapping agencies should be engaged to determine levels of noise and vibrations	Triggered	The proposed project will involve construction of estate roads using earth movers and other heavy machinery. They can generate considerable amount of noise and vibration and thereby noise and vibration monitoring is recommended during construction activities. Adherence to these provisions is encouraged because the RA has existing and active homes, schools (Mwangala Primary

Regulation	Description	Status	Relevance to project
	produced by site activities.		School and Junior Secondary School and places of worship (e.g. St. Joseph Catholic Church) which will require noise regulation for effective performance. Secondly, all workers and site visitors should be equipped with full Personal Protective Equipment for the protection of their hearing systems. Thirdly in compliance with these regulations, the construction machinery and equipment is expected to be in good working condition which does not allow them to generate excessive noises and vibrations. **Required:** Noise level measurement and well documented before settlement , during and after occupation of land
Air Quality Regulation, 2014	The Air Quality Regulations 2014 provides for the prevention, control, and abatement of air pollution to ensure clean and health ambient air. The regulations are applicable to (i) all internal combustion engines (ii) all premises, places, operations or works on which the provisions of the act and regulations made thereafter apply and etc. They specifically prohibit burning of waste or grassland or back burning	Triggered	The rules are relevant to the proposed project because site clearance for construction of structures is envisioned. Disposal of the cleared vegetation must not be by burning in situ. Other activities that could affect air quality include dust generation, burning of solid waste from households and the status of the planned cemetery when in operation etc.
EMCA (Fossil Fuel Emission Control) Regulations, 2006	Gazetted in legal Notice no. 131 in 2006, the regulations provide for standards of internal combustion engines, These Regulations set out emission standards for internal combustion engines, provide for the licensing of	Triggered	The proposed project triggers these regulations especially because diesel powered graders and compactors will be used to construct roads within the estate and level some areas to improve their ability for habitation. The contractor will

Regulation	Description	Status	Relevance to project
	persons who treat fuel and for the appointment of environmental inspectors for purposes of emission inspection and authorizes the National Environment Management Authority to enter into partnerships for purposes of emission inspection		be expected to ensure minimal emission from his equipment (within acceptable range by these regulations)
The EMCA (Conservation of Biological Diversity and Resources, and Access to Genetic Resources and Benefits Sharing) Regulations, 2006.	Developed to protect biological diversity and resources, the regulations apply to access to genetic resources or parts of genetic resources, whether naturally occurring or naturalized, including genetic resources bred for or intended for commercial purposes within Kenya or for export, whether in in-situ conditions or ex-situ conditions.	Triggered	The proposed RA encompasses several Kayas with conservation areas whose integrity should be preserved. No introduction of new plant should be allowed into the kaya ecosystem. Invasive spp. such as the ***Prosopis juliflora*** and ***Cuscuta reflexa*** and ***C. japonicum*** should also not be allowed to grow in the kaya ecosystem because of the adverse effects they have on host ecosystems.
National Sand Harvesting Guidelines, 2007	These guidelines put in place legal and technical structures to regulate and ensure sustainable sand harvesting in Kenya	Triggered	The entire Dongo Kundu area is currently vulnerable to non-controlled sand harvesting
Integrated National Land use Guidelines	The Integrated National Land Use Guidelines (INLUG) outlines land issues including requirements on the quality of the living environment, economical and ecological development of community structures, the preservation of natural values and the built heritage, utilization of natural resources and communication networks which should be taken into account in all land use planning. The guidelines particularly aim at implementing, in Kenya, international conventions	Triggered	Bothe resettlement sites targeted for development of infrastructure lie in close vicinity of known and easily identifiable resources with immense conservation interest.

Regulation	Description	Status	Relevance to project
	protecting cultural environments and the biological diversity and combating the climate change and desertification.		
The National Solid Waste Management Strategy, 2014	This National Solid Waste Management Strategy (NSWMS) seeks to establish a common platform for action between stakeholders to systematically improve waste management in Kenya. The strategy lays the framework for improved waste management in the country by assisting the public and institutions involved to be a 7R (Reducing; Rethinking; Refusing; Recycling; Reusing; Repairing and Refilling their waste) oriented society.	Triggered	Diverse wastes are anticipated in the development and operation of resettlement sites and infrastructure there in.

Source: This Study

EMCA requires for regular environmental audit of each licensed project

The license to proceed with project implementation as issued by the authority after robust review of the ESIAs in Kenya has conditions which the authority expected the proponent and his contractors are expected to comply with during the whole process of project implementation. These requirements include a standard annual environmental audit, done after every 12 months. A copy of the audit is supposed to be submitted to NEMA for review. This is considered as a monitoring tool and its findings should be acted upon for the purposes of project sustainability and continuous improvement.

Inter-sectoral coordination in project implementation

Legal Notice No. 101 requires that the lead agencies representing all sectors of the economy relevant to the proposed project or project area should be consulted by NEMA and the persons carrying out the Environmental Impact Assessment study before a license to proceed with a project is granted by THE authority. It promotes robust consultations with the lead agencies as key stakeholders during the process of ESIA preparation and that a copy of the final ESIA report should be shared with the lead agencies to review and confirm that the input provided by them

during stakeholder consultations was considered. NEMA will not approve any project which conflicts with existing sector policies and legislation.

The consultant carried out a well-thought-out stakeholder mapping and analysis and produced a list of all relevant stakeholders and a schedule was development to both consult and engage each of them in their capacity. In sections below, we highlight sectoral laws and policies likely to be triggered by the proposed project as planned.

Information access

Finally, Section 3(A) of EMCA (cap 387) grants Kenyans the right to access information from NEMA. In compliance with this section, the consultant moved his office to the site and operated from the office of the DCC at Dongo Kundu. This decision was necessitated by the urge to ensure the PAPs and all interested parties were able to access free, honest, accurate information about the project without incurring any cost at all.

3.3.4: Occupational Safety and Health Act, OSHA (2007)

The provisions of OSHA (2007) target the safety and health at the workplace. The main aim is to eradicate or minimize accidents at places of work which are estimated by the International Labor Organisation at 250 million annually. The act provides for the safety, health and welfare of workers and all persons legally present in a place of work. Its provisions will be relevant during construction of roads and structures such as markets, schools and health center. The Act imposes obligations on both the employers and employees for the purposes of enhancing safety and health at the place of work. In addition to creation of a safety and health committee, the act also requires training and adequate induction under supervision for all new employees. It demands that all persons within the workplace must be in full Personal Protective Equipment.

The Act imposes various obligations on both employers and employees. These are all necessary for the health and safety of persons accessing and using the premises of the proposed site. Strict provisions are made for in respect of equipment containing self-acting machines, hoists and lifts and the requirement for supervision and training of inexperienced workers. There must be put in place a Safety and Health Committee which should be adequately trained to execute its mandate well in matters safety within the project area.

3.3.5: The Wildlife Management and Conservation Act 2013

This act applies to wildlife resources found in any public, community and private land. Section 34 requires an Environmental Assessment while demanding that a "***User or other related right shall not be granted under this act where the requirement for a strategic environmental, cultural, economic and social impact assessments have not been complied with, according to the provisions of the Environmental Management and coordination act cap 387 laws of Kenya."***

Although there are no larger animals in the RA, the consultants have identified a variety of small animals in the classes of (i) insectica (ii) reptilia (iii) and (iv) avian. The activities to be undertaken for site enhancement may disturb the existing habitat but as mitigation the consultant has recommended the (i) creation of a wide conservation area around the new RA where in no one is allowed to encroach and (ii) the conservation of the three Kaya ecosystems located within the RA.

Some flora and fauna species listed under Schedule Six and Seven of the WMCA 2013 were found to occur in the Study area.

3.3.6: The Forest Conservation and Management Act, 2016

FCMA (2016) is among those laws that give effect to article 69 of the constitution in the matter of forest resources and provide for their development and sustainable management of forest resources including the genetic resources therein including utilization of forest resources for socio-economic development of the country.

Though the RA is not within any gazetted area, the consultant identified 3 kaya ecosystems which have conserved trees/vegetation and their genetic resources over time. FCMA (2016) focuses on preservation of indigenous knowledge of forest resources which is held by the local community especially the elders and managers who manage the kaya ecosystems locally.

3.3.7: The Coast Development Authority Act (1990)

The Coast Development Authority (CDA) was established by the Coast Development Authority Act (1990) with a large mandate cross-cutting on many issues related to development within the coastal zone of Kenya. The mandate is provided in section 8 of the act. Public Health Act, PHA (Cap. 242)

3.3.8: The Public Health Act (Cap. 242)

The Act Provides for the management of matters such as sanitation, hygiene and general environmental health and safety. The proposed project will include activities which trigger certain sections of the Public Health Act cap 242 laws of Kenya.

All activities that will be implemented on the Resettlement site are governed by Part IX Section 115 of the Public Health Act that prohibits to all persons creation of or cause to be created any nuisance or conditions liable to be injurious or dangerous to human health. The act considers any noxious matters or wastewater discharged into a watercourse as noxious and thus are a nuisance.

The county government of Mombasa is empowered by section 116 to take all lawful necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or conditions liable to cause injuries or just are dangerous to human health. This is applicable to the settlement. Part XII Section 136 classifies all collections of stagnant water, sewage, rubbish, refuse and other substance which permit or facilitate the breeding or multiplication of pests and rodents shall be deemed a nuisance. The site planning of the RA is expected to allocate space for the purposes of solid waste collection, road side drainage and adopt a sanitation strategy which complies with the provisions of the act. Open bush defecation will not be practiced in the estate because the proponent has allocated a budget for development of pit latrines in all public places such as the proposed ECDE centers, market and the Dispensary. Private home owners will be encouraged to also employ similar sanitation strategy for the purposes of general public health and safety.

The proposed structures and developments in the RA must not create room for water stagnation (because this will be amble ground for the breeding of the Female anopheles mosquito which transmits malaria) nor piles of rubbish or debris etc. (which could pay host to noxious rodents and insects.

3.3.9: Malaria Prevention Act Cap 246 laws of Kenya

Part XII Section 136 of the public health act cap 242 complements well with the Malaria Prevention Act (Cap246) which provides measures to curb the breeding of mosquitoes at development sites. Such measures as prescribed by the act include: maintenance of free drainage channels, removal of stagnant water from any land to prevent larvae breeding, removal of wastes and broken bottles, amongst others. In this regard, the consultant requires full implementation of the ESMP mitigation measures that are contained for to control acquisition and transmission of malaria causing parasite, ***Plasmodium gambianse*** and ***Plasmodium falciparum***. Any vessel in the form of a pond, material borrow pits pan broken vessel or slow-moving draining system that can breed the mosquito must be removed both during and after site development (this is applicable to all concerned including households, institutions and etc.

3.3.10: Sexual Offences Act, SOA (2006)

Section 23 of SOA (2006) prohibits misuse of position and authority including public office by making persistent sexual advances on any other person. It states that any one in a position of authority or holding a public office who persistently makes any sexual advances or requests which are unwelcome, is guilty of the offence of sexual harassment and shall be liable upon conviction to imprisonment for a term of not less than three years or to a fine of not less than one hundred thousand shillings or both. SOA (2006) is relevant to the proposed project in more ways than one. No officer acting for the project will be allowed to ask for sexual favors in return for access to any benefit from the project which may include favors to enlist youth into the project skills training programme.

The act grants all concerned and PAPs the right to report any allegations of sexual harassment to any court of law and grants girls and children from sexual exploitation from project implementation team at whatever stage or phase of the project. Recruitment for any opportunities arising from the project will be done on equal-opportunity basis. The proponent and the contractors are hereby notified that all sexual offences viz; rape, indecent acts, pornography, prostitution, child trafficking etc. will not be tolerated throughout the project implementation cycle. The project implementers stand thus guided.

3.3.11: Public Roads and Roads of Access Act (Cap 399, laws of Kenya)

The act defines a public road as any road which the public had the right to use immediately before the commencement of the act or all proclaimed roads and thoroughfares being in existence on any land sold or leased or otherwise held under the East Africa land regulations (1897) the crown lands ordinance (1902) or the government lands act at any time before the commencement of this act and all roads and thoroughfares hereafter reserved for the public use. The proposed infrastructure development must be cognizance of the provisions and recognize that all existing roads and thoroughfares within the RA are declared public roads and or roads of access. They cannot be private property and the planners cannot compress them or parts of them into plots for allocation

3.3.12: Persons with Disability Act (Cap 133, Laws of Kenya)

This law was enacted to protect the rights of persons with disabilities and to ensure that they are not marginalized nor discriminated against on account of their disabilities. According to the Act: (i) a person with a disability shall not be denied access to suitable employment on account of his or her disability (ii) a qualified employee with any form of disability shall be subject to the

same terms and conditions of employment and same compensation, privileges, benefits, fringe benefits, incentives or allowances as qualified able-bodied-employees (iii) an employee with disability shall be exempted from tax on all income accruing from his/her employment

In addition, a person with disability is entitled according to this law to exemptions which apply with respect exemptions, deductions as described in schedule 42 subsection 2.

Thus by this law the project implementers are bound to ensure that they do not deny a person with disability employment in any contract or subcontract opportunity that may arise out of the execution of this project on account of their disability alone.

Secondly, the consultant advices that all PAPs with disability should be granted priority in balloting to ensure that they do not get land parcels which are in hard to access sites or difficult-to-live in because of their disabilities. The market, Dispensary and other structures proposed for site enhancement should be disaster friendly in their construction and final finishing. That is the responsibility of the design teams and contractors.

3.3.13: The Environment and Land Court Act

Enacted in 2012, the Environment and Land Court Act gives effect to article 162 of the constitution for the objective to hear and determine disputes relating to the environment and the use and occupation of and title to land and to make provision for its jurisdiction functions and powers. Section 13 (1) of the Act gives the Court original and appellate jurisdiction to hear and determine all disputes in accordance with Article 162(2)(*b*) of the Constitution and with the provisions of this Act or any other written law relating to environment and land. In exercise of its jurisdiction under Article 162 (2) (*b*) of the Constitution, the Court shall have power to hear and determine disputes relating to environment and land, including disputes relating to (i) environmental planning and protection, trade, climate issues, land use planning, title, tenure, boundaries, rates, rents, valuations, mining, minerals and other natural resources (ii) compulsory acquisition of land (iii) land administration and management (iv) public, private and community land and contracts, choses in action or other instruments granting any enforceable interests in land and (v) any other dispute relating to environment and land.

The law is relevant to all development activities in Kenya because it provides for legal redress in case of infringement of anyone's environment or land rights. The PAPs and the Proponent can each seek recourse from this court in case of any form of injustices that happen to them in the ownership, use and titles of their land and land acquisition methods used.

3.3.14: The Penal Code CAP 63

Chapter XVII on "Nuisances and offences against health and convenience" of the penal code strictly prohibits the release of foul (air which affects the health of the persons) into the environment. It states, "Any person who voluntarily vitiates the atmosphere in any place so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighborhood or passing along a public way is guilty of a misdemeanor" Waste disposal and other project related activities shall be carried out in such a manner as to conform to the provisions of this code. Thus the contractor must not use machines and equipment that emit noxious fumes into the atmosphere while the project designs must take note of the fact that both solid waste and waste water originating from the project must be managed well.

Thus the project implementation especially during construction of basic infrastructure will comply with this requirement while PAPs once settled remain guided accordingly on their actions which could constitute a misdemeanor. Other relevant laws are described in table 4.5.

Table 3.5: Additional legislation critical to proposed project implementation

S/No.	Legislation	Description	Relevance to the proposed project
1.	The Traffic Act (Cap 403 Laws of Kenya)	The Act also prohibits encroachment on and damage to roads including land reserved for roads by and project or any human settlement or by an exercise of resettlement. The project is under the provision of the Act.	The RA comes with well-marked roads with adequate signage. The Traffic act in section 52 demands that all road users must comply with the signage and markings of the roads. Contravention of the section 52 of the Traffic Act cap 403 is an offence under section 53 and is punishable by a fine not exceeding Ksh. 50,000.00 or an imprisonment of a term not exceeding 6 months or both fine and imprisonment
2.	Street Adoption Act	Regulates construction, improvement and adoption of streets by the county government	The streets feeding the new estate should be constructed according to the provisions of this act with adequate and clear marking, identification, signage and lighting. Their maintenance and repair are the responsibility of the county government of Mombasa
3.	Physical and Land use Planning Act 2019	Provides for the preparation and implementation of physical and land use development plans, including provisions for street networks, footpaths, and cycle tracks	The ministry of lands produced an advisory map of the planned activities to be undertaken in the resettlement area. This was approved by the Physical planning unit as per the Physical planning act 2019. As per the approved plan, all mapped-out roads, streets , walkways and cycle tracks should be developed to the approved standards
4.	Urban Areas and Cities Act (2012)	The act Provides for the classification, governance, and management of urban areas and cities. Parking, traffic control, public transport, and street lighting are listed as requirements for classification of an area as a city or a municipality	The proposed Resettlement area is within Mombasa city and thus governed by the provisions of the UACA (2012) the mapped parking area should be modernized with cabro while all streets should have street lighting , the public bus park in the allocated parcel of land should be modernized, not earth but in the least cabro-paved The management of the bus park, market, Dispensary should be under the CGoM
5.	Kenya Ports Authority Act	Section 12 (2) (j) empowers KPA to prohibit, control or regulate the presence of any person etc. within any port or on any premises occupied by the KPA.	The proposed resettlement area is land legally owned by the KPA and thus KPA has the powers by the KPA act cap 391 laws of Kenya to allow or not allow any person to whatever part of the area. KPA is single most important stakeholder in the project and exercises control on nature, types and kind of improvements that can be done on the land to make it habitable for the PAPs

S/No.	Legislation	Description	Relevance to the proposed project
6.	**The Water** Act (2016)	The Act vests the water in the state and givers the provisions for the water management, including irrigation water, pollution, drainage, flood control, and abstraction. In the Resettlement Policy Framework (RPF) the main legislation governing the use of water especially through water permit system where special provision of water may be made for settlement or resettlement is the Water Act (2016)	All water supplied to the new estate will come from boreholes located in Tiwi area of Kwale county. The Water Act (2016) is relevant because it created Water Resources Authority which controls all matters ground water. Thus the boreholes should have a (i) valid Hydrogeological Survey Report, (ii) an Authorization to drill license (iii) An abstraction permit from the WRA, and (iv) WRA approved meters. All bills of abstracted amounts should be paid by the 5th day of every month. Failure to comply with these regulations of WRA constitutes an offence punishable by law under the Water Resources Regulation (2021) of the Water Act (2016)
7.	The National Land Commission Act (2012)	An Act of Parliament to make provision as to the functions and powers of the National Land Commission, qualifications and procedures for appointments to the Commission; to give effect to the objects and principles of devolved government in land management and administration, and for connected purposes	The NLC was responsible for disclosure of the project, verified list of valued assets and issued awards. NLC plays a significant role in the project GRM system
8.	The National Museums and Heritage Act (2006)	An Act of Parliament consolidating the laws on among other components national museums, antiques, monuments, and heritage. It provides conservation and transmission of the cultural and natural heritage of Kenya. The Act repealed the Antiquities and Monuments Act (Cap. 215) and the National Museums Act	The NMK Prescribes in the Chance find procedures what to do with any item (of cultural, historical, or archaeological importance) that could be found by chance during the development of the proposed resettlement site. The contractor will collect the item and complete the CFP form and report to the NMK

S/No.	Legislation	Description	Relevance to the proposed project
9.	Land Registration Act, 2012	LRA (2012) is an act of parliament enacted to revise, consolidate and rationalize the registration of titles to land and for land ownership. It gives effect to the principles and objects of devolved government in land registration and for connected purposes	The relevance of LRA (2012) in the proposed project cannot be under-estimated because once the land has been adjudicated and balloted by the PAPs, it is the LRA (2012) by which the PAPs will be registered as legal owners of the new parcels and granted titles of ownership of the land into which they will settle going forward. Section 26 subsection (1) states that the certificate of title issued by the Registrar upon registration, or to a purchaser of land upon a transfer or transmission by the proprietor shall be taken by all courts as prima facie evidence that the person named as proprietor of the land is the absolute and indefeasible owner, subject to the encumbrances, easements, restrictions and conditions contained or endorsed in the certificate, and the title of that proprietor shall not be subject to challenge, except on the ground of fraud or misrepresentation to which the person is proved to be a party; or where the certificate of title has been acquired illegally, un procedurally or through a corrupt scheme. A certified copy of any registered instrument, signed by the Registrar and sealed with the Seal of the Registrar, shall be received in evidence in the same manner as the original. Each title should be compared well with the identification documents of the tittle for accuracy before acceptance from the ministry The borderlines of the access roads etc. are protected under section 18 of the act
10.	Climate Change Act (2016)	Provides a regulatory framework for enhanced response to climate change	The activities towards improvement of the RA for human occupation should not generate GHGs nor should they cause destruction of vegetation especially mature trees
11.	Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act, 2012	The Act provides for the prevention of displacement. According to the act, displacement, relocation can only be lawful if justified by compelling and overriding public interest.	The Mombasa Special Economic Zone project will cause acquisition of land for easements, constructions, way leaves etc. and thereby displacement of persons. Affected persons must be compensated. The most feasible compensation was land for land and thus government found land in the selected resettlement area.

Source: This study

3.4: Codes, Specifications and Standards

3.4.1: Guidelines for Prevention and Control of Soil Erosion in Road Works, 2010

The guidelines acknowledges that road works potentially result in environmental hazard through the spillage of carbon products, contaminating the surrounding land, dust and noise pollution, interference with the drainage pattern hence extensive soil erosion. The guidelines will be important in the site enhancement subprojects of estate roads and will guide (i) The design and construction of roadside drainage systems and soil erosion control (ii) Soil erosion control measures needed in upper and lower catchment areas (iii) Soil erosion and their mitigation measures against anticipated damages from the road drainage discharge.

In addition to the relevance of this guideline in the construction of the estate access roads, this guideline should be complied with when leveling the parcels of land proposed for playground, cemetery, market and bus park developments.

3.4.2: Environmental Guidelines for Roads and Bridges, 2010

The guideline provides for detailed environmental analysis of issues arising from roads and road constructions. According to the guidelines, a thorough analysis of the environment state should be done before the project implementation and consistent monitoring during construction and after to ensure sustainability of environment protection measures.

According to the guidelines, (i) an ESIA should be prepared at feasibility and be updated during design stages of the proposed road project (ii) the certificate for road project completion cannot be issued before the certificate of environmental compliance (iii) emphasis should be placed on healthy and environmental quality objectives such as ecosystem protection, air quality, health and safety of workers and users. The guideline will be applied in the proposed access road subprojects together with the guidelines from NEMA and in any case where conflicts arise between the guidelines and NEMA, the primary law on environment will supersede the guidelines.

3.4.3: Physical Planning Handbook

This manual provides guidelines and modus-operandi for physical planning. This includes planning for transport infrastructure. It calls for dedicated pedestrian walkways, cycle tracks and NMTF as well as adequate landscaping in all urban road and street planning and development.

It is relevant in the proposed project especially in the component of the project dedicated for transport infrastructure development within the new estate.

3.4.4: The Building Code 2009

When constructing the structures such as the proposed roads, market, Dispensary and schools the Resettlement project should comply with the provisions and rules set by the building code (2009). The code requires that the building plans, drawings and designs be submitted to the county government planning unit for review and subsequent approval. The building code goes ahead to prohibit (i) construction of any structures even when deemed temporary (such as site or camp site) to which the regulations apply (ii) occupation of any structure which is constructed in contravention of the regulations especially when such situation is known.

The building code (2009) is relevant to the proposed project because planned structures such as buildings to be used as market, Dispensary and schools are all governed by the set rules of the building code. The proponent has been adequately advised by the consultant on the relevance of these regulations and is committed to implement them in all related construction activities.

3.5: International and multi-lateral environmental agreements

Kenya has ratified several international and multi-lateral agreements which influence decisions about development and environmental sustainability. This subsection describes critical and relevant IMEA that are relevant to the proposed project as it is proposed for implementation in Kenya.

3.5.1: United Nations Convention on Biological Diversity, UNCBD

UNCBD is the international instrument for the conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the utilization of genetic resources. It is ratified by 196 nations of the world including Kenya and Japan. The main objective is to promote actions that could lead to a sustainable future.

It is relevant to the proposed project because it targets biodiversity at all levels including ecosystems, species variety, genetic resources, the role of biodiversity in developing politics, education, agriculture, and culture among other components of biodiversity.

The proposed site encompasses Kaya conservation areas which are sacred and traditional Miji Kenda places of worship, and are located within sacred forests .They are considered to be intrinsic sources of ritual power and origin of the cultural centers. However none of the Kayas that are encompassed in the RA are under the UNESCO classification as a world heritage site

It is noteworthy that the kayas present in this area have springs of flowing water which serve the community and have a variety of plant species, many of the sacred, medicinal and culturally important to the community. It is thus recommended that all kaya land and forest be left as-is without any disturbance. It should not form part of the land for allocation to individuals

Interactions between the consultant and the leaders of the Kaya system provided critical information which led to the conclusion that Kaya zones should be fenced all round and the incoming settling community should be educated on the need to respect the Kaya; Nobody is allowed to approach the kaya ecosystem for whatever purpose (be it to collect firewood, fetch water, defecate etc.) except under the leadership and express permission of a kaya elder. Failure to adhere to the rules governing the kaya system is believed to be detrimental to the welfare of the intruder.

3.5.2: United Nations Convention to Combat Desertification, UNCCD

UNCCD was adopted in 1994 and it remains the sole legal international agreement that links environment and development to sustainable land management. It focuses on arid, semi-arid and dry sub-humid areas of the world also called drylands. In such ecosystems exist the some of the most vulnerable ecosystems and people on earth.

The convention believes that when land is degraded (and when usable land becomes scarce,) women are significantly affected because of their traditional role in agriculture and food

production, greater vulnerability to poverty, weaker legal protection and social-cultural status which presents men as the main decision makers for both household and community issues.

The convention pushes for full participation of men and women in efforts geared towards fighting drought and desertification.

The provisions of UNCCD are relevant and must be observed by the implementers of the resettlement project in Dongo Kundu. The consultant recommends the following measures to ensure continued war against droughts and desertification:

- All mature indigenous trees must not be cleared. Road works should avoid cutting down mature traditional trees
- Protect all Kaya ecosystems with their variety of tree species
- Promote planting of trees especially around homesteads and on all newly and existing public spaces such as the schools, places of worship, Dispensarys and road sides. The project water supply system should ensure a coordinated supply of water for the purpose of watering planted seedlings until maturity
- Clear vegetation carefully to avoid destruction of ground covers which play a major role in the prevention of soils erosion on the RA whose soils are loose and easy to be eroded by both rain and wind

3.5.3: United Nations Framework Convention for Climate Change, UNFCC

UNFCC was ratified in 1994 and has a near-universal membership with 198 member nations. It binds member states to act in the interest of human safety despite lack of or inadequate scientific certainty. Its ultimate objective was to of stabilize Green-House-Gas Concentrations to a level that would prevent dangerous anthropogenic and induced activities from interfering with the climate system. The provisions of this are relevant to the proposed project because of the following reasons:

- Potential of using not-well-served road construction equipment that would emit large fumes during operation
- Destruction of vegetation would interfere with photosynthesis and absorption of Carbon dioxide by plants and release of desired oxygen gas for the benefit of humans.

3.5.4: The Paris Agreement (2016)

The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015 and entered into force on 4 November 2016.Its overarching goal is to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels” and pursue efforts “to limit the temperature increase to 1.5°C above pre-industrial levels. “The Paris Agreement is a landmark in the multilateral climate change process because, for the first time, a binding agreement brings all nations together to combat climate change and adapt to its effects.

For Kenya, climate change is acknowledged in all key national policy documents: Vision 2030, Medium Term Plan II, National Climate Change Response Strategy (NCCRS 2010), National

Climate Change Action Plan (NCCAP 2013), National Adaptation Plan (NAP)- under preparation which provides a vision for low carbon and climate resilient development pathway, while a National Climate change Framework Policy and legislation are in their final stages of enactment to facilitate effective response to climate change. Kenya is operationalizing these policies and plans through the reforestation, geothermal and other clean energy development, energy efficiency, climate smart agriculture, and drought management.

3.5.5: Convention on the Protection of World Cultural and Natural Heritage, 1972

Parties are required to put in place effective and efficient measures and actions that include assessment of the feasibility of the proposed projects and available alternatives to prevent or minimize adverse impacts as well as assess the nature of potential impacts on natural heritage resources. The convention also calls for the protection of threatened species of fauna and flora within project areas. This convention provisions are relevant to the proposed project because of its proximity to kaya cultural heritage areas. This project will not interfere with the Kaya ecosystem at all in respect to their significance in the culture of the Mijikenda community which hosts the proposed resettlement project. Table 3.6presents a highlight of potential triggers to international Conventions to which Kenya is a Party State. Nine out of 11 treaties are potentially triggered by the Project.

Table 3.6: An analysis of other relevant international conventions

No	Convention	Status	Reason
1	Convention on International Trade in Endangered Species of Wild Fauna and Flora	Triggered	• Four tree species are listed as Near Threatened while one is listed as Endangered under IUCN Data lists. Mpingo- (Dalbergia melanoxylon).-one of the near threatened trees found in the Study area is overexploited on account of its highly valuable timber. • Out of 156 bird species counted in the Study area, two are classified as Endangered and One is Near Threatened. Mitigation measures are listed in the ESMP
2	Convention on the Elimination of all forms of Discrimination against Women, 1979.	Triggered	▪ Women form the bulk of the poor in the rural Digo community where project is located. ▪ The main source of livelihood include climate-change-ravaged subsistence farming ▪ The Study has proposed mitigation measures including employment and training for skills acquisition. ▪
3	Convention on the Conservation of Migratory Species of Wild Animals, 1979 and its Daughter Convention –The AEWA	Triggered	The project area does not host any form of migratory birds or species of any organisms. None of the sites proposed for Project related investment fall within a wildlife migratory corridor. However CMS and AEWA bird species were recorded in the area.
4	The Vienna Convention on Protection of the	Potential	▪ Potential - If project machinery and vehicles will emit fumes yes. ▪ The consultant recommends use of well serviced

	Ozone Layer (1985)		machinery to prevent dangerous emissions. ▪ Please refer ESMP
5	The Montreal Protocol on substances that deplete the ozone layer (1987)	Potential	▪ If project machinery and vehicles will emit fumes the potential for such emission exists ▪ The study recommends use of well serviced machinery to prevent dangerous emissions. ▪
6	Convention on Biological Diversity	Triggered	The Kaya ecosystems are repositories of biodiversity and genetic resources
7	International Plant Protection Convention (Revised), 1997	Triggered	▪ None of the project objectives involve introduction of non-native species of organisms. Thus ▪ However, the biodiversity survey identified presence in small quantities of ***Cuscuta reflexa*** and ***Prosopis juliflora*** both of which are classified as invasive under the Seventh Schedule of WMCA 2013. ▪ Measures have been prescribed in the ESMP to stop potential spread into the area of these two invasive spp.
8	African Convention on the Conservation of Nature and Natural Resources (1968)	Triggered	Exploitation of groundwater resources from aquifers in Tiwi and rangelands will trigger this convention
9	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972	Triggered	Internal Roads and the Public Market proposed under the Project will dispose runoff into natural drainage which drains directly into the Port Reitz Creek thus opening the possibility of wash off of solid waste and sediment into this marine ecosystem.
10	The Convention on Wetlands of International Importance (Ramsar 1971)	Not Triggered	There is no wetland of any nature within RA and there is not Ramseur site within RA or its immediate vicinity
11	Convention on the Protection of World Cultural and Natural Heritage, 1972, which also protects threatened plants	Triggered	▪ There 3 Kayas within the Project Area which are revered as the centers for local indigenous religion. ▪ ▪ Endangered species of flora and fauna (including birds) have recently been documented as occurring in the project are hence the trigger.

Source: this Study

3.6: Institutional framework

3.6.1: The National Environment Management Authority, NEMA

The National Environment Management Authority (NEMA) is a Semi-Autonomous Government Agency (SAGA) in the ministry of environment and forestry established under the Environmental Management and Co-ordination Act Cap 387, laws of as the principal instrument of Government for the implementation of all policies relating to environment. It is mandate under section 9 (i) to exercise general supervision and coordination over all matters relating to the environment and to be the principal instrument of the Government of Kenya in the implementation of all policies relating to the environment.

NEMA works with lead agencies and development partners such as JICA, UNDP, UNEP etc. The role of NEMA in the proposed project is paramount because it coordinates implementation of EMCA including the requirements for an Environmental and social Management plan for projects of categories similar to the proposed resettlement plan. Thus the ESIA subject of this report will be submitted to NEMA for review and approval for the project to be approved to progress to implementation.

In a summary, NEMA will require the following from the project and its executers:

- Terms of references and scoping report
- A full environmental and social impact assessment study report
- Unrestricted entry into the project site for the purposes of investigations, inspection, on progress on the ESMP implementation
- Compliance with instruction issued by NEMA officer on site
- Regular environmental audit reports annually
- Compliance with the license conditions

Table 3.7: Institutions around EMCA (Cap 387, laws of Kenya)

Structure	**Description**	**Applicability**
The National Environment Council, NEC	Responsible for policy formulations and directions for the purposes of proper Operationalization of EMCA cap 387 laws of Kenya. It sets environmental goals and objectives and creates policies and priorities for environmental protection in Kenya	The NEC will examine the progress of the proposed project implementation carefully to learn and guide policy formulation which will guide similar projects going forwards
The National Environmental Complaints Committee, NECC	Section 20 of EMCA prescribes the functions of the National environmental complains committee which include to: (i) to investigate allegations or complains related to the environment (ii) prepare annual reports on the state of the environment and undertake public litigation on behalf of the citizens in environmental matters	NECC will receive any complaints from any person, group of persons or entity presented to them. These complaints can be only related to implementation of this project where other means of settling the issues have failed. NECC will investigate and provide guidance on how the matter/s can be settled
The County Environment Management Committee	Section 18 of EMCA which Establishes the County Environment Committees with an obligation to: manage the environment affairs at the county level by developing county environment strategic action plan every five years and any additional functions prescribed under the Act or as assigned	The resettlement area is rural as it is but will soon upon occupation be transformed into an urban area. This will be important in the CEMC strategic plans for the next five years and thus should be managed within the current strategic plan provisions.

Structure	Description	Applicability
	by governor by notice in the gazette.	

Source: This study

3.6.2: The Kenya Ports Authority(KPA)

In the Capacity of Project Proponent and Owner, the KPA bears responsibility for the successful conduct of the ESIA Study and implementation of Construction Phase ESMP. Upon commissioning, implementation of ESMP will fall under the jurisdiction of the County Government of Mombasa. County Government of Mombasa.

The proposed project will be implemented within the borderlines and jurisdiction of Mombasa City County. Several improvements and functions services within the estate are devolved and will be later handed over to the CGoM for operation and management. Hereunder is a selection of devolved functions relevant to the project: (i) Provision of water (ii) Early Childhood Development and Education (infrastructure and staffing) (iii) Solid waste management (iv) Health services including infrastructure construction/improvement and staffing (v) Air quality management and control (vi) Firefighting and disaster management (vii) sanitation and wastewater management (viii) approving the drawings, designs and plans for public infrastructures such as schools, market, Dispensarys and roads (ix) establishment and management of cemeteries. All the subprojects related to the above functions will be handed over to the county government of Mombasa for maintenance and operation.

Table 3.8: Environmental-related permits required in the project

Activity	Relevant Legislation	Requirement	Issuing Authority	Responsible Authority	Date for Acquisition	Timeframe
Pre-construction stage						
Infrastructure development of internal roads, water distribution and kiosks, market, health centre and Cemeteries	Environmental Management and Coordination Act (EMCA), Cap 387 of 2018	• Submission of ESIA report to NEMA. • Obtaining an EIA License	National Environment Management Authority (NEMA)	KPA	Right after approval of ESIA Report	45-90 days
Stockpile site for road contractor	Environmental Management and Coordination Act (EMCA), Cap 387 of 2018	• Submission of ESIA report to NEMA. • Obtaining an EIA License	National Environment Management Authority (NEMA)	KPA	Right after approval of ESIA Report	1 month
Construction activities	Occupational Safety and Health Act, (OSHA) of 2007	Application for registration of work premises (sites)	Directorate of Occupational Safety and Health Services (DOSH)	Contractor	Before construction activities	1-4 weeks
Construction camp site	Environmental Management and Coordination Act (EMCA) Cap 387 of 2018	• Submission of ESIA report to NEMA. • Obtaining an EIA License	National Environment Management Authority (NEMA)	Contractor	Before construction activities	1 month
Cutting of trees	Forest Conservation and Management Act 0f 2016	Application for tree cutting on construction sites	Kenya Forest Service (KFS)	Contractor	Before tree cutting	-
Waste Management (short-term storage, transport, and	Environmental Management and Coordination Act (EMCA) Cap 387 of	• Submission of a Waste Management Plan to NEMA	National Environment Management Authority	Contractor	Before construction activities	1 month

disposal	2018	Obtaining a waste management license	(NEMA)			
Construction stage						
Emission of excessive noise/vibration	Environmental Management and coordination (Noise and Excessive Vibration Pollution Control) Regulations of 2009	Obtaining a permit to emit excessive noise/vibrations	National Environment Management Authority (NEMA)	Contractor	Before excessive noise/vibration works	2-7 days

Source: This study

CHAPTER FOUR: THE BASELINE ENVIRONMENT

4.1: Approach to Baseline Characterization

Documentation of the baseline environment for this Study had the objective of providing a firm, clarified profile of the pre-project environment, against which, potential impacts would be analysed and interpreted. As such, comprehensive analysis based on both secondary and empirical data was undertaken for this ESIA Study as unveiled in sections below. Data collection in the ESIA was restricted to unearthing basic facts, trends and processes in the Project's area of influence with the goal of defining potential impact area.

This chapter presents the result of analysis based on the secondary data. In addition to this, Chapters Six, Seven and Eight provide in-depth analysis of key natural resources namely;- air quality, biodiversity and the socio-economic profile based on various surveys that were undertaken as part of the detailed ESIA study.

4.2: The Physical Profile

4.2.1: Relief and topography at the Resettlement Sites

Plates 4.1 and 4.2 present topographic profiles for the MSEZ area following east to west and north to south directions. The land rises gently towards the east and north with elevation ranging from 4m asl at the mudflats along the Bombo Creek shorelines to reach a high of 65m asl at the DCC Compound. The terrain is originally a gently rolling plateau which has been dissected by minor valleys, the most prominent of which are the Vizioni and Mwayongo (Plate 4.2). Terrain therefore is a gently rolling dissected plain tapering gently to the east and south but, to the north of the DCC compound, the land dips sharply through a cliff to connect the tidal mudflats of the Port Reitz Creek (Plate 4.2).

Plate 4.1: Topographic cross section of Study area between Bombo Creek and the Mtishe Swamp
Source: This study

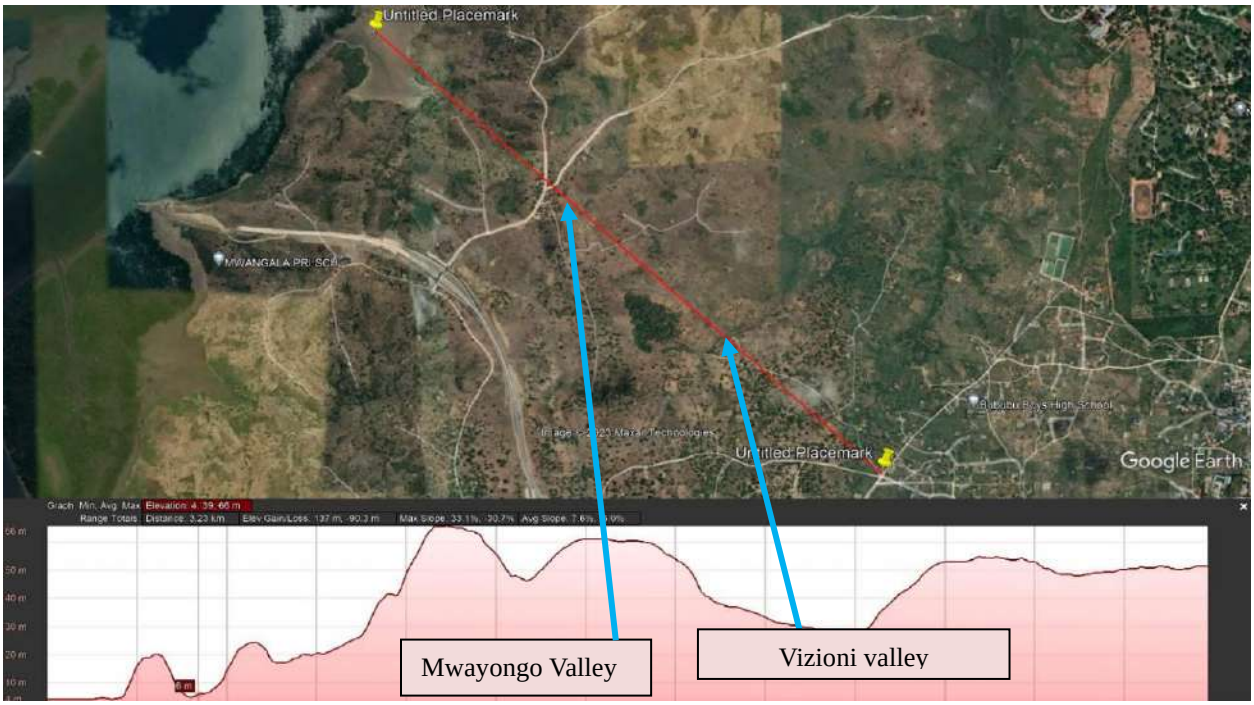


Plate 4.2: Topographic cross section of Study Area from Mbuta to the mudflats of Port Reitz Shoreline through the DCC compound
Source: This study

4.2.2: Physiographic profile

The most dominant physiographic feature in the study area is the Indian Ocean Coastline to the East and its Port Reitz Creek located to the immediate West and North of MSEZ area.

Moomaw (1960) describe the Kenya coastal elt through four major physiographic zones: Coastal Plain, Foot Plateau, Coastal Range and Nyika Plateau and the same model was adopted by Hiroshi Toya, et al, 1973 (Plate 4.3). This is the model relied on to describe the physiographic profile of the MSEZ area and proposed resettlement sites.

The Coastal Plain varies in width from 5-70 km, and consisting of Pleistocene deposits of coral and sands. The Coastal Plain lies generally below the 30m contour and displays a series of old, flat-bedded coral reefs, coral breccia, calcareous sands and beach sands. The Foot plateau, lying between 60 – 150 m contour, is found on marine shales, mudstones and limestones of Jurassic age. On the eastern side of the Foot Plateau rises the Coastal Range, a low ridge of Pliocene Magarini sands that is found at intervals throughout the entire length of the coast. The Coastal Range is best represented by the Shimba Hills. The Shimba Hills consist of Mazeras sandstone capped with a layer of Shimba grit at about 400 m contour, and carries a

heterogenous forest type determined by soils and altitude (Glover 1968, Schimidt 1991). The plant communities on the Shimba Hills and the Coastal Range are different to the other vegetation in the area (Moomaw 1960; Robertson & Luke 1993). To the west and further inland from the Coastal Range there is a lower lying ground, the Nyika Plateau, beginning at about 200 m contour at the eastern edge and gradually rising to 300 m contour extending to the fringes of Taru Desert (Spear 1978). The Nyika Plateau soils and vegetation are developed on the Duruma sandstone series.

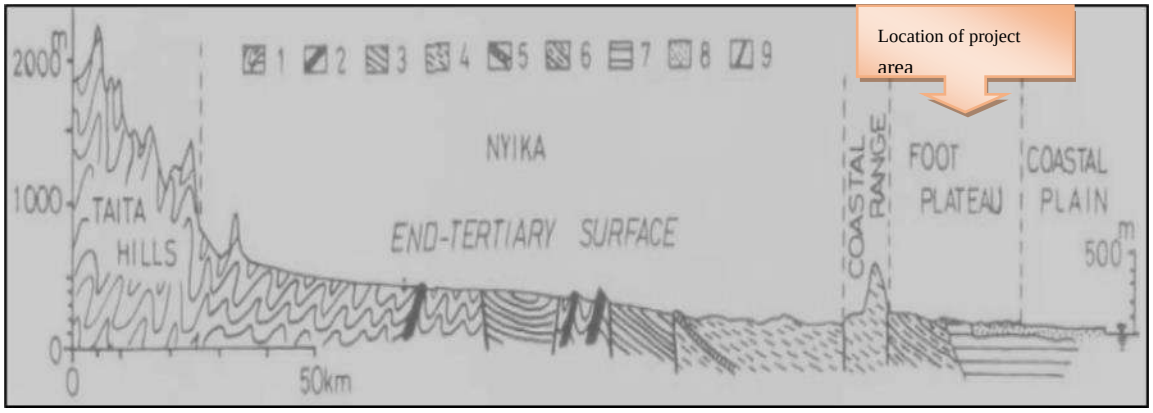


Plate 4.3: Geomorphology of South Kenya Coast including the Project area
Source: Hiroshi Toya, et al, 1973

From this brief survey of available literature backed up by field observations (Plates 4.1 to 4.2 above), the conclusion is that, the MSEZ area in Dongo Kundu is situated on boundary between the Coastal Plain and the Foot Plateau area at an altitude range of 45 to 60 metres above mean sea level. The Terrain is generally flat at the coastal plain

4.2.3: Geology and Soils

Soils of the coastal plain and foot plateau were developed on sandy sediments of the Miocene, Pliocene/Pleistocene and Jurassic ages which have weathered deeply to produce Ferralo-chromatic LUVISOLs to ACRISOLS dominated by well drained moderately deep to deep friable sandy clay loam to sandy clay. The Pliocene sediments have been heavily exploited for building sand leaving behind muddy and calcareous sediments which accumulate water in places.

4.2.3: Climatic patterns

4.2.3.1: Temperature, Wind Run, Relative Humidity and Sunshine

Temperature

Given the low altitude location, Mombasa remains generally hot throughout the year with mean temperatures averaging 26.3 ^{o}C with a range from 22.4 to 30.2 ^{o}C. Temperatures are generally highest in February and October and lowest in July (Table 4.1).

Table 4.1: Climatic Records at Moi Port Reitz International Airport Met Station

Temperatures			Relative Humidity		Daily Sunshine (hrs.)	Daily Wind Run (km)	Daily Evap (mm)	Monthly Mean Rainfall (mm)
Month	Daily max (°C)	Daily min (°C)	Daily Max (%)	Daily Min (%)				
Jan	31.6	24.2	76	66	8.3	141.3	210	25
Feb	32.3	24.6	75	63	8.9	143.2	203	17
Mar	32.6	25.2	77	63	8.9	138	221	65
Apr	31.2	24.7	81	71	7.6	158	184	200
May	29	23.4	85	76	6.5	162.3	155	325
Jun	28.3	22.6	83	72	7.3	168.6	144	118
Jul	27.7	21.8	83	72	7	162.2	138	91
Aug	27.8	21.6	83	72	8	158.1	158	64
Sep	28.4	22	80	70	8.4	153.8	178	63
Oct	29.5	23	78	69	8.9	148.2	197	85
Nov	30.9	23.8	77	69	8.9	123	188	98
Dec	31.4	24.1	78	69	8.7	128.5	191	59
Total					97.4	1785.7	2167	1210
Max.	32.6	25.2	85	76	8.9	168.6	221	325
Min.	27.7	21.6	75	63	6.5	123	138	17
Ave.	30.1	23.4	79	69	8.1	148.8	180	100

Source: Ralph and Jaetzhold, 2006

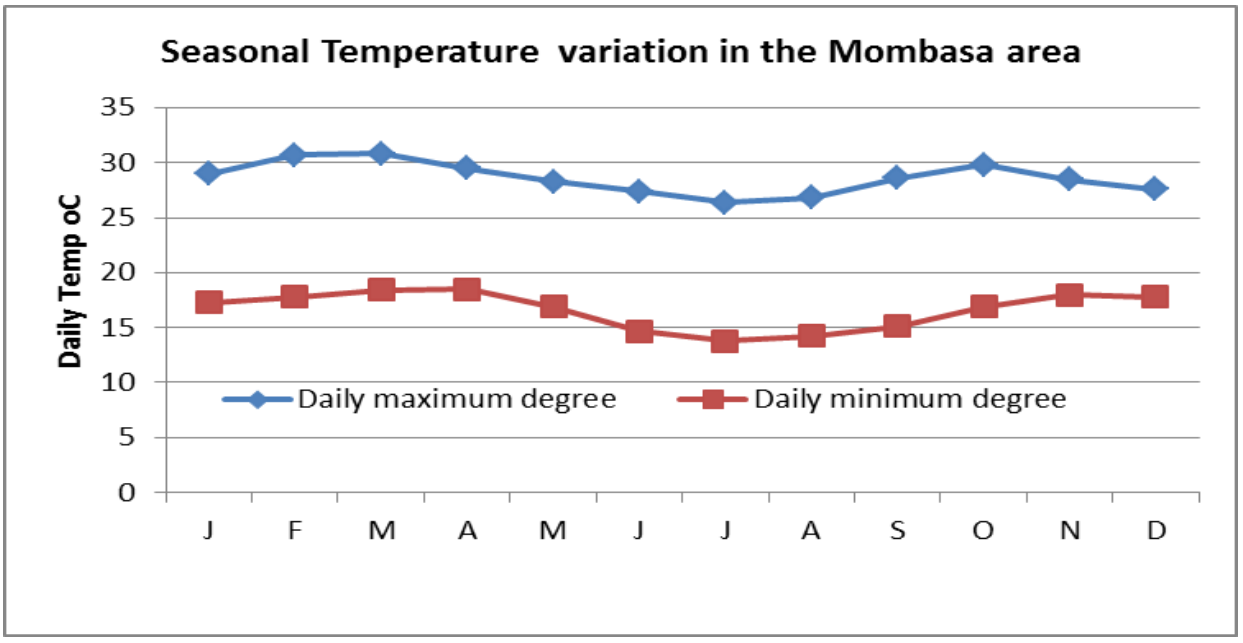
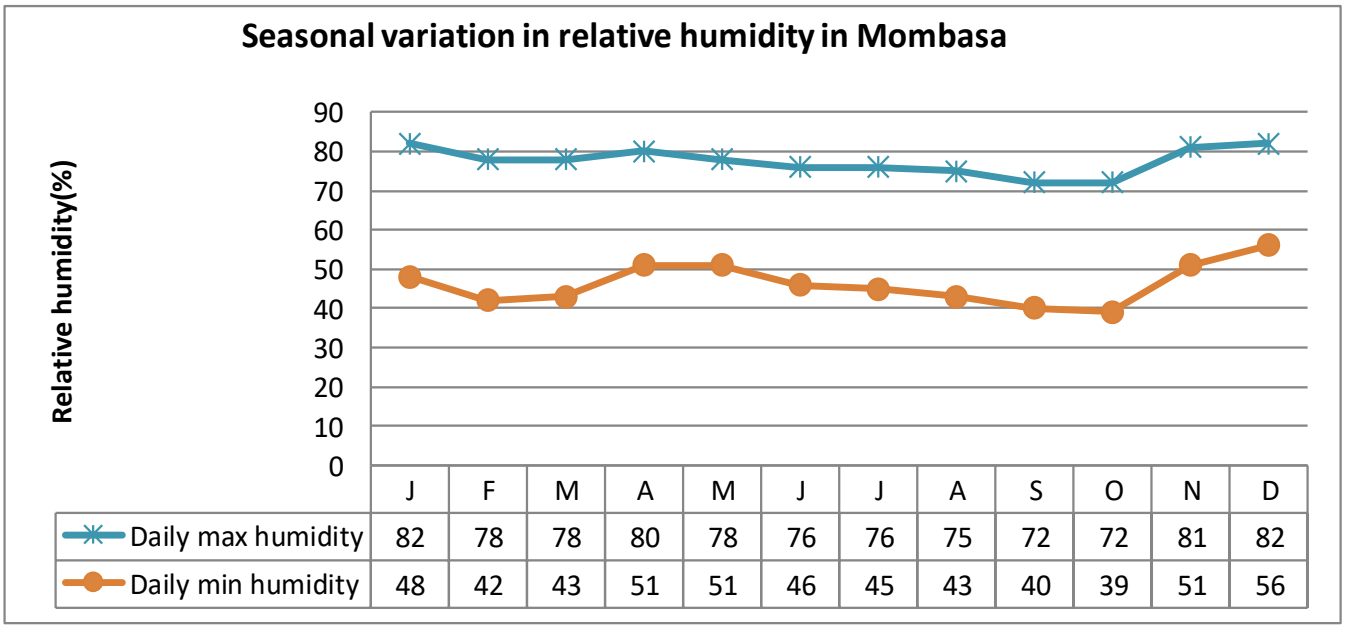


Figure 4.1: Seasonal Variation of Daily Temperature in the Mombasa Area
Source: Study of the National Water Master Plan, 1992

4.2.3.2: Relative Humidity

Figure 4.2 traces the seasonal variation of relative humidity in Mombasa. Mombasa is generally humid with a long-term (1959-1990) average of 61.5% and a range of 46% to 77%. Relative humidity does not display extreme seasonal variation as the maximum recorded is generally in the range of 72 to 82% with the months of January, April, November and December recording somewhat elevated humidity while February, September and October recording the lowest levels, according to the Study of the National Water Master Plan in 1992.



	J	F	M	A	M	J	J	A	S	O	N	D
Daily max humidity	82	78	78	80	78	76	76	75	72	72	81	82
Daily min humidity	48	42	43	51	51	46	45	43	40	39	51	56

Figure 4.2: Seasonal Variation of Relative Humidity in the Mombasa Area
Source: Study of the National Water Master Plan, 1992

4.2.3.3: Wind run and number of sunshine hours:

Daily wind run displays a very high seasonal variability with a prominent limb building up from July to peak in October then dropping drastically in November and December. Wind run is lowest in April to June.

Daily sunshine in Mombasa ranges from 6.5 to 8.9 hours whose average of 8.1 hours is among the highest recorded in Kenya. The period September to January has the highest stretch of sunshine hours with May and July recording the lowest.

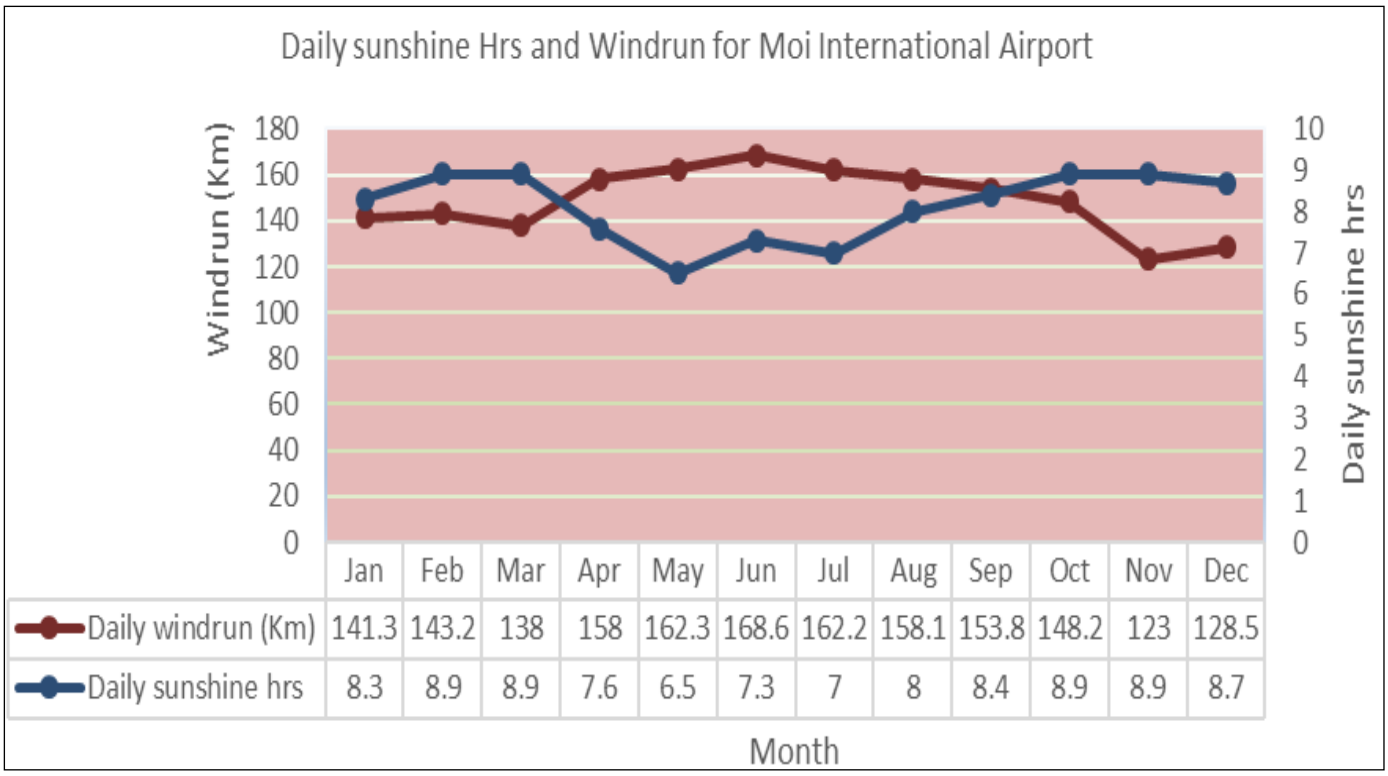


Figure 4.3: Seasonal Variation in Daily Wind Run and Sunshine Hours
Source: Study of the National Water Master Plan, 1992

4.2.3.4: Rainfall

Climate for the study Area is best referenced by 3 climatic stations listed in Table 4.2 and Fig. 4.4 all of which are found in the immediate vicinity and immediate west of the target area and hence afford the best estimate of rainfall input into the area.

Annual rainfall: From Table 4.2, mean annual rainfall in the intervention area is 1031mm. Annual rainfall generally increases to the south (Fig 4.4) with highest catch being recorded around Msambweni and it immediately decreases to the west of Tiwi towards the Shimba Hills/ Kwale Town area.

Table 4.2: Meteorological Stations within vicinity of the MSEZ area

Station	**Monthly mean rainfall (mm)**												**Longterm annual average (mm)**
Station	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**Total**
Waa Dispensary	14	16	29	155	292	121	90	51	67	70	59	49	1013
Tiwi Dispensary	25	13	46	197	291	113	88	69	59	76	78	57	1112
Mombasa Port Reitz	35	14	45	140	242	81	74	52	54	78	79	73	967
Average (mm)	*25*	*14*	*40*	*164*	*275*	*105*	*84*	*57*	*60*	*75*	*72*	*60*	*1031*

Source: Ralph and Jaetzhold, 2006

Seasonal rainfall occurrence and distribution: Rainfall occurrence in Kenya's coast region is associated with the semi-annual passage of the Inter-Tropical Convergence Zone (ITCZ) and the monsoons – the *North Easterly Monsoon (NEM)* from December to March and the *South Easterly Monsoon* from May to October. Most of the rainfall occurs between the monsoons when convection activity is enhanced. Annual rainfall is delivered in one long season lasting from March to July and a minor one in October and November. With a long-term average of 275 mm, May is the wettest month in the project area while the period between January and mid-March is the driest.

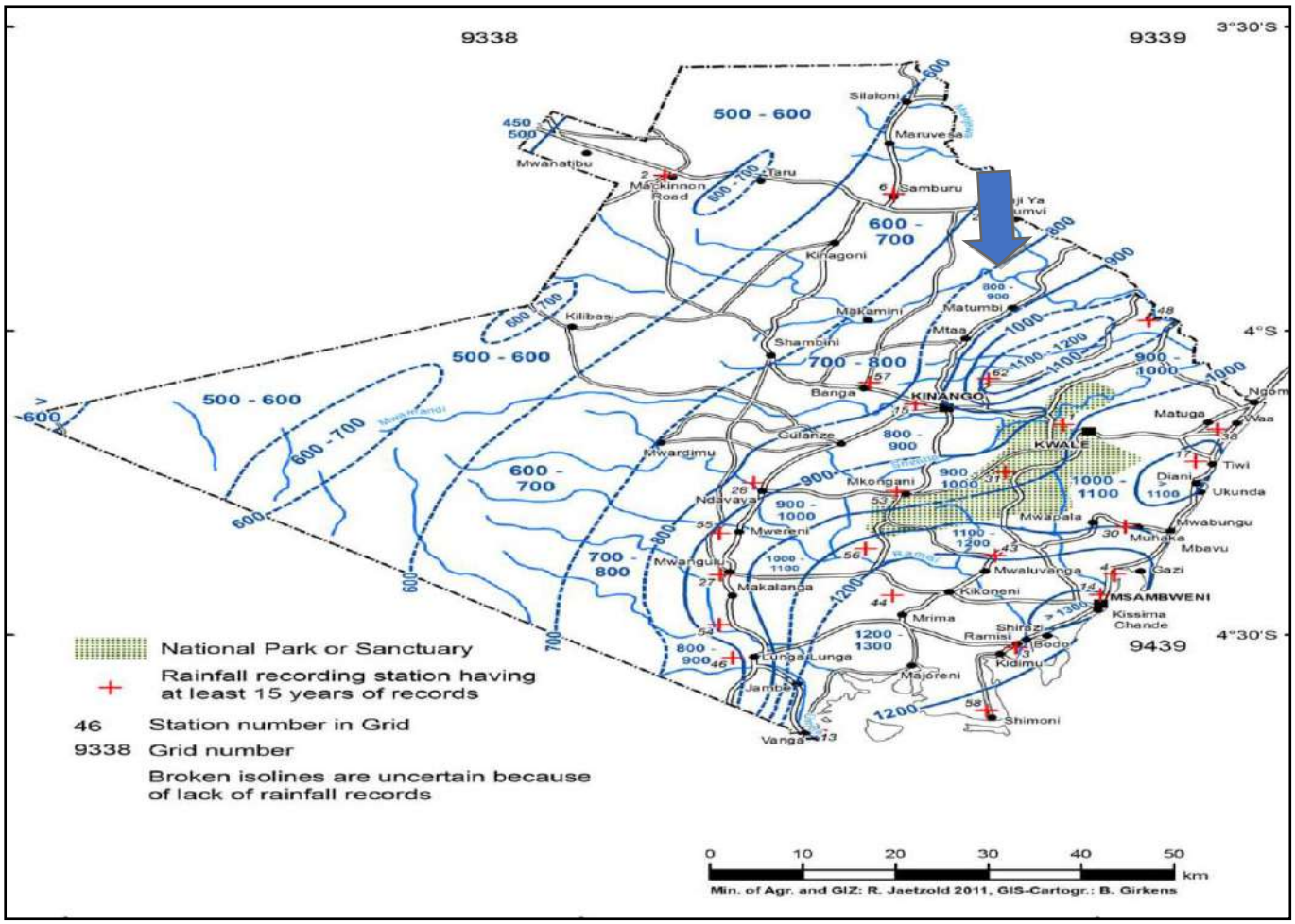
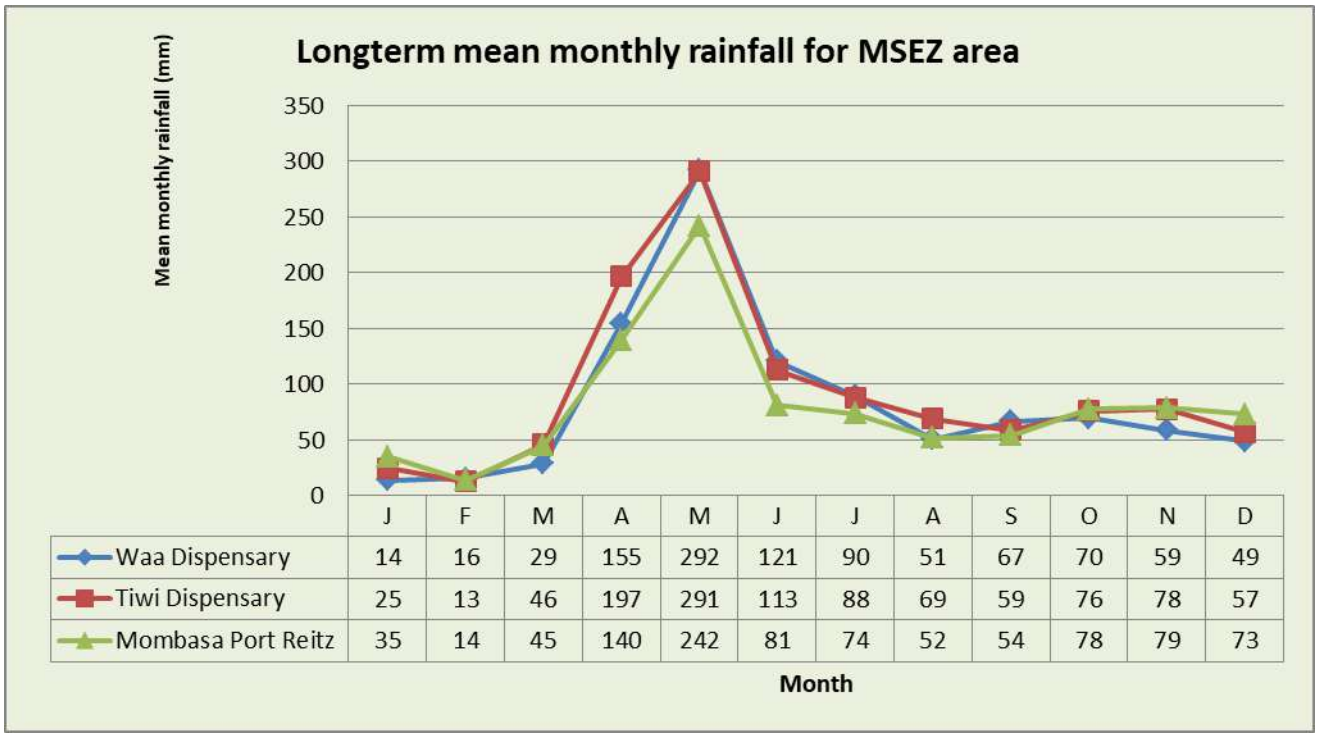


Figure 4.4: Isohyetal map of Kwale and South Coast
Source: Ralph and Jaetzhold, 2006



	J	F	M	A	M	J	J	A	S	O	N	D
Waa Dispensary	14	16	29	155	292	121	90	51	67	70	59	49
Tiwi Dispensary	25	13	46	197	291	113	88	69	59	76	78	57
Mombasa Port Reitz	35	14	45	140	242	81	74	52	54	78	79	73

Figure 4.5: Seasonal rainfall for the MSEZ Area
Source: Data from Farm management handbook (Ralph and Jaetzhold, 2006)

4.2.3.5: Climatic potential of rainfall

Table 4.3 provides an analysis of the climatic potential of rainfall input into the study Area based on computation of the climatic index as determined by the ratio of rainfall (R) to potential evapo-transpiration (Eo) based on the method of Sombroek et. al, 1982.[2] Computation of the R/Eo ratio has relied on rainfall data for Three (3) Stations (Table 5.2) and Potential Evaporation for Mombasa Port Reitz Station (lowlands). From Table 5.3, R/Eo ratios for the study area range from 0.45 to 0.51 implying long-term climate ranging from transitional semi-

2Classification of climate based on ratio of rainfall to Potential evaporation after Sombroek et al, 1982

zone	r/Eo (%)	classification	r average annual rainfall (mm)	Eo average annual potential evaporation (mm)
			excluding areas above 10,000 ft altitude	
I	> 80	humid	1100 - 2700	1200 - 2000
II	65 - 80	sub-humid	1000 - 1600	1300 - 2100
III	50 - 65	semi-humid	800 - 1400	1450 - 2200
IV	40 - 50	semi-humid to semi-arid	600 - 1100	1550 - 2200
V	25 - 40	semi-arid	450 - 900	1650 - 2300
VI	15 - 25	arid	300 - 550	1900 - 2400
VII	< 15	very arid	150 - 350	2100 - 2500

humid to semi-humid. However, on account of highly seasonal nature of rainfall, climatic designation is highly variable ranging from hyper-arid (0.1) to per-humid (3.3).

Table 4.3: Analysis of long-term climate in the Tiwi catchment

SN	Station	Annual rainfall-R (mm)	Annual Evaporation-Eo (mm)	R/Eo ratio	Climatic designation
1	Waa Dispensary	1013	2167	0.47	Transition
2	Tiwi Dispensary	1112	2167	0.51	Semi-humid
4	Mombasa Port Reitz	967	2167	0.45	Transition
5	Long-term average	1031	2167	0.48	Transition

Source: This Study

Such a high variability poses severe challenges in terms of vegetation development and semi-deciduous vegetation adapted to cope with seasonal moisture scarcity dominates the area. A seasonal moisture scarcity building from June to February imposes major limitation to rain-fed crop production and, as will appear in sections below, the project area is food insecure on account of poor crop yield associated with inadequacy of soil moisture.

In terms of hydrological impact, aridity imposes acute moisture scarcity as exemplified by lack of surface drainage in the area. With the monthly evaporation exceeding monthly rainfall for 11 out of 12 months (Fig 4.6) then, a situation of extreme aridity prevails through most of the year and this account for observed lack of surface drainage in form of streams or rivers in the area. The exception to this is the scenario in May where the moisture surplus of 123 mm builds on the near saturation effect of April rainfall to build a surplus soil moisture reserve which, where well harnessed, can convert to stream-flow and this explains the reason that all Kaya Forest patches in the area are associated with springs which form the only source of surface water in the area. The same surplus moisture possibly recharges local perched aquifers from which it is accessed through shallow wells.

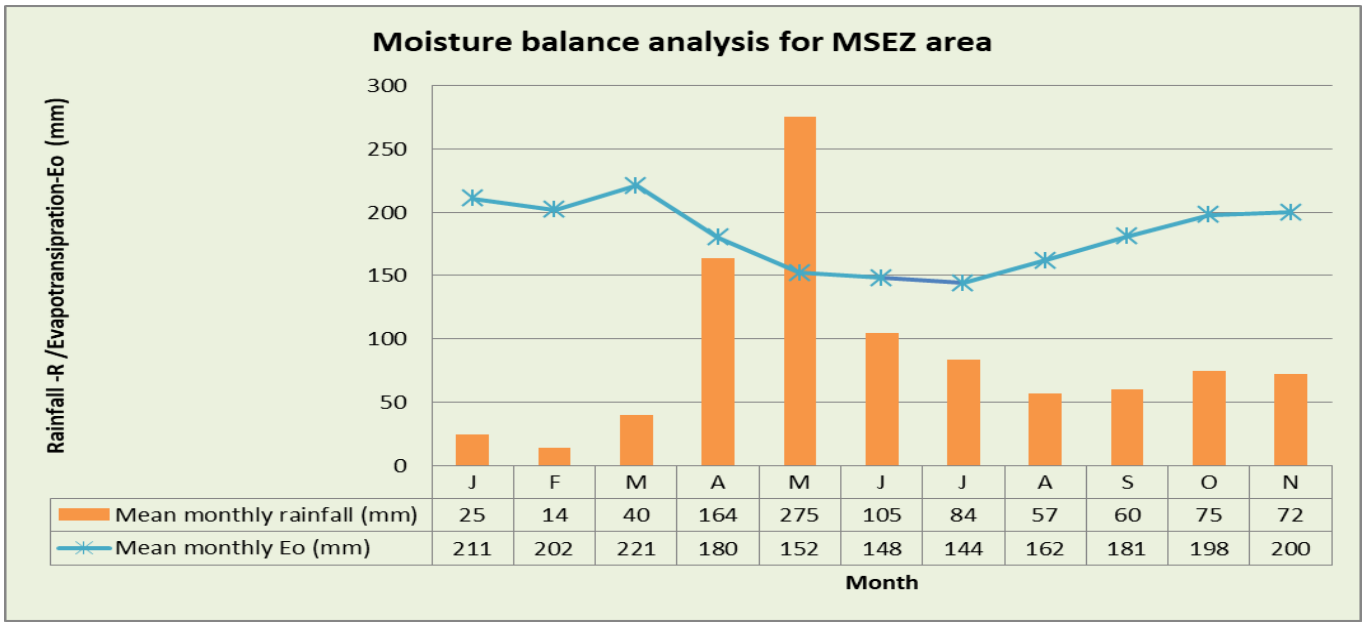


Figure 4.6: Seasonal Moisture Balance for the Mombasa SEZ area

Source: Ralph and Jaetzhold, 2006

4.2.4: Hydrology and drainage

Surface Water

With the exception of Lamu and Tana River Counties, the entire coastal zone of Kenya falls under Drainage Basin 3 where the main river is the Athi-Sabaki-Galana system. South of the Sabaki-Galana however, the land is drained by so-called shoreline tributaries that drain directly into the Indian Ocean. The Dongo Kundu area forms part of the Bombo catchment draining into the Mteza Creek tributary of the Port Reitz Creek.

Hydrology and drainage are a function of the local physiography and soils. On account of generally flat topography and deep well draining soils, the area between Likoni and Ukunda has no surface drainage as all rainwater input infiltrates the soil. The numerous depressions however accumulate water and convert into minor lakes in the wet season and are considered locally important as recharge points that feed local groundwater systems such as the Tiwi and Msambweni Aquifers.

Surface drainage within Dongo Kundu area:

The Dongo Kundu area forms part of the Bombo catchment draining into the Mteza Creek tributary of the Port Reitz Creek. Local drainage comprises of three valleys namely the Mbuta, Vizioni and Mwayongo which drain northwards to enter the Port Reitz Creek through the Mtishe Swamp (Fig 4.7) and Mrongondoni which drains westwards to enter Port Reiz via the Bombo /Mtza Creek. Though all valleys have water at the source areas, they soon dry out downstream, causing the flow to be ephemeral for most of the year.

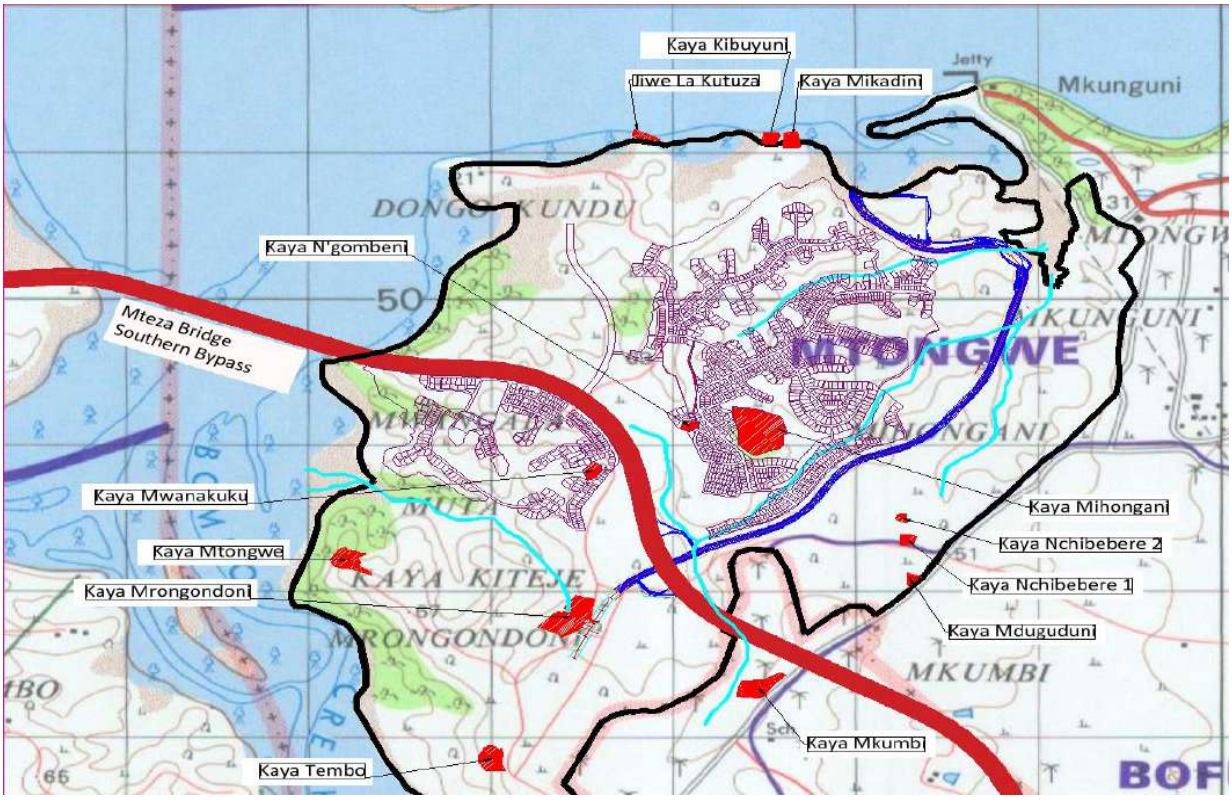


Figure 4.7: Drainage map (light blue lines) of the MSEZ Area

Source: This study

Current land-use within the catchment:

Details of the four valleys as obtained through ground truthing are summarized in Table 4.5 below and also exemplified in Plate 4.4. With the exception of some hilltops especially in Dongo Kundu and Mbuta Villages that are under moderately heavy settlement, the rest of the catchments especially the slopes and valley bottoms are under diverse vegetation ranging from bush fallow, degraded bushlands/woodlands and forest patches especially within the enclave of Kayas.

Both the Vizioni and Mwayongo valleys drain through the proposed Resettlement Area A and are therefore likely to undergo drastic change in land use which is likely to affect storm-flow behaviour in both valleys.

Table 4.5: Drainage characteristics in the MSEZ Area

SN	Catchment name	Area (ha)	Characteristics	Land-use
001	Vizioni Valley	15	Vizioni valley originates in the Mkumbi/Kiteje area of Kwale County near the Kaya Mkumbi. The valley flows northwards to cross MPARDIII at KM 15+100 and is soon joined by two other branches to the immediate north of Mrongondoni Mosque. The valley drains northwards to join the Mbuta Valley then draining to form the Mtishe swamp that adjoins the Port Reiz Creek near the KDF base at Mtongwe. Villages drained include Kiteje (Kwale), Mrongondoni and Mbuta.	This valley under intense cultivation of both seasonal and permanent crops and also partly drains Kaya Mihogani.
002	Mbuta	5	Mbuta is a small 1.73-kilometer-long valley originating to the North of Mbuta Health Center and draining northwards to join the Vizioni and then on to the Port Reitz Creek.	Mbuta valley forms the eastern boundary for the SEZ area. The slopes are intensely settled especially on the side of Bububu settlement.
003	Mwayongo	10	Mwayongo is the second longest Valley in the MSEZ area, starting off at the DCC Compound and draining directly northwards to enter Port Reitz through the Mtishe swamp. This valley entirely falls in Mbuta Village.	Mwayongo Valley is largely under secondary bushed grassland used for grazing with some isolated scattered settlements.
The 004	Mrongondoni	8.2	This valley drives name from Kaya Mrongodoni where its spring originates and drains to the North East through Mrongondoni and Mwangala Villages to enter the Bombo Creek at its confluence with Mteza.	Mrongondoni Valley is intensely settled and has very steep slopes which make it quite vulnerable to soil erosion.

Source: This study

Plate 4.4: Land use in the lower reaches of the Mwayongo Valley (background)
Source: This study

4.3: Emerging Issues

4.3.1: Invasive plant species

The presence of two invasive plants species was noted within the Resettlement area.

The Dodder (Cuscuta)

The Dodder, (genus Cuscuta) is a genus of about 145 species of leafless , twinning parasitic plants which belong to the family called morning glory or Convulvulaceae. They are widely spread throughout the temperate and tropical regions of the world and many species have been introduced with their host plants into new areas and are generally considered as invasive species. The consultant identified two species of the dodder family: *Cuscuta reflexa* and *Reflexa japonicum* which have infested the several plants within the RA.

Dodder does not have any chlorophyll and thus absorbs food from its host by use of specialized "attack root systems" called haustoria. The root-like organs penetrate the host plant tissues, absorb both water and nutrition from the host's systems leaving the host either dead or largely impoverished. Dodder is largely leafless and where leaves exists, they are small and scaly. The stems are slender and string-like which could be yellow, orange, pink or brown in color depending on the species. It produces flowers in nodule-like clusters which are made up of tiny yellow or white bell-like lobed corolla.

The dodder seed germinates and forms an anchoring root, before sending upwards a slender stem that grows in a spiral fashion until it reaches a host plant. It then twines around the stem of the host plant and throws out haustoria to penetrate it. It draws water from the host through the haustoria by penetrating its stem and xylem while nutrients are drawn from the phloem of the

host by the same haustoria system. Once a stem contact has been established and haustoria have been fully installed in the host plant, the anchoring root will rot slowly and finally die away .As it grows, it sends new haustoria until it establishes itself very firmly on its host. After making a few spirals around one host shoot, it will find another, throw an haustoria and continue to twine until the crown of the host is fully colonized into a densely tangled web of thin stems enveloping the host plant. Dodder seeds can live within the soils and remain viable for up-to 20 years. Thus dodder is invasive, parasitic and shows allelopathy characteristics.

Dodder can do great damage to all manner of plants including crops (such as legumes) ,fruit trees (such as mangoes and oranges) and ornamental trees and trees planted for shade provision. There is no effective herbicide in the market that can treat and put the dodder menace under control. Biological control of the dodder (by use of bacteria which feed on the dodder twines) is still being studied and not very well developed. The preliminary results are not practicable in Kenya because the common dodder species (*Cuscuta reflexa* and *Reflexa japonicum*) in Kenya have not yet been studied fully to the point of developing microbial control mechanism. Table 4.6 shows the kind of microbes being studied to control dodder:

Table 4.6: Microbes under study

Microbes	**Target dodder species**
Fusarium tricinctum, Fusarium *Alternaria*	Swamp dodder, *Cuscuta gronovii*
Alternaria alternata , Geotrichum candidum	Field dodder, *Cuscuta. pentagona*
Colletotrichum gloeosporioides	*Legume dodder* ***Cuscuta chinensis*** and ***Cuscuta . australis*** which attack mostly soybeans

Source: This study

The most common dodder control mechanism is mechanical removal. It includes hand-pulling, cutting, and or removing and mowing. These can reduce dodder infestation in a farm. The recommended method is to break it off, cut, or mow the host plant just below the point of dodder attachment (about 1/8 to 1/4 inch). All pieces and seed-contaminated soils should be gathered and destroyed by fire. However, burning will be effective as long as the invaded plant tissues is also destroyed to prevent regeneration of the dodder from embedded haustoria. The fire should be left to burn intensely and for longer period of time in order to destroy all seeds of the dodder.

Thus the consultant encourages the PAPs to regularly monitor their crops and trees for dodder infestation and to take immediate action to remove it once noticed before it can fully establish itself. The consultant identified several plants infested with the Dodder and recommends that active measures should be taken to stop its spread within the resettlement area.

Plates 4.5 Different manifestations of Dodder infestation within RA
Source: This study

Mesquite (Prosopis juliflora)

Popularly known as Mathenge in Kenya, *Prosops juliflora* is a deciduous shrub or small tree in the family Fabaceae. It is native to Mexico, South America and the Caribbean. However, in Africa, Australia and Asia, it is classified as invasive and is accused as a critical contributor to the transmission of malaria especially during dry seasons when sugar sources from native plants are largely unavailable to mosquitoes. In Ethiopia, Hawaii, India, Jamaica, Nigeria, Sudan, Somalia, South Africa, and Kenya, *P. juliflora* is considered as a noxious invasive weed. It is hard and expensive to remove and can propagate through seeds, cuttings and seeds.

In Australia, it has colonized over 2,000,000 acres of arable land with severe environmental, economic and agricultural implications. Because of its thorns and low lying branches, *P.juliflora* makes impenetrable thickets thus negatively affecting grazing lands and presenting a safety risk as the thorns are very sharp, tough and painful on pricking.

The consultant identified several shrubs of Mathenge within the RA and recommends action to be taken before the weed colonizes a larger part of the lord.

Plate 4.6: Prosopis juliflora colonized field
Source: This study

4.3.2: Non controlled alluvial sand harvesting

While sand is a main driver of world economies everywhere, unsustainable harvesting methods pose a risk to rivers, peoples, economies and nature. In Kenya this presents a great threat to agricultural land and must be contained through enforcement of laws and regulations governing sand harvesting in the rural areas especially on-farmland –sand harvesting.

The RA does not have river-based sand harvesting activities. However, the consultant identified several on-land sand harvesting sites within the special economic zones where investors are supposed to set up their investments. The harvesting is uncontrolled and is accessed through non-designated roads which are earth roads. Persistent use of these access routes risks creation of on-surface gullies thereby exacerbating local soil erosion.

The method utilized by the harvesters are crude and destroy the rooting systems of mature trees and are potential causes of their death. In addition, all harvesting sites are cleared of ground covers, climbers, herbs, shrubs etc.

Though the demand for building sand continues to increase, mining of sand on agricultural land is a major environmental issues and is common on the special economic zone land and its negative impacts on the soil structure, topography, vegetation and farm productivity is evident. It is not regulated nor controlled and it is being carried out at an alarming rate. Imoru (2010) notes that although sand contributes to the construction sector, it comes with negative effects such as permanent loss of sand in the spot areas, habitat destruction and yet it is a major public health issue. The consultant identified on one site over 20 harvesters who do not have a sanitation strategy and thus they apply open bush defecation sanitation plan which presents public health issues to both the immediate environment and the environment that maybe affected when it rains leading to contamination of shallow well waters (which is a common source of domestic water in the area)

Dust from sand harvesting is a major air pollutant within mining sites and affects not only the miners themselves but also the vegetation around the site where it is deposited on leaves, flowers and tree trunks negatively affecting their physiological activities.

Uncontrolled sand harvesting has been shown to also affect negatively school attendance and academic performance of students especially from day schools who instead of reading and doing homework in the evening they go to the mining sites to work. Drugs and substance abuse are rampant in sand mining sites. Thus the consultants advises that there is need for control and regulation of sand harvesting everywhere but more specifically in the project area for the purpose of sustainability of the local community and environment.

Plate 4.7: On-land sand harvesting activities within special economic zones investment areas

Source: This study

CHAPTER FIVE: BASELINE MONITORING SURVEY

5.1: Air Quality Monitoring

The objective of the environmental (ambient air quality and noise) survey is to investigate and document the pre-project status of the baseline ambient air quality and noise level in the MSEZ areas that border the proposed resettlement area. This takes the cognisance of the fact that the persons that will be living in the resettlement areas bordering the MSEZ operations (roads, port, warehouses and factories) are ones who will most likely be the recipients of pollutants, hence suffer health effects through inhalation. Accruing data provided will serve as useful baseline datum for future monitoring and reference.

5.1.1: Applicable standards and guidelines

Legislation and guidelines

The Air Quality Regulations of 2014 prescribe ambient air quality Statutory requirements relevant to this study are detailed in the First Schedule (Ambient Air Quality Tolerance Limits) of the Legal Notice No 34. The results have been further compared to the interim targets from the World Health Organisation Global Air Quality Guidelines (AQG) of 2021 as listed in Table 5.1 below.

S/No.	Pollutant	Time weighted Average	NEMA Tolerance limits			
			Industrial area	Residential, rural & other areas	Controlled areas	WHO Interim targets
1	Respirable Particulate Matter – PM_{10}	24 hours	150µg/Nm³	150µg/Nm³	75µg/Nm³	150µg/Nm³
2	Respirable Particulate Matter – $PM_{2.5}$	24 hours	75µg/m³			75µg/m³
3	Sulphur dioxide – SO_2	Instant peak	500µg/m³			
		Instant peak (10 min)	0.191 ppm			
		24 hours				125µg/m³
4	Oxides of nitrogen – NO_x	24 hours	150µg/m³	80µg/m³	30µg/m³	
		8 hours				
		24 hours		0.4ppm		
		One hour		0.8 ppm		
		Instant peak		1.4 ppm		
5	Nitrogen dioxide – NO_2	Annual average	150µg/m³	0.05 ppm		
		Month average		0.08 ppm		
		24 hours	100µg/m³	0.1 ppm		120µg/m³
		One hour		0.2 ppm		
		Instant peak		0.5 ppm		
6	Carbon monoxide/Carbon dioxide	One hour	10mg/m³	10mg/m³		
	Carbon monoxide	24 hours				7mg/m3
7	Ozone – O_3	24 hours				100µg/m³
		8 hours				160µg/m³
		1 hour	200µg/m³	0.12 ppm		

Table 5.1: Ambient Air Quality Tolerance Limits from EMCA and WHO
Sources: LN 34/2014 and WHO Air Quality Guidelines, 2021

5.1.2: Methodology of monitoring

Air sampling: Air samples were collected continuously for 24 hours using Polludrone Air

Quality equipment. Polludrone is a fully integrated real-time air quality monitoring system that delivers reference equivalent performance and offers a comprehensive solution for monitoring all the critical ambient environmental parameters related to air quality, noise, odour, weather, and radiation.

Air sampling mainly targeted to generate ambient atmospheric air quality at specific location at detailed design phase given the initial sampling was done three years ago during the feasibility study. Air samples were extracted at roughly 12-15ft (4 meters) above ground level in an open surrounding according to the selection criteria for monitor placement specification of the Polludrone air quality monitoring system.

Plate 5.1: Sample collection at Mwangala Primary and DCC Compound in Dongu Kundu

The monitor is designed to intake air samples at predefined frequency through the air sampling system. In order to assess the impact on human health, the rate of air intake by the machine is equivalent to the rate of inhalation of air by an adult human being. Once the air sample is stabilized, the sensor system takes multiple readings during the sampling time and performs relevant data-processing. During this cycle time, the monitor flushes out old air samples and pulls/breath in a fresh one. After each sampling, the data processing system sends the relevant processed data to the central server using a built-in communication module. From the server, data visualization and further analysis is made possible through a web application. The central server is empowered with both wired and wireless communication protocol. The wireless communication system is compatible with fall back 2G, 3G and 4G networks. Table 5.3 shows the sensor specification of the monitor.

Table 5.3: Sensor specifications and methods in measurements

ID	Parameter	Range	Resolution	Min. Detection	Error/Drift	Working Principle /Measurement Method
$PM_{2.5}$	Suspended Particulate Matters with size less than 2.5µ		0.1 µg/m^3	µg/m^3	Up to ± 10 %	Optical Particle Counter
PM_{10}	Suspended Particulate Matters with size less than 10µ	0-5000µg/m^3				
CO_2	Carbon Dioxide	Up to 5000 ppm	1 ppm	20 ppm	< ±5 ppm/Year	NDIR – Non-Dispersive Infrared - Method
CO	Carbon Monoxide	0-1000 ppm	10 ppb	100 ppb	< ±100 ppb/Year	Electrochemical
SO_2	Sulphur Dioxide	0-20 ppm	1 ppb	10 ppb	< ±20 ppb/Year	Electrochemical
NO	Nitric Oxide	0-20 ppm	1 ppb	10 ppb	< ±50 ppb/Year	Electrochemical
NO_2	Nitrogen Dioxide	0-20 ppm	1 ppb	10 ppb	< ±20 ppb/Year	Electrochemical
O_3	Ozone	0-20 ppm	1 ppb	10 ppb	< ±20 ppb/Year	Electrochemical
H_2S	Hydrogen Sulphide	0-100 ppm	1 ppb	10 ppb	< ±100 ppb/Year	Electrochemical
NS	Ambient Noise	Upto 140 dB	1 dB	30 dB	2%/Year	Capacitance
Li	Light Intensity	Up to 1,00,000 Lux	1 Lux	1 Lux	N. A	Photoconductivity
UV	UV Radiation (0-12 UVI)	0.1-100,000 uW/cm^2	0.1 Uw/cm^2	0.1uW/cm^2	N. A	Photoconductivity
Temp	Temperature	-20 ºC to +85 ºC	0.01 ºC	-20 ºC	N. A	Solid State Semiconductor Sensing
Hum	Humidity	Up to 100% Rh	0.10%	0.10%	N. A	Solid State Semiconductor Sensing
Ws	Wind Speed	0-40 m/s	0.1 m/s	0.1 m/s	N. A	Ultrasonic
Wd	Wind Direction	0-359º	1º	1º	N. A	Ultrasonic

Source: Operator's manual from supplier

5.1.3: Scope of the survey

Parameters: The air quality and noise monitoring survey focused on 24 hours monitoring of 7 pollutants (PM_{10}, $PM_{2.5}$, NO, NO_2, SO_2, CO, and O_3) and 2 meteorological factors namely winds speed and direction.

Monitoring sites: The Terms of Reference for this Study had specified monitoring at two sites located within Resettlement Areas A and B respectively. However, in order to capture data from all likely sources of pollutants, monitoring sites were increased to 11 and these were spread out in reference to the Land Use Advisory Plan. The criteria for selection of sampling points was based on the proximity of the proposed PAP's resettlement areas relative to the MSEZ sites, the proposed access road to D1 area, industrial zone, the existing gravel roads within the proposed resettlement areas and the newly constructed Mteza - Kibundani Road. In total, 11 sampling points were identified as follows:

i. Seven of the sampling points were located in the Resettlement area A (RA) whose features will include an access road to D1 area constructed to bitumen standard by KeNHA and gravel roads network for the resettlement areas;

ii. Resettlement area B (RB) had three sampling points with one of the points bordering the proposed industrial zone and rest of the two points at Mwangala Primary School next to PK3 road and midway of Mwangala Primary School and the Industrial zone.

iii. The eleventh was the control point located at the DCC compound. The data from the control point was the basis on which the baseline data was to be obtained.

After the identification of the sampling points on the Advisory Plan, a reconnaissance visit was done to identify and verify the points on the ground. Table 5.4 gives the GPS data, while Figure 5.1 below shows the sampling points as plotted on the Land use Advisory Plan.

Table 5.4: GPS data for MSEZ Air quality sampling sites

Resettlement Area	Name of Monitoring Site	Name on GPS	Date of Monitoring	WGS 84 Coordinate System		Elevation (masl)
				Easting	Northing	
Resettlement Area A - Dongo Kundu	RA_1 (Jiwe la Kutuza)	RA_1	13/06/2023	567042.63	9549991.6	42.617
	RA_2 (KOT)	RA_2	15/06/2023	568117.2	9550066.7	36.495
	RA_3 (Taifa Gas)	RA_3	16/06/2023	568525.67	9549647.8	38.138
	RA_4 (Nyundo Bejito)	RA_4	17/06/2023	568355.65	9549244.2	24.772
	RA_5 (Mihongani)	RA_5	19/06/2023	567268.21	9548275.6	54.257
	RA_6 (Kwa Rama)	RA_6	20/06/2023	568019.28	9548544.8	39.888
	RA_7 (Kwa Kimweli)	RA_7	21/06/2023	568312.52	9548909.6	39.156
Resettlement Area B - Mwangala	RB_1 (Mwangala Pr. Sch)	RB_1	23/06/2023	566160.33	9549024.1	60.222
	RB_2 (Kwa fundo)	RB_2	26/06/2023	565741.39	9548562.6	43.693

	RB_3 (Shaban)	RB_3	24/06/2023	566602.9	9548022.2	52.077
	DCC _ Control	DCC _	21/07/ - 28/07/2023	567084.97	9549281.5	61.065

Source: This study

Figure 5.1: Ambient Air Quality sampling points plotted on Land Use Advisory Plan
Source: This Study

5.1.4: Results for air quality monitoring

This section provides the outcome of the ambient air monitoring. An overview of the core observations is provided based on which, monitoring of future impacts of the project on ambient air quality has been modelled using the data obtained from the Control Point at the DCC's office.

The raw data for hourly average concentrations for 24 hours data for all the eleven sites is provided in Appendix 5.1, while the hourly average concentrations for 7 days data for the Control Point is provided in Appendix 5.2. Monitoring data for the eleven sites within the MSEZ sampling sites is summarized in Table 5.5 below and the results are compared with the tolerance limits specified by NEMA or the World Health Organization interim targets. From the table, it is observed that recorded pollutants' concentration in all the eleven sites fell below the prescribed NEMA tolerance limits and WHO interim targets with exception of Sulphur Dioxide - SO_2 which recorded higher concentrations at sites RA_5, RA_7 and RB_3. The MSEZ project area is largely rural and the low values of pollutants can be attributed to the lack of industrial activities coupled with little motorized traffic.

Table 5.5: 24 hour mean concentration of pollutants in MSEZ resettlement Site Infrastructure project area

S. No.	Location / GPS Name		HAQI	CO_2 (ppm)	*CO (mg/m^3)	NO_2 ($\mu g/m^3$)	*O_3 ($\mu g/m^3$)	NO ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	UV (Index)	RH (%)	Temp. (°C)
1	Jiwe la kuruza	RA_1	26	508.22	0.17	5.59	14.74	48.49	15.38	12.53	25.87	1.9	77.47	27.51
2	KOT	RA_2	55	-	0.21	6.21	23.44	57.51	43.07	11.56	23.96	0	71.32	28.56
3	Taifa Gas	RA_3	29	-	0.21	10.11	20.42	24.97	4.51	13.14	28.5	0	78.47	26.61
4	Nyundo Bejito	RA_4	30	72.49	0.18	8.28	17.18	15.73	0.76	14.95	30.28	0	81.67	26.47
5	Mihongani	RA_5	160	434.82	0.4	8.92	22.87	90.33	259.33	13.8	29.09	0	76.31	28.47
6	Rama	RA_6	44	444.85	0.3	11.22	17.45	20.33	11.21	22.27	43.99	0	83.49	26.14
7	Kimweli	RA_7	205	436.73	0.37	12.29	48.59	57.2	397.91	21.78	44.13	0	80.45	27.18
8	Mwangala Primary School	RB_1	60	413.45	0.38	47.03	4.42	27.57	39.75	12.3	24.85	-	70.43	27.97
9	Shaaban	RB_2	35	418.73	0.3	27.72	15.98	11.9	1.21	15.78	32.28	0	76.47	26
10	Fundo	RB_3	173	414.68	0.39	49.74	11.54	50.22	298.19	10.52	21.63	0	79.7	25.37
11	DCC Compound (Control sample)		37.62	451.64	0.20	4.65	23.07	5.10	1.71	15.27	34.61	82.64	25.43	0.00
	NEMA Limits (Industrial Area)				4	100	120	150	125	75	150			
	(Residential, rural and other areas)				10	0.1	200	80	80		100			
	WHO (Interim targets/guidelines)				7	120	100			125	75	150		

Note:* 1-Hr.

Source: This study

5.2: Health Air Quality Index (HAQI):

Further, this study compared the general Health Air quality Index (HAQI) to that of the US EPA - U.S. Environmental Protection Agency. The AQI is calculated for four major air pollutants regulated by the Clean Air Act: ground level ozone, particle pollution, carbon monoxide, and sulphur dioxide. The AQI values range from 0 to 500 and is divided into six major levels of health concerns. An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level EPA has set to protect public health. AQI values at or below 100 are generally thought of as satisfactory. When AQI values are above 100, air quality is considered to be unhealthy for sensitive group of people according to US EPA guidelines.

Figure 5.2 illustrates the colour coding and descriptions for the AQI. In this regard, Fig 5.3 below shows that, out of the eleven locations that were monitored, six (5.6%) of them recorded good AQI (index value of less that 50); 18% moderate AQI (51-100) and 27% had AQI greater than 100.

AQI Basics for Ozone and Particle Pollution

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

Figure 5.2: HAQI Colour code and descriptor for air quality
Source: U.S. Environmental Protection Agency **www.epa.gov**

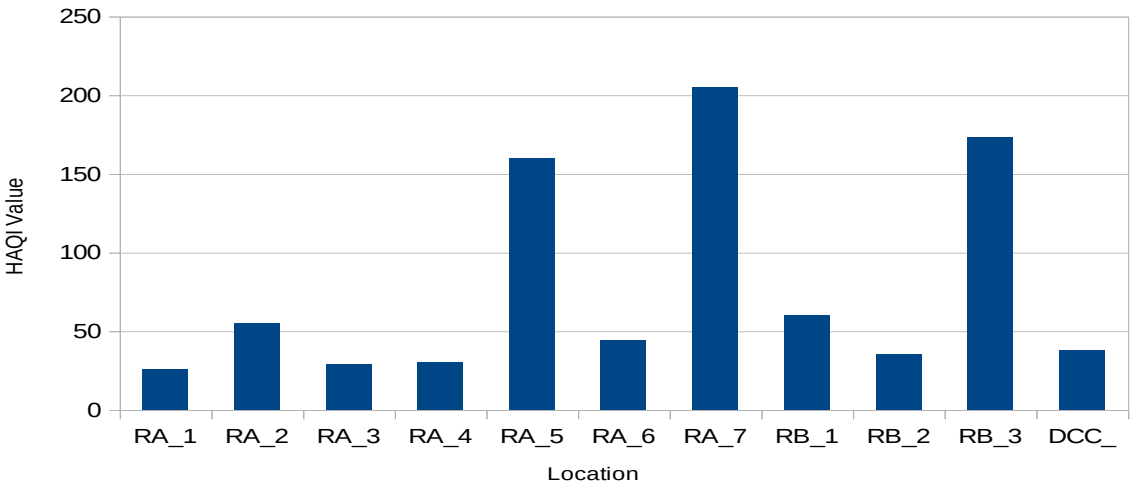


Figure 5.3: HAQI comparison of the sampled locations

Source: This Study

5.2.1: Carbon monoxide (CO):

Carbon monoxide (CO) is a colorless, non-irritant, odorless and tasteless toxic gas which reduces the delivery of oxygen to the body's organs. It is produced by the incomplete combustion of carbonaceous fuels such as wood, petrol, coal, natural gas and kerosene. For those with heart disease, exposure to low doses can result in chest pain. It is only slightly soluble in water, blood serum and plasma. In the human body, it reacts with hemoglobin to form carboxyl-hemoglobin (COHb). Carbon monoxide poisoning occurs when carbon monoxide builds up in the blood. When too much carbon monoxide is in the air, the body replaces the oxygen in the red blood cells with carbon monoxide. This can lead to serious tissue damage, or even death.

CO mixes freely with air in any proportion and moves with air via bulk transport. It is combustible, may serve as a fuel source and can form explosive mixtures with air. It reacts vigorously with oxygen, acetylene, chlorine, fluorine and nitrous oxide.

The levels of CO emission for the sampled areas were way below the NEMA limit of 10 mg/m^3. The highest levels were recorded at RA_5 with CO concentration at 2.06 mg/m^3 , near Kaya Mihongani, and RA_7 (ranging from 1.2 -1.8 mg/m^3 in three consecutive hours), probably due to charcoal burning activities in the areas. All the other sampled points representing 98.8% of the measurements fell below 0.63 mg/m^3.

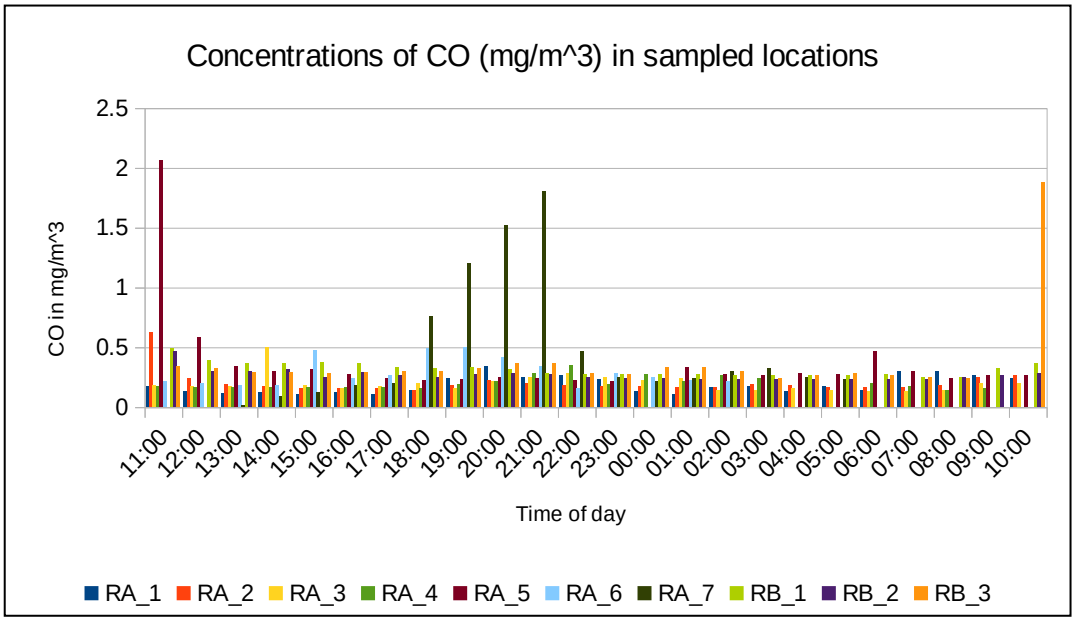


Figure 5.4: Hourly mean rate of CO emissions (mg/m3)
Source: This Study

5.2.2: Nitrogen oxides (NOX):

Nitrogen oxides (NO_x) are formed during combustion processes at high temperatures from the oxidation of nitrogen in air or fuel. The major types of oxides of nitrogen are nitric oxide (NO)

and nitrogen dioxide (NO_2). The main source of NO is road traffic, emitted from both petrol and diesel engine motor vehicles. NO_x is a precursor of ozone formed in the troposphere. Oxides of nitrogen are immunotoxic and increase the susceptibility to respiratory tract infection. Continued or frequent exposures to high concentrations of NO_x in breathing air may cause irritation of the lungs and consequent acute respiratory illness.

Nitrogen oxides were detected in all the sampling sites but in quantities far below the NEMA stipulated limits. Low detection of Nitrogen oxides can be attributed to MSEZ area that is largely rural with very few vehicles traversing the area. Indeed the traffic count revealed scarcity of motor vehicles. It is however expected that once the relocation exercise and construction activities of residential and the D1 areas commence, then the emissions of NO_X will be on the rise. The measurements for the NO_2 and NO were well below the NEMA limits for both industrial areas (150 µg/m^3) and residential areas (80 µg/m^3) as shown in Figure 5.5 below. The spikes between 10:a.m. to 11:00 a.m. in NO_2 were due to instant peaks.

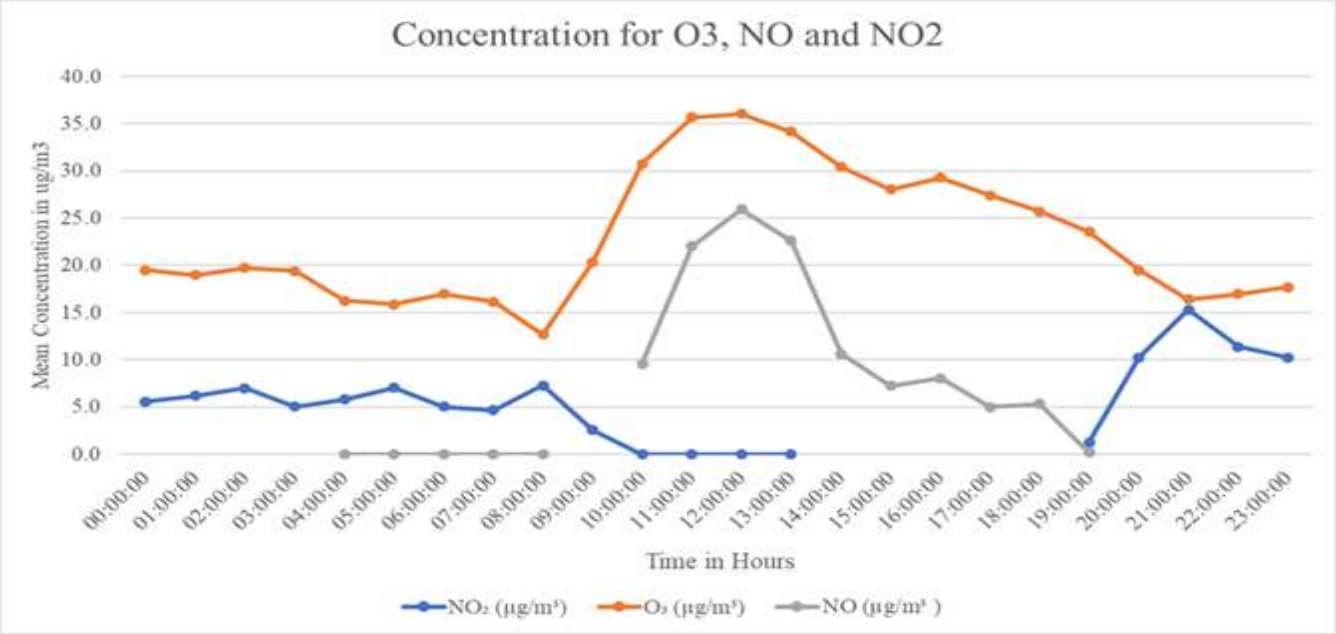


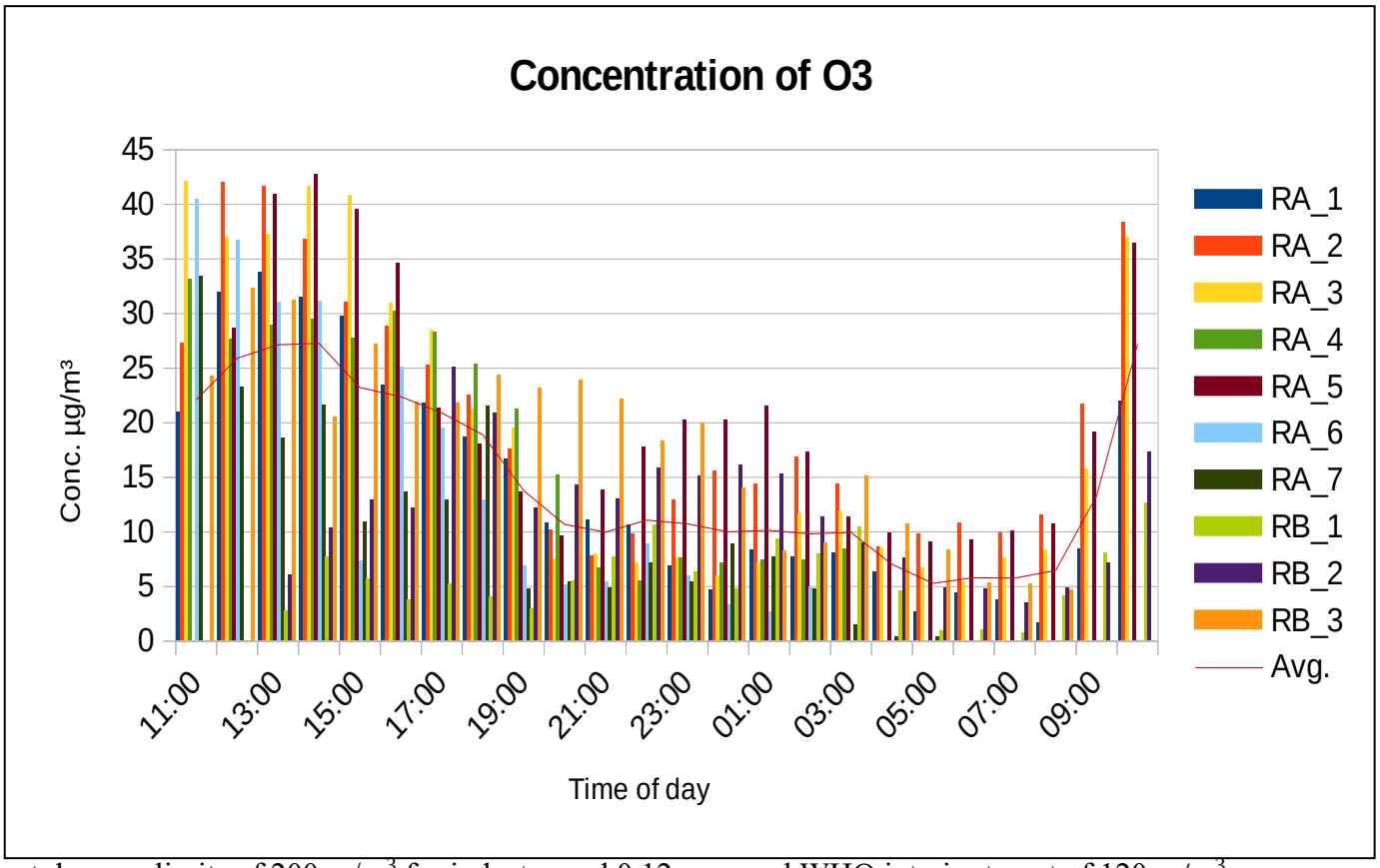
Figure 5.5: Mean hourly concentrations for NO_2 and NO
Source: This study

From the observation made in this study, the level of NO_2 in the atmosphere tends to reduce in the daytime and increases in the night, while NO reduces in the night and increases in the daytime. This phenomenon is due to reaction in the night between O_3 and NO to form NO_2;

during the day, reverse reaction takes place through photolysis and the NO_2 reverts to NO and O_3. This is illustrated in Figure 5.6 below. Involvement of O_3 in the reaction leads to dip in the amount of O_3 in the night as it reacts with NO and rise in the daytime due to photolysis.

5.2.3: Ozone (O3):

Ozone gas is a strong oxidizing agent. In the troposphere, it is formed through a complex series of reactions involving the action of sunlight on nitrogen dioxide (NO_2) and volatile organic compounds (VOCs). There are no significant anthropogenic emissions of ozone. As explained in above, ozone-producing processes involve absorption of solar radiation (hν) by nitrogen dioxide and ozone scavenging by nitric oxide (NO). Ozone was detected in all the eleven monitoring sites, and as can be observed in Fig. 5.6, the concentration is way below the NEMA



tolerance limits of 200µg/m^3 for industry and 0.12 ppm and WHO interim target of 120µg/m^3.

Figure 5.6: Hourly mean concentration for O_3

Source: This study

5.2.4: Sulphur dioxide (SO2):

Sulphur dioxide (SO2) is a gas primarily emitted from fossil fuel combustion at power plants and other industrial facilities, as well as fuel combustion in mobile sources such as locomotives and other natural emitters. Sulphur dioxide was detected at all the eleven sites as shown in

Figure 5.8. However, the mean concentration of the gas varied considerably across all the study sites with eight out of ten locations recording far higher concentration beyond the 24 hours WHO limit of 125µg/m³. Similarly, the peak concentrations (maximum in Table 5.6) over shorter periods (averaging 10 minutes) recorded higher levels than the NEMA tolerance limits of 500 µg/m³ (Thick red horizontal line) at four out of eleven sites suggesting that the mean concentration of SO_2 is greatly influenced by outlier emissions. Additionally, the data shows positive skew, implying most of the values obtained were on the lower side.

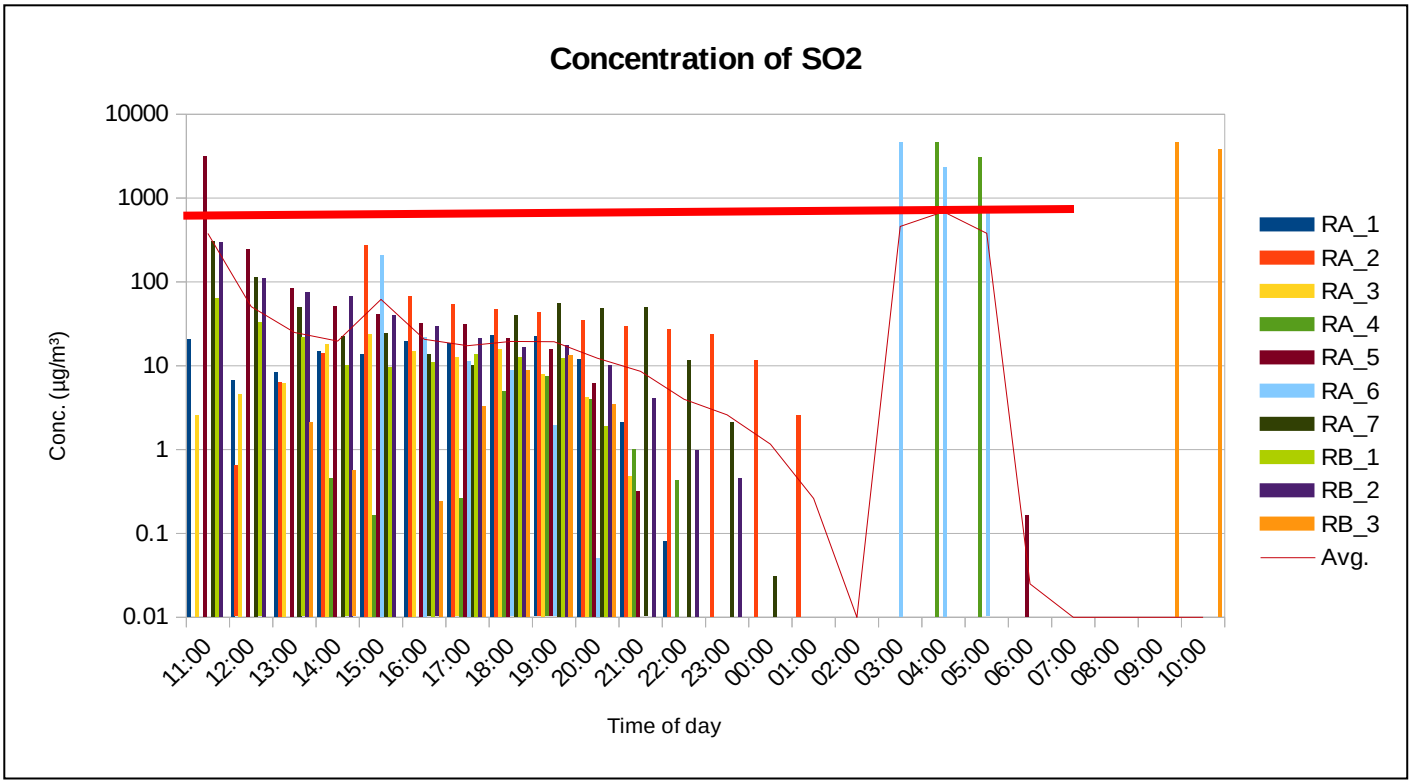


Figure 5.7: Hourly mean concentration of SO2 at monitoring sites
Source: This study

Table 5.6: Descriptive statistics for SO2

Location	Mean	Median	Std. Dev.	Skewness	Range	Minimum	Maximum
RA_1	6.62	0.05	8.58	0.81	22.55	0.01	22.56
RA_2	25.99	4.38	55.06	3.92	266.58	0.01	266.59
RA_3	4.51	0.01	6.89	1.48	23.10	0.01	23.11
RA_4	318.92	0.01	1101.65	3.46	4593.45	0.01	4593.46
RA_5	151.29	0.09	631.70	4.85	3107.12	0.01	3107.13

RA_6	327.86	0.01	1027.90	3.68	4593.73	0.01	4593.74
RA_7	30.59	5.98	63.56	3.63	299.41	0.01	299.42
RB_1	7.77	0.01	14.45	2.83	63.16	0.01	63.17
RB_2	28.33	0.71	63.23	3.57	293.59	0.01	293.60
RB_3	350.72	0.01	1189.27	3.28	4593.00	0.01	4593.01
Avg.	90.32	14.84	184.56	2.26	686.65	0.01	686.66

Source: This study

5.2.5: Particulate matter (PM10 and PM2.5):

Particulate matter is the term for particles and aerosols found in the air, including dust, dirt, soot, smoke, and liquid droplets, and can be large and dark enough to be seen with the naked eye or so small that they can only be detected with an electron microscope. Many man-made and natural sources emit particulate matter directly while others emit gaseous pollutants that react in the atmosphere to form particulate matter.

The size of the particulate has important health considerations. Particulate matter less than or equal to 10 microns in diameter (PM_{10}) poses a health concern because it can be inhaled into and accumulate in the respiratory system. Particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) is believed to pose the greatest health risks as it can lodge deeply into the lungs.

During the monitoring exercise at the MSEZ resettlement sites area, the hourly mean concentration of PM_{10} was within the NEMA standard of 150 $\mu g/m^3$ (max); similar to WHO interim target. The highest reading recorded was 122.27$\mu g/m^3$ at location RA7. Particulate source in the project area is mainly comprises of soil dust from paved roads, home chores like cooking and charcoal burning activities. Figure 5.8 below shows the hourly mean concentration for the ten sites that were sampled. The trend generated from the monitoring showed that there is heightened emission of PM_{10} from about 5:30 p.m. to 10 p.m. after which the emissions fall rise from 5:00 a.m. to 10:00 a.m. This trend can be attributed to cooking activities, as well as lighting, in the evenings after daily activities and preparation of breakfast before people embark to their daily routine. Data from KNBS shows that up to 76% of residents in the area use paraffin, firewood and charcoal.

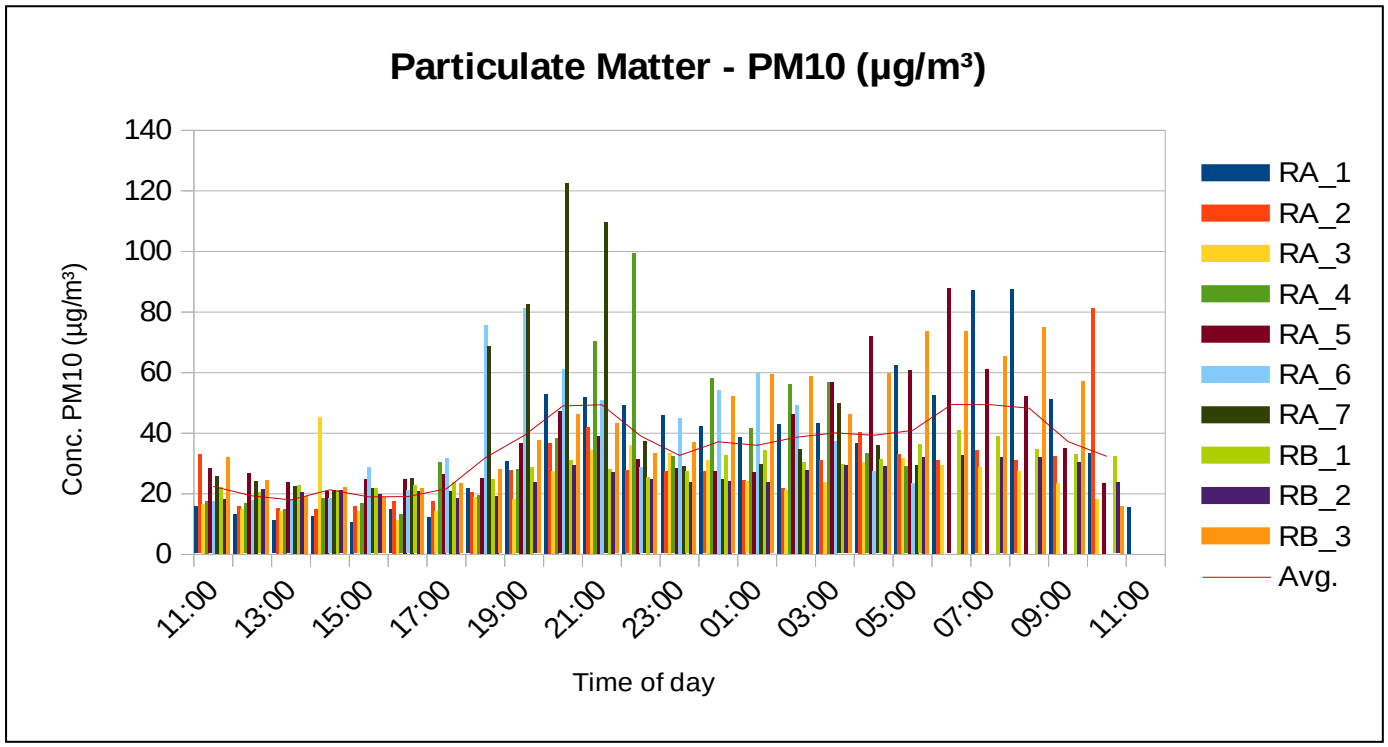
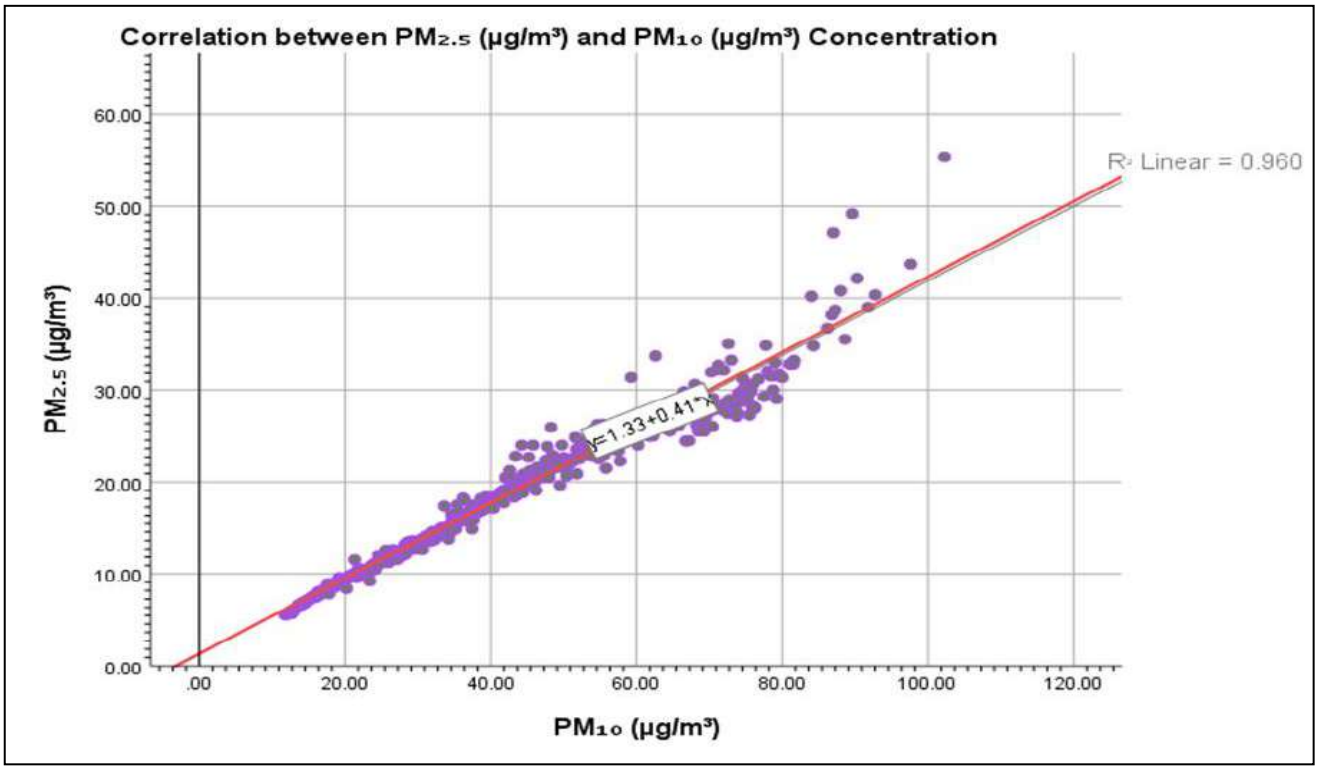


Figure 5.8: Hourly mean concentration of PM10 at the project site
Source: This study

$PM_{2.5}$ follows a similar pattern as in PM_{10}, probably for the same reasons. It is found that PM_{10} concentrations are well correlated with $PM_{2.5}$ loadings with correlation coefficient (R^2) of 0.96 for all samples as illustrated in Figure 5.9 below. This indicates that PM_{10} and $PM_{2.5}$ levels at eleven sites are influenced by similar sources in the MSEZ area based on the routine activities



that take place in the largely rural area.

Figure 5.9: Correlation between PM2.5 and PM10
Source: This study

5.2.6: Data comparison between current study at MSEZ and Mombasa Gate Bridge (MGB) Project

The comparison was done using the data obtained from the control point at the DCC office, which can effectively serve as control data for the MSEZ and the immediate neighbouring areas. Table 5.7 shows the data obtained following the monitoring at the control point. The values in the table were evaluated using three methods, i.e., Huber's, Tukey's Biweight and Hampel's Mean-Estimators (M-Estimators). The estimators are normally applied in statistical analysis to fix issues emanating from outliers and non-linearity. Any of the estimators can be used. However, it is preferable to use Hampel's M-Estimator since it processes data using three constants with each of the constants being generated at each stage. None of the estimators

generated data for NO and NO_2 (see the footnote at the table); in this case, the alternative used was arithmetic mean.

Tested parameters	Huber's M-Estimator [a]	Tukey's Biweight [b]	Hampel's M-Estimator [c]	Andrews' Wave [d]	Arithmetic mean [f]
HAQI	36.4126	33.8383	35.8463	33.7747	
CO_2 (ppm)	450.3147	450.1339	450.7160	450.1305	
CO (mg/m^3)	0.1951	0.1946	0.1940	0.1947	
NO_2 ($\mu g/m^3$)	1.7150	0.5086	1.1517	0.4999	
O_3 ($\mu g/m^3$)	22.3913	22.3224	22.3700	22.3199	
NO ($\mu g/m^3$)					8.2140
SO_2 ($\mu g/m^3$)					5.8510
$PM_{2.5}$ ($\mu g/m^3$)	14.2576	13.8642	14.5058	13.8583	
PM_{10} ($\mu g/m^3$)	31.7640	30.4254	32.1948	30.3758	
R. Humidity (%)	83.5052	83.4060	83.0993	83.4030	
Temperature (°C)	25.1244	25.1303	25.2486	25.1323	
Light (Lux)	253.4634	13.2369	24.5558	13.1330	

Notes: a. The weighting constant is 1.339.

b. The weighting constant is 4.685.

c. The weighting constants are 1.700, 3.400, and 8.500

d. The weighting constant is 1.340*pi.

e. Some M-Estimators cannot be computed because of the highly centralized distribution around the median.

f. Note: Based on e. above, the arithmetic mean was used for NO and SO_2

Table: 5.7: M-Estimators for the Control Point at the DCC Compound

Source: ESIA Study in the Mombasa Gate Bridge Construction Project-Draft ESIA Report, 2022

Table 5.8: Mombasa Gate Bridge Air Quality Monitoring Data

S/No	Survey Location	HAQI	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)	O_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Temperature (°C)	R. Humidity (%)	UV(Index)
1	Qubaa Muslim School	125.59	81.12	28.42	99.23	9.22	143.90	0.67	20.53	0.00	28.32	74.33	0.13
2	Moi Avenue - Canon Towers	106.71	88.87	31.67	113.91	6.43	101.11	0.80	34.61	0.00	29.33	72.23	1.30
3	Sacred Heart School	113.88	63.66	24.51	57.85	0.91	91.50	0.51	17.96	0.00	28.38	73.77	0.23
4	Puma Primary School	99.07	39.70	13.87	36.55	11.93	90.01	0.42	13.48	0.00	28.26	78.19	0.00
5	Moi Forces	89.18	39.59	13.80	40.40	6.57	94.42	0.34	18.99	0.00	29.18	73.94	0.00
6	Mtongwe Polytechnics	72.82	33.56	14.74	25.14	5.56	57.20	0.26	26.27	0.00	26.55	81.69	0.00
7	Vyemani Primary School	52.98	32.72	13.89	10.57	1.72	37.14	0.24	23.07	0.00	25.90	79.67	0.00
8	Bypass Interchange	87.18	32.41	13.69	52.06	0.33	74.14	0.27	26.11	0.00	27.21	77.99	0.30
9	Mtongwe RD Junction	122.00	39.54	15.00	36.22	5.52	127.84	0.34	19.65	0.00	23.60	82.19	0.00
10	NEMA Limits - 24 hours	-	150	75	150	100	-	-	-	1.5			
11	WHO Limits - 24 hours	-	150	75	-	120	125	-	100	-			
The weighting constant is 1.339 - Huber's mean estimator statistics													

Source: ESIA Study in the Mombasa Gate Bridge Construction Project-Draft ESIA Report, 2022

Air pollutants

The data from the monitoring at the sampled sites within the proposed MGB project site, are largely within the NEMA tolerance limits, with the exception of SO_2 whose measurements were beyond the limits during moments of instant peak. However, the MGB data shows (See Table 5.9) that the parameters for the pollutants for 61 of the 72 samples (i.e., 84.72%) are way above the Control Sample data. When compared to the WHO Iterim Targets, two samples from MGB at Qubaa Muslim School and Mtongwe Road Junction were above the 120µg/m^3 limit.

Table 5.9: Comparison of the of the MGB with the DCC Control Sample

S/N	Monitoring Location	HAQIa	PM_{10}	$PM_{2.5}$	NOb	NO_2	SO_2[c]	CO	O_3
1	Qubaa Muslim School	125.59	81.12	28.42	99.23	9.22	143.9	0.67	20.53
2	Moi Avenue – Canon Towers	106.71	88.87	31.67	113.91	6.43	101.11	0.8	34.61
3	Sacred Heart School	113.88	63.66	24.51	57.85	0.91	91.5	0.51	17.96
4	Puma Primary School	99.07	39.7	13.87	36.55	11.93	90.01	0.42	13.48
5	Moi Forces	89.18	39.59	13.8	40.4	6.57	94.42	0.34	18.99
6	Mtongwe Polytechnic	72.82	33.56	14.74	25.14	5.56	57.2	0.26	26.27
7	Vyemani Primary School	52.98	32.72	13.89	10.57	1.72	37.14	0.24	23.07
8	Bypass Interchange	87.18	32.41	13.69	52.06	0.33	74.14	0.27	26.11
9	Mtongwe Road Junction	122	39.54	15	36.22	5.52	127.84	0.34	19.65
10	NEMA Limits – 24 hours		150	75	150	100			
11	WHO Interim Targets		150	75		120	125		100
12	Hampel's M-Estimator	35.84	32.19	14.5	8.21	14.5	5.85	0.194	22.37
14	Sites readings > Control Sample	9	9	5	9	0	9	9	4
15	Sites readings > NEMA tolerance limit	0	0	0	0	0	0	0	0
16	Sites reading > WHO Interim targets	0	0	0	0	0	2	0	0

Source: ESIA Study in the Mombasa Gate Bridge Construction Project-Draft ESIA Report, 2022

Notes:

a HAQI is not provided by WHO and NEMA. The US-EPA of 100 has been used.
b The Hampel's M-Estimator cannot be computed because of the highly centralised distribution around the median.
c The Hampel's M-Estimator cannot be computed because of the highly centralised distribution around the median.
d NEMA tolerance limit for SO2 and NO not captured by Hampel's M-Estimator, hence Arithmetic mean has been used

5.1.5: Noise Levels and Traffic Count

This study relied on noise levels monitoring that were done for the MGB in 2022. The descriptive statistics for the noise monitoring is shown in Table 5.10 below. The point that was chosen at the Bypass Interchange is situated approximately 4 kms away from the proposed MSEZ project area at KM 17, along the newly constructed Mteza-Kibundani Road, and has similar ambience to the MSEZ project area. The choice at KM 17 was informed by the sources of noise as characterized by the following activities:

i. **Motorised traffic**: Since the Mteza-Kibundani Road is yet to be commissioned, the area has low volume of motorised traffic that is largely associated with contractor's vehicles. Others are motorcycles and private vehicles of persons who own land in the area; as well as members of public driving along and exploring the developments taking place in the area;
ii. **Domestic animals**: Herds graze around the area and water at the nearby Ziwa la Pungu, which is a seasonal lake;
iii. **Mosques**: Noise emission happens periodically as payer calls are made in the course of a day.

The above sources of noise also apply to MSEZ project area. Additionally, there are occasional airplanes that overfly the MSEZ area as they take-off from the Moi International Airport, Mombasa.

It is expected that the noise levels in MSEZ shall start increasing once the construction activities for the roads, D1 and PAP's residential areas commence. The increase in vehicles shall be necessitated by the construction equipment and trucks traversing the area delivering deliver construction materials. However, it is expected that the noise levels will be mostly during the day.

Table 5.10: Descriptive statistics for 24 hours noise level in the project area

Survey Location	Mean			Median			Mode			Std. Deviation			Minimum			Maximum		
	Lmin (dB)	Leq (dB)	Lmax (dB)	Lmin (dB)	Leq (dB)	Lmax (dB)	Lmin (dB)	Leq (dB)	Lmax (dB)	Lmin (dB)	Leq (dB)	Lmax (dB)	Lmin (dB)	Leq (dB)	Lmax (dB)	Lmin (dB)	Leq (dB)	Lmax (dB)
Qubaa Muslim School	41.63	62.29	76.92	42.00	62.50	79.00	42.00	74.00	85.00	3.55	11.04	9.71	33.00	40.00	51.00	46.00	76.00	88.00
Moi Avenue - Canon Towers	38.96	60.04	77.88	39.50	59.50	80.00	38.00	67.00	83.00	4.77	8.80	9.01	22.00	46.00	62.00	47.00	74.00	90.00
Sacred Heart School	36.88	53.38	72.13	36.00	54.00	72.50	30.00	43.00	68.00[a]	5.27	9.37	9.30	30.00	38.00	56.00	48.00	72.00	90.00
Puma Primary School	37.92	54.00	70.46	39.00	56.50	73.50	41.00	56.00[a]	77.00	3.62	8.02	9.56	30.00	40.00	54.00	42.00	67.00	87.00
Moi Forces	29.00	41.63	65.38	27.00	44.00	63.50	26.00	22.00[a]	58.00	5.37	12.67	8.98	22.00	22.00	52.00	38.00	64.00	80.00
Mtongwe Polytechnics	38.63	50.54	76.63	38.50	48.00	79.50	30.00[a]	43.00	62.00[a]	6.70	9.39	11.45	30.00	38.00	60.00	48.00	67.00	90.00
Vyemani Primary School	40.08	57.29	83.79	37.50	57.00	87.00	33.00[a]	55.00[a]	87.00	7.77	5.96	5.12	33.00	41.00	69.00	61.00	66.00	90.00
Bypass Interchange	37.33	49.67	73.83	37.00	46.00	75.50	34.00	45.00	76.00	3.68	6.13	7.55	31.00	41.00	56.00	45.00	59.00	84.00
Mtongwe RD Junction	42.88	69.17	84.71	43.00	70.00	86.50	45.00	71.00[a]	90.00	7.78	4.00	5.25	34.00	63.00	74.00	65.00	76.00	92.00

a. Multiple modes exist. The smallest value is shown

Source: Source: ESIA Study in the Mombasa Gate Bridge Construction Project-Draft ESIA Report, 2022

5.2.7: Way forward

The data collected during the ambient air monitoring for MSEZ formed the basis for determination of the concentrations of ambient air pollutants that are harmful to human health, and the environmental impacts arising thereof. The data will therefore be earmarked to serve as baseline information for ambient air within the MSEZ.

Based on this study, it shall be important to use the baseline data to monitor and trend the extent to which the proposed D1 area and industrial park activities within MSEZ will impact on the environment and the health of workers and the residents within MSEZ. The GoK has legal and regulatory mechanisms in place that can ensure that monitoring of quality of ambient air is within the set tolerance limits. Indeed in the Environmental Management and Co-ordination (Air Quality) Regulations, 2014, the First Schedule provides the air qualities tolerance limits. Other than the limits, a matrix detailing pollutants and corresponding industries has been provided in the Third Schedule, while the monitoring parameters for each of industrial facilities is provided in the Fourth schedule. The Air Quality regulations also encourage industrial operators to be proactive by providing guidelines which cover monitoring, reporting and pollution preventive measures.

This data therefore, has been applied in developing the ESMP unveiled in chapter below.

5.3: Flora and fauna Mapping

5.3.1: Objectives of the flora and fauna survey

This survey had the broad objective of guiding the understanding of the biological resources of the proposed Mombasa Special Economic Zone (MESZ) focusing on the flora and fauna within the resettlement area of Dongo Kundu and Mwangala villages inclusive of three kayas.

Specific objectives of the survey were to:

- Identify the different vegetation types, abundance and their value that are present in the resettlement area.
- Provide a description of the fauna occurring on the resettlement area.
- Identify species of conservation importance that occur in the resettlement area .
- To provide a biodiversity map of the resettlement area (where applicable).
- To provide management recommendations to mitigate negative effects and enhance positive impacts of the proposed development.

5.3.2: Approach to the Mapping Survey

A comprehensive baseline survey of flora and fauna within the resettlement area was undertaken from 12th June 2023 to 9th August 2023. The survey focused on the proposed resettlement area of Dongo Kundu and Mwangala villages inclusive of three kayas, (Kaya Mihongani, Kaya Ng'ombeni and Kaya Mwanakuku) totalling 189 Ha. The resettlement area is shown in Figure 5.1. Different survey methods were employed in mapping the flora and fauna as highlighted below.

5.3.2.1: Flora Survey:

Collection of vegetation data involved establishment of 100m-by-100m vegetation assessment transect at each point sites within the resettlement area using pre computerized and generated points. This was followed by a taxonomist capturing information on date, village name, and GPS coordinates and starting time of the survey. A thorough walk through of each area within the established transect was done to identify each single species of flora. The lead taxonomist helped in the identification of the species in the local Digo language which were later translated to their respective English and scientific names (An ethnobotanical study of the Digo at the Kenya Coast by Mohamed Pakia, M.Sc. January 2005). Individual counts of each species were recorded as the team progressed to different areas of the transect (direct counts were done for trees and shrubs whereas certain assemblage of shrubs, grass, herbs, and vegetables were recorded in terms of their individual density cover in the transect). The health of individual species within the same transect was recorded based on accounts of either healthy (green or juicy) or poor (dried up, withered or brown fallen leaves). The general land use of the transect was described depending on the economic or (lack of) human activities. Ecosystem formation of the transect was recorded in depth with close attention to the abundancy of trees and shrubs and their formations in the transect (scattered or in close proximity). The economic and social importance of each species identified was noted and recording of the plant species.

Other data components collected during the survey included GPS locations for all transects , photographs of each individual transect, important values of individual flora, human activities noticed in the area, topography of the land, threats witnessed, whether the species is indigenous or exotic and the health of the species.

223 and 79 quadrats were established in Dongo Kundu and Mwangala villages respectively. Coordinates for each quadrats were picked using a GPS and used to plot a transect map of the vegetation cover of both areas (Figure 5.10). Key aspects recorded along the transects were ecosystem types, vegetation types, species diversity, abundance and species importance to the community.

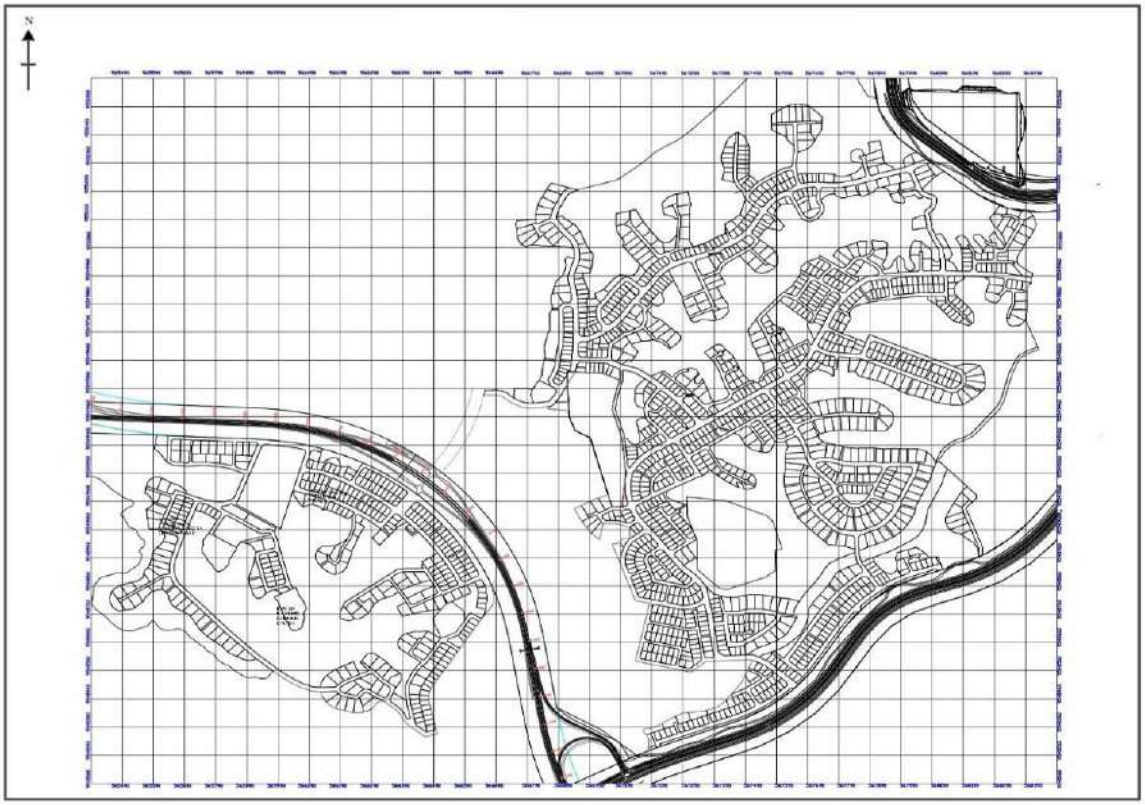


Figure 5.10: Transects covered during the survey in Dongo Kundu and Mwangala Villages

The flora mapping techniques used in Dongo Kundu and Mwangala villages were applied for the Kayas but with variation. The variation was to facilitate collection of data and information of the maturity of the native old trees, general use of the Kayas according to the community and the Diameter at Breast Height (DBH). In establishing DBH, the team took samples of five individual old layered tree species at intervals of 10-meter radius (where the same species was identified). Health of a Kaya was determined by recording the physical appearance of the Kaya presently. To fully understand the change, the team interviewed the chairperson of the 14 kayas within the resettlement area and an 80-year kaya committee member. Information on status of maturity of trees within the Kayas was assessed through measuring of the Diameter at Breast Height (DBH). The conservation challenges facing the kayas were observable as we conducted the survey and through the information shared by the kaya committee on the challenges, they have experienced in conserving the kaya. Information on the importance of kayas to communities was also provided by the kaya committee, protection strategies to improve conservation of the kayas was both through secondary data analysis and discussions held with the committee members on how best to protect the kayas.

5.3.2.2: Faunal Surveys

Fauna survey entailed scanning for wild animals on established transects employing direct counting or indirect counting methods. Direct counting method involved counting and recording

any animal seen by the observer on a pre-prepared data sheet. Indirect counting method involved observation of animal tracks, animal droppings, and burrows. Information gathered from indirect counting was collaborated through interviews held with local residents. The residents would describe the animal to the team and using animal guides and own knowledge of animals, was able to identify a number of wild animals. Key aspects recorded during the fauna survey for the proposed resettlement area included animal community assessments, animal importance, and animal ecosystem, the threats facing each individual fauna, mapping and targeted threatened fauna.

A desktop analysis was undertaken to reinforce field findings. To confirm conservation status, of a given animal species, the animal was screened using the IUCN Red List of Threatened Species and a list prepared.

5.3.2.3: Birds survey

Exclusively an ornithologist conducted birds' survey. Survey started with ground logistics. The ornithologist visited the area to familiarize self with the project area topography, vegetation structure and project boundaries. The survey which took place between 23rd June and 4th August would start very early in the morning between 6.00am to 11.00 am when birds are most active. Counting would resume from 3.00pm to 6.30pm when it would end. Bird's identification involved listening and observing for 30-40 minutes in one area covering a radius of about 20 meters before moving to the next area. Bird's identification involved direct observation of close by birds, or use of binoculars for far away birds or through birdcalls, the latter was appropriate for identifying birds located on tall trees, or far away. Total silence was required for identification of birds from calls and avoids scaring away birds. Once sighted, or identified through the call, this was recorded in a notebook. A walk through of the area was adopted to locate bird nests on trees, shrubs or even those on the ground. Eggs, eggshells and feathers were also used to identify bird species that reside within the area. The bird count by either direct counting or sampling method for large flock of birds was adopted. The ornithologist relied on personal experience and use of guidebooks. The process was repeated every day until entire area was covered. Daily sightings were recorded daily to form daily checklist, which were summed to a single checklist. Daily lists were consolidated into an overall resettlement birds checklist.

Key aspects recorded during the bird survey for the proposed resettlement area included different species, diversity, bird's importance, and conservation status. To confirm conservation status, all the identified bird species, were screened using the IUCN Red List of the Threatened Species. The species were also analysed to determine whether resident or migratory. Birds counting in the kayas adopted the same technique. However, counting only took place after the kaya elders had sought authority from the spirits. The Kaya elders led the team to conduct both flora and fauna surveys the Kayas donned in their Kaya uniform**.**

5.3.2.4: Insects Survey

Insects counting involved walking through transects established for the flora. A physical search was conducted in different ecosystems as insects have preference ecosystems. Grasslands are preferred by different flying insects, ground by crawling insects such as millipedes, shrubs and backs of trees are also preferred ecosystem for certain insects, flowering plants are host to pollinators like bees, flies and wasps. The team also scanned for insect tracks, honey colonies, spider webs, and dung balls. In addition to relying on individual knowledge of the insect, the team used insect guidebooks for cross-referencing. Binoculars were used to identify flying insects. Interviews were held with local residents and through their description and the team's knowledge of the insect and using guidebooks, several insect species were identified. In addition, the physical location of where the insect was located (among the grasses, hovering around flowers, on the back of a tree etc) was also recorded. Insect species abundance count was taken in terms of the time the individual species was observed with most species sighted a few times within the same transect as their abundance is a key indicator of the health of the ecosystem around. Both local and international threats facing the individual species were recorded thereby helping to identify conservation measures to ensure its survival in future.

Focus of this survey was on insect types, ecosystem preference, importance of the species to the local community, and conservation status. A desktop analysis was undertaken to reinforce field findings. To confirm insect's conservation status, of a given insect species, the insects were screened using the IUCN Red List of the Threatened Species and a list prepared.

5.3.3: Interviews/Discussions with the local people:

The team held interviews with the local people to reinforce what the team had observed. This was to fill information gap and provide historical perspectives of fauna species and the Kayas. Discussion also focused on the changes observed on the ecosystem within the resettlement area, change in land use patterns and the different roles played by diverse species to the lives of the local community.

5.3.4: Application of the IUCN Criteria:

The IUCN Red List data Search Engine (http://www.iucnredlist.org/) was applied to screen species for conservation status;- Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Lower Risk, Data Deficient and Not Evaluated in line with IUCN categorization;-

- EXTINCT (EX) when there is no reasonable doubt that the last individual has died, or;
- EXTINCT IN THE WILD (EW) when it is extinct in the wild and it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range;

- CRITICALLY ENDANGERED (CR) when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the criteria (A to E in the IUCN Red List Categories);
- ENDANGERED (EN) when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the criteria (A to E in the IUCN Red List Categories);
- VULNERABLE (VU) when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the criteria (A to E in the IUCN Red List Categories), and;
- LOWER RISK (LR) when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Species included in the Lower Risk category are separated into three subcategories namely(i) Conservation Dependent (CD): Taxa which are the focus of a continuing taxon-specific or ecosystem-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years (ii) Near Threatened (NT): Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable (iii) Least Concern (LC): Taxa which do not qualify for Conservation Dependent or Near Threatened.

- A species is DATA DEFICIENT (DD) when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status.
- Lastly, a species is NOT EVALUATED (NE) when it has not yet been assessed against the criteria.

5.3.5: Requirements of the Convention on Migratory Species of Wild Animals

The Bonn Convention is a non-governmental treaty concluded under the aegis of the United Nations Environment Programme, and aims to conserve terrestrial, aquatic and avian migratory species throughout their range of Ecosystems on a global scale. Kenya became a party to this convention in May 1999. As the only global convention specializing in the conservation of migratory species, their Ecosystems and migration routes, CMS complements and co-operates with a number of other international organizations, NGOs and partners in the media as well as in the corporate sector. Migratory species threatened with extinction are listed on Appendix I of the Convention. CMS Parties strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Besides establishing obligations for each State joining the Convention, CMS promotes concerted action among the Range States of many of these species.

Migratory species that need or would significantly benefit from international co-operation are listed in Appendix II of the Convention of which, Kenya is identified as a Range State for 44 of these. In this respect, CMS acts as a Framework Convention. The Agreements may range from legally binding treaties (called Agreements) to less formal instruments, such as Memoranda of Understanding, and can be adapted to the requirements of particular regions. Kenya is a party

to four MOUs namely;- AEWA (African Eurasian Water Bird Agreement) Marine Turtles Africa MOU, Marine Turtles-IOSEA and the African Elephant MOU. Under the Bonn Convention, Kenya is recognised as a Range State for 50 bird species out of which 4 namely, the *Ardoela idea, Larus saundersi, Hirundo atrocaerulea, Acrocephalus griseldis and Zoothera guttat* are Bonn Convention Appendix 1 species.

5.3.6: The African-Eurasian Migratory Water-bird Agreement (AEWA)

This agreement was negotiated under the provisions of Article IV of the Bonn Convention and concluded on 16 June 1995 in The Hague, the Netherlands subsequently coming into force on 1 November 1999. The Aim of AEWA is to create a legal basis for concerted conservation and management policy by the Range States for migratory water bird species in pursuit of the mission to maintain migratory water bird species and their populations at a favourable conservation status or to restore them to such a status throughout their flyways, over a range of 118 countries.

5.3.7: Convention on International Trade in Endangered Speciesof Wild Fauna and Flora.

This is an international agreement, signed by 184 parties in 1973, designed to ensure that international trade in animals and plants does not threaten their survival in the wild.

5.3.8: Screening for local importance as per Kenyan Law

Conservation of biodiversity in Kenya vests under three laws namely:

- The National Constitution
- Forest-Conservation-and-Management Act, 2016
- Environmental Management and Coordination Act (1999, amended 2015)
- Wildlife Conservation and Management Act, 2013 and its Schedule Six and Seven

Flora and fauna recorded were screened against requirements of each tool.

5.4: Finding of the Flora Survey

Comprehensive findings from the floral and fauna mapping survey covering the resettlement area in Dongo Kundu and Mwangala villages inclusive of three kayas are presented in Appendix 5.1. Brief highlights on the findings are provided under respective headings below.

5.4.1: Dominant Ecosystems

Vegetation of the Dongo Kundu site of the proposed MSEZ was once part of the East African coastal forests;- a heterogeneous group of isolated evergreen and semi-deciduos closed-canopy, seasonal dry forests, found within 60 km from the Indian ocean and usually on low hills rising to not more than 600 m above sea level (Burgess & Mlingwa 1993). These forest fragments are part of the once extensive and diverse eastern lowland forest within the Zanzibar-Inhambane, that extends from southern Somalia in the north, to northern Mozambique in the south (Robertson & Luke 1993), between 1º North and 25º South latitude, and 34 - 41º East longitude, covering approximately 3167 km^2 (White 1983). Within the eastern lowland forest there are

about 3000 plant species, of which about 550 species are endemic (White 1983, Burgess *et al.* 1998) and 190 are forest tree species (White 1983). According to Burgess *et al*. (1998) East African coastal forests are ecologically important and highly threatened centres of endemism for plants (c 550 spp.); mammals (6 spp.); birds (9 spp.); reptiles (26 spp.); frogs (2 spp.); butterflies (79 spp.); snails (>86 spp.); and millipedes (>20 spp.).

However, on account of many factors mainly anthropogenic, the original vegetation was systematically lost and will only be found in a few dwindling patches of forests called calls, locally revered as centres for traditional worship. Fig. 5.11 below provides an outlay of the distribution of dominant ecosystems as currently found at the MSEZ site covered in the botanical survey for this ESIA Study and the same is summarized in Table 5.11 and schematically presented in Fig. 5.1. From the Map, four dominant vegetation types were identified namely:-

- Bush fallow
- Secondary Thicket
- Woodland
- Closed canopy forest

Table 5.11: Occurrence of ecosystems within the resettlement area

Vegetation formation	**Total quadrants**	**Share (%)**
Bush fallow	172	55.8
Secondary Thicket	97	31.5
Woodland	32	10.4
Closed canopy forest	7	2.3
Total	**308**	**100**

Source: This study

Bush fallow is apparently the most dominant cover type within the target resettlement area accounting for 55.8% of the land followed by secondary thicket at 31.5%. Closed canopy forests and associated woodlands (Kaya Miongani) account for only 12.7% of the land area. Thus, vegetation at the resettlement site is largely dominated by bush fallow comprised of abandoned grasslands and farmlands followed by secondary thickets at diverse stages of regeneration and only broken by scattered homesteads at the ridge tops. The once flourishing closed canopy forest that connected the shimba hills forest to the mangroves on the Indian Ocean Coastline has now been reduced to isolated patches mainly within the Kaya enclaves accounting for a partly 2.3% of the land area.

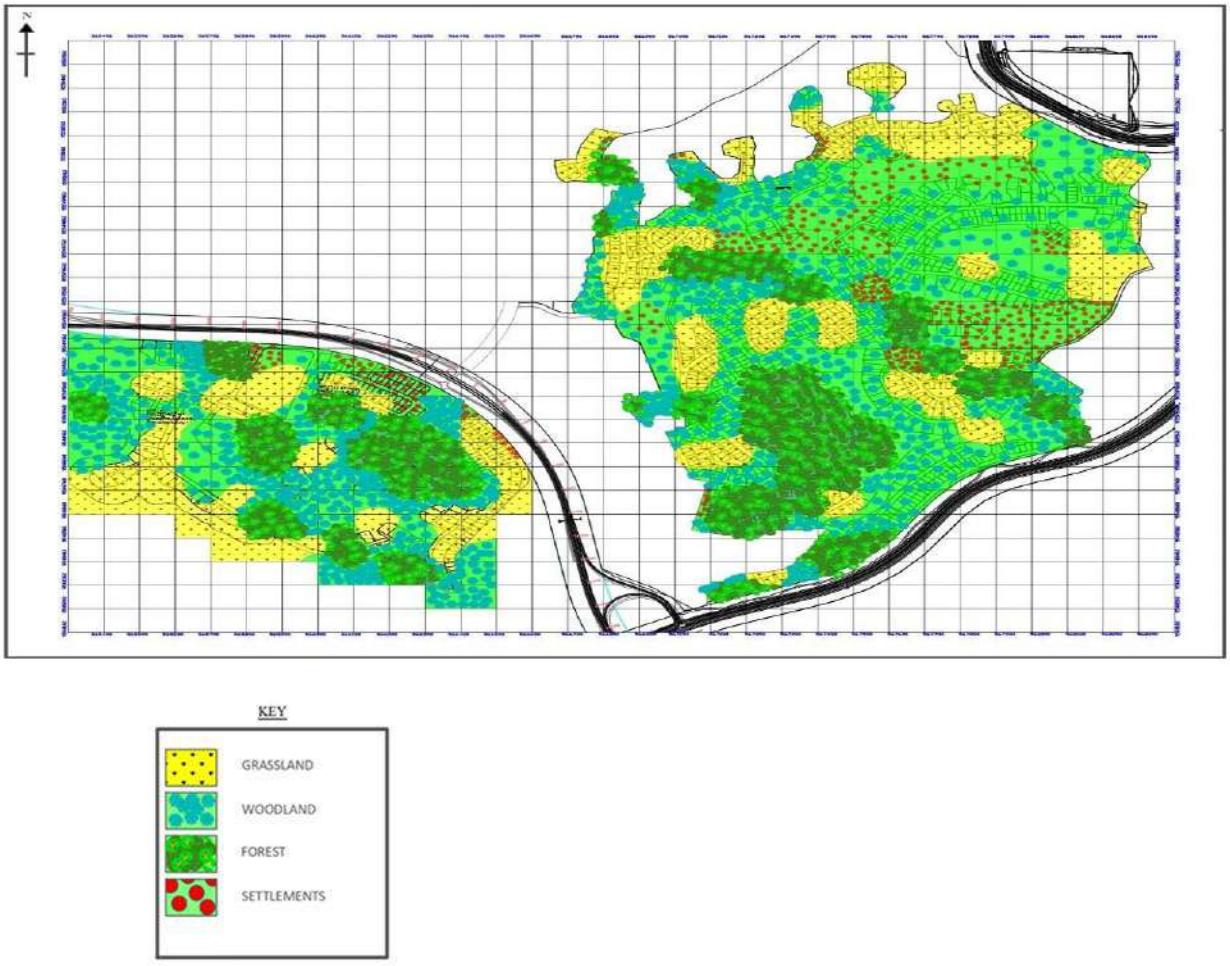


Figure 5.11: Map showing ecosystems within the resettlement area
Source: This study

Plate 5.2: The wooded bush fallow ecosystem dominant in Dongo Kundu area
Source: This study

5.4.2: Characterization of vegetation types

Appendix 5.1 provides a full list of floral species encountered in the proposed Resettlement Areas and the same is summarized in Fig 5.4 and Table 5.12. From Fig. 5.12 which presents a mapping of species diversity across the vegetation types encountered in the Resettlement Area, it is clear that secondary thickets have the highest species diversity followed by woodlands while closed canopy forests, farmlands and bush fallow follow closely. Trees are the dominant growth form across all vegetation types followed mainly by shrubs, crops or grass depending on the vegetation type. As such, and contrary to expectation, secondary thickets and woodlands harbor the highest species diversity in Dongo Kundu Area compared to closed canopy forests with woodlands even displaying a much higher count of tree species compared to the closed canopy forests.

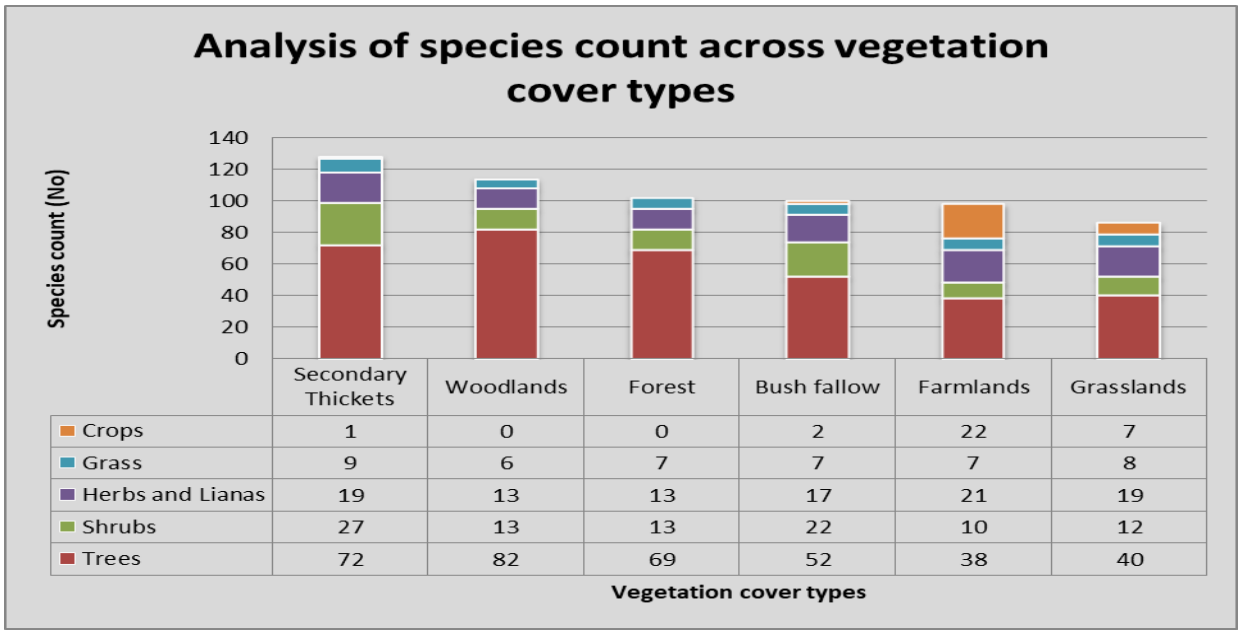


Figure 5.12: Species diversity within vegetation formations
Source: This study

Table 5.12: Summary of species count across vegetation formations within the area studies

Growth form	Trees	Shrubs	Herbs and Lianas	Grass	Crops	Total count
Secondary Thickets	69	32	15	10	2	128
Woodlands	81	16	9	7	1	114
Closed canopy forest	70	15	11	8	0	104
Farmlands	38	10	14	8	31	101
Bush fallow	49	27	14	8	1	99
Grasslands	40	14	17	8	7	86

Source: This study

5.4.3: Diversity of Floral Species

Appendix 5.1 provides the full list of floral species recorded within the Study area and the same is summarised in Fig 5.13 below. A total count of 210 vascular plants as recorded in the study area compares favorably with the count of 203 observed for the area (Pakia, 2015) but compares very unfavorably with the count of 2489 species observed for the entire coastal region.[3] Trees remain the most dominant growth form with a count of 120 equivalent to 57.14% of the total species recorded, followed by shrubs, herbs and lianas with a combined count of 58 equivalent to 27.62% with grasses coming a distant third at 10.48%. An overdominance of species diversity by trees followed by Shrubs and lianas is an indication of a once thriving forest formation which has been degraded through selective exploitation and conversion to farmlands

[3] Ngumbao, Veronicah Mutele, et. al; (2020): An annotated checklist of the coastal forests of Kenya, East Africa. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7237506/#

and settlements, a trend confirmed by the high presence of crops which, at 22 account for 10.48% of the floral diversity.

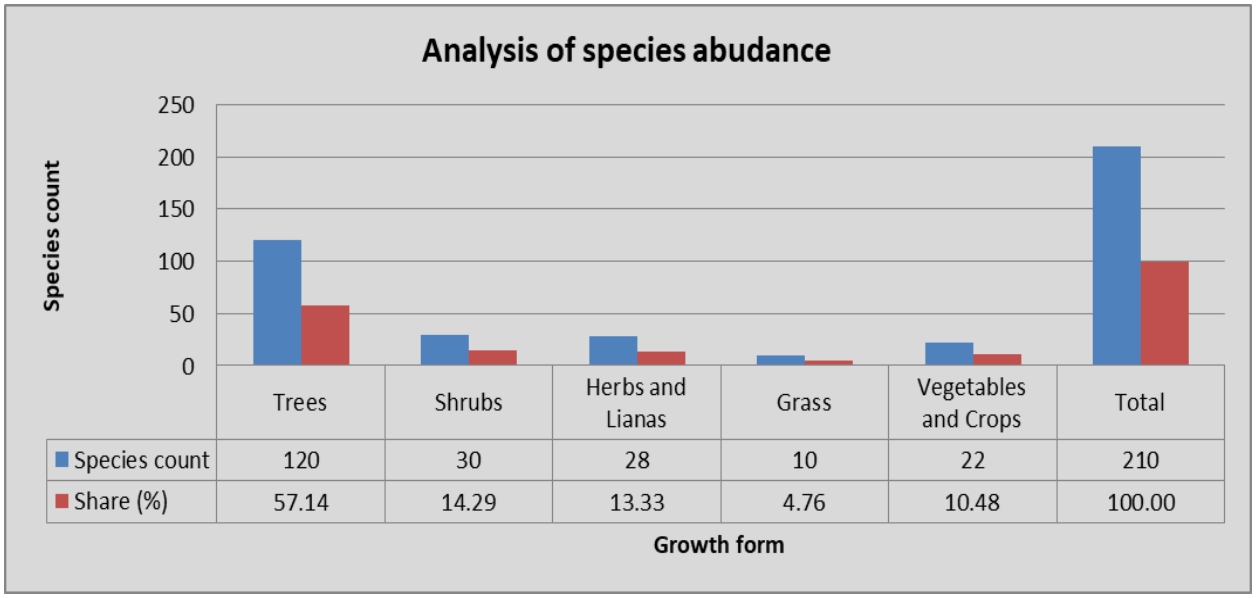


Figure 5.13: Number of species recorded for respective growth formsSource: This study

5.4.4: Stratification of the floral diversity

Table 5.13 below provides an analysis of the composition of floral biodiversity based on the criteria of nature of origin namely;- indigenous versus exotic. It turns out that 20.5% of the entire floral biodiversity of 210 vascular species are introduced (exotic) while the bulk, at 79.5% are indigenous to the area. All the ten species of grass counted are native to the area while fifteen crops, equivalent to 68.2% of the 22 counted, are introduced in the area. At 47.62%, indigenous trees dominate the entire floral biodiversity in terms of species listing which is indicative of the fact that the area was originally covered by a natural forest which is slowly giving way due to land use change.

Table 5.13: Stratification of floral biodiversity by origin

SN	**Count by growth form and origin**				**Share by origin**	
1	*Growth form*	*Indigenous*	*Exotic*	*Total*	*Indigenous*	*Exotic*
2	Trees	100	20	120	83.3	16.7
3	Shrubs	27	3	30	90.0	10.0
4	Herbs/ Lianas	23	5	28	82.1	17.9
5	Grass	10	0	10	100.0	0.0
6	Crops	7	15	22	31.8	68.2
	Total	**167**	**43**	**210**	**79.5**	**20.5**

Source: This study

5.4.5: Trends in regeneration within the study area

An analysis in trends for forest regeneration is provided in Table 5.14 below based on observed counts and status of the top ten most abundant tree species in the Study area. The stocking density counted for all the 210 vascular species recorded in the Study Area, is 98,837 standing trees most of which are juvenile to medium sized. However, the top six most stocked tree species are all exotic accounting for 27.8% of all wood stocks in the area with both the Neem *(Azadirachta indica)* and Jujube *tree (Zizuphus mauritania)* being dominant. Given that most of the trees are saplings, it is apparent that regeneration of forests in the Study area is dominated by exotic colonising tree species which have been known for similar tendencies in other areas of the coast region especially in Kilifi County.

Table 5.14: Top ten most abundant tree species in the Study area

Scientific name	**Local name**	**Nativity**	**Stocking**	**Description**
Azadirachta indica	Mwarubaini	Exotic	4774	Majority are juvenile
Ziziphus mauritania	Mkunazi	Exotic	4273	
Senna siamea	Mrabai	Exotic	2773	
Thevetia peruviana	Mbonobono	Exotic	2763	
Leucaena leucocephala	Mlukina	Exotic	2749	
Anacardium occidentale	Mkorosho	Exotic	1917	
Acacia nilotica	Kigundigundi	Indigenous	3624	
Catunaregam nilotica	Mdzongodzongo	Indigenous	2681	
Thespesia danis	Mhoe	Indigenous	2117	
Terminalia spinosa	Mwanga	Indigenous	1944	
Sub-total for top six exotic species			*19,249 (27.8%)*	
Sum for other species			*49,973 (72.2%)*	
Total wood stocking			98,837 (100%)	

Source: This study

5.4.6: Conservation status for individual floral species

Each of the 210 individual species identified were analysed for conservation status through screening against the IUCN Red Data Local Tools.

Screening against IUCN Red Data:

Table 5.15 presents findings of species screening against the IUCN Red Data. A total of 15 species were found to be of interest with five (5) being near threatened; Eight (8) being Vulnerable and Two (2) being endangered. Fig. 5.6 presents a map of their distribution in the Study area.

Table 5.15: Screening against the IUCN Red Data

SN	**Scientific name**	**Local Name**	**Nativity**	**Growth form**	**IUCN Status**	**Tally**
1.	*Julbernardia magnistipulata*	Mtsamvia	Indigenous	Tree	NT	5
2.	*Cola minor*	Mpingo	Indigenous	Tree	NT	

3.	*Dalbergia melanoxylon*	Mhambalapanya	Indigenous	Tree	NT	
4.	*Delonix baccal*	Mchumbu	Indigenous	Tree	NT	
5.	*Lannea schweinfurthii*	Mvule	Indigenous	Tree	NT	
6.	*Milicia excelsa*	Mphamva	Indigenous	Tree	VU	8
7.	*Millettia usaramensis*	Mkoko Bara	Indigenous	Tree	VU	
8.	*Sideroxylon inerme*	Mgoza/Muuzi	Indigenous	Tree	VU	
9.	*Sterculia africana*		Indigenous	Tree	VU	
10.	*Vitellariopsis kirkii*	Mfudu Madzi	Indigenous	Tree	VU	
11.	*Vitex ferruginea*	Mdungu	Indigenous	Tree	VU	
12.	*Rhynchosia velutina*	Mkuwa	Indigenous	Tree	VU	
13.	*Rhynchosia velutina*	Libugu	Indigenous	Climber	VU	
14.	*Zanthoxylum holtzianum*	Mtengedzi	Indigenous	Tree	EN	2
15.	*Canthium glaucum*	Mfunda	Indigenous	Tree	EN	
	Total					**15**

Key: NT-Near Threatened; VU-Vulnerable; EN-Endangered
Source: This study

5.4.7:Screening against Schedule Six of the Wildlife Management and Conservation Act 2013:

This tool identifies tree and wildlife species that are considered to be of conservation interest locally though not flagged by the IUCN. None of the Schedule Six Trees namely;- Encephalartos kisambo (Voi cycad), Osyris lanceolata (East african sandalwood) Prunus (Africana Red stinkwood), Vitex keniensis (Meru oak). Ocotea kenyensis (Camphor), Polyscias kikuyuensis (Parasol tree) Aloe ballyi (Rat aloe) and Populus ilicifolia (Tana river poplar) were encountered in the Study area.

5.4.8: Way forward with conservation of floral biodiversity

Vegetation in the settlement area is mainly natural and of moderate healthy status. Some floral species are reported to be of conservation concern and corrective measures are needed to safeguard their survival. Having confirmed their location, the next step is to reconfirm their status through proper identification using preserved samples with the National Museums of Kenya. Negative impacts on vegetation in the settlement area will be mitigated through establishing appropriate conservation measures including putting in place and implementing an environmental management program focusing on the kayas, gazetting forested Kayas to become national heritage or protected national forests, erecting solar fence around the Kayas to control unsustainable human activities; introducing green villages and towns in the resettlement area and developing kayas as cultural eco-tourism sites and linking the area to the coast tourism circuit. To address demand for wood due to resettling, there is need to establish woodlots in the area with a mix between natural species like Terminalia spinosa naturally occurring in the area and exotic species like casuarina pilot can be done KEFRI that has experience in dry land plant species including wood lots. To maximize impact, the local community should be sensitized on value of environment conservation including protection of the existing natural species and participating in establishment of green zones. Mitigation will require collaboration among all

actors – National government, county government, Kenya Port's authority, investors, community, private sector, NGOs and researchers. 5.5: Finding of the faunal Survey

5.3.1: Status of conservation of mammalian species

Nineteen mammalian species have been recorded within the resettlement area over the survey period. All mammals recorded in the area are small and the list is shown in Table 5.16 and Plates 5.3-5.5

Table 5.16: Mammalian species recorded in the resettlement area

No.	Common Name	Scientific Name	Conservation status based on IUCN RED List
1	Wild boar	*Sus scrofa*	Least Concern
2	Impala	*Aepyceros melampus*	Least Concern
3	Grant's gazelle	*Nanger granti*	Least Concern
4	African stripped weasel	*Poecilogale albinucha*	Least Concern
5	African civet	*Civettictis civetta*	Least Concern
6	Masked palm civet	*Paguma larvata*	Least Concern
7	Vervet monkey	*Chlorocebus pygerythus*	Least Concern
8	Yellow baboon	*Papio cynocephalus*	Least Concern
9	Four toed hedgehog.	*Atelerix albiventris*	Least Concern
10	Bush baby	*Galago senegalensis*	Least Concern
11	Mongoose	*Viverra suricatta*	Least Concern
12	African hare	*Lepus microtis*	Least Concern
13	Bush Baby	*Galago senegalensis*	Least Concern
14	Mongoose	*Helogale parvula*	Least Concern
15	Bat	*Pteropus spp..*	Not Screened
16	Red-legged tree squirrel	*Heliosciurus rufobrachium*	Least Concern
17	Cane-rat	*Thryonomys swinderrianus*	Least Concern
18	House mice	*Mus musculus*	Least Concern
19	Wood mouse	*Apodemus sylvaticus*	Least Concern

Source: This study

Nineteen mammal species were screened for conservation status based on the The IUCN Red List of Threatened Species. No species was found to be threatened and were found to be of Least Concern. Bats were not screened as they had not be identified to species level.

The resettlement area has moderate diversity of mammals, which occupy the existing ecosystems. Woodlands support more mammals than the other ecosystem in the area. The survey has not established threatened mammal species in the resettlement area.

Plate 5.3: Bat resting in one of the Kayas

Plate 5.4: Bush baby resting on a tree

Plate 5.5: Cape hare in the grassland

5.3.2: Threats to the fauna conservation of the settled area

Conservation of fauna in the resettlement area is facing some threats such as habitat loss and fragmentation attributed to expansion of human settlements, agricultural activities, and infrastructure development. This has led to loss of natural habitat for wildlife causing decline in wildlife numbers. Poaching on the other hand has been a cause of decline of wildlife numbers and species in the resettlement area. Human -wildlife conflict is associated with loss of some animal species such as snakes when they kill livestock. Climate change, a new entrant is affecting wildlife habitats, numbers and species.

These threats have reduced mammalian numbers and diversity in the settlement area, which explains availability of only small sized mammals. The area does not have any mammalian species listed as threatened under the IUCN RED List and hence the proposed project will not affect threatened mammalian species. However, mitigation measures such as conservation education and integrated management are required to sustain the few remaining mammalian species. Wildlife Conservation and Management Act, 2013 remains relevant in safeguarding the remaining wild animals. Environmental Management and Coordination Act (1999, amended 2015) is applicable to addressing environmental degradation.

5.3.3: Status of avian conservation

The resettlement area inclusive of three kayas was surveyed and analysed to determine the different avifauna diversity that are found in the area. One hundred and twenty two bird species were recorded. A complete list of all the birds recorded during the survey, together with their IUCN classification, population growth, AEWA conservation status and migratory status are listed in Appendix 5.3 while Plates 5.5 show some of the birds that were sighted in the area. The resettlement area and the Kayas have similar bird types and no major differences were observed. A complete list showing each bird species with the area sited is listed in Appendix 5.3.

Table 5.17 shows average count of bird species in each site studies including the three Kayas while Figure 5.14 shows the physical representation of birds collected in each area. A total of 156 bird species were overall recorded.

Table 5.17: The average count of bird species recorded in each area

Dongo Kundu	Mwangala	Kaya Miongani	Kaya Ng'ombeni	Kaya Mwanakuku
88	71	83	78	86

Source: This study

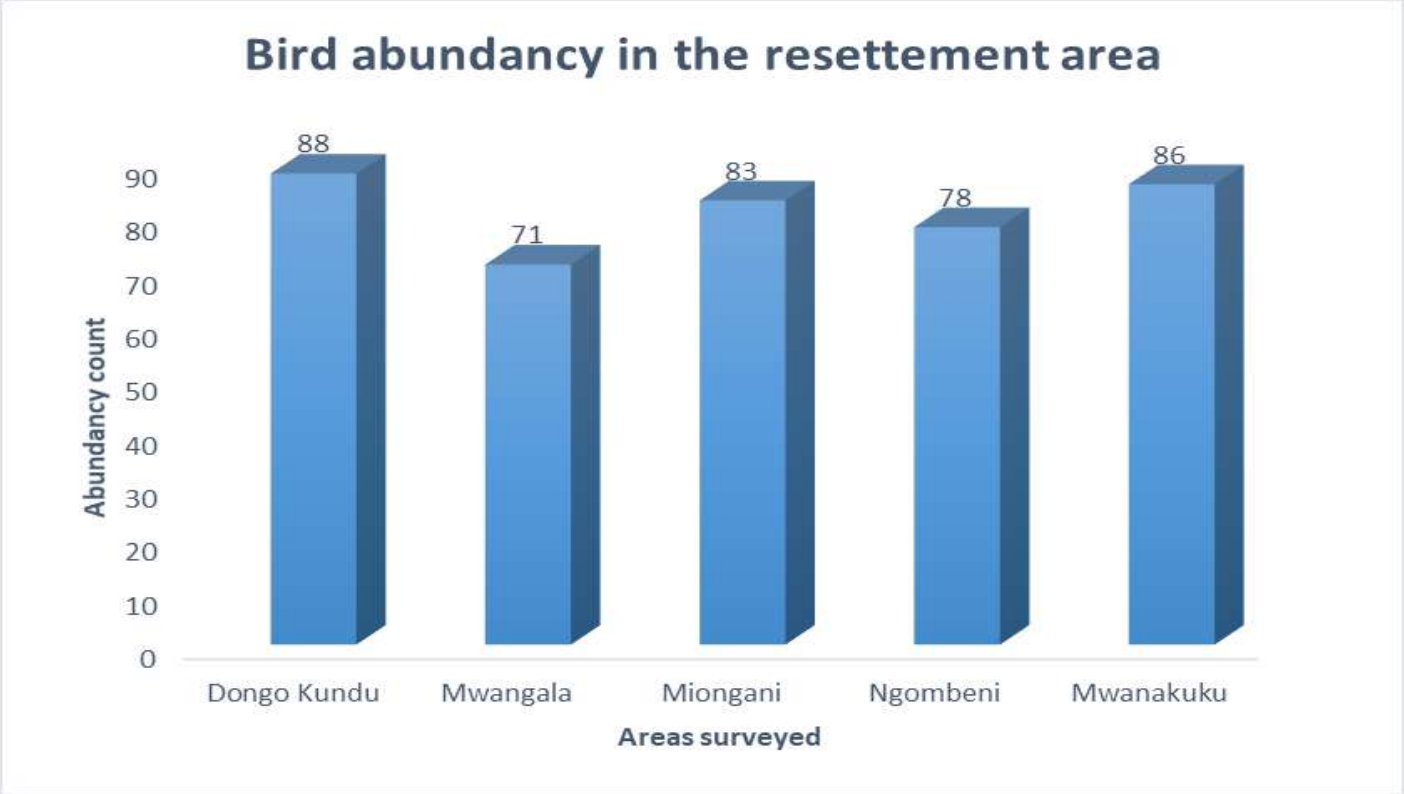


Figure 5.14: Bird abundance within the resettlement area and the kayas within (Source: This study)
Source: This study

The woodland ecosystem was the most suitable ecosystem recording the highest numbers of both bird species and of fauna in general. The forest ecosystem recorded the second highest abundance of fauna and avifauna.

In addition to providing a checklist on the species diversity, each individual bird species observed and recorded was run through two checklists. This was to check on their conservation or protection status. These checklist include

- AEWA (The African-Eurasian Migratory of Water bird Agreement) The AEMW checklist is an intergovernmental treaty dedicated to the conservation of migratory water birds and their habitats across Africa, Central Asia, Europe, The middle East, Greenland and the Canadian Archipelago.
- The IUCN red list and AEMW Checklist play a crucial role in ensuring that the birds of the region are fully recognised, and proper protection and conservation measures are adhered to ensure their survival.

Of the 136 bird species scanned, 11 species are present within the AEWA checklist as shown in Table 518.

Table 5.18: Bird species present within AEWA

SN	English Name	Scientific Name	CMS Listing	AEWA Conservation Status	IUCN Red Data	Schedule Six to WMCA 2013	Schedule Seven to WMCA 2013
1	African Open Billed Stork	*Anastomus lamelligerus*		✓			
2	Bateleur	*Terathopius ecaudatus*		✓	EN		
3	Black Headed Heron	*Ardea melanocephala*		✓			
4	Black Kite	*Milvus migrans parasitus*		✓			
5	Grey Heron	*Ardea cinerea*		✓			
6	Little Egret	*Egretta garzetta*		✓			
7	Ringed Plover	*Charadrius hiaticula tundrae*	✓	✓			
8	Sacred Ibis	*Threskiornis. aethiopicus*		✓			
9	White Faced Whistling Duck	*Dendrocygna viduata*	✓	✓			
10	Woolly Necked Stork	*Ciconia*		✓	NT	✓	

		microscelis					
11	Wood sandpiper	*Tringa glareola*		✓			
12	Martial Eagle	*Polemaetus bellicosus*			EN	✓	
14	African Fish Eagle	Haliaaetus vocifer				✓	
15	Red billed ox pecker	Buphagus erythrorynchus				✓	
16	Speckled Mousebird	Colius struatus					✓
17	House Crow	Corvus splendens					✓
18	Red billed Qualea	Qualea qualea					✓

Adapted: AEWA Checklist
Source: This study

In addition to the analysis on the AEWA checklist, the 136 bird species were also run through the IUCN Red list data. One hundred and twenty-one species were classified as Least Concern, One bird species, Martial Eagle (*Polemaetus Bellicosus)* was found to be of conservation interest as it is classified an endangered species globally. Further analysis was done on the birds to determine the area of origin for each bird species. This was done to inform the regions that should be given conservation priority and nature of conservation for the recorded birds. The region of origin was sub divided into three main regions of the world as shown in Table 5.10. These regions include

- Sub Saharan Region
- Asian Region
- Europe

Plate 5.6: Birds nesting among trees and shrubs within the resettlement area
Source: ESIA Team

Plate 5.7: Birds nesting among trees and shrubs within the resettlement area
Source: ESIA Team

5.4: Finding of Insect Survey

Twenty-three insect species were identified in the resettlement area and subjected to conservation status screening under the IUCN Red List and the findings presented in Table 5.19. Some of the species are presented in Plate 5.8. The most common insects that were recorded in partially all the habitats are green grasshopper (*Omocestus viridulus*), a variety of butterflies such as, the monarch butterfly (*Danaus plexippus)* African emigrant (*Catopsilia florella*), and other insects were observed in certain habitats. These habitats mainly consisted of tall trees, within bushes, on the ground or within the grasses. These insects included - locust (*Schistocerca gregaria), honey bee (Apis mellifera litorea),* dragon fly (*Sympetrum flaveolum),* rhinoceros beetle *(oryctes rhinoceros),* cricket (*Gryllinae sp),* safari ants (*Dorylus laevigatus*), weaver ant (*Oecophylla smaragdina),* and Grass yellow butterfly *(Eurema regularis),*

Table 5.19: List of common insects recorded in the study area

SN	Local name	Common name	Scientific name	IUCN Classification
1.	Banzi	Green grasshopper	*Omocestus viridulus*	Least concern
2.	Buibui	Red-legged golden orb-weaver	*Nephila inaurata*	Least concern
3.	Bung'o	Tsetse fly	*Glossina palpalis*	Least concern
4.	Buu	Armyworm	*Spodoptera frugiperda*	Least concern
5.	Chiboho/Kipepeo	Butterflies	*Rhopalocera*	Least concern
6.	Chipepule	Monarch butterfly	*Danaus plexippus*	Least concern
7.	Chongwa	Rhinoceros beetle	*oryctes rhinoceros*	Least concern
8.	Dingo	African Stag Beetle	*Prosopocoilus antilopus*	Least concern

SN	Local name	Common name	Scientific name	IUCN Classification
9.	Dundu	Dung beetle	*Onthophagus taurus*	Least concern
10.	Injeinje	giant centipede	*Scolopendra gigantea*	Least concern
11.	Jongoo	Giant African millipede	*Archispirostreptus gigas*	Least concern
12.	Kanja	Black-garden ants	*Lasius niger*	Least concern
13.	Kwanya	Caterpillars	*Ceratophaga vastella*	Least concern
14.	Mavu	Asian giant hornet	*Vespa mandarinia*	Least concern
15..	Mwamfukufuku	House crickets	*Gryllinae sp*	Least concern
16	Mwamvuvu	Yellow- winged darter	*Sympetrum flaveolum*	Least concern
17.	Nyoe	Long-horned grasshopper	*Tettigonia cantans*	Least concern
18.	Nyuchi/Nyuki	Honeybee	*Apis mellifera litorea*	Least concern
19.	Nyungunyungu	Earthworms	*Lumbricina terrestris*	Least concern
20.	Nzige	Desert locust	*Schistocerca gregaria*	Least concern
21.	Pambo	weaver ant	*Oecophylla*	Least concern
22.	Tandu	Black garden centipede	*Lithobius niger*	Least concern
23.	Tsalafu	Safari ants	*Dorylus Spp*	Least concern

Source: This study

Plate 5.8: Different types of insects found within the resettlement area
(Source: This study)

Insects are critical in sustaining a healthy ecosystem. They maintain healthy soil, recycle nutrients, pollinate flowers and crops, and control pest's buildup. Some like bee are source of products such as honey, propolis, wax and jelly. Despite these important roles played in the ecosystem, insects are facing major threat from human activities such as tree cutting, use of pesticides and effects of climate change. For sustenance of these species, unsustainable practices such as environmental degradation will be addressed through adoption of responsible environmental stewardship, including integrated pest control and awareness creation.

5.5: Hepertofauna

Ten reptiles were identified in the resettlement area. The majority of the reptile species recorded are common and widespread throughout the resettlement area.
The reptile checklist was subjected to conservation status screening under IUCN Red List and the data is presented in Table 5.20.

Table 5.20: List of common reptiles recorded in the study area

SN	Local name	English name	Scientific name	IUCN Classification
1	Balabala	Tree lizard	*Acanthocercus atricollins*	Least concern
2	Jonjoka	Striped skink lizard	*Trachylepis striata*	Least concern
3	Kijenje	House gecko	*Hemidactylus frenatus*	Least concern
4	Lubwi/Kinyonga	Flap-necked chameleon	*dilepis Leach*	Least concern
5	Maja	Blacked-necked spitting cobra	*Naja nigricollins*	Least concern
6	Mbulu/Mbulukenge	Nile monitor	*Varanus niloticus*	Least concern
7	Ngate	Ground lizard	*Pholidoscelis fuscatus*	Least concern
8	Nyoka	Green Mamba	*Dendroaspis angusticeps*	Least concern
9	Nyoka (Bafwe)	Puff udder	*Bitis arietans*	Least concern
10	Nyoka (badya)	Pythons	*Python sebae,*	Near Threatened

Source: IUCN Red list

Plate 5.9: Yellow-throated Plated Lizard (Gerrhosaurus flavigularis)
Source: ESIA Team This study

Reptiles play an important role in the ecosystem. They play the role of gene transporters through the processes of seed dispersal and pollination; they enhance ecological balance through feeding on pests. For example, snakes help in controlling population explosion among rats that would be a vermin to food crops. Venoms and toxins from different species of reptiles are vitally important for the development of modern medicines. They are widely used for ant venoms, and in treating other medical conditions. To safeguard reptiles found in the project area, conservation efforts will be enhanced through collaboration with agencies responsible for their protection.

CHAPTER SIX: THE SOCIAL ECONOMIC PROFILE

6.1: Background Information

The world is rapidly urbanizing, and it is estimated that by 2030, 60% of the world's population will be living in urban areas. In developing countries, urbanization has had the negative consequence of inequitable economic growth, food insecurity and increased urban poverty. Kenya like many other African countries continues to experience increased rural-urban migration as people seek better livelihood sources in urban areas. This migration will continue to present challenges in infrastructure development, services provision and food requirements to meet the needs of increasing urban population. The effect of urbanization has led to conversion of land hitherto used for farming to other uses.

According to *Kenya Vision 2030*, it is estimated that by the year 2030, 63% of Kenyan population will be domiciled in urban areas. The increased urban population has been observed to result in social and economic challenges including rise in food demand, environmental burdens, inequitable economic growth, increased urban poverty, limited access to clean water and sub-standard waste management. This necessitates the need for organized urban land use that contributes to economic well-being without compromising safety, security and economic development of the people.

Mombasa County is entirely urban according to the *Kenya Census 2019 report*. Its' population is projected to be 1,283,933 in 2022 and 1,367,714 and 1,422,440 in 2025 and 2027 respectively. The population growth can be attributed to the fact that Mombasa is an industrial city, a port city and a major gateway to the East and Central African region. As a result, many people come into the city in pursuit of employment opportunities, education and investment opportunities. This implies more pressure on infrastructure, housing, transport and other social services, hence there will be need to invest in these sectors as well as expand economic activity to create more jobs for the rapidly increasing population. Mombasa has a dependency ratio of 53.5% and a labour force population (15-64yrs) of 65.6%. Children below 15 years population is 32.6% and above 65 years population of 1.9%.

The MSEZ-DK resettlement project area covers the Mbuta location of Likoni sub-county south of Mombasa Island. The area has multi-ethnic groups but, the main group of people living in this area are the *Miji Kenda* mainly the Digo sub-tribe. They own and operate their traditional sacred shrines known as *Kayas* as per their culture and traditions. The Digo community is a patriarchal society and the study showed that most households are male headed. The two predominant faiths are Christianity and Islam. The community occupies the KPA land where some extensive agriculture for subsistence is done. They also keep local breeds of cattle, sheep & goats (Shoats) and poultry in the farms.

A satellite urban centre is being developed by the resettlement of the PAPs in the Dongo Kundu area of Likoni Sub-county. This is one of the planned urbanisation strategies in Mombasa County Integrated Development Plan (CIDP) 2023-2027.

The Dongo Kundu property owned by the KPA falls within the administrative jurisdiction of Mbuta Location within the Likoni sub-County of Mombasa.

Land targeted for development of the Mombasa Special Economic Zone totals 3006 acres whose title rests with the Kenya Ports Authority This is the land that comprises the Dongo Kundu Settlement with among others 2319 landed and non-landed PAPs. It is served by an Administrative Compound, the Mbuta Heath Centre, Mwangala Primary and ECDE School, seven (7) Churches, four (4) Mosques and a total of thirteen (13) community Kayas.

The Persons affected by the Project (PAPs) from the six villages of Dongo Kundu, Mwangala, Mrongondoni Kaya Mtongwe Siji and Mbuta, and are being settled into two areas i.e. Dongo Kundu and Mwangala villages comprising a total of 490 acres (inclusive of roads and conservation areas). The Land Use Advisory Plan is the main focus of this study and it is expected to change from one dominated by agriculture to a multiple land use landscape.

6.2: Focus of the Baseline Socioeconomic Survey

6.2.1: Overview of Socioeconomic Survey

The primary purpose of a socioeconomic baseline survey/study is to gain an understanding of the Persons Affected by the Project (PAPs), their hhouseholds, their sources of incomes, their access to services and infrastructure, their social networks, and preference for relocation and livelihood restoration as basis for determining displacement impacts and designing mitigation measures / strategies. In this study the eligibility considered PAPs with claim to land, trees and / or structures. None of the PAPs had legal rights to land (as land belongs to KPA) but those present in the affected area at the time of cut-off date were eligible.

Economic displacement in this study will be considered as loss of assets (including land) or access to assets (land, trees, natural resources - flora, fauna) that has led to loss of income source or means to livelihood as a result of the Mombasa Special Economic Zone – Resettlement Site Infrasturture Project (MSEZ - RSIP) The PAPS from six villages in the MSEZ-DK will be resettled in two villages, i.e. Dongo Kundu and Mwangala

6.2.2: Administrative profile

Two parallel administrative systems are operational in Kenya namely, the Central government and County government. The National government and Mombasa County government will be found within the resettlement area.

***National Government set-up*:** The resettlement area under focus is within the Mombasa County in Likoni sub-county, Mbuta location, Bububu sub-location. The six villages are Dongo Kundu, Mwangala, Mrogondoni,, Kaya Mtongwe, Siji and Mbuta.

Table 6.1: Distribution of PAPs by administrative jurisdiction

Central Government		**Admin Locations**		**Parliamentary**	**County Government**	
County	Sub county	Location	Sub locations	Name of Constituency	Electoral ward	Villages
Mombasa	Likoni	Mbuta	Bububu	Likoni	Mtongwe	Dongo Kundu, Mwangala, Mrogondoni, Kaya Mtongwe, Siji and Mbuta

Source: Baseline household survey / study 2023

Under the Parliamentary system: The Project will be in Likoni constituency.Under County Government Set Up: In the devolved system of government, the project is in Mombasa County (County No. 001)). Within Mombasa, the Project falls under one electoral Ward - Mtongwe, where the six villages named are found.

6.3: The Study Methods and Approach

The study utilized a mixed-methodology approach, collecting both qualitative and quantitative data. Survey tools included Key Informant (KI) questionnaires, Focus Group Discussions (FGD) with special interests and vulnerable groups where check-lists were used, and detailed baseline household (HH) survey questionnaires. A total of 484 PAPs (M-264, F-220) were met during the FGD meetings. (*Household baseline survey questionnaire - Appendix 6.1)*

A formal baseline household survey questionnaire was administered to all PAPs resident and non-resident in the six villages by enumerators (Team of personnel in Household survey - *Appendix 6.2)* at household level. The PAP is the most important stakeholder in the resettlement process. A baseline analysis report was developed and is detailed as *Appendix 6.3.*

A total of fifteen(15) National and County government heads of departments (key stakeholders) based in Mombasa county were engaged in meetings held on individual basis in their offices. The PAPs resettlement program plan was explained to them in detail then the forum was open for their interrogation and sharing of the various statutes that guide their operation in relation to their part / mandate in the planned resettlement program in Dongo Kundu.

To interrogate the Advisory Plan for resettlement of PAPs in MSEZ- Dongo Kundu (MSEZ-DK), Likoni, Mombasa, a sustainable livelihood matrix (Figure 7.1 below) was also used.

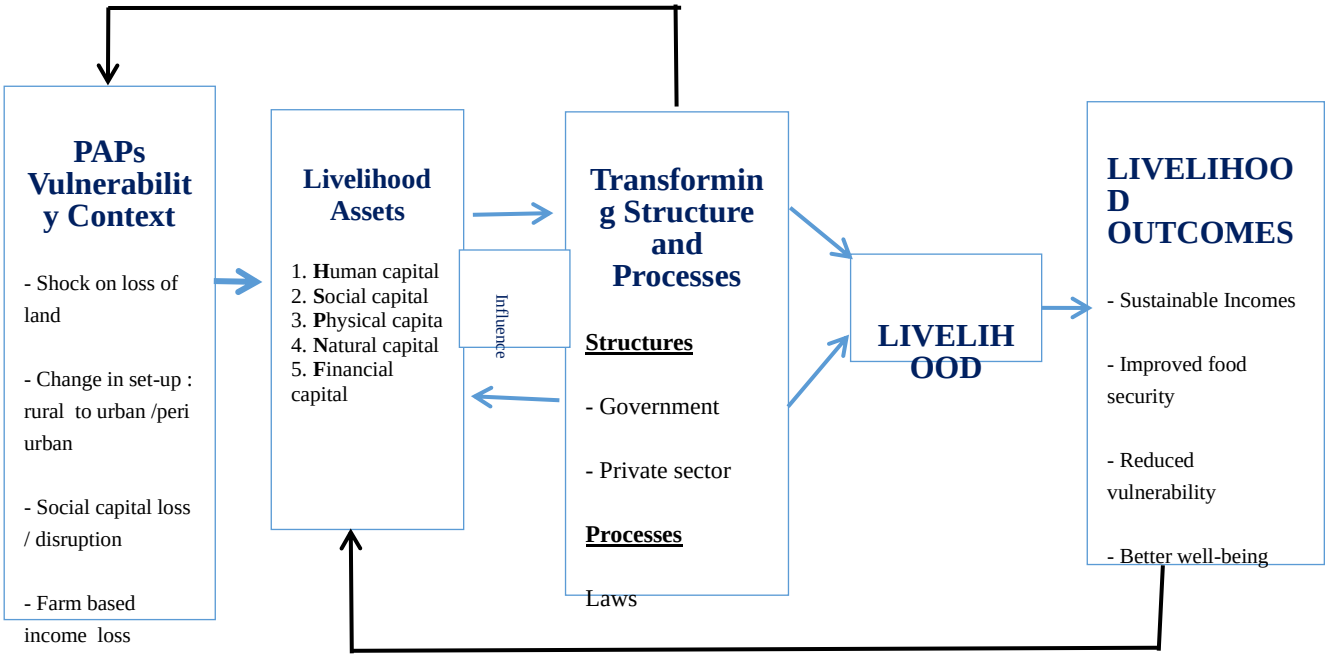


Figure 6.1: Livelihood Framework

As per this livelihood approach, the means for livelihoods studied were based on people's access to economic capital assets as well as how they combine and grow these assets to make a living through interactions with actors and institutions (from National and County government).

The five livelihood capitals, namely **Human capital, Social Capital, Physical Capital, Natural Capital and Financial Capital** (as in Figure above) form the pillars of the investigating tool for the sustainable development approach, commonly accepted as the livelihood framework. These key livelihood pillars used in this study with inference from the household baseline survey data were:-.

a) *Human capital* - The skills, knowledge, ability to labour and good health to pursue livelihood strategies
b) *Social Capital* - Social resources - networks, membership to groups, relationship of trust, access to wider institutions of society - which people draw in pursuit of livelihoods
c) *Physical capital* - Basic infrastructure - transport, shelter, water, energy, communication and production equipment - that enable people pursue livelihoods
d) *Natural capital* - Natural resources stock from which resources flow useful for livelihoods are derived from e.g. land, water, wildlife, biodiversity, environment resources.
e) *Financial capital* - Financial sources which are available to people e.g. savings, credit supplies, regular remittances or pension.

6.4: Findings from the Socio-economic Profile

6.4.1: The People in the Resettlement Area

The MSEZ-Resettlement Site Infrastructure Project area covers the Mbuta region of Likoni sub-county south of Mombasa island. The area has multi-ethnic groups but, the major groups of people living in this area are the *Miji Kenda* mainly from the Digo sub-tribe. They own and operate their traditional sacred shrines known as Kayas as per their cultures and tradition. The Digo community is a patriarchal society and the study showed that most households are male-headed. The two predominant faiths are Christianity and Islam. Their main activity is farming and occupies the six villages where they practice extensive subsistence farming and livestock rearing mainly cattle, sheep goats and poultry.

6.4.2: Status and Length of Residency among the PAPs

From the baseline study, the majority of resident PAPs (92.6%) have lived in the project area for a period between 0-40 years. All residents who have been there before 2018 (more than 5 years at the time of the study) account for 90.8%. Majority (71.5 %) of the PAPs in the baseline study are resident in the area and 28.5% are non-residents or absent at the time of the study, they have a structure that was not occupied during the survey. As per the eligibility criteria used in the baseline survey study, a total of 99.8% of those interviewed were landed (owned land and any other item) while 0.2 % owned structures only. Majority 84.4% owned land, structures and trees in combination.

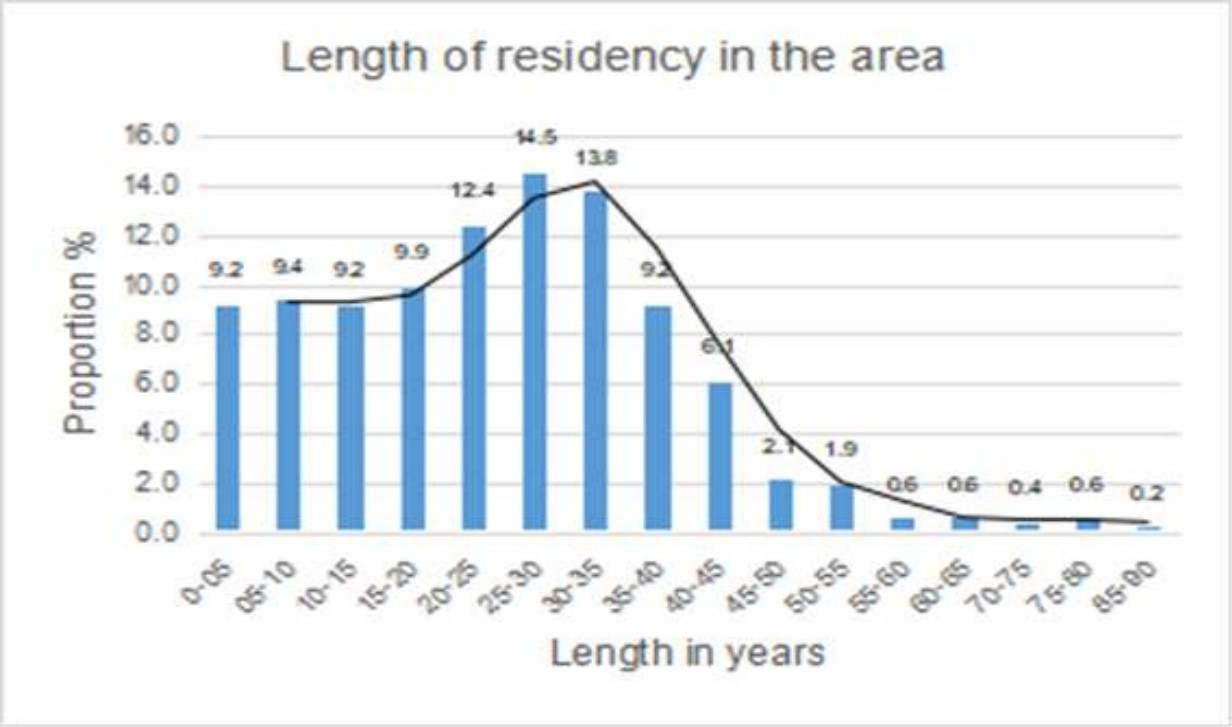


Figure 6.2: Length of residency in the area
Source: This study

6.4.3: Land holding, use and structure profile

The landscape is mainly extensive agriculture used for growing subsistence food crops, trees and rearing animals like cattle, shoats, and poultry. A total of 2,319 PAPs were identified to be resident using the land in one way or the other in the 1217 ha (3006 acres) of the land. Of these, 1,648 PAPs claimed they owned land among other things like houses/structures and trees. Majority (70.9%) of the respondents claim ownership of up to 2 Hectares (5 acres) of land at the time of this baseline study. About 22.4% have parcels between 2-4 ha (5-10 acres) and less than 1 % own more that 6 ha (15 acres) of the KPA land. Along the shore lines are mangroves forests which are gazetted forests under the Kenya Forest Service (KFS).

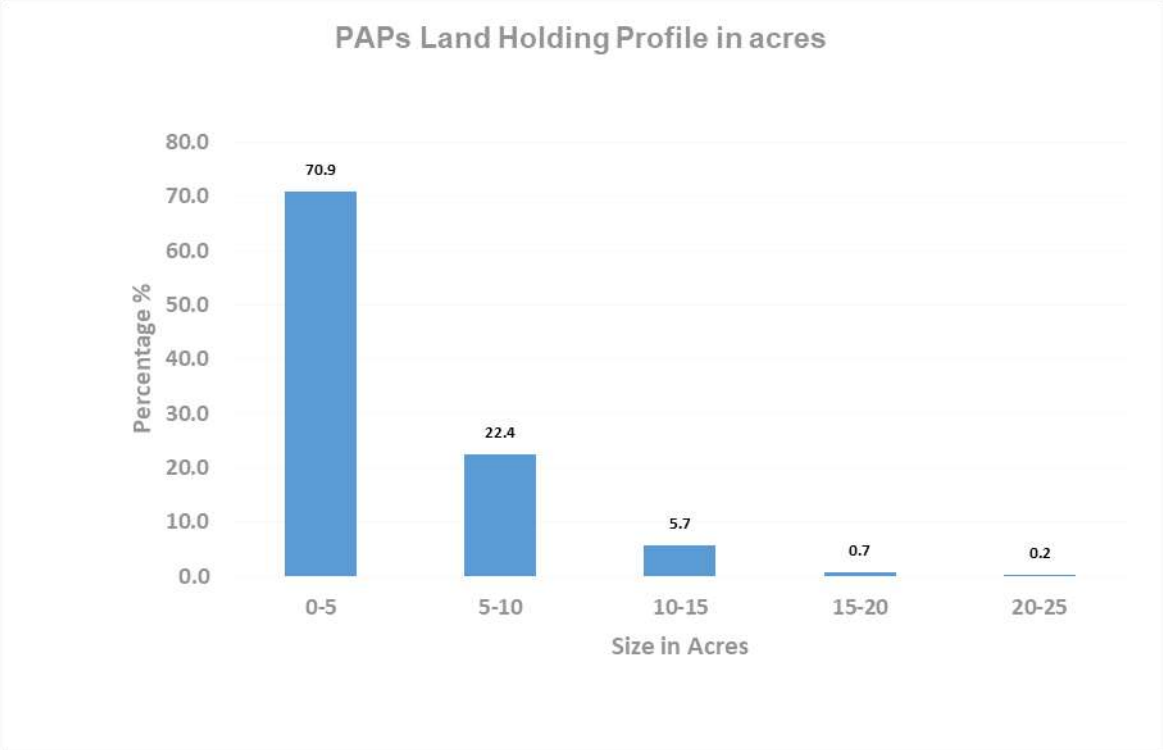


Figure 6.3: Land Holdings Profile in Hectares (Ha)
Source: This Study

The PAPs have been supporting their livelihoods from these parcels of land by using them for farming, rearing/grazing animals and/or extracting various resources from them e.g. firewood, charcoal, palm fronds, construction materials, shrines /alter housing for worship and trade, herbs for medicine and trade and fauna for the traditional treatments and spells (witch doctors). The population density is low in the vast open land.

6.4.4: The Social Characteristics of the PAPs

The study findings show that the PAPs being resettled are mainly in male-headed households, accounting for 69%, while female-headed households only account for 27.5%. Institutions account for the remaining 3.5%. which includes Schools, Mosques, Churches, Health Centre, Government Office, self-help groups and Community Based Organizations (CBOs) in the target area.

There is a big proportion, of 65.8% of household-heads that are married. . Only a third of the households are single, separated and widows/widowers... This category of people is viewed differently in some African societies and the Mombasa Dongo Kundu area is no exemption. They may be stigmatized by virtue of either being single through choice, separation or death of a spouse.

Most household heads are Muslim accounting for 72.9%, while only 27.1% subscribe to the Christian faith.

6.4.5: Household Population, Age and Education

There are a number of key characteristics from the survey PAPs as indicated below.

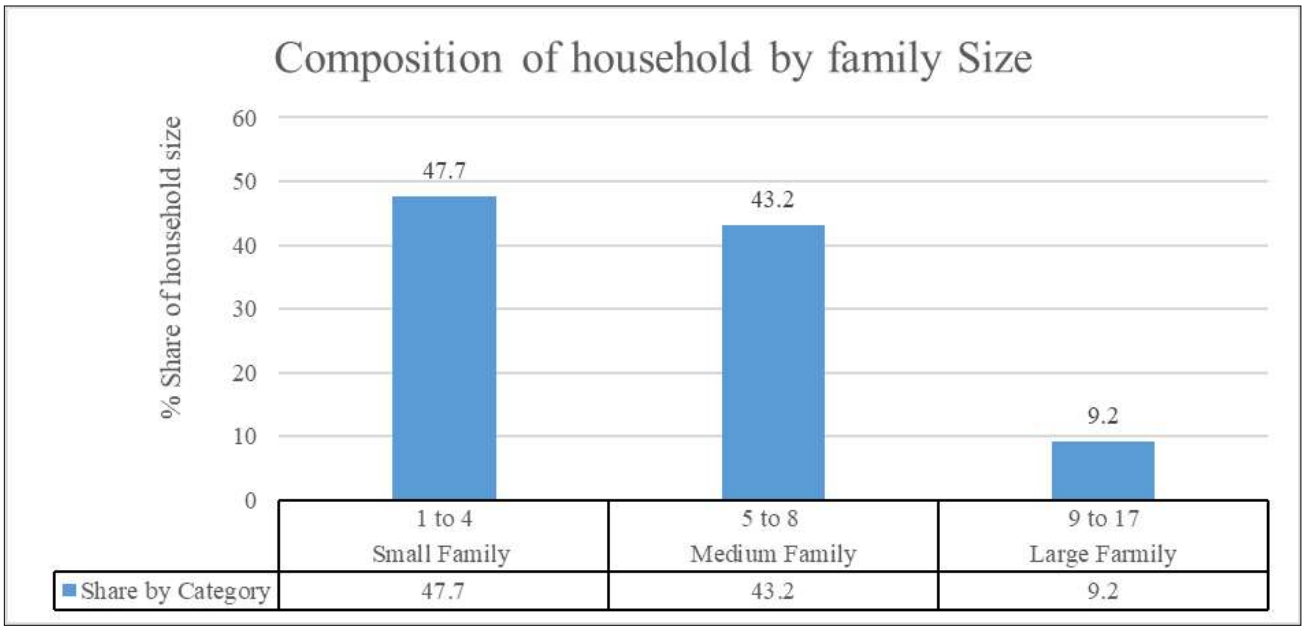


Figure 6.4 Household Population
Source: This Study

Figure 6.4 above, shows composition of household size in the MSEZ area. From the Figure, most households are of small size family with household members ranging from 1 to 4, followed by medium size family of between 5 to 8 members. However, large size family only accounts for 7.2% of the family composition in the entire MSEZ area.

The population is young and skewed towards the left.

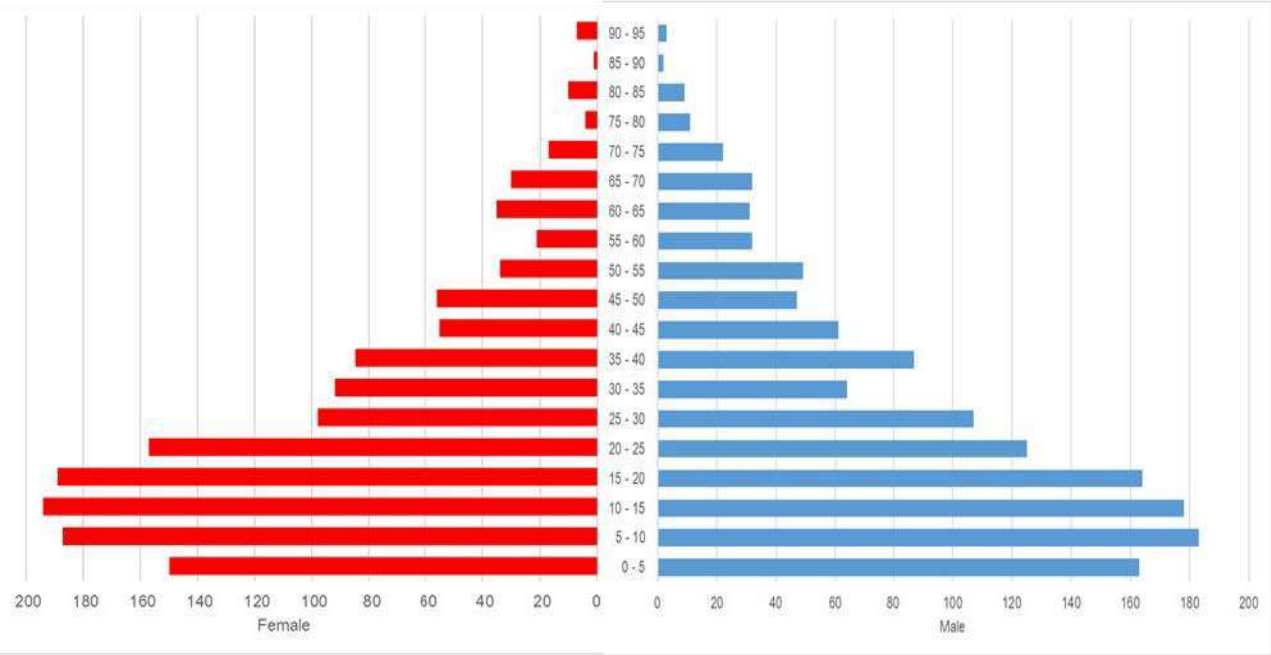
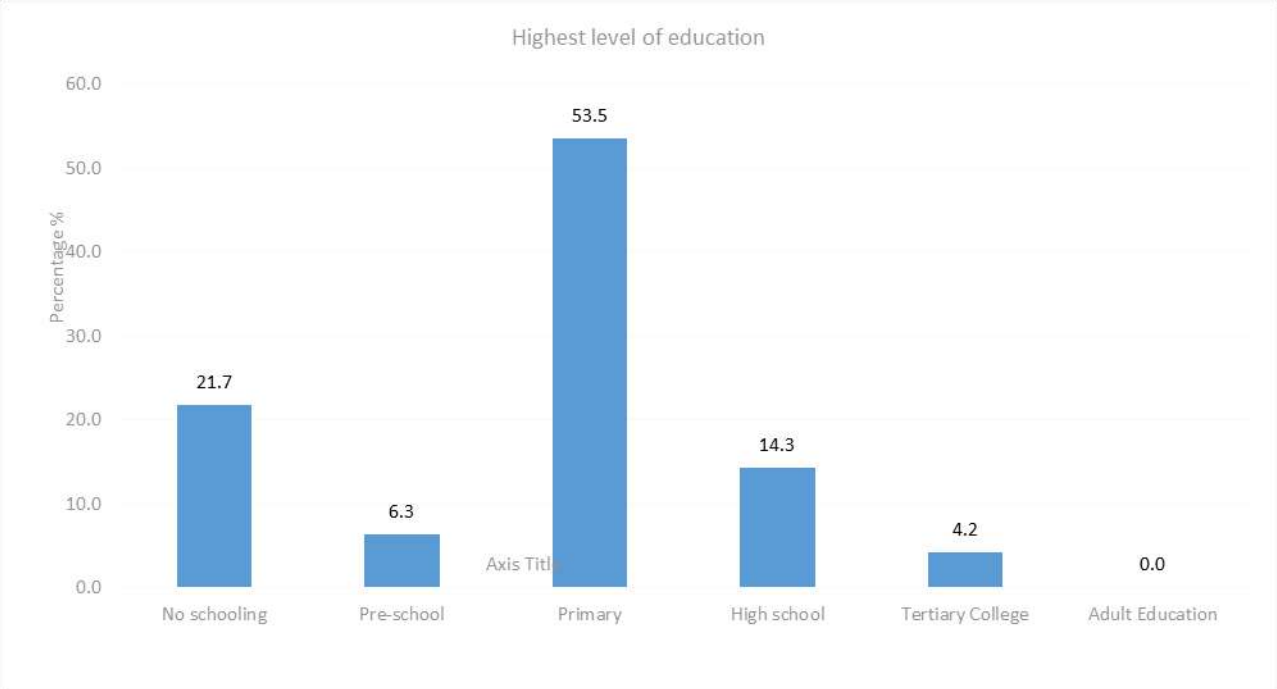


Figure 6.5: Age Profiles of Household Members by Gender
Source: This study

The population to be resettled in the MSEZ -DK is youthful and bottom heavy as indicated in the population pyramid in Figure 6.5. From the baseline survey, most (56.9%) of the population are in the age bracket of 20-65 years accounting for a huge labour force availability among the PAPs. The elderly account for 5.3%. of the PAPs.

The labour-force age (15-65 years of age) proportion in Mombasa County is 65.6% (KNBS



2019, and 64.5% est. for 2023).

Figure 6.6: Level of Education of PAPs
Source: This study

However, the PAPs being relocated generally have low education levels as in Figure 7.6 : The study indicates that 53.3% have primary level education, and 28% have no education at all. The proportion with secondary education and above is 17.5%. This affects the literacy level which usually has an impact on capacity and choice of skills enhancement for livelihoods development.

6.4.6: Assets Mapping in The PAPs Households

Majority (70.9%) of the respondents own up to 2 ha. (5 acres) of land at the time of this baseline study.

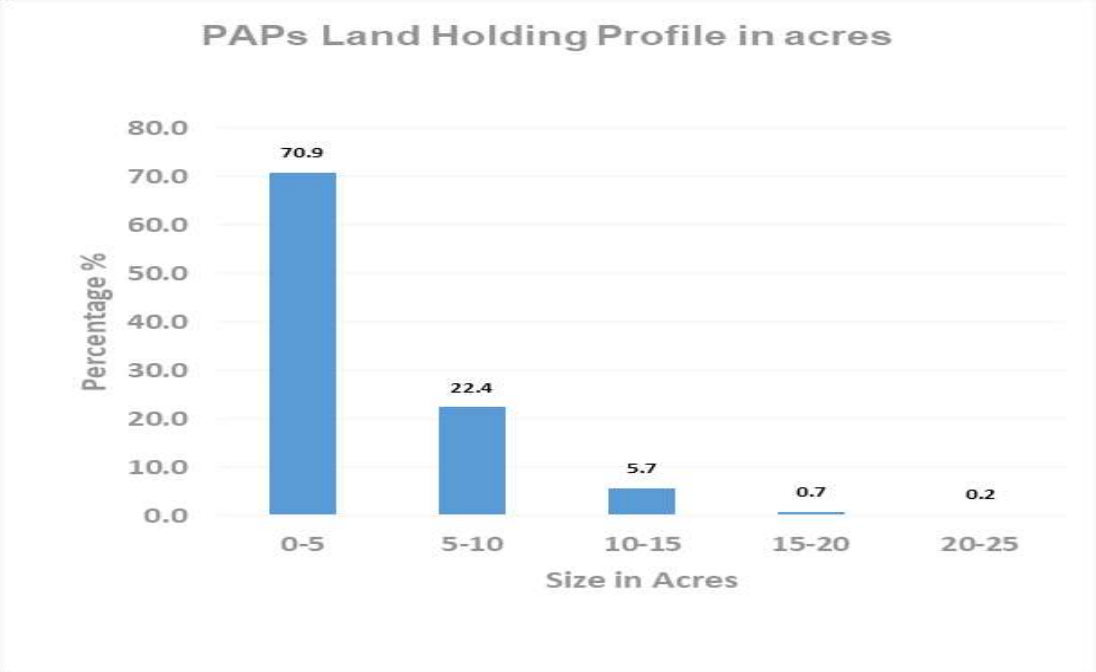


Figure 6.7: Land holdings in acres
Source: This study

About 22.4% have parcels between 2-4 ha. (5-10 acres) and less than 1% own more than 6 ha. (15 acres) of the KPA land. They have been supporting their livelihoods from these parcels by using them for farming, rearing animals and/or extracting various resources from them e.g. firewood, charcoal, palm fronds, construction materials, shrines / altar housing for worship and trade, fauna for the witch doctors' trades.

The PAPs have a number of structures in the farms they occupy. Majority had a main house (34.7%). Other structures reported are kitchens, animal pens/sheds for cattle , goats and poultry while a few had sunk wells (2.8%) in their farms to provide domestic water. Some had shrines/altars and graves in their farms. However, only 9.5% reported having a toilet. This may indicate a lot of open defecation which can be a sanitation /health challenge in the area.

Tabulated below are the types of assets owned by the surveyed PAPs and the most frequent (mode) and average numbers of the same indicated.

Table 6.2: Asset Owned by PAPs

Assets owned	**No of PAPs owning the asset**	**Average number of the asset owned (Mean)**	**Most frequent number of the asset owned (Mode)**	**Cumulative totals numbers**
Land/Acres	419	4	2	1522.3
Houses	535	2	1	1056
Trees	430	572	50	245907
Cattle	81	8	2[a]	656

Shoats (sheep & goats)	239	9	2	2254
Poultry	404	15	10	6072
Fish Pond	0			0
Donkeys	3	6	1	18
Pigs (only 1 PAP had pigs)	1	25	25	25
Dogs	100	2	1	210
Cats	283	2	1	495
Shrine	25	1	1	27
Farm Tools	601	8	6	4604
Fishing Gear	107	4	3	453
Canoes	49	1	1	69
Boats	17	1	1	21
Cars	6	1	1	7
Bicycles	245	1	1	333
Motor bikes	127	1	1	148
Tuk-Tuks	6	2	1	9
Mkokotenis (push carts)	13	1	1	16
Power saw	6	2	1	11
Generators	19	1	1	24
Solar	330	1	1	448
Television	205	1	1	237
Others	253	2	1	398

Source: This study

In general, from the numbers tabulated in Table 7.2, most of the PAPs are *asset poor,* except for assets like trees which was the most common at an average of 50 trees per household. The other assets are scanty in number and on the lower side, with most household owning 1-2 of each asset as the most frequent. Most PAPs claimed to own land, houses, trees, poultry, farm tools and solar panels. The solar panels owned are mostly simple solar systems to provide electricity for house lighting and watching TV

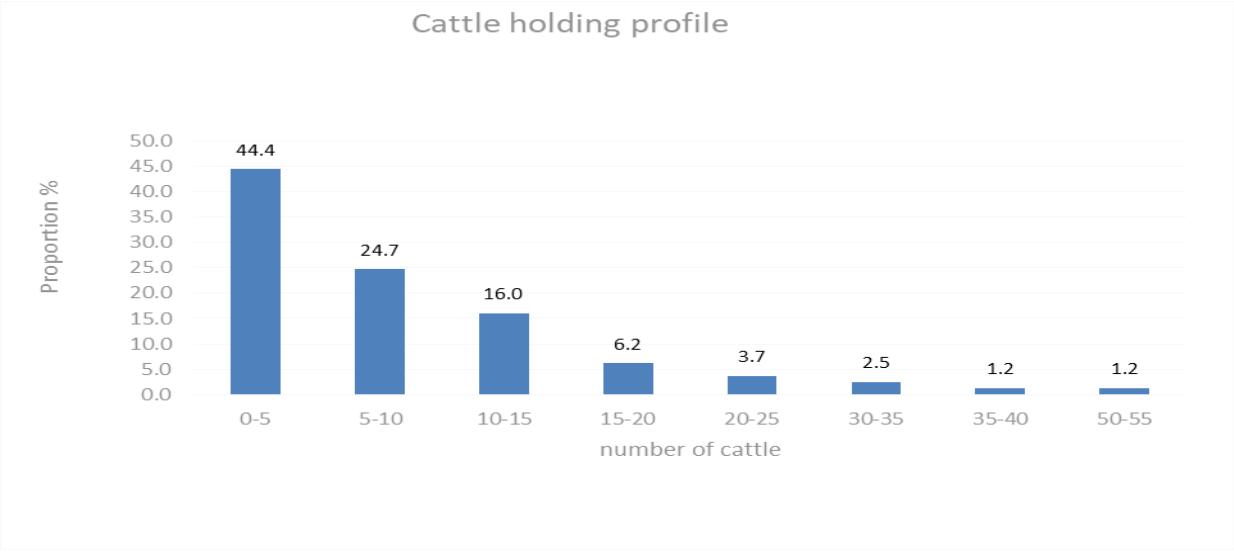


Figure 6.8: Cattle Holding Profile
Source: This study

Most (69.1%) PAPs owned up to 10 heads of cattle while 44.4% of them own 0-5 heads of cattle. The total number of livestock owned by the PAPs are cattle - 656, Shoats (sheep &goats) - 2,254, Poultry - 6,072. Most of the animals kept by the farmers are local breeds with low productivity.

With all these animals, the challenge the PAPs will face is what to do with them as they resettle on their 1/8th or 1/3rd acre plot. Many may be forced to sell before relocation. The small land parcels can't hold these animals except for poultry if confined in an intensive production system. Cattle and shoats need a lot more unit of land per animal. The county by-laws (though not enforced) do not allow residents to keep animals roaming freely in the city estates. According to the Ministry of Agriculture Livestock and Fisheries, any urban agriculture of animals must be confined in zero grazing intensive units. For any PAP to adopt these production systems, they will need initial capital, capacity and skills as well as de-stocking of the large numbers of animals. Intensive production is also only encouraged for high productive and quality animals.

6.5: PAPs Livelihoods Analysis

6.5.1: Resources / Requirements Access in the MSEZ-RSIP area

To understand the change brought about by relocation the PAPs were taken through a livelihood analysis on how they derive their daily and other requirements. All their daily necessities were listed and categorised based on where they come from. The categories were:-

- Locally available and self sufficient
- Locally available but partially sufficient
- Wholly outsourced from outside.

The households are currently accessing and are self sufficient on most (52 items) of their needs and daily requirements which include: foods from the farm, firewood for household energy, faith and spiritual services, land for building, building materials (- post, pole, natural roofing) and inheritance, firewood, pasture for livestock, herbal medicine and services, water and cemeteries. All these are available from their farms and the environment around them. They feel they have adequate land to provide their subsistence food needs (except for Maize), to build and inherit their children.

They are partially self sufficient on 9 items. They externally outsource 19 items which are not available in the area. These mainly include manufactured products like sugar, cooking fat/oil, beverages, advanced construction materials like stones, roofing sheets, nails, electricity, etc.

On resettlement this scenario will change and majority of their subsistence food needs and requirements will be wholly outsourced (63). Their level of self sufficiency will be highly reduced to 14 items as in Figure 7.9, Table 7.3 herein. They will be partially sufficient on land for building and inheriting their children due to the limited nature of their plots. They will be in extreme need for subsistence requirements as a possible cash economy is foreseen. Appropriate mitigation measures will be required with appropriate strategies and partnerships.

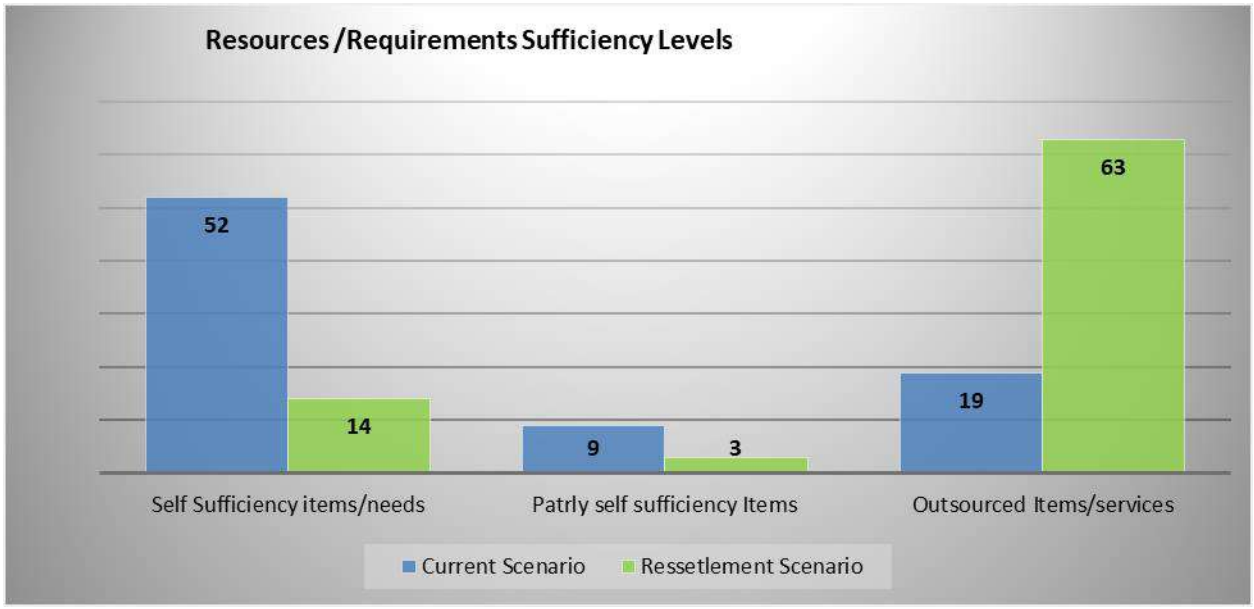


Figure 6.9: PAPs Resources and Requirements Access and Sufficiency Levels
Source: This study

Table 6.3. Resources /needs Requirements Status Levels Before and on Resettlement.

Category	Current Scenario	Resettlement Scenario
Self Sufficient	44	14
Partially Self Sufficient	15	3
Outsourced	24	63
Total	80	80

Source: This study

After the resettlement on their 1/8th, 1/3rd acre plots of land the discussion revealed that the PAPs will be insufficient in many things including land for housing and inheritance. Their self-sufficiency level reduces drastically to only 14 items devoid of food items. They are partially self-sufficient on 3 items i.e. their land for housing and heritage to their children, while they will outsource most items (63 items) which are mainly food items - fresh or manufactured.

There were few economic activities for family livelihoods that they undertake to sustain the family, which include - charcoal burning for sale, firewood for sale, sale of makuti and mats, herbal medicines and services, and witchdoctor services.

6.5.2: Gender Analysis and Daily Time Schedule /Calendar

A gender analysis and daily time calendar /schedules exercise on what the PAPs do and spend their time on was also done by gender. The exercise revealed that the men wake up at 4-5am to pray , but their major activities start at 6am where they start traveling to work, farm or attending to livestock. Their day ends early mainly at 9 pm when they go to sleep.

Women wake up mainly at 5am to pray and start preparing breakfast and children for school, Then they travel to work or take children to school or start other household chores. Their day ends late mostly at 10pm when they go to sleep. The time gap of 2 hour is that women are awake and more active for 18hrs, while men are awake for 16hrs (only a few men were up for 18 hrs.) and most of this time they are resting listening to radio, news etc..

Both women and men perform multiple roles in their lives, in the *productive domain* – which includes *activities related to the production of goods for consumption or trade and income-generating activities* – and in the reproductive domain . *The reproductive domain roles include – childbearing and caring for children, unpaid domestic tasks to sustain the home* (cooking, fetching water, fetching firewood, cleaning, washing clothes, etc.)

6.5.3: Productive /Economic, Reproductive and Recreative Activities /tasks

This gender analysis reveals that women have a total of 71 tasks they perform compared to men 39 activities / tasks. Of these 71 tasks done by women - 24 are productive, 38 reproductive and 9 recreative /entertainment. The men 39 activities /tasks include 20 productive, 10 reproductive and 9 recreative with a lot of time for rest.

Both gender have nine (9) creative activities /tasks which are relaxing and entertainment related . These include resting, listening to music, watching news, reading novels/bible, phone chats and visiting friends/neighbours. Their numbers are represented in Table 6.4 below.

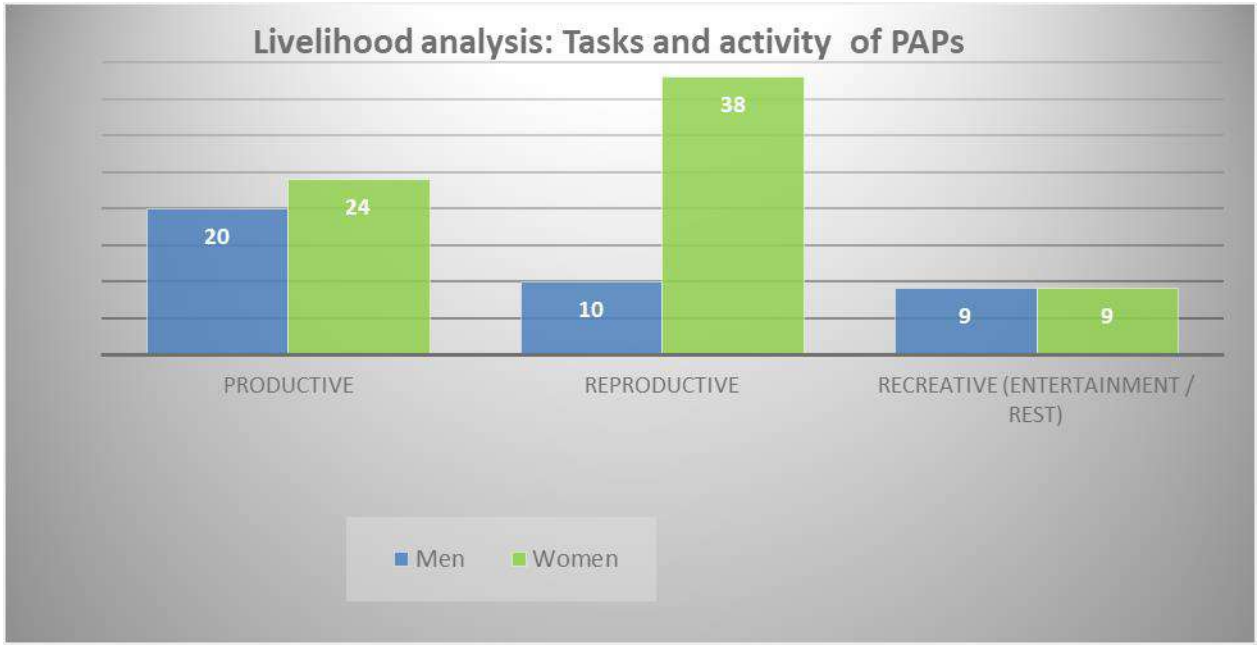


Figure 6.10: Types and levels of PAPs Tasks and Activities in Households
Source: This study

Table 6.4: Number of tasks on how PAPs use their time in the day - both men and women

Type of Task / Activity	**Men**	**Women**
Productive	20	24
Reproductive	10	38
Recreative (Entertainment / Rest)	9	9
Total	**39**	**61**

Source: This study

The following activities were predominant in the meeting with PAPs during the FGD

6.5.4: Household Sources of Income Among the PAPs

Households have a number of income sources i.e. formal employment, informal employment and farming. Majority are in informal employment (74%) and a good number are in full formal employment (21%). Farming as employment engaged only a dismal 5% of the respondents.

Table 6.5: Employment Type for income

Types of Employment of PAP		
Nature of employment	***Proportion %***	***Remarks***
Formal employment	21%	
Informal employment: • Motorbike rider • Building/construction • Self employed • Caretaker • House help • Casual labour • Others	74%	Most common
Farmers	5%	Least Common

Source: This study

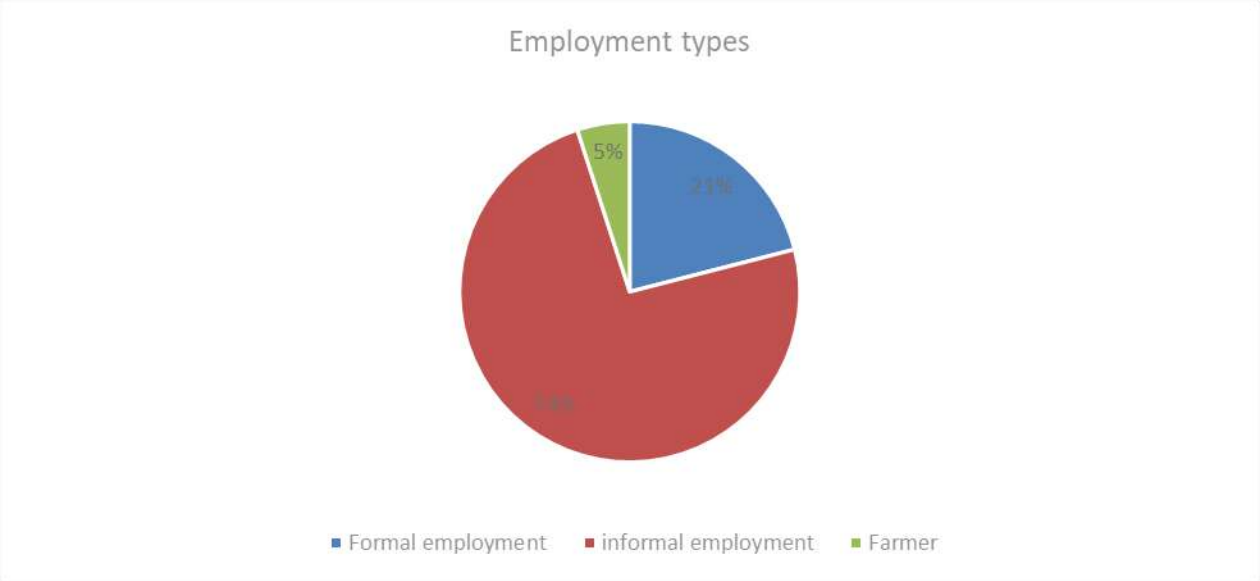


Figure 6.10: Proportions on Types of Employment for Income
Source: This study

Table 6.6: Sources of Income

Various Sources of income	**Number of respondents in sample**
Employment income	448
Remittance income	138
Trade and business income	444
Type of Business / trade in:	
- Sheep	16
- Cattle	33
- Poultry	67
- Goat	116
- Vegetable	265
- Charcoal	205
- Firewood	255
- Cashew nuts	88
- Mango	174
- Makuti	69
- Fishing	21
- Wwitchcraft	27
- *Mnazi*	17
- Herbal medicine	11

Source: This study

* Some PAPs reported multiple sources of household income, while a few homesteads reported receiving remittances from relatives and pension on monthly basis.

6.5.5: Types of Business

The PAPs had various businesses that contribute to their household incomes in addition to their employment and remittances. Among those reported were small businesses as tabulated herein. Food vending business was one of the most mentioned (26.3%) contributing to their income, and the next one was non-food small businesses.

Agro-based businesses (both crops and livestock), makuti/mats and basket making, firewood & charcoal trades are some that are *extractive of the environment flora* in the area. Relocation and resettlement of those in this trade will have effect on sourcing materials, and their marketing price as the area gets cleared for investment.

Table 6.7: Types of business

Type of Business	**Numbers**	**%**
Agro-based trade (crop/livestock)	47	10.3
Mats/baskets/brooms	43	9.6
Food & food vending	122	26.3
Motorbikes (*boda boda*)	41	9.1
Construction business	15	3.2
Hair dressing & beauty	19	4.2
Small trade (not food)	78	16.5
Selling fuel products	10	1.9
Others	59	16.4

Source: This study

Their overall high involvement in non-food & other businesses and less of the agro-based businesses is an indicator of a peri-urban landscape in the making.

6.5.6: Household Incomes

A few PAPs (138) as per the table on remittances reported receiving remittances from families, 53.6% of these receive up to Ksh 5,000 / month and 29% receive between Ksh 5,000-10,000./ month. There's a big segment earning between Ksh 5,000-10,000 per month from formal employment As with the other sources of income, majority (71.4%) of households, income from informal employment (trade & businesses) and was below Ksh. 15,000 per month as in Figure 6.11.

Most PAPs earn just below the current minimum wage of Ksh. 15,120 per month in Kenya in 2023, as projected in the cities of Nairobi, Mombasa and Kisumu. (*source*http://virtualhr.co.ke/ https://africapay.org/kenya/salary/minimum-wages/2182-cities-nairobi-mombasa-and-kisumu
From the study, 138 PAPs receive remittances every month. Out of these, 82.6% get up to Ksh 10,000.

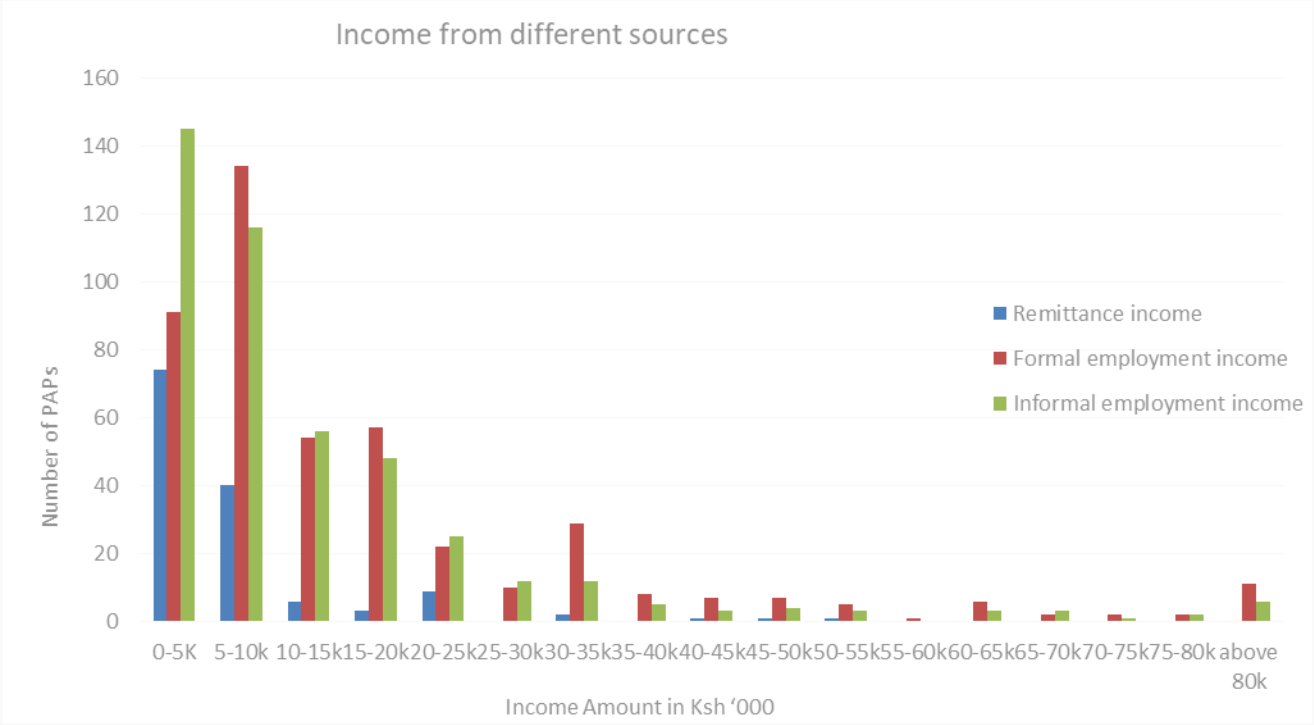


Figure 6.11: Income Levels from Different Sources
Source: This study

6.5.7: Household Income Expenditure

Food and household energy takes the larger proportion of the household income. On average, the amount spent on food is Ksh. 15,184 while most households spend about Ksh. 9,000 per month on the same. Household energy sources (charcoal and firewood) take the next large share of income and the most frequent amount spent by households is Ksh. 4,800 per month. With this level of household spending, the income must be coming from multiple sources since for most of the respondents, one source may not be adequate to meet their needs.

A few households use Liquefied Petroleum Gas (LPG) spending on average Ksh.1,451 per month, which is about 1/3rd of what they spend on firewood and charcoal, a common energy source in the rural household set-up.

Investment in education in the sample surveyed takes a low key in terms of expenditure, with the most frequent amount spent being less than Ksh. 100 per month. This may indicate the low regard for education among the PAPs. The income is from multiple sources as in the table above. Consolidating all households and expenditure on all items the mean expenditure per household is at Ksh. 5,541 and the most common (mode) expenditure level is Ksh. 2,800.

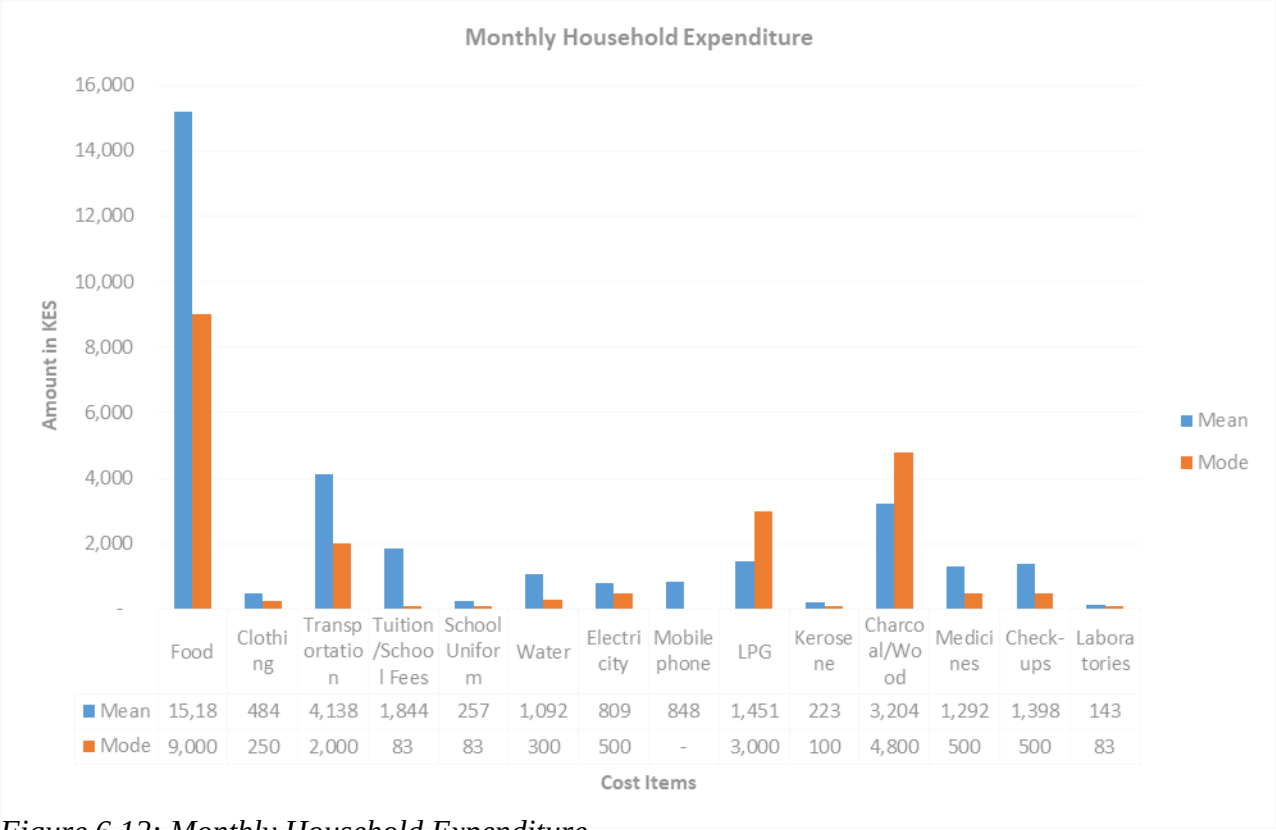


Figure 6.12: Monthly Household Expenditure
Source: This study

6.5.8: Poverty Indications among the PAPs

From the foregoing, it is evident from the baseline data that the PAPs are resource poor. They own on average 1-2 of the common assets except for trees and chicken. Most PAPs earn just below the current minimum wage of Ksh. 15,120 per Month in Kenya 2023 in the cities of Nairobi, Mombasa and Kisumu. Their monthly income at below Ksh. 15,000 (is about $3.4 per day) They consume most of this on basic items like food and household energy.

Most of the business the PAPs engage in is geared towards a peri-urban landscape by the nature of trade they engage in. Though they have vast lands at their disposal their productivity or engagement for productive farming is low and those who keep animals are of local breeds with low productivity under extensive grazing. Only 5% said that farming as an employment activity while informal employment and formal employment engaged 74% and 21% respectively..

Majority of the PAPs have low education levels, mainly below primary education. Education levels is one of the drivers of poverty and with such a high number under primary level in addition to a very low income expenditure on education for their children, poverty is high in the area.

Their houses are also of low quality, mainly made of local construction materials and most households don't have basic sanitation structures like toilets..

6.6: Findings and discussion on the PAPs Livelihoods

6.6.1: Vulnerability Profile among MSEZ PAPs

The PAPs in the resettlement area of SEZ-DK live in a rural set up with abundant natural resources at their disposal for farming, livestock herding, household energy, raw materials for making mats and roofing materials, flora and fauna for their witchcraft practices, herbs for their medicine, home for their witchcraft shrines and general social capital. The resettlement will remove them from their comfortable locale to a new landscape where they are more concentrated and population per km^2 will be quite high. This will make them feel vulnerable and mitigation measures have to be put in place. Among the measures will be related to their use of the resources at their disposal to harness multiple incomes to meet their need for food and energy among others.

Below are some of the vulnerabilities they will face:

a. - **Food and Iincome Ssecurity vulnerability** - loss of farming land for household food and grazing land in the settlement on 1/8 or 1/3 acre plot. Food insecurity and loss of incomes will be eminent. There are 656 cattle, 2,254 shoats, 6,072 poultry, 25 pigs and 15 donkeys to deal with as they relocate. There are county by-laws that do not allow free grazing of animals in urban areas. . They also depend on the biodiversity in the area, farmlands, livestock, palm fronds, firewood and charcoal to make a living. These will be limited or no access to the conservation areas as investment takes off.

b. - **Social vulnerability** - they will experience loss or disruption of social capital. The neighbourhood trust will be lost and will take time to develop one with their new neighbours. As heterogeneity increases the next door neighbourhood trust won't be there. The PAPs belong to self-help groups and CBOs, whose area of operation will be disrupted. At resettlement the disruption will affect their activities, cohesion/availability and some members might drop out all together.

c. - **Economic vulnerability** - Most PAPs feel that their economic base has been disrupted and are worried about how they will survive in the small parcels in the settlement areas. Food security will be disrupted as many depended on their farm land for household foods. Food in the household takes a big portion of household income. Traders feel they will lose clients, while the witches and herbalist are worried about where to relocate their paraphernalia and their shrines (27). They are also worried about the cost of relocation, acceptance by their new neighbours and loss of clients who may not be comfortable to seek their services in the resettlement areas.
Others businesses depend on materials extracted from the environment e.g. firewood, charcoal, palm fronds for mats and *makuti* traders. The witches, witchdoctors and herbalists depend on the vast biodiversity for their flora and fauna that they use in their trade. This vast area will no longer be available with the resettlement and investors taking position. The cost of their business will go up as their clientele might go down (especial the witches). The witches and witchdoctors also feel that they will incur additional costs as they relocate their shrines and build new ones. They have to make some rituals and sacrifices to the *spirits* to agree to be moved from the *'Mibuyu'*.

6.6.2: Livelihood Assets in the SEZ-DK Resettlement Program

The PAPs have a number of livelihood assets from where they draw their livelihoods. These assets include their land (on average each PAP had 0.8 ha.), livestock, other unfarmed areas and

human capital - their skills and jobs among others. Land and the biodiversity in the area disrupted and highly reduced or made inaccessible with relocation.

They have a big labour force population of the age bracket 20-65 years (68.9%) However, the PAPs education level is low, as majority (85.1%) are at primary level and below. The elderly & aged, disabled and orphan children are few in the survey sample.

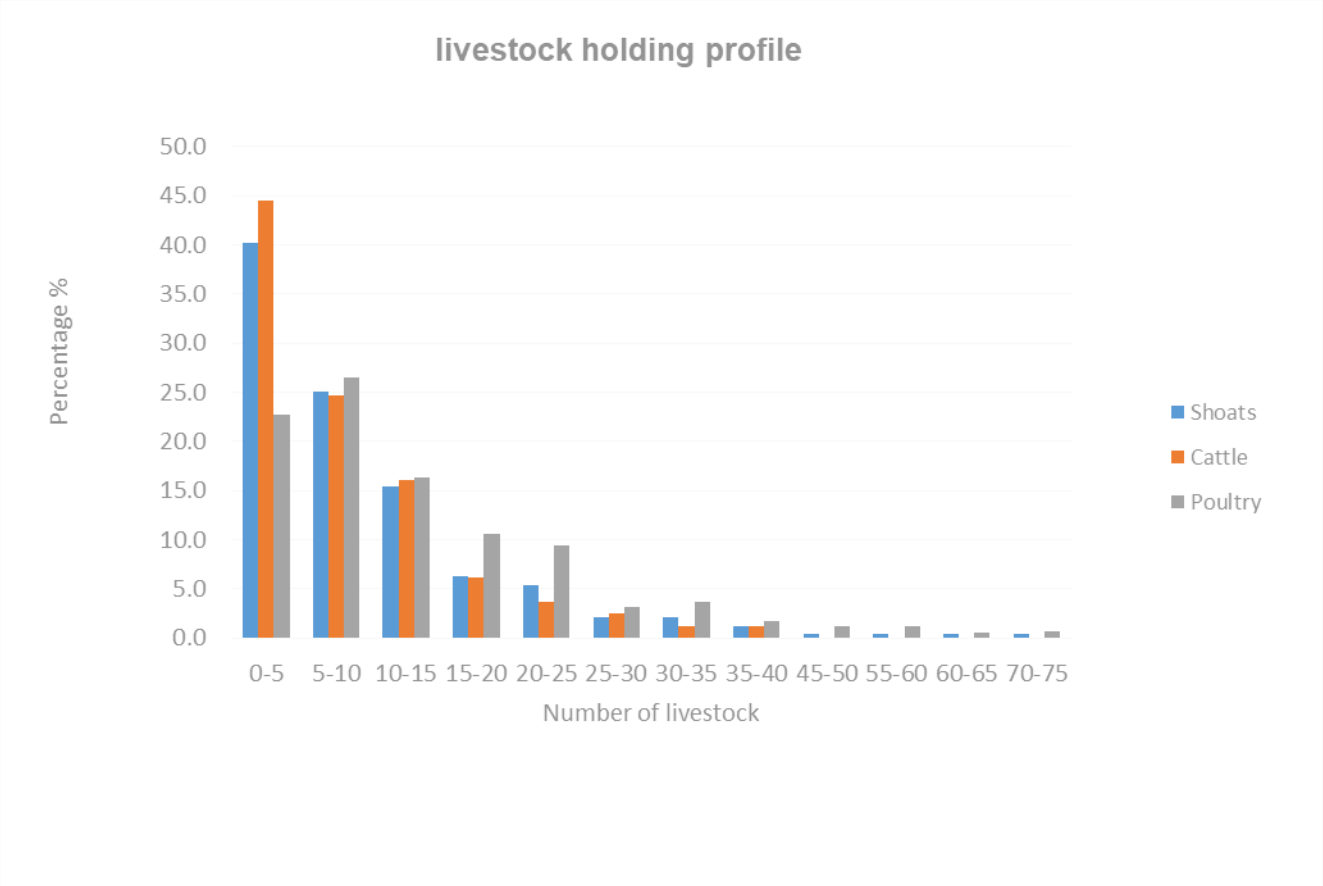


Figure 6.13: Livestock Holding Profile
Source: This study

Most household report an average of 50 trees and 10 poultry units. They may be forced to sell some animals, cut and sell their trees.

Currently they have the 1217 ha (3006 acres) of KPA land at their disposal (most common acreage being 0.8 ha. per household) and environmental resource with all its biodiversity. From these assets therein they extract firewood and charcoal, herbal medicines, palm fronds for making *makuti* / mats and baskets, witchdoctors' fauna, flora and shrines for their trade, witches /witchdoctors have the vast area offering the privacy for their business/trade, while livestock have access to vast areas to graze on.

As per data analysis of their assets profile, most of the PAPs can be considered *asset poor*. They own 1-2 items as per data on Table 7.2, except for trees (50 being most common

number/household) and poultry (10). A few PAPs have motor bikes (148) which they use in the transport sector to earn incomes. The only asset that is in plenty per household are the trees which are environmentally related and might be cut down and sold as the the investors take over in the SEZ -DK area.

CHAPTER SEVEN: CONSULTATIVE PUBLIC PARTICIPATION

This Chapter outlines the outcome of stakeholder engagements under auspices of the ESIA for infrastructure development for resettlement area in Mombasa Special Economic Zone Project.

7.1: Overview of stakeholder engagement

The MSEZ project has achieved sufficient consultations having conducted 85 meetings with different stakeholders. A total of 9,892 participants have been consulted since formulation of RAP of the project to date. Six (6) meetings were held in 2018 with an attendance of 872 participants who comprised of the PAPs committee, Leaders in various categories and PAPs from the six affected villages. Further, 12 meetings were held in 2022 during disclosure of the compensation policy. The 12 meetings were held with leaders in various categories, PAPs in the affected villages, group discussions with women and youths in the project area. This attracted an attendance of 2513 stakeholder who aired out different issues regarding the project. The ESIA study for infrastructure development for the resettlement area conducted a total of 67 meetings which had a total attendance of 6,567 participants. The 67 meetings consulted various stakeholders during leaders meetings, public participation meetings, technical meetings, PAPs committee meetings, Focus group discussions and key informant interviews among others meetings. In all the meetings held, the project received immense support. The process and outcome of the stakeholder consultations are reported in sections below.

7.2: Procedure and Legal Foundation for Stakeholder Consultation in Kenya

7.2.1: Provisions of the National Constitution

Section 35 of the National Constitution 2010 provides for access to information as follows: *35. (1) Every citizen has the right of access to (a) information held by the State; and (b) information held by another person and required for the exercise or protection of any right or fundamental freedom.* Further, Section 69 (1) (d) requires the State to encourage public participation in the management, protection and conservation of the environment, thereby giving legal foundation for stakeholder consultation in the environmental assessment process. Stakeholder consultation as conducted for this ESIA was partly in fulfillment to above stated legal obligations.

7.2.2: Requirements of EMCA 1999 (Cap 387)

Legal Notice 101 of June 2003 requires that all environmental assessment processes in Kenya incorporate public consultation. This is a requirement informed by the awareness that stakeholders are largely in the constituency likely to be impacted by proposed developments and it is imperative that they be informed of the project following which they can make informed comments and reactions to the proposed development. It is also important to ensure that all stakeholder concerns as well as aspirations are identified and incorporated in project development, implementation, and operation. Against such background, a number of consultations have been undertaken with cross sections of stakeholders to the MSEZ with objectives as follows:-

i. To inform Fundamental Right Holders and Legal Mandate Holders primary of the proposed development;
ii. To clarify stakeholder interests and concerns in the project area;
iii. To better define scope and magnitude of potential impacts of implementing the project based on stakeholders' feedback.

7.3: Approach to Stakeholder Analysis

7.3.1: The Strategic Approach

In addition to fulfilling statutory requirements for project disclosure, stakeholder engagement should also aim at securing informed consent and support of potentially affected community which requires that an effective communication/ consensus building strategy be identified and implemented. In the case of ESIA for resettlement, consensus building was achieved at multiple levels as schematically illustrated in tabular form in table 7.1 below.

Table 7.1: Strategy in the Public Engagement Process in the ESIA for the resettlement area.

Action level	**Stage One**	**Stage Two**	**Stage Three**	**Stage Four**	**Stage Five**
Aim	Prepare dissemination material	Build consensus on approach	Market Project to Leaders	Engage with community groups	Investigate emergent concerns
Action	Prepare Disclosure Material	Identify and engage core Leaders	Mount Leaders Meeting	Mount Public Hearing Meetings	Key Informant Interviews and FGDs
Outcome	Disclosure package	Date for Leaders meeting	Consensus on Public Hearing Meetings	Core Public Concerns	Better analysis of issues and core concerns
Next action	Proceed to stage Two	Proceed to Stage Three	Proceed to Stage Four	Proceed to Stage Five	Documentation of core concerns on the Project

Source: This Study

The core strategy was to principally build consensus among political and administrative leadership who then facilitated entry and engagement with communities. In the event that serious issues would have arisen; the fallback position would have been to get the Leadership to intervene.

7.3.2: Criteria for Stakeholder Identification/Stratification

Diverse categories of stakeholders are encountered within the project area and more specific the resettlement areas. For ease of treatment and study, stakeholders were lumped into two broad categories as follows:-

- Fundamental Rights Holders
- Legal Mandate Holders

Core features and groups within each broad category are highlighted in sections below.

7.3.2.1: Fundamental Rights Holders (FRH)

A total of 11 groups which hold fundamental rights in the resettlement area were identified as summarized in Table 7.2 below. The fundamental rights extend far beyond national borders and are shared by generations yet to be born who have an inherent entitlement to a healthy, functional environment.

Table 7.2: Analysis of Fundamental Rights Holders in the Resettlement Areas

SN	Stakeholder category	Stake in the Mombasa Special Economic Zone Project
1.	Kenyan citizens present and in future	Constitutional /inherent right to a clean health environment
2.	Global community	Inherent right to a preserved functional global ecosystem
3.	Stakeholders to developments	This category includes individual, corporate and other categories of owners and occupants to land and land-based resources in the Project Area .
4.	Existing and potential investors within the Dongo Kundu	This category includes all persons who are potential investors and those who have invested in property, trade, utilities and other ventures within Dongo Kundu.
5.	Residents in the project area	Inherent right to sustainable economic development. This is also the category who will have their lives changed either on account of resettlement to the new parcels of land from the current residential areas, other common property (schools, medicare centres, places of worship, cemeteries, etc), among others.
6.	Ancestral/ sentimental heritage holders	They hold special sentimental value to the property /business on account of many years of residence
7.	Traditional religious heritage holders	This category includes subscribers of the Kaya culture based on traditional religious sites/ shrines that could be displaced
8.	Vulnerable Groups	This category comprises individuals or groups who are disadvantaged in life either on account of advanced age, disability, orphanage, or other challenges.
9.	Nature-based livelihood systems	People operating livelihood systems such as traditional artisanal fishing, extraction, etc. are likely to suffer displacement or blockage from resources that sustain livelihoods systems.
10.	Operators of capital resources	This category includes utility providers owning water and sanitation, waste management, power supply and oil pipelines which may be affected by the project

Source: This Study

7.3.2.2: Legal Mandate Holders (LMH) within target jurisdiction

Stakeholders identified under this category include those in National Government, County Government and State Corporations whose mandates confer jurisdiction over the resettlement areas.From analysis as shown in table 7.3, 13 Statutes are deemed to have over-bearing

influence on the resettlement areas while simultaneously conferring specific mandates to 13 respective institutions.

Table 7.3: Analysis of Legal Planning Mandates covering the MSEZ resettlement area

SN	Legal Tool	Custodian	Legal mandate	Relevance to Resettlement Area in MSEZ
1.	KPA Act	Kenya Ports Authority	Has mandate in developing Marine Transport in Kenya	KPA is proponent in the implementation of the RAP in resettlement areas.
2.	Schedule 4 to National Constitution 2010	Allocates non devolved functions for National Government	Coordination of National Government	Administrative oversight, security functions in the development and operation of MSEZ
3.	Kenya Roads Act 2007	KeNHA	Development and maintenance of classified roads in Kenya	KeNHA controls the Port access road and Southern By-Pass which are part of the road infrastructural component in the resettlement area.
		KURA	Jurisdiction over urban non-classified roads	KURA would ultimately take over the repair and maintenance of road work within the resettlement areas at Dongo Kundu Special Economic Zone.
4.	The Physical Planning Act Cap 286	State Department of Physical Planning	Coordinate all spatial planning at National and county level	Proposed development of resettlement areas has to harmonize with both National and County Spatial Plans
5.	County Government Act of 2012	County Government of Mombasa	Have planning jurisdiction for Mombasa County	The County Government will manage sanitation, waste management, street lighting, ECDEs, market, health centres, cemeteries among other facilities in the resettlement area.
6.	WMCA 2013	KWS	Manage and preserve the national wildlife heritage	Traverse area has special case birds.
7.	Museums and Heritage Act of 2006	NMK	Protection of the cultural and archaeological heritage	Entire coastal strip has a sensitive archaeology. There also traditional sacred sites, three (3) kayas in the resettlement area.
8.	Water Act 2002	WRA	Management of the National water resource base	Conservation of riparian area.
9.	Forests Act 2005	KFS	National custodian for all vegetation including	Conservation of catchment areas and conservation of trees fall under Jurisdiction of KFS.

SN	Legal Tool	Custodian	Legal mandate	Relevance to Resettlement Area in MSEZ
10.	National Land Commission Act 2012	National Land Commission	NLC is designated Land Acquiring Authority in Kenya	NLC will compensate all development owners (Structures and trees) in the MSEZ project area.
11.	EMCA 1999/2015	NEMA	Has national mandate for environmental regulation.	Conformity to EIA requirements as prescribed in EMCA and corresponding regulations.
12.	Electric Power Act No 11 of 1997	Kenya Power Transmission Company Ltd (KETRACO)	To build and operate power transmission lines	KETRACO will Avail power to plots for construction and investment purposes.
13.	Fisheries Act	State Dept of Fisheries	Management of the fisheries resource base	Has jurisdiction over fisheries. There is one BMU operating on four affiliate landing sites

Source: This Study

7.3.3: Modalities Stages in Stakeholder Consultations

The stakeholders' consultations were done in three stages of the project as follows;

- **ESIA for infrastructure development for resettlement area consultations**. Consultations at this stage acted as an update of the two previous stages. This stage consultations seeks to inform, involve, collaborate with, and empower stakeholders to take up their roles and make informed decision on the Dongo Kundu SEZ Project. Additionally, consultations in this stake aimed at building consensus with stakeholders on the proposed resettlement area.

7.3.4: Approach to Stakeholder engagement

The stakeholder consultations in this stage were categorized into nine (9) categories under auspices of the ESIA for resettlement area in Mombasa Special Economic Zone Project. The categories include the following:

1) Inception/Introductory meetings
2) Leaders meetings
3) Public Participation meetings
4) Technical coordination meetings
5) PAPs committee coordination meetings
6) Focus Group Discussions
7) Key Informant Interviews
8) Money Management Trainings
9) Other meetings

7.3.4.1: Leaders Meetings

The leaders meetings comprised of National and County government, lead agencies, civic groups, multi agencies members, political leaders, and local administration, CBOs and MSEZ PAPs committee members. The leaders were informed about the resettlement process where they shared their views and opinion on the same. Upon conviction, the leaders would then help in dissemination of the information about the project to other stakeholders in their specific levels. A total of four (4) leaders meeting were held three at ACK Guest house and one at DCC's Compound in Dongo Kundu. The meetings were attended by 250 leaders with a representation of 196 males and 54 females. This represented a 78 % and 22 % of both genders respectively. Proceedings of these meetings have been provided in appendix 7.1.

7.3.4.2: Public participation Meetings

These meeting were held at the grass root level with the Project Affected Persons (PAPs). In the meetings were the PAPs, multi-agency partners, MSEZ PAPs committee members, national security members and political leaders from National and County governments. These meetings were of great importance as PAPs were able to express their fears and demands from the project. A total of three (3) barazas were held with an attendance of 2495 members with 1495 males and 1000 females. The participation by gender represented 60% males and 40% females. Proceedings of these meetings have been provided in appendix 7.2.

7.3.4.3: Technical Coordination Meetings

Technical coordination meetings included participation from an Inter-Agency Committee comprising of SEZA, NLC, MOL, KPA, KETRACO, KENHA, CWWDA, KURA, KPLC, NEMA, Ministry of Interior and coordination of national government. The meetings were held for purposes of reporting progress, and coordination of tasks of the agencies towards smooth running of the resettlement process. A total of eight (8) technical meetings have been held with participation of 171 members (130 males and 41 females). Proceedings of these meetings have been provided in appendix 7.4.

7.3.4.4: PAPs committee coordination meetings

The PAPs committee serves as an intermediary between PAPs and the Project proponent (KPA). Meetings with the committee were meant to disclose plans of the multi-agency partners and any other group. The PAPs committee upon conviction of the intended plans, spearheads introduction of the project to the PAPs in the grass root level. The Committee was elected KPA and as such is involved in all activities planned in the project area. A total of seven (7) PAP Committee meetings have been held majority at the DCC's Compound in Dongo Kundu. Proceedings of these meetings have been provided in appendix 7.4.

7.3.4.5: Focus Group Discussions (FGDs)

FGDs were held with special interest groups within the project areas. The meetings involved, vulnerable persons, institutions within the project area, common interest groups, Mwangala Beach Management Unit among others. The FGDs aimed at consensus building of the resettlement sites and listening to the group's concerns about the project. Further the FGDs purposed at disclosing livelihood restoration plans of the project. The FGDs were categorized into three groups; (1) General discussions with special interest groups (2) In-depth discussion with CBOs and PAPs on livelihood mapping (3) in-depth discussion with PAPs on climate change. A total of 17 FGDs were held with an attendance of 544 members, 314 males and 230 females. The FGD meetings were held at the DCC's Compound with an exception of two

meetings with Mwangala Primary School and Mbuta dispensary which were held at their respective offices. Proceedings of these meetings have been provided in appendix 7.5.

7.3.4.6: Key Informant Interviews

The Key Informant interviews were held with legal mandate holders and Mombasa County Government departments relevant to the project. Consultations were held at their respective offices with either individual officers or several officers in a group. A semi-structured questionnaire was used for these specific categories where the officers were required to sign the proceedings of the discussions noted done in the forms. The interviews aimed at identifying core concerns of the specific group in the resettlement process. A total of 16 key informant interviews were held from during the study period. . Evidence of the proceedings have been provided in appendix 7.7.

7.3.4.7: Money Management Trainings

Money Management training was held at the DCC's compound in Dongo and targeted all PAPs with developments namely structures and trees who would be awarded by NLC for the same. The training aimed at educating PAPs on management of the compensation money and stressed that the money was meant for development of dwelling places in the resettlement sites and not any other use. The 11 day training achieved an attendance of 1270 PAPs with 710 males and 480 females.

7.3.4.8: Other Meetings

These meeting include meetings with Parliamentary committee, Cabinet Secretary for Trade, meetings with PAPs within investor's area of operation, Launch of Taifa gas by His Excellence President William Ruto and meeting with Kaya elders. These meetings had an attendance of 1642 members with 1012 males and 630 females. Proceedings of these meetings have been provided in appendix 7.6.

7.4: General progress/ The Statistics

The deliberations for the stakeholders mentioned in section 7.3.1 were done through meetings on various dates. A total of 67 meetings were held in various categories. The stakeholder consultations achieved a total attendance of 6567 persons with 4062 males and 2505 females as shown in Table 7.4 below. The male gender outnumbered the females in all the meetings resulting to 61.9% representation from males and 38.1% from females. Table 7.6 provides a summary of the meetings.

Table 7.4: Summary of Meetings held

S/No	Type of Meeting	Date of meeting	Venue	Attendance		
				M	F	Total
1.	Introductory meetings	13/12/2022	RC's Boardroom	24	8	32
2.		17/08/2023	DCC's Compound-Dongo Kundu	9	3	12
3.		21/08/2023	DCC's Compound-Dongo Kundu	55	15	70
4.	Leaders Meetings	13/12/2022	ACK Guest House-Likoni	41	14	55
5.		25/02/2023	ACK Guest House-Likoni	66	22	88
6.		02/03/2023	DCC's Compound-Dongo Kundu	10	0	10
7.		08/06/2023	ACK Guest House-Likoni	79	18	97
8.	Public Participation	15/12/2022	DCC's Compound-Dongo Kundu	694	409	1103
9.		27/02/2023	DCC's Compound-Dongo Kundu	466	347	813

S/No	Type of Meeting	Date of meeting	Venue	Attendance		
				M	F	Total
10.	Meetings	09/06/2023	DCC's Compound-Dongo Kundu	335	244	579
11.	Technical Coordination Meetings	14/12/2022	County Commissioner's Hall	12	5	17
12.		16/01/2023	KPA offices	34	6	40
13.		14/02/2023	ACK Guest House-Likoni	13	5	18
14.		15/03/2023	SEZA offices-Nairobi	17	5	22
15.		04/04/2023	ACK Guest House-Likoni	10	2	12
16.		25/05/2023	DCC's Compound-Dongo Kundu	25	5	30
17.		05/07/2023	DCC's Compound-Dongo Kundu	4	6	10
18.		29/09/2023	KPA offices	15	7	22
19.	PAPs Committee Meetings	19/01/2023	DCC's Office, Vyemani	14	5	19
20.		24/05/2023	DCC's Compound-Dongo Kundu	16	9	25
21.		31/05/2023	DCC's Compound-Dongo Kundu	9	6	15
22.		14/07/2023	DCC's Compound-Dongo Kundu	13	5	18
23.		18/07/2023	DCC's Compound-Dongo Kundu	9	3	12
24.		07/08/2023	DCC's Compound-Dongo Kundu	14	9	23
25.		11/10/2023	DCC's Compound-Dongo Kundu	14	4	18
26.	Focus Group Discussions	09/08/2023	Mwangala Primary School	57	51	108
27.		10/08/2023	DCC's Compound-Dongo Kundu	11	0	11
28.		10/08/2023	DCC's Compound-Dongo Kundu	16	6	22
29.		10/08/2023	DCC's Compound-Dongo Kundu	13	0	13
30.		10/08/2023	DCC's Compound-Dongo Kundu	5	2	7
31.		11/08/2023	DCC's Compound-Dongo Kundu	17	2	19
32.		11/08/2023	DCC's Compound-Dongo Kundu	5	3	8
33.		11/08/2023	DCC's Compound-Dongo Kundu	19	16	35
34.		12/08/2023	DCC's Compound-Dongo Kundu	20	9	29
35.		14/08/2023	DCC's Compound-Dongo Kundu	0	57	57
36.		14/08/2023	DCC's Compound-Dongo Kundu	4	4	8
37.		14/08/2023	DCC's Compound-Dongo Kundu	8	0	8
38.		15/08/2023	DCC's Compound-Dongo Kundu	16	14	30
39.		15/08/2023	Mbuta Health Centre	6	3	9
40.		23/08/2023	DCC's Compound-Dongo Kundu	23	17	40
41.		19/09/2023	DCC's Compound-Dongo Kundu	44	36	80
42.		26/11/2023-27/11/2023	DCC's Compound-Dongo Kundu	50	10	60
43.	Key Informant Interviews	17/07/2023	Public Health office	1	0	1
44.		17/07/2023	Department of Youth, Sports, Gender, and Social services office	1	0	1
45.		25/07/2023	County Commissioner Office	1	0	1
46.		25/07/2023	Department of Transport office	4	0	4
47.		26/07/2023	Department of Lands, Housing and Urban Planning office	2	0	2
48.		27/07/2023	NEMA office-Mombasa	3	0	3
49.		28/07/2023	WRA office-Mombasa	2	0	2
50.		01/08/2023	Department of Education and Digital Transformation office	3	0	3

S/No	Type of Meeting	Date of meeting	Venue	Attendance		
				M	F	Total
51.		02/08/2023	Department of tourism, trade and Culture office	2	0	2
52.		02/08/2023	MOWASCO office-Mombasa	2	0	2
53.		02/08/2023	NCA office-Mombasa	1	0	1
54.		03/08/2023	Department of Agriculture, livestock, and Fisheries office	1	2	3
55.		03/08/2023	KPLC office-Mombasa	3	0	3
56.		04/08/2023	KFS office-Mombasa	1	0	1
57.		25/09/2023	Department of environment and waste management office	0	1	1
58.		28/09/2023	Department of Environment and Natural Resources	1	0	1
59.	Other Meetings	22/02/2023	DCC's Compound-Dongo Kundu	300	200	500
60.		24/02/2023	Taifa Gas Grounds-Dongo Kundu	600	400	1000
61.		26/07/2023	Taifa Gas Grounds-Dongo Kundu	22	5	27
62.		27/07/2023	DCC's Compound-Dongo Kundu	7	1	8
63.		04/08/2023	DCC's Compound-Dongo Kundu	21	4	25
64.		14/08/2023	DCC's Compound-Dongo Kundu	23	8	31
65.		14/08/2023	DCC's Compound-Dongo Kundu	11	4	15
66.		18/08/2023	DCC's Compound-Dongo Kundu	28	8	36
67.	Money Management Training	06/06/2023-20/06/2023	DCC's Compound-Dongo Kundu	710	480	1190
Total participants				4062	2505	6567

Source: This study

7.5: Summary of outcomes from the stakeholder Engagements

7.5.1: Overview

This section analyses in summary form outcome from the entire stakeholder engagement process. Numerous inquiries, proposals and concerns were raised. However, general conclusions can be made as follows:-

i) **Mombasa Special Economic Zone enjoy overwhelming support**: Based on the awareness level raised to the PAPs during the formulation of Resettlement Policy Framework, there was consensus on the objective and way forward is as far as the RAP implementation is concerned. This process did not encounter any die-hard opposition to the resettlement.

ii) **Benefits of MSEZ**: The project will open up the area and improve the local economy and country at large. It is expected that there will be numerous employment opportunities and that priority will be given to the PAPs. However, the skills and competencies will be a necessity in a competitive job market.

iii) **Inadequate compensation**: PAPs felt that the award amount being offered for compensation was inadequate. This may lead to PAPs failure to afford decent housing, thereby leading to proliferation of slum in the resettlement areas.

iv) **Ability to fit on small land holdings**: Some PAPs have been used to commanding and operating on large pieces of land and will find it difficult to fit operations on the proposed eight -acre plots. Some may opt to sell and go seek alternative and suitable land elsewhere. Others who have never used toilets and instead rely on the bushes may find the new way of life quite incompatible to their lifestyles.

v) **The Plight of Herbalist and Traditional Healers:** On their part, the herbalist and traditional healers expressed major difficulty in relocating their shrines (Mbuyu) and fitting operations on an eight acre plot and feared that, they could lose their public-shy customers.

Outcomes specific to each broad category of stakeholders are highlighted in section below.

7.5.2: Outcomes from Introductory Meetings

Outcomes from introductory meetings are as shown in table7.5 below.

Table 7.5: Outcomes from Inception meetings

S/no	*Date*	*Venue of Meeting*	*Participants*	*Attendance*			*Outcomes from of the Meeting*
				Male	*Female*	*Total*	
1	13/12/2022	Regional Commissioner's Boardroom	Regional Commissioner, Inter-agency members	24	8	32	• An Inter-Agency Committee comprising of SEZA, NLC, MOL, KPA, KETRACO, KENHA, Administrative unit, Consultant was formed to prepare a Plan of Action towards achieving a smooth and seamless resettlement process for the Dongo Kundu.
2	17/08/2023	DCC's Compound Dongo Kundu	Nippon Koei design team, PAPs Committee Members	9	3	12	• The meeting was informed that:- ✓ Design exercise for basic infrastructure will take a period of 20 – 30 days in all the six affected villages. ✓ There will be four teams and each team will require three PAPs committee members and one village elder
3	21/08/2023	DCC's Compound-Dongo Kundu	Area Chief, Repcon officials and the PAPs.	55	15	70	▪ There will be basic training and preliminary training offered to PAPs by KPA and such PAPs were encouraged to register with the skills mapping team.
Total Participants				88	26	114	

Source: Public Consultation Records

7.5.3: Outcomes from Leader Meetings

Leaders' Meeting comprising representatives from Special Economic Zone Authority (SEZA), National Lands Commission (NLC), Ministry of Lands, KETRACO, Kenya Ports Authority (KPA), Resettlement consultants (Repcon Associates), the local administration and members of the SEZ PAP's committee. The agenda was to Report on progress towards the implementation of the Resettlement Policy Framework for the SEZ. Each of the team members gave their role for the SEZ during resettlement. Other GoK Agencies including the County Government, were expected to come join the sessions in subsequent meetings. Local political leadership of their appointed representatives attended some of the meetings and offered input during the deliberations. These forums coupled with the inclusion of the MSEZ PAPs committee served as community sounding boards from which preliminary public concerns on the proposed resettlement activities bounced off thus helping to shape and inform preparations for the Public Hearing Meetings. Core outcomes arising the meetings have been discussed in table 7.6 below

Table 7.6: Outcomes from leaders meetings

S/no	***Date***	***Venue***	***Participants***	***Attendance***			***Outcomes from the Meeting***
				Male	***Female***	***Total***	
1	13/12/2022	ACK Guest House	Inter-Agency Committee Members, PAPS committee members	41	14	55	• A liaison office will be established at Dongo Kundu for ease of communication with the PAPs. • KPA and NLC PAPs registers to be disclosed to the PAPs for inspection and registration of grievances. • The leader felt that it's not right for people holding different land acreage getting similar compensation. • The Dongo Kundu community is ready for the project. • Priority on employment opportunities be given to PAPs and surrounding communities.
2	25/02/2023	ACK Guest House	Inter-Agency Committee Members, PAPs Committee, Lead agencies, Civil Societies, Mombasa County Government Official, Interior security members, Political leaders.	66	22	88	• NLC to compensate for improvements on land after issuance of titled plots to PAPs by Ministry of land. • The leaders called for transparency and fairness of the compensation process. • The MSEZ project to create room for development of fishing landing sites. • Money management training will be offered to help PAPs manage their compensation monies appropriately. • The project has put in place provisions for additional assistance to vulnerable PAPs. • All agencies to observe transparency and accountability in the implementation phase of the project. • All kayas will be zoned out and access to the kayas will also be provided. • The project to prioritize locals in skilled

S/no	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the Meeting*
				Male	*Female*	*Total*	
							and unskilled labour. • Public participation meeting was scheduled on 27th January, 2023
3	02/03/2023	DCC's Compound-Dongo Kundu	Resettlement consultant and religious leaders	10	0	10	• The religious leaders requested for larger size of plots noting that the 1/8 acre of land was not enough to accommodate their planned developments.
4	08/06/2023	ACK Guest House	Inter-Agency Committee Members, PAPs Committee, Lead agencies, Civil Societies, Mombasa County Government Official, Interior security members, Political leaders	79	18	97	• Advertisements for expressions of interest in local and international media have attracted 80 potential investors. • 1360 PAPs have complete documents and are ready for compensation. The remaining PAPs who had incomplete documents will have their awards in phase two of awarding. • 98% of the PAPs have viewed the 2019 asset register and registered 1007 grievances. • A Money Management Training Program started on Tuesday 6th June, 2023 where PAPs will be trained on better management of compensation money. • The leaders called for preservation of all water sources within the project area. • Vulnerable PAPs will be given special consideration in the resettlement process.
			Total Participants	196	54	250	

Source: Public Consultation Record

7.5.4: Outcomes from Public Participation Meetings

As part of the business transacted during Leaders Meetings, schedules for holding Public Consultative Meetings were agreed upon and immediately rolled out. Three (3) Public Hearing Meetings were held at the DCC's compound in Dongo Kundu for purposes of engaging with members of the local community who were largely the PAPs. A core agenda in the meetings was to build consensus on the implementation of the RAP. Matters addressed during the Public Hearing include: -

- Allocation of land by Ministry of Lands,
- Presentation of the Land Use Advisory Plan,
- Compensation of developments by NLC,
- Opening of liaison office,
- Grievances redress mechanism handling,

- Capacity building for PAPs (i) money management; and ii) registration of individuals interested skills training in order to be competitive in the job market within MSEZ during construction and operational phases of projects,
- Identification of vulnerable persons,
- Balloting for land for allotment

The total attendance during the public consultative meetings was 2495 comprising 1495 (60%) males and 1000 (40%) females. Table 7.7 below shows outcomes from for the public consultative meetings.

Table 7.7: Outcomes from Public Participation Meetings

S/no	***Date***	***Venue***	***Participants***	***Attendance***			***Outcomes from the meeting***
				Male	***Female***	***Total***	
1	15/12/2022	DCC'S Compound-Dongo Kundu	Inter-agency community members, PAPs committee, political leaders, all PAPs.	694	409	1103	• NLC verification process to be undertaken village wise to allow for registration of grievances arising the list. • Kwale County Government expressed its full support to the MSEZ project. • The project to provide training opportunities to the locals to enable them tap into the employment opportunities. • Copies of the asset register will be available at the chiefs' office, the DCC's office and at the liaison office. • A grievance redress committee be formed to deal with all issues arising from PAPs during project implementation.
2	27/02/2023	DCC'S Compound-Dongo Kundu	Inter-agency community members, PAPs committee, political leaders, all PAPs.	466	347	813	• Amount compensated to be fair and adequate for PAPs. • Compensation to reach actual and rightful PAPs and not unknown persons. • PAPs were cautioned against selling the 1/8 acre piece of land after issuance of the titled plots by Ministry of Lands. • The NLC verification process to place in the six villages from 30th January, 2023 to 16th January, 2023. • Disclosure of 2019 Asset register to commence on 30th January 2023 at the resettlement office in Dongu Kundu.
3	09/06/2023	DCC'S Compound-Dongo Kundu	Inter-agency community members, PAPs committee, political leaders, all PAPs.	335	244	579	• Communication on balloting dates will be done in good time. • 1200 youths to be trained under the livelihood rehabilitation process. • NLC will communicate second phase of giving out awards to PAPs.

S/no	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the meeting*
				Male	*Female*	*Total*	
			Total Participants	1495	1000	2495	

Source: Public Consultation Records

7.5.5: Outcomes from Technical Coordination Meetings

The Technical Coordination Committee, whose convener was SEZA, met in various locations both in Mombasa and Nairobi to strategize on the implementation of the RAP. Attendance registered was 149 comprising 115 (77%) males and 34 (23%) females. Table 7.8 provides the outcomes in relation to the activities of the Technical Coordination meetings.

Table 7.8: Outcomes from Technical Coordination Meetings

S/no	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the meeting*
				M	*F*	*Total*	
1	14/12/2022	County Commissioner Hall – 8th Floor Uhuru na Kazi Building	Inter-Agency Committee members	12	5	17	• Attempt should be made to link the names in KPA and NLC schedules before disclosing the same to the PAPs. • The process of land preparation to proceed while grading to be considered at individual level after land allocation. • Land to be allocated through balloting. PAPs to be consulted on modalities of plot allocation. • All agencies submitted work plan and time schedule for harmonization of implementation. • A Public meeting to be held at 10.00 am on 15/12/2022 at Dongo Kundu ground.
2	16/01/2023	KPA Offices	Inter-Agency Committee members	34	6	40	• Work plans and timelines in delivering services towards operationalizing the Special Economic Zones was reviewed and adjusted. • Advertisement for Expressions of Interest in local and international media to attract investments be done by 31/01/2023. • Issuance of Title Deeds and payment of compensation to start beginning of April 2023.
3	14/02/2023	ACK Guest House	Inter-Agency Committee members	13	5	18	• Expression of Interest' Adverts has been placed on local newspapers and various other media. • Amalgamation of 4 land titles is done. • Disclosure of KPA and NLC PAP lists is ongoing. • Coordination of agencies dealing with specific technical matters to be considered.
4	15/03/2023	SEZA Boardroom	Inter-Agency Committee members	17	5	22	• Compensation processes have to await land allocation to PAPs to ensure vacation is possible when the notice is issued.

S/no	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the meeting*
				M	*F*	*Total*	
							• Surveyors from SDLPP have beaconed & demarcated the plots based on original provisions & are ready to prepare title deeds with the beneficiary's names. • List of awards for payments for developments is ready.
5	04/04/2023	ACK Guest House	Inter-Agency Committee members	10	2	12	• Planning and survey of the resettlement area is complete. The advisory plan is at approval stage within the ministry. • Advisory plan be subjected to comprehensive public participation for acceptance and in compliance to legal requirements. • Issuance of awards is scheduled from 11th April.
6	25/05/2023	DCC'S Compound-Dongo Kundu	Inter-Agency Committee members	25	5	30	• Guided balloting (special balloting) method to be used for plot allocation to protect PAPs with special needs and those currently living in the resettlement sites. • The received requests for additional land plots should be scrutinized to generate genuine number of plots needed. • KPA to form a committee to develop an Urban Plan for the PAPs
7	05/07/2023	DCC's Compound-Dongo Kundu	Inter-Agency Committee members	4	6	10	• SEZA is in charge of Stock taking of all SEZ projects in the country. • The GoK need to covers programs like urban planning and assistance to PAPs to construct standard structures that was recommended by their PS and development of systems like waste management system among others.
8	29/09/2023	KPA offices	Inter-Agency Committee members	15	7	22	• NLC's 1st step will be compensation of the 1,366 PAPs who were already awarded and approved for payment. • There is need for coordination between KPA, SEZA and the Local Administration to develop a framework on managing both the prospective and the existing investors. • KPA together with other agencies are undertaking an update of the Mater Plan in Dongo Kundu. • There is need for KPA to issue the letter of recognition to the SGRC so that they can continue handling the grievances on the genuine request for additional land and the new grievances out of the balloting exercise.
			Total Participants	130	41	171	

Source: Public Consultation Records

7.5.6: Outcomes from PAPs Committee coordination Meeting

During the discussions with PAPs committee members, outcomes from the meetings are captured as shown in table 7.9 below.

Table 7.9: Outcomes from PAPs Committee Meetings

S.No	***Date***	***Venue***	***Participants***	***Attendance***			***Outcomes from the Meetings***
				M	***F***	***Total***	
1	19/01/2023	DCC's Office, Vyemani	Likoni Deputy County Commissioner, KPA Consultants, NLC, Interior security members, PAPs Committee Members	14	5	19	• Developments done after the National Lands Commission cut-off dates will not be compensated. • The PAPs committee will be trained on resolution of grievances. • NLC verification exercise will commence after a public participation meeting with all PAPs. • PAPs to present copies of their National Identification Cards, KRA pins and bank accounts to aid in verification exercise.
2	24/05/2023	DCC'S Compound-Dongo Kundu	Likoni Deputy County Commissioner, KPA Consultants, PAPs Committee Members	16	9	25	• Most of the PAPs have accepted the NLC award which shows high satisfaction level. • The Sub County Grievance Redress Committee through the DCC committed to resolve pending grievances emanating from the asset register.
3	31/05/2023	DCC'S Compound-Dongo Kundu	Likoni Deputy County Commissioner, KPA Consultants, PAPs Committee Members	9	6	15	• The committee proposed two methodologies in plot allocation; (1) Zoning out the resettlement sites village-wise so as to maintain social networks among families. (2) Retain PAPs already living within the resettlement site at their individual plots to minimize disturbance.
4	14/07/2023	DCC'S Compound-Dongo Kundu	KPA Consultants, PAPs Committee members	13	5	18	• The committee added a total of 38 vulnerable persons whom they requested the consultant to include in the final list upon meeting the required criteria.
5	18/07/2023	DCC'S Compound-Dongo Kundu	Likoni Deputy County Commissioner, KPA Consultants, PAPs Committee Members	9	3	12	• A public baraza was proposed to enlighten PAPs on the process of signing the transitional allowance agreement and disclosure of the land Advisory Plan for purposes of ESIA. • Signing of the transitional allowance agreement will be done village wise.
6	07/08/2023	DCC'S Compound-Dongo Kundu	KPA Consultants, PAPs Committee Members	14	9	23	• Focus Group Discussions (FGDs) are scheduled to start on 9th August, 2023 with identified interest groups to disclose the land Advisory Plan for purposes of ESIA. • A skill mapping survey will be done to identify youths to be involved in the livelihood restoration program.

S.No	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the Meetings*
				M	*F*	*Total*	
7	11/10/2023	DCC'S Compound-Dongo Kundu	Nippon Koei team, PAPs Committee Members	14	4	18	• A material investigation exercise will be done in the resettlement site for two weeks by the Nippon Koei team,
Total Participants				89	41	130	

Source: Public Consultation Records

7.5.7: Outcomes from Focus Group Discussions

Outcomes from Focus group Discussion are as shown in table 7.10 below

Table 7.10: Outcomes from Focus Group Discussions

S/No	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the meeting*
				M	*F*	*Total*	
1	09/08/2023	Mwangala Primary School	Mwangala Primary School Children, teachers and Board of Management	57	51	108	• The children are excited about the project because of ease of transport, close proximity to the school, increased businesses in the area, presence of power and water in the resettlement areas. • They recommended proper road signage and a fry over to prevent accidents to school going children. • The teachers noted that there will be increased psychological tension in the children as they adjust to their new way of life and area. • The Board of Management (BOM) requested improvement of the school facility by the government so as to help accommodate the anticipated influx of pupils after resettlement.
2	10/08/2023	DCC'S Compound-Dongo Kundu	Mosque leaders	11	0	11	• Mosques established after 2019 RAP study be consider for land allocation. • There should be a clear demarcation of the cemeteries, preferably a wall in-between. • The sizes of the plots allocated for the mosques are too small to accommodate all the required facilities. • Humanity be observed in relocating people and ample time be given for relocation
3	10/08/2023	DCC'S Compound-Dongo Kundu	Churches Leaders	16	6	22	• Seven churches established after 2019 RAP study be considered for land addition. • The project should set aside land for development of secondary schools and tertiary (TVETs) colleges. • The resettlement process is taking too long which is creating anxiety among the locals. • The community need to be educated on other means to livelihood as majority of the

S/No	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the meeting*
				M	*F*	*Total*	
							locals depend on farming activities.
4	10/08/2023	DCC'S Compound-Dongo Kundu	Kayas Elder	13	0	13	• Kayas in the resettlement area should be clearly demarcated and beaconed to prevent encroachment. • The public need to be sensitized on the importance of the kayas as well as the dangers from misuse of these areas. • The Kaya elders requested that they be allocated plot next to the kayas for ease of management.
5	10/08/2023	DCC'S Compound-Dongo Kundu	Mwangala Beach Management Unit	5	2	7	• The BMU currently has 5 landing sites along the shore line which are gazetted by the department of fisheries but none is mapped in the resettlement plan. • The proposed market to allocate some space to accommodate the BMU. • BMU fears that there will be more restrictions on use of the landing sites as investors take position. • Increased environmental pollution from industrial waste will affect the daily catch and fishing activities
6	11/08/2023	DCC'S Compound-Dongo Kundu	Witchdoctors	17	2	19	• That they be allowed to use the conservation areas for their rituals. • The government of Kenya to recognize unregistered witchdoctors and provide them with an officer to register them
7	11/08/2023	DCC'S Compound-Dongo Kundu	Witchdoctor and Herbalist	5	3	8	• Clearing of the area for resettlement and industries will rob them of the easy access they have to medicinal trees and herbs. • That medicinal trees and herbs be planted in the conservation areas for use by the herbalists and others that may require them.
8	11/08/2023	DCC'S Compound-Dongo Kundu	Self-help Groups	19	16	35	• The self-help groups recommended that a committee be formed and be tasked with ensuring that locals are given first priority employment by investors' companies.
9	12/08/2023	DCC'S Compound-Dongo Kundu	Physically Challenged	20	9	29	• There was a concern that some vulnerable PAPs didn't get special balloting as promised. • People living with disabilities (PWDs) be given priority in job opportunities within the resettlement area.
10	14/08/2023	DCC'S Compound-Dongo Kundu	Widows	0	57	57	• Source of cooking energy will be challenging as majority of the households use firewood in cooking. • They requested for the resettlement process to be hastened citing deplorable condition of some residential structures which need

S/No	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the meeting*
				M	*F*	*Total*	
							major repairs. • Priority in job opportunities be given to Widows and other vulnerable groups by potential investors in the area.
11	14/08/2023	DCC'S Compound-Dongo Kundu	Orphans (<18 yrs.)	4	4	8	• The orphans expressed fear of increased kidnappings due to insecurity. • They appreciated that the project will enhance ease of transport and more businesses in the area.
12	14/08/2023	DCC'S Compound-Dongo Kundu	Widowers	8	0	8	• The government to set up a scheme to assist the widowers. • With the resettlement of all PAPs in two resettlement areas, Police Stations in both resettlement area will help curb insecurity. • The cemeteries be allocated land prior to human resettlement as death is a non-foreseen event.
13	15/08/2023	DCC'S Compound-Dongo Kundu	Elderly	16	14	30	• The elderly expressed fear of loss of livelihood as majority depend on farming and livestock keeping. • A request was made on Special assistance for the elderly during the transition period. • The elderly expressed anxiety and uncertainty over the predicament of their children who do not own land in the resettlement area. • The resettlement process be hastened as the elderly and the community at large is getting anxious. • They recommended that land be set aside for the construction of a slaughterhouse in the resettlement area.
14	15/08/2023	Mbuta Dispensary	Mbuta dispensary officers and Management committee	6	3	9	• Mental health, drug and substance abuse and gender-based violence are the leading public health concerns in the project area. • Concerns were raised about the treatment of sewerage waste in the resettlement area. • Land allocation for cemeteries should be in both resettlement areas. • Secondary schools and tertiary institutions should be constructed in the resettlement area to ease access to education.
15	23/08/2023	DCC'S Compound-Dongo Kundu	Self-help Groups	23	17	40	• There are about 32 self-help groups within the project area which engage mainly in environmental activities, Savings, livestock keeping and small businesses. • The groups requested for trainings to help them tap into opportunities available in the resettlement area.

S/No	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the meeting*
				M	*F*	*Total*	
16	19/09/2023	DCC'S Compound-Dongo Kundu	60 PAPs from six affected villages, PAPs committee and village elders	44	36	80	• Self-sufficient Livelihood resources before relocation will be outsourced after resettlement. • KPA will offer livelihood training to PAPs to help them adopt new livelihood means after resettlement. • The consultant offered to do a second skills mapping exercise from 25th September, 2023 to register residential PAPs who missed out on the initial exercise held in August, 2023.
17	26/11/2023-27/11/2023	DCC'S Compound-Dongo Kundu	Selected PAPs from the six affected villages, KFS, Coast water,	50	10	60	• A climate change action plan was developed.
			Total Participants	314	230	544	

Source: Public Consultation Records

7.5.8: Outcomes from Key Informant Interviews

Outcomes from Key Informant Interviews are as shown in table 7.11 below

Table 7.11: Outcomes from Key Informant Interviews

S/No	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the meeting*
				M	*F*	*Total*	
1	17/07/2023	Public Health offices	Public Health officer	1	0	1	▪ The issues of the cemetery will be handled by Public health and the department environment. ▪ Sewerage system to be considered to save the community from communicable diseases.
2	17/07/2023	Department of Youth, Sports, Gender and Social services	CECM Youth & Sport, Gender and Social Services	1	0	1	• Vulnerable PAPs identified by the project will be registered in the county programs to ensure continuity of support after project implementation. • The department will visit the project area to identify services suited to the vulnerable Persons.
3	25/07/2023	County Commissioner Office	Mombasa County Commissioner	1	0	1	• There is need for the government, both county and national government to initiate affordable housing programmes to avoid development of slums within the SEZ.
4	25/07/2023	Department of Transport and	Chief Officer roads, Deputy County Engineer Roads, Deputy	4	0	4	• Proposal was made for provision of similar/or equal social amenities in both resettlement areas. • County department will take over the

S/No	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the meeting*
				M	*F*	*Total*	
		infrastructure	County Engineer Electrical, Transport Engineer				mandate to maintain the Roads infrastructure, Street lights and drainage within the resettlement sites. • Need for incorporating the proposed designs with the county's grid for a smooth handover and continuous development and maintenance by the county. • Fecal contamination between water sources and pit latrines can be avoided by development of Commercial/Industrial sized sewerage treatment systems.
5	26/07/2023	Department of Lands, Housing and Urban Planning	Chief Officer Land, Urban planning & Housing –Lands, Housing & Urban planner.	2	0	2	• Change of user from residential to commercial use has to be guided by the physical planning and land use Act No. 13 of 2019 with an Approval being acquired from the county government and under the guidance of SEZA. • Advisory plan is valid for 5 Years from the date of approval and any amendments to incorporate changes will be advised by the physical planning and land use Act of 2019.
6	27/07/2023	National Environment Management Authority (NEMA) offices	County Director NEMA and Environmental Officers	3	0	3	• ESIA study to provide more information on the proposed waste management mechanisms. • Land allocation for the county government offices in the resettlement area was proposed. • Investors with inoffensive industries be allocated land close to the resettlement area while the offensive industries should be further away from the resettlement sites. • Mitigation and environmental conservation measures be put in place to prevent deforestation and degradation of the conservation areas.
7	28/07/2023	Water Resources Authority (WRA) offices	Senior Water Quality & Pollution Control Officer, Water Tower Officer	2	0	2	• Community awareness on planting indigenous trees in the conservation areas as a means for protecting the catchment in the long-term be enhanced. • Formations of Water Resource Users Associations (WRUAs) within the resettlement area to assist in catchment management through the development of sub catchment management plan. • Adoption of Eco-Friendly toilets amongst PAPs adjacent to the proposed water kiosks was recommended. • Common sewerage collection and effluent

S/No	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the meeting*
				M	*F*	*Total*	
							treatment system be considered in the advisory plan designs to help in liquid waste management.
8	01/08/2023	Department of Education and Digital Transformation	Chief Officer - Education; CECM's Personal Assistant.	3	0	3	• There is need for development of a vocational training center, Libraries and digital centers within the resettlement center. • He proposed primary school should be provided with adequate land to allow for development of a secondary school.
9	02/08/2023	Department of tourism, trade &Culture	County Executive Committee Member (CECM) for tourism, trade &Culture, CECM's Personal Assistant	2	0	2	• The county will be involved in management of the markets and collection of tariffs once the project is implemented. • A Proposal was made to develop a wholesale market at the proposed site and also develop a retail market elsewhere within the resettlement areas. • There is a directive from the Ministry of housing of having markets developed some distance away from the main roads which should be considered in the MSEZ project. • Kayas in the resettlement area can be used as eco-tourism sites.
10	02/08/2023	Mombasa Water and Sewerage Company Limited (MOWASCO) office	Managing Director and one Engineer	2	0	2	• There is a plan (proposal ready, waiting for funding) to develop a treatment plant to collect and treat wastewater for the entire MSEZ.
11	02/08/2023	National Construction Authority office	Coastal Region coordinator.	1	0	1	NCA will be responsible of the following; • Ensuring compliance with the government procedures according to the NCA Act No. 41 of 2011. • Project registration of all structures constructed whether permanent or temporary. This project registration is free of charge. • Registering all contractors responsible for constructing and implementing the designs.
12	03/08/2023	Department of Agriculture, livestock and Fisheries	Director of agriculture, Agricultural Officers	1	2	3	• Zero grazing is allowed in settlements since free range/open grazing is not allowed for animals in an urban setup. • The ministry trains farmers- capacity building and link them to the markets

S/No	Date	Venue	Participants	Attendance			Outcomes from the meeting
				M	F	Total	
13	03/08/2023	Kenya Power and Lighting Company (KPLC) office	Chief Security Officer; Customer Service Manager and electrical Engineer	3	0	3	• KPLC's role will be distribution and connection of power in the resettlement area. • Their current customers will be involved to recover the existing lines and meters from the PAP's who are currently connected to the existing power line.
14	04/08/2023	Kenya Forest Service (KFS) office	County Forest Conservator (CFC) Mombasa County.	1	0	1	• Conversation areas to be clearly marked to avoid encroachment. • Approval to individual tree cutting in the resettlement area should come from the local administration with coordination with the county conservator office.
15	25/09/2023	Department of environment and waste management office	Department officer of environment and waste management	0	1	1	• The proposed Waste Collection site should have a waste management plan. • Residents should be engaged in identification of the waste collection points. • Residents should be sensitized on waste management methods. • Registered and gazetted dumpsite in Mombasa County are Mwakirunge dumpsite in Kisauni and Shonda dumpsite in Likoni.
16	28/09/2028	Department of Environment and Natural Resources	Director climate Change-Mombasa County	1	0	1	• Flooding is a major risk of climate change. • All infrastructural developments should be climate change resilient in the resettlement site.
			Total Participants	28	3	31	

Source: Public Consultation Records

7.5.9: Outcome of Money Management Training

Outcomes from money management training are as shown in table 7.12 below.

Table 7.12: Outcomes from money management training

S/No	Date	Venue	Participants	Attendance			Outcomes from the Meetings
				M	F	Total	
1	6/06/2024-22/06/2023	DCC's Compound-Dongo Kundu	Money Management training with PAPs owning structures and trees	710	480	1190	•The trainees understood the danger of homelessness that might occur from misdirection of the awards meant for reconstruction of structures after relocation. •The trainees realized that they have consider alternative means to livelihood to replace farming.

S/No	*Date*	*Venue*	*Participants*	*Attendance*			*Outcomes from the Meetings*
				M	*F*	*Total*	
							• The trainees fully comprehended the risk arising from using their awards for unbudgeted expenses. • The trainees embraced the idea of making decisions together with their families rather than having disputes on the compensation money. • The trainees identified different risks and hazards that may hinder the resettlement process which included; (i) Inadequate funds to construct proper residential structures; (ii) Loss of livelihood; (iii) Premature sale of plots by PAPs; (iv) Family disputes triggered by expected compensation; (v) Misuse of compensation monies and allowances; and (vi) Landlessness for PAPs owning developments only.
			Total Participants	710	480	1190	

A section of PAPs in attendance during the first public baraza held in Dongo kundu.

Likoni Sub County- Deputy County Commissioner addressing participants in the second leaders meeting

PAPs Committee members during the first meeting.

Focus group discussion with Kaya elders.

Participants during an in-depth discussion on livelihood mapping.

PAPs in a training session

Plate 7.1: Pictorial summary of stakeholder consultation
Source: This study

7.6: Emerging Concerns from stakeholder Consultations

- **Local Employment**- Consultations with different stakeholders brought out the need of the local community to be priority in job opportunities in the project area. It was noted that the community source employment from other areas and it would be better if opportunities were brought near them. Locals wished to be considered in both skilled and semi-skilled labour.

- **Size of Plots-** Concerns were raised by locals on the 1/8 acre of land offered by Ministry of Land. Though landed PAPs will be provided with titled plot, they expressed their dissatisfaction with the size of plot noting that the plot was inadequate to accommodate more than one household. PAPs expressed their fear on where to take their livestock saying that the provided plots have no room for livestock keeping nor farming activities. This concern was

also aired by religious groups which deemed the size of plot too small to accommodate their developments and plan for future developments.

- **Additional land**. The additional land concern was highly discussed by the locals. This was brought about by the fact that the majority of residents in the project area are non-landed raising the question of where they will be resettled considering the 1/8 plot cannot accommodate many households. The need for additional land was evidenced by the number of PAPs who flock the resettlement office requesting for additional land after Cabinet Secretary for trade and Investment, Hon. Moses Kuria, opened a window for registration.

- **Inadequate Compensation.** Concerns were raised about awards provided to development owners by National Lands Commission. The amount awarded was termed inadequate by PAPs who aggrieved that the money is not enough to construct standard structures. PAPs were awarded based on their individual effort and the type of development they owned during inventory. However, there is a concern that the resettlement area will be converted into a slum as there will be no standard structures.

- **Allocation of cemeteries in both resettlement areas.** Stakeholders consulted felt that land for cemeteries should be provided in both resettlement areas.

- **Provision of Land for development of a secondary school and tertiary institution.** Absence of a secondary school and tertiary institution in the project area raised need for their development. This concern was also triggered by the fact that these institutions have not been allocated land in the land advisory map provided by Ministry of Lands.

7.7: Way forward with Stakeholder Engagement

During the MSEZ RAP implementation process, stakeholder engagement, especially to the PAPs, shall continue being a continuous process until the implementation cycle comes to a substantial completion as per the RAP Implementation Policy.

CHAPTER EIGHT: ANALYSIS OF ALTERNATIVES IN PROJECT DEVELOPMENT

8.1: Overview

In this section, alternative approaches and options towards securing project k have been explored to ensure rationalized selection of the most optimal investment package. Such analysis is a statutory requirement for all ESIA Studies under Legal Notice 101 of EMCA 1999 whose Regulation 18(1-i&j) requires an analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies. In line with this requirement, an extensive analysis of alternatives was undertaken in respect of the Mombasa Special Economic Zone – Resettlement Site Infrastructure Projectas outlined in sections below.

8.2: Basis for Analysis of Alternatives

A comparative assessment of the project's merits of alternatives was undertaken to identify the best method for achieving the project's objectives of securing resettlement of MSEZ PAPs to pave way for implementation of MSEZ Programmes. The main aim of assessing Project alternatives was to ensure that the social, financial and environmental sustainability of the project is achieved or mitigated. Table 8.1 provides an analysis of the options.
Analysis of alternatives was conducted at two broad levels namely:

- Analysis to the entire Project as conceived
- Analysis for each of the sub components

8.2.1: Analysis of alternatives of Project Concept Level

Analysis here compared both the with Project Scenario and without the Project Scenarios as tabulated in table 8.1 below.

Table 8.1: Analysis of the With and Without Project (No Go Option) Scenarios

Scenario	Merits	Demerits	Proffered option
With Project Scenario	PAPs will be resettled on titled plots and thus enjoy security of tenure	Land committed to PAPs is no longer available for development of SEZ	Purse the With Project Scenario
	Relocation of PAPs will make land available for investment in SEZ and thus contribute to achievement of Kenya Vision 2030 Goals as planned	Relocation is a costly option given the funds consumed in compensation and related programmes	
	Resettlement will fore ever the resolve the feeling of	As the population of settlers increases in future, there	

	historical entitlement to the land	will be increased demand for additional land	
	Development of MSEZ can stimulate similar development in Kwale where land is readily available		
Without Project Scenario	The Government will save on money for both compensation and other programmes	The MSEZ land will continually be un-available for development of the SEZ	
		With increase in population and villagization of SEZ, the land will be locked out for any alternative use.	
		Planning goals and benefits anticipated from the MSEZ are likely to be missed.	
		Local goals for creating employment and unlocking development of Mombasa Mainland South will remain a mirage,	

Source: This study

8.2.2: Analysis of Alternative means to achievement of Project Goals

Having decided under 8.2.1 above that implementation of the MSEZ should proceed, the next level entailed analysis of the different options to meeting intended Project Goals. Several criteria including the three specified in Regulation 18(1) (i) & (j) of LN 101 were further amplified as follows:-

Criteria One: Merits of alternatives alignments

- Does the site optimize on net economic benefits
- Does site selection minimize on social, economic and environmental impacts
- Does site selection harmonize with land-use plans as influenced by the physical layout of the land among other factors
- Does site selection resonate with local felt needs

Criteria Two: Alternatives to the preferred design: Issues considered included,

- Alternatives to the entire MSEZ-RSIP as currently proposed
- Alternatives to bridge type as proposed
- Alternatives in the provision of ancillary facilities

Criteria Three: Analysis of the Zero Option

- Past, current and future effect/ impacts of the road as currently existing
- Anticipated benefits of proposed upgrading.
- Any other considerations

In pursuit of criteria one to three above, three alternative were considered namely:-

- Relocate all PAPs out of the SEZ Land
- Implement the Comprehensive Compensation Policy Framework which allows for integration of PAPs into the SEZ
- Implement the Option of forced eviction

Outcome of the analysis is provided in Table 8.2 below but clearly, the option of pursuing a development model which entails resettlement of PAPs within the MSEZ has very clear merit.

Table 8.2: Options in relocating PAPs out of the SEZ

Scenario	**Merits**	**Demerits**	**Preferred Option**
Relocate all PAPs out of the SEZ Land	This will secure the entire 3000 acre property for development	Total relocation is a more costly option, requiring Ksh 3.4 Billion	Implementation of the Comprehensive Compensation Policy Framework
	PAPs will get an opportunity and resources to start off elsewhere	PAPs will lose out on the benefits that come with integration in the SEZ activities	
		Political costs in relocating an entire sub-location	
		Elders who subscribe to the Kaya Culture will loose out	
Implement the Comprehensive Compensation Policy Framework	This option is in line with provisions of the Masterplan for the Mombasa Special Economic Zone	Part of the SEZ Land will henceforth not be available for investment in economic production	
	PAPs will be strategically placed to tap into benefits of the SEZ	Challenges of inadequate land to settle all family members	
	Opportunity for the Kaya Elders to stay around to tend to their Kayas	Subsistence cultivators will loose their means to livelihood	
	Political gains in retaining the DK voting Block		
	Opportunity for the community to retain some coherence through staying in the same locality		
Implement the Option of	There is legal provision for eviction under Sections	Political costs in forced eviction	

forced eviction	152A to 152H of the **Land Laws (Amendment) Act 2016.**		
	Eviction will secure all land for the MSEZ	Global retribution of the Project	
		Option could incur lengthy court battles which can delay project implementation	

Source: This study

8.2.3: Analysis of Mwangala Village as the only Resettlement Village

The option of restricting all resettlement activity to Mwangala village was assessed (Table 8.3). This was motivated by desire to release the Dongo Kundu area which has more gentle slope to be available for commercial use. As currently planned, the resettlement area scattered in Mwangala and Dongo Kundu Villages is accounting for 900 acres out of the 3000 acre property leaving almost nothing available for commercial development as proposed under SEZ. It is observed that, if all resettlement can be restricted to the more hilly Mwangala, it will release more land in Dongo Kundu to be available for the SEZ Investors.

Table 8.3: Analysis of the Mwangala only Resettlement Model

Scenarios	**Merits**	**Demerits**	**Preferred scenario**
Resettlement in the Mwangala Village alone	Site has hilly topography and hence less suited to commercial utilization	Site is hilly and will require he**a**vy investment in landscaping	Restriction of resettlement to Mwangala Village
	The Mombasa Southern Bypass Road will create an artificial barrier between the settlement and commercial zones and will help in the control on encroachment on commercial land	Much land will be lost to landscaping.	
	Option will release the DK site which has gentle topography to be available exclusively for commercial development.		
	Site is nearer most of social facilities viz School, churches, Mrongondoni Mosque, proposed cemetery site		
	Site is near proposed SEZ Reservoir and will cut down on water transmission costs		
	Option will cut down on the need for		

	infrastructure development in as proposed for RA		
	Option is nearer the highway		
	Model can exploit the provision for landscaping costs allowed for in the CPF		
Scatter of resettlement to Mwangala and Dongo Kundu Villages	Dongo Kundu Village has gentle slopes more suited for settlements	Dongo Kundu is better suited for commercial utilization owing to proximity to the proposed Port Development Projects	
		Very heavy public expenditure in extending infrastructure over a scattered settlement	

Source: This study

8.2.4: Analysis of alternatives in the packaging of the resettlement Project

Having decided under section 8.2.2 above that Internal resettlement of PAPs within the SEZ is a preferred option, analysis was taken to a third tire, that of choosing between different packages of the Resettlement Project. Specifically, analysis here centered on analysing the merits and demerits of providing basic infrastructure as envisaged in the Masterplan for Mombasa Special Economic Zone.

Table 8.4: Analysis of Options in packaging the Resettlement Project

Scenarios	**Merits**	**Demerits**	**Preferred scenario**
Implement Resettlement Option without infrastructure component	Option will be less costly to the exchequer	Non provision of Roads and water will trigger slum development	Implement Resettlement Option backed up by essential infrastructure
	Land set aside for infrastructure can be channelled to other uses	Non development of reserves set aside for roads will trigger encroachment which will be costly to reclaim in future	
		Future delivery of services such as fire-fighting will be challenged in the absence of essential infrastructure	
Implement Resettlement Option backed	Option is provided for in the Masterplan for the Mombasa Special	Provision of infrastructure is costly to the National Government	

up by essential infrastructure	Economic Zone		
	Provision of basic infrastructure and planning creates a high profile settlement quite suitable for an SEZ	A lot of time will be taken in planning and securing the necessary authorizations	
	Value of land will appreciate		
	Settlers will enjoy high quality life in the background of basic pillars for urban development and planning		
	Provision and operation of a market will improve access to food		

Source: This study

8.3: Analysis of measures to minimize adverse impacts

Under this section, measures whose implementation can improve the overall net worth of the Project as conceived have been highlighted.

8.3.1: Measure to improve the overall Land Use Advisory Plan

The LUP should provide for a business center: Currently, the LUP does not provide for a business center. The nearest to this is the 1 acre plot reserved for a public market on very sloppy ground. Given that investors in the MSEZ are likely to require the Services Sector (Banking, Finance, Insurance, etc.), there is need to set aside at least 5 acres of appropriately located land for this purpose.

8.3.2: Measures to improve the roads sub component

(i) Eliminating some of the proposed roads: Some roads provided for in the Land Use advisory apparently do not add value to the settlement and could be safely eliminated to cut down on both economic and environmental costs. Roads that could be easily removed or merged include:-
Roads A51, part of road A13, B33, B29 among others.

(ii) *Proposed Road A1 is entirely unnecessary*: Road A1 though provided for in the masterplan for MSEZ is deemed unnecessary. This is because; areas potentially served by this road can be served by the current access road to Dongo Kundu which is already developed with a suitable terrain on top of the ridge and ends up in the same destination targeted by
Road A1.

8.3.3: Measures to improve the Market sub component

(i) Reassign the market from the current valley location: The Proposed public market is a sited in a steep, north draining valley that opens directly into the Port Reitz Creek Shoreline. Effluent and sediment at generated at both the construction and operation phases of the market are likely to load directly into the Port Reitz Creek Ecosystem with disastrous effects. This facility should be realigned elsewhere.

(ii) Expansion of the market area: As designed, the public market allows for about 50 stalls and 5 shops following the model of Shika Adabu which serves a peri-urban population. However, given that the Dongo Kundu Community are likely to carry the practice of subsistence production right into the resettlement area, there is need to expand the market to make provision for livestock and other trades such as hardware, building materials etc. As designed, the LUP does not provide for such.

8.3.4: Measures to improve the water supply sub component

Beefing up of water Kiosks: The current provision of seven water kiosks for both resettlement areas is considered inadequate given that some households will till require to trek long distances to access water, the possibility of providing a water kiosk for every block should be considered.

The option of introducing tap and metered connections: Current design does not allow for metered connections inclusive of private tap. However, given that some residents could have capacity to afford metered connections, more-so those who want to put up upmarket rental units, the option of providing metered connections should be considered.

CHAPTER NINE: PROJECT IMPACT PREDICTION

9.1: Strategy in Impact Prediction

Chapters 4 through to 8 above have documented the environmental and social baseline preceding development of the MSEZ-RSIP to set the background for impact analysis - the most critical outcome of an Integrated Impact Assessment Process including ESIA Studies. It is the outcome of impact assessment that informs decision making on the future direction in project development in which case, a full-proof system for impact prediction and analysis is fundamental to the integrity of an ESIA process.

This chapter provides an analysis of the potential impacts likely to ensue from implementation of the MSEZ-RSIP as currently packaged. Impact analysis as unveiled in this Chapter was approached from different directions, applying diverse diagnostic tools and processes leading to build-up of core issues that constitute potential impacts from the infrastructure development within the resettlement site.. Tools applied include:-

- Baseline characterization to identify pre-existing environmental and social concerns including sensitive resources
- Review of requirements of policy/legal tools of the Gok
- Screening against international standards for sustainable development; and
- Screening against stated stakeholder concerns and interests.

The overall impression from impact analysis is that the Resettlement Project and backup infrastructure is itself an intervention in mitigating would be displacement impacts of the wider MSEZ and is therefore immensely beneficial. In section below, possible impacts anticipated from implementation of the resettlement process and backup infrastructure are analyseed to provide the basis for mitigation.

As a strategy in impact management, all positive and negative impacts for each phase (Design, Construction, Operation and Decommissioning) have been identified, scoped for severity and then summed so as to give a picture of the net overall effect of each phase of intervention.

9.2: Design Stage Impacts

Creation of Forums for Public Expression: The Design Phase is always associated with extensive engagement with diverse stakeholders who are then provided with a forum for expression towards building consensus on the Project.

Job and employment opportunities: Generally, the design phase is associated with positive impacts mainly manifested through creation of business opportunities for professionals involved in the design work, support staff hired in the enumeration survey, etc, while the country benefits from generation of additional planning data which will influence policy decisions within long-term frames.

Capacity Building for leadership Structures: As an entry point, the process of stakeholder engagement relies on local leadership structures to reach to wider public audience and this therefore entails some element of capacity building. A case in point is the PAPs Committee within the MSEZ which form the entry point in all public engagement and which is

subsequently involved in all planning endeavors thus coming out very informed and commanding an impressive reservoir of information.

Generation of additional planning data: Certainly, the database compiled from design reports will find consumption far beyond the confines of the SEZ and will provide a useful baseline for downstream projects. Specifically, baseline mapping conducted for the ESIA study generated new data as follows:-

- Comprehensive list of the flora and fauna along the MSEZ resettlement area transect
- Unearthed existence of IUCN Red List, CMS and AEWA bird species within the traverse
- The conservation importance of the Kayas and local marshlands
- Contributed to better understanding of the Mombasa Mainland South Area

Social coherence from stakeholder engagement: During stakeholder engagement at diverse levels, communities came together to analyze concerns following which, they took a common stand This was seen to enhance social cohesion.

9.3: Construction Phase Impacts

As with most civil works, adverse impacts largely manifest at the construction stage but however are short-lived, ceasing once construction activity is ended. This is the scenario with the MSEZ Resettlement Site Infrastructure Project.

9.3.1: Impacts associated with reconstruction of PAPs dwellings

Generation of debris and construction ruble from demolition of current dwellings: Assuming that all proceeds as planned, most of the 2585 structures currently occupied by PAPs will be demolished as PAPs relocate to the new resettlement areas. Such action will generate huge boulders of earth rubble and other non-merchantable construction debris which will be left behind littering the landscape. Any pits previously excavated for use as toilets will be abandoned open and thus pose injury hazards to people and animals.

Degradation of the local resources in pursuit of construction wood, mud and water: Unless checked, PAPs have a tendency to exploit local wood resources for building poles, withies etc. while the land will be quarried to yield building sand and mud for plastering walls in new dwellings as computed in Table 2.7 above. This is likely to further degrade the local landscape such as the already degraded Kaya Forests and further jeopardize the fate of floral species deemed to be in need of conservation on account of being near threatened, vulnerable or endangered.

Destruction of site vegetation in land clearing for house construction: Further degradation of the landscapes and natural habitat is likely to ensue from site clearing during land preparation for construction of new PAP dwellings. Such loss of cover vegetation is likely to be long-term without any hope of reestablishment on the same site and if it involves the removal of ingenious trees or even baobab trees which take long to establish and mature, then the loss is irreversible.

Site clearance will not only affect the flora but also the fauna which find habitation within the area as it exists currently.

Marginalization of vulnerable PAPs: This ESIA Study came across many PAPs considered vulnerable on account of being physically and visually challenged, terminally ill, orphaned, etc. and who therefore, would be quite unable to manage the transition process on their own. Such PAPs, therefore are likely to be further marginalised on account of inability relocate with the rest of community.

Table 9.1: Impact prediction for Design and Construction Phase

Project phase	Activity	Potential Impacts	Severity ranking	Duration	Persistence
Project design phase	Field surveys and public particpation meetings	Creation of forums for public expression and coherence	P	Short term	
		Creation of shorrterm employment	P	Short term	
		Capacity building for Leadership Structures	P	Long term	
		Generation of new data on the project area	P	Long-term	
Relocation and reconstruction of PAP dwelings	Demolising of current PAP dellings	Generation of rubble and other waste	N	Shortterm	Reversible
	Pressure on natural resources-wood, water, mud etc in housing construction	Degradation of of the natural environment and natural resources	2N	Shortterm	Irreversible
	Destruction of site vegetation in land preparation for PAP housing constrcution	Loss of cover vegetation, natural habitat and climate amerioration impact	2N	Long-term	Irreversible
		Threat on vulnerable and enadangered flora and fauna resources	2N	Long-term	Irreversible
	Relocation of vulnerable PAPs	Vulnerable PAPs could be rendered destitute and exposed to suffering	N	Long-term	Irreversible
	Challenges in	Cross family strive	N	Shortterm	Reversible

Project phase	Activity	Potential Impacts	Severity ranking	Duration	Persistence
	accomodating large familes on eighth acre plots	and conflict			
Construction of Internal Roads, Water Supply, Public Market, Dispensary and Cemeteries	Opportunities for shorterm bussiness in constrcution and supplies	Cash income to both local and other bussinessment	2P	Shortterm	
	Opportunities for employment in consttruction	Cash income for local population	2P	Shortterm	
	Secondary benefits form contracts in construction	Opportunities for small scale bussiness in catering for construction workers, provision of housing , sale of food etc	P	Shortterm	
	Potential conflict in labour sourcing	Local community could resent influx of speculators	N	Shortterm	Reversible
	Potential escallation of labour costs	Escallation of constrcution costs for PAPs who will be building at the same time	N	Shortterm	Reversible
	Stripping of cover vegetation and top soil in land preparation; stockpiling of stripped soil	Loss of biodiversity and habitat	N	Long-term	Irreversible
		Possible spillage of sediment into natural drainage including the Port Reitz Creek	N	Long-term	Irreversible
	Land degradation in material sourcing and transport sites	Destruction of the landscape, loss of habitat and hazzards to life	N	Shortterm	Reversible
	Hazards posed to other motorists and pedestrians	Potential injury, loss of life and unnecessary expenses	N	Shortterm	Reversible
	Hazzards of introduction of additional invasive species with building material	Further degradation of local biodiveristy	N	Long-term	Irreversible

Project phase	Activity	Potential Impacts	Severity ranking	Duration	Persistence
	Hazards associated with operation of contractor and labour camps	Pollution from waste oils and spares	N	Shortterm	Reversible
		Sanitation concerns for workers	N	Shorterm	Reversible
		Proliferation of social vices	N	Shortterm	Reversible
		Threats of fire hazzard	N	Shortterm	Reversible
	Occupational Health and Safety Hazzards in operating Plant and Equipment	Hazzards of potential injury and loss of life	N	Shorterm	Irreversible
		Pollution from fumes, noises and vibrations	N	Shortterm	Irreversible
Summary Scenario pre-mitigation		• 9P (Nine Possitive Effects) • 22N (Twenty Two Negative Effects) • Net Effect: 13N Pre Mitigation		6 Long-term Adverse Impacts	8 Irreversible Adverse Impacts

Key: 2P-Huge Possitive Effect; P-Moderate Possitive Effect; 0-No Effect; N-Moderate Net Negative Effect; 2N-Severe Adverse Effect
Source: This study

Incidences of cross-family strive and conflict during transition: A major challenge in the resettlement process is the inability of land allocation to benefit all would be beneficiaries especially that resident on parents' land and are therefore expected to relocate and fit-in on the same eight acre plot with parents and other siblings. As such, the decision on whom to accommodate and where to accommodate on the eighth acre plot is likely to cause strive and tension within families with potential for long-term disagreements. Already, incidences of tension and family breakups have been reported.

9.3.2: Positive impacts in the construction of infrastructure

Cash income from opportunities in construction: Contracts for the construction of internal roads, public market, water supply, dispensary and cemeteries will create numerous opportunities for both local community and businessmen to benefit through making supplies, employment, small scale trade among others all of which will inject cash income into the local economy. And though the windfall is short term, wise investment of proceeds can have a long-term impact on household economies.

9.3.3: Adverse impacts in the construction of infrastructure

Potential conflict in labour sourcing: Both the infrastructure component and reconstruction of PAP dwellings are labour intensive and will take place in the same isolated geographical space.

As such, in the incidence where both activities take place simultaneously, very stiff competition for labour would set in causing an upward inflation of construction costs to the detriment of PAPs who would find it difficult to compete for labour with Contractors.

Potential influx of job seekers: Construction activity is always associated with influx of foreigners coming to speculate for jobs and opportunities and in a closed community such as Dongo Kundu, such a move could be resented and possibly resisted. This is more so where the incomes apparently seem to access better paying jobs due to possession of more superior competencies.

Siltation threats posed by stockpiled soil: Stockpiling of excavated soil estimated at over 50,000 cubic meters (3000, 20tonne truckloads) on sites in close proximity to the Indian Ocean's Port Freitz Creek is likely to pose severe siltation threats to this critical ecosystem which also hosts Kenya's main commercial harbor whose hinterland extends to South Sudan, Rwanda, DR Congo, Northern Tanzania among others. Already, the Kenya Ports Authority (KPA) management spends huge sums of money dredging off silt inflow from the Mwache River.

Land degradation from material sourcing and transport activities:- The sourcing and transport of stone and other materials required in road construction is notorious as an agent for land degradation, leaving behind quarry spoils and degraded tracks as evidence of the activity. Such quarries not only constitute a loss to arable land and also pose huge safety and occupational hazards.

Hazards posed to other road users: Divers of trucks deployed in road construction are also notorious as being ruthlessly arrogant and disrespectful to other motorists and road users with the occasional accident and attendant costs.

Threats of introduction of Invasive Species: Several species such as Neem, Phyllanthus, and Leucaena are already rapidly establishing as colonizing species in the Dongo Kundu area on account of anthropogenic factors.

Pollution effluent, Waste Oils and Spares from Contractor Camp: Contractors camps are normally introduced in remote rural sites not connected to sewers, storm drainage etc and are notorious for discharging gray water and raw, non-treated sewage into nature while posing hazards of oil spills and waste spares from the maintenance areas. Such sites thus turn into eye sores and pose severe threats to Public Health and livestock.

Sanitation Concerns for Construction Workers and crew: The core issue here is human waste associated with construction workers and threats so posed to Public Water through contamination of water bodies. The problem will be further aggravated in case where PAPs will be reconstructing simultaneously which would lead to a huge concentration of a mass of humanity lacking access to sanitation facilities.

Proliferation of Social Vices: Dongo Kundu is a rural village with apparently little influence from surrounding urban settlements such as Mtongwe, Shika Adabu and Likoni. A huge influx of new comers with ready pocket money earned in construction work is likely destabilize the social order and also introduce vices hitherto unheard of in the area. While everybody remains vulnerable, school going and under-age girls are at higher risk and would end up the main losers.

Plate 9.1: The Invasive weed, Phyllanthus Spp
Source: ESIA Team

Occupational Health and Safety concerns for Construction Workers: Workers deployed to operate plant and equipment will suffer exposure to vibrations, noise, fumes and emissions whose health effect are well known. The local ecology could also be exposed to excessive dust bowls whose disastrous impacts on crop productivity and public health are well documented.

9.4: Operation Stage Impacts

Unlike the construction phase, impacts at the operation phase are slow to set in but are largely of a long-term nature. A summary of operation stage impacts is provided in Table 9.2 with brief highlights provided in sections below.

9.4.1: Positive Impacts of PAPs settling in at Operation Stage

Potential gains to the National Economy through implementation of the MSEZ: Construction phase will hopefully see all PAPs relocated to the Resettlement Area thus paving the way for implementation of the Masterplan for the Mombasa Special Economic Zones in pursuit of Foreign Direct Investment in the manufacturing of exports and in the process, creating jobs for the local populace. Thus, the action of PAPs constructing their dwellings in the resettlement area will unlock the MSEZ Area to investors ready to move in and start operations.

Opportunity for a new start of life for PAPs: Resettlement of PAPs will accord them an opportunity to start life again; to shift from subsistence cultivators to market economy, from low density to high density settlements, etc all of which will avail new opportunities in life.

Creation of new neighbourhoods: Land allocation in the Resettlement Area is largely though balloting which not allow one to choose a neighbor. To be neighbored by the traditional "witches" and herbalist could be unhealthy for some PAPs who do not like the activities and practices of traditionalists and vice versa, in which case, relocation will facilitate breaking off from the past and starting a fresh in a new neigbourhood.

Table 9.2: Impact analysis for the Operation Phase

Activity	**Potential Impacts**	**Severity ranking**	**Duration**	**Persistence**
Settling-in of PAPs in the Resettlement Areas	Gains to the National Economy through implementation of the MSEZ	2P	Long-term	Irreversible
	Opportunity to start life again	2P	Long-term	Irreversible
	Benefits associated with owning a Titled Plot	2P	Long-term	Irreversible
	Creation of new neigbourhoods	2P	Long-term	Irreversible
	Expossure to new opportunities and means to livelihoods	2P	Long-term	Irreversible
	Loss of means to food production upon resettleing	2N	Long-term	Irreversible
	Over-explotation of wood resources in search of biomass energy and associated loss of habitat and biodiversity	2N	Long-term	Reversible
	Incompatibility of some aged PAPs to urban livestyles	N	Long-term	Irreversible
	Breakup of exisiting social networks upon resettlement	N	Long-term	Irreversible
	Potential influx of other PAPs to encroach on remaining SEZ land including road and conservation reserves.	2N	Long-term	Reversible
Commissioning and operation of the road network	Ease of access and means to doing bussiness	P	Long-term	Irreversible
	Opportunities in for investing in the transport sector	P	Long-term	Irreversible
	Change local hydrology due to creation of impervious surfaces	N	Long-term	Irreversible
	Increased expossure to hazards of road accidents	N	Long-term	Irreversible
Commissioning and operation of the Public market	Stabilization of food security	P	Long-term	Irreversible
	Opportunities for trade in food suppply	P	Long-term	Irreversible

Activity	Potential Impacts	Severity ranking	Duration	Persistence
	Solid and liquid effluent from garbage and market refuse	N	Long-term	Irreversible
	Opportunity for revenue generation for County Government	P	Long-term	Irreversisble
	Opportunities for employment in the trade	P	Long-term	Irreversible
	Creates a forum for social enagement and bonding	P	Long-term	Irrevresible
Commissioning and operation of the water aupply system	Health benefits asociated with easy supply of clean potable water	2P	Long-term	
	Opportunity for limited kitchen gardening for diestary and nutritional security	P	Long-term	
	Saving on time spent fetching water from long distance source	P	Long-term	
	Improved security and quality of life for the girl-child	P	Long-term	
	Employment creation in runing water kiosks and associated infrastrcuture	P	Long-term	
Commissioning and operation of the Public Dispensary	Increased efficiency in responding to medical emergencies	P	Long-term	
	Provision of a forum for disseminating public health information and services	P	Long-term	
	Threats posed to public health by medical wastes	N	Long-term	Reversible
	Creation of job opportunties at the dispensary	P	Long-term	
Christian and Muslim Cemeteries	Provision of a designated site for resting the departed	2P	Long-term	
	Long-term leakage of pollutatnts into local water bodies	N	Long-term	Irreversible
Net Scenario	• 28P (28 Possitive Effects) • 10N (10 Adverse Effects • ***Net Effect: 18***P (Overall net positive Effect pre- mitigation)		8 Long-term adverse impacts	8Irreversible Adverse Impacts
Net Secenarion for all Project Phases: • 13N for Construction Phase • 18P for Operation Phase • ***Net Effect:*** 5P (Net Overall Positive Effect before mitigation); 14 Long-term Adverse Impacts all (14) irreversible				

Source: This study

PAPs will now enjoy security of tenure: The relocation phase will see each landed PAP allocated a titled plot and will thus enjoy security of tenure and all benefits associated with command of capital resources.

Exposure to new opportunities for earning livelihood: Concentration of many people in the resettlement areas will create opportunities for trade which PAPs can tap and develop alternative means to livelihood.

9.4.2: Adverse impacts of PAPs settling in at Operation Stage

Loss of means to food production: Majority of the PAPs currently are subsistence farmers growing crops and keeping animals such as goats and cows. The common method of animal husbandry is free range. Conversion of existing lifestyles into the proposed system will reduce significantly the available land for crop growing and animal husbandry. Thus the PAPs ability to grow crops and keep animals will be significantly affected negatively. The income and food that is generated by the economic activity will be adversely affected. Once settled in the Resettlement Areas, PAPs will henceforth loose all access to their former lands and will therefore lose any agricultural based food and income security. For aged and vulnerable PAPs who cannot secure employment, this move will render them both food and income insecure.

Over-exploitation of wood resources for biomass energy: At a pa capita daily firewood consumption of 1.5Kg, the 579 households currently resident within the MSEZ consume about 4.34 tonnes of biomass energy daily which is sourced from their farmlands and surrounding bushes. Upon relocation to the Resettlement Areas, such demand for firewood will now be deflected to any unoccupied bushes and wood resources adjacent to the homesteads which will then be systematically exploited and in the process be degraded off their tree cover. Ultimately, the current scenario where trees and shrubs are currently the dominant growth forms will be lost and converted to a treeless landscape exposed to the forces of erosion. This is likely to be the main impact of PAPs settling in the designated areas.

Incompatibility of aged PAPs to urban lifestyles: From interviews with diverse categories of PAPs, some expressed apprehension regarding ability to successfully squeeze and live life in an eight acre plot of land, or even to start using toilets where one was just used to the bushes. For others, a lifestyle where one is denied the opportunity to walk around and stretch in their farm or even tend to livestock is likely to mark a drastic departure from what they are used to with potential for drastic results.

Loss of existing neigbourhoods and networks: Upon relocating, PAPs who have lived as neighbours will be dispersed within the resettlement area to the effect that bonds previously existed on account of neihbourhood proximity will be lost permanently and, with them, some social support systems are likely to be lost. Formerly next door neighbours will now have to reorient and register the new addresses while domestic animals will also find it difficult to reorient and establish their routes between home, water and pasture.

Encroachment on remaining reserve land by influx of new PAPs: The Land Use Advisory Plan has identified huge tracts on land that could not be allocated to PAPs on account of location on rough steep terrain while layout of the internal roads will create huge road reserves, sometimes upto five (5) metres wide both of which are likely to be encroached upon by a new generation of speculators. As the demand for land increases, with increase in population pressure, more of the KPA land is likely to be invaded and may prove quite difficult to reclaim in the future.

9.4.3: Impacts from commissioning and operation of the Internal Roads subcomponent

Main benefits of commissioning of the internal roads component will be to open up the resettlement area in Dongo Kundu and Mwangala through providing functional linkage to the Mombasa Southern Bypass Road which is set for commissioning in March 2024. The new road network will among others confer benefits as follows:-

- Opportunities for investment in the transport sector,
- Make it easy for people and goods to move around,
- Will benefit service delivery especially development of the other infrastructure subcomponents such as water supply, market, dispensary and cemeteries.

On the environmental front, delineation of the road reserve will make it possible easy to identify public spaces on which to mount the tree planting programme and other conservation activities

Adverse impacts from commissioning of the road are highlighted in sections below:-

Change in local hydrology and drainage: The road network will complement house construction in increasing the overall ratio of impervious surface in the area with overall increase in the runoff coefficient-the ability of the land to convert rainfall input into surface runoff. As a consequence, more of the rainfall input will be increasingly converted into runoff whose destructive tendency on the land and infrastructure due to erosive capacity is well known. A secondary impact to this is that, such sediment laden runoff will ultimately load into the Port Reitz Creek Ecosystem where, among others, it will compound already pre-existing sedimentation problems.

Increased exposure to hazards of traffic accidents: Once completed, the density of roads serving the Resettlement Areas will be quite high as each of the 1624 plus plots will be served by a murram road. And given the tendency of Kenya drivers to over speed, presence of the road will expose local residents to permanent hazards of traffic accidents especially from outriders.

9.4.4: Impacts associated with Operation of the Public Market

Operation of the public market will be immensely beneficial to diverse stakeholders:-

- It will stabilize food security by making food more readily accessible and in the process, create opportunities for gainful employment either in trade or market jobs,
- Its an opportunity for the County Government to earn revenue
- It will create an opportunity for market traders and other stakeholder to engage and bond

As with other similar facilities, operation of the market will generate copious quantities of solid effluent (garbage), which, alongside liquid effluent comprise the main adverse impact

associated with presence of the facility. Given the close vicinity of the proposed market site to natural drainage, the tendency for such effluent to load into the Port Reitz Creek Ecosystem is quite high.

9.4.5: Impacts from operation of the water supply systems

Operation of the Public Water Supply Project has numerous benefits core among which include:-

- Health benefits associated with provision of clean portable water,
- Creation of job opportunities in operating the system,
- Boosting of household food security through opportunity of limited kitchen gardening relying on waste water,
- Saving on time spent fetching water in far distant places,
- Enhanced security and quality of life for the girl child and women through elimination of hazards associated with fetching water in lonely isolated places,

Source areas impacts in Public Water Supply were addressed in a previous ESIA Study and though acknowledged will not be highlighted here. However, in cases where maintenance of water draw off facilities and leakages lag behind, any non-accounted for water constitutes a major adverse cost to the aquifer and would also pose hazards to public health through creation of breeding sites for disease causing organisms.

9.4.6: Impacts from operation of the Dispensary

Provision and operation of the Dispensary will provide the first line in responding to medical emergencies in the area which, in addition to creating opportunities for employment and deployment comprise the main benefits. Further, presence of the dispensary creates a forum for dissemination of diverse health related services such as Pre-Natal and Post-Natal, Immunization, HIV/AIDs Outreach, Public Health Policies, Strategies and Services among others.

Threats posed to public health by inadequate disposal of medical waste largely comprise the main adverse impact of operating such a facility.

9.4.7: Impacts from operation of the Public cemeteries:

The public cemeteries will avail a designated place where the departed will be rested without fear of future interference. Proposed location of the cemetery grounds however on a steep ground next to an ephemeral river bed exposes the river water to contamination by leachates from the Cemeteries.

9.5: Net pre-mitigation impact

All components of the project under consideration are public goodwill interventions aimed at mitigating would be impacts of public displacement from the SEZ land. Measure identified towards mitigation of observed adverse impacts are outlined in Chapter Ten below.

CHAPTER TEN: THE ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN-ESMP

10.1: Overview

This chapter outlines the Environmental and Social Management Plan (ESMP) proposed to address, resolve and monitor impacts as analysed in Chapter Nine above. The ESMP comprises four core elements namely:- the Impact Mitigation Plan (unveiled in Tables 10.1 and 10.2), the Management Plan (Table 10.3), the Monitoring Plan (Table 10.3 and 10.5), and a budget for implementation (Table 10.6).

10.2: The Mitigation Strategy

The Core Mitigation Strategy is that, the proposed Resettlement and Infrastructure components as proposed under the SEZ are in themselves an intervention in mitigation and are therefore largely beneficial even before mitigation. Towards managing the adverse impacts resulting from the same, to the largest extent possible however, the strategy and action plan in formulating this ESMP is to prevent impact occurrence, then move to mitigate inevitable occurrence-a position secured by ensuring that recommendations made here-in are incorporated into and influence final outcome of the project design process in which case, the latter process also becomes part of the mitigation programme. In pursuit of this strategy, all mitigation will be sealed at Detailed Design Stage by adopting measures as follows:-

- The Environmental and Social Management Plan unveiled in here will be integrated into the Final Design Report- as a standalone chapter and also to moderate design decisions
- The same will be provided for in the BOQs to ensure funding allocation for environmental and social mitigation
- Clauses binding parties to affirmative action on the ESMP will be integrated into Contracts for Construction to ensure that the contractor is legally bound to implement impact mitigation.
- Upon commissioning, all facilities will be promptly handed over to the County Government of Mombasa so as to put in place management structures required in implementation of the ESMP.
- On its part, the KPA will put in place, a governance system to take charge of all non-settled land for purposes of enhancing conservation. This should include lobbying relevant Authorities towards gazzetment of all Kayas within the SEZ.

10.3: Mitigation of Design Stage Impacts:

The Impact Mitigation Plan summarised in Table 10,1 below indicates absence of negative impacts during the construction stage simply because measures had been put in place to forestall would be adverse impacts as follows:-

Use of already existing tracks to access sites: Site disturbance during field surveys has been minimized through use of existing tracks to access sites of interest and always to avoid crop damage.

Mitigation of accidents: Towards mitigation of accidents in field, sober and serious-minded survey teams were selected and sensitized on the need to observe safety requirements during enumeration and site surveys and this has greatly mitigated incidence of accidents.

Management of community level tension: Generous amounts of time and energy were invested in explaining the project and addressing any emergent public concerns with a view to mitigate build-up of tension. The fact that the ESIA Team established offices and operated within the Project Area was a major affront against community dissent.

10.4: Mitigation of Construction Stage Impacts

10.4.1: Mitigation of impacts associated with Construction of PAP dwellings

Thus, even before mitigation, the components enjoy a largely positive profile as exemplified by an overall net P of 7 (Seven positive effects) implying that mitigation can only add value and improve on an already positive impact. Most of the long-term adverse impacts are costs to the local landscape and biodiversity inclusive of the Kaya Ecosystems likely to be occasioned by PAPs action of exploiting the local wood resource in pursuit of building materials at construction and biomass energy to cook their foods once settled in. The mitigation of this long-term impact will require KPA to be physically present to secure their land resource from both the genuine PAPs and land speculators. Specific mitigation will be undertaken as follows:-

Mitigation of rubble heaps left behind by relocating PAPs: This menace will partly be offset by restricting relocation to only PAPs resident outside the Resettlement Areas. However, all relocating PAPs will be required to recover all merchantable and reusable materials following which, they will level up their sites in readiness for the next occupant. In particular, any pits being abandoned will require to be completely filled to eliminate hazards to people and animals.

Mitigation of land degradation from materials sourcing by PAPs: The tendency by relocating PAPs to remove and utilize the trees left behind in building new houses will require to be controlled through enforcement of a decree. Once compensation is paid, thee trees then belong to the KPA and must be treated as such. Early payment of the compensation money will enable PAPs to afford purchase of construction materials in the market which coupled, with enforcement will insure against local sourcing.

In the sourcing of clay for plastering, the KPA should designate sites for harvesting and issue guidelines as to the depths allowable and requisite measures towards rehabilitation. As well, the

KPA should readily avail water to enable PAPs to easily and cost effectively reconstruct their homes.

This is a phase requiring very close monitoring especially to ensure that PAP utilize their Plots alone and respect boundaries and this will require among others, a strong physical presence of the KPA in capacity of Project Proponent and immediate neighbour.

Mitigation of destruction of site biodiversity in land preparation by PAPs: Mitigation will start on the day that PAPs are introduced to their respective sites. Under the ongoing Contract for Services, KPA will issue assist each allotee to take stock of all biodiversity and site layout so as to plan conservation measures. Site management plans will be prepared for each plot to allow for conservation of any special interest biodiversity.

Managing relocation for Vulnerable PAPs: Relocation of vulnerable PAPs will be mainstreamed into the Livelihood Restoration Plan (LRP) in line with provisions of the Compensation Policy Framework. Within this Framework, each vulnerable PAP has been facilitated to choose a neighbor in the form of a trusted caregiver to take charge of both relocation and post relocation concerns for the PAP. Additionally, each Vulnerable PAP is entitled to a cash grant of Ksh 10,000 over and above other cash awards specifically to cater for needs occasioned by vulnerability. The KPA, through the ongoing Contract for Services will closely monitor all relocation in respect of Vulnerable PAPs to insure against manipulation.

Challenges in fitting large families on the same plot: This challenge is acknowledged at all relevant levels of management of the MSEZ. Proposals have been made for land allocation to resettlement a further 640 PAP households currently resident on the land but who missed out in the original allocation but as yet, decisions are yet to be made.

10.4.2: Mitigation of impacts in the civil works for Roads, Water Project, Market, Dispensary and Cemeteries:

All construction will be undertaken under contracts managed by the KPA through a Resident Engineer and essentially generate similar impacts whose mitigation can be generalized.

Mitigation of potential conflict in labour sourcing: In order to forestall a situation whereby PAPs and Contractors are competing for the same labour pool with attendant hikes in labour charges, it is advisable for PAPs to be compensated early enough before onset of civil works. By so doing, such PAPs will complete their building works early and release the labour for deployment in civil works, while also being available for enlistment in the construction works. Now that compensation to PAPs is likely to be handled by the KPA, lobbying for early payment will take place under the Contract for Services.

Mitigation of biodiversity losses during soil and vegetation stripping: This impact is common to all civil works and also emanates from land preparation in construction of PAPs dwellings. As a rule, all stripped topsoil will be carefully stockpiled and then late applied in landscaping non construction sites so as to preserve the genetic reserve. Further measures towards mitigation of biodiversity loss will be unveiled in section 10.5 below.

Towards reconstruction of the carbon sink: A reforestation plan will be implemented to replace the trees to be displaced by the road and to cater for those to be lost to intensified settlement. Reforestation will aim to replace lost trees as documented in section 6.6.6 above. All stakeholders, PAPs and contractors have their allocation of trees to replant as per the ESMP.

Mitigation of slope destabilization and associated siltation into Port Reitz Creek:

All cut and fill areas will require stabilization with both grass and masonry structures. Soil stabilization measures will be put in to prevent soil wash into the creek areas. Towards this,

- Clearing and stripping will be restricted to the pavement area and all downstream vegetation will be retained intact.
- Stuffed gunny bags or other appropriate technology will be deployed to stabilize soil downstream of cut and fill sites.
- Stockpiling of soil and building material will avoid slanting ground and all riparian areas,
- All stockpiled soil will be ring-guarded from intrusion by runoff
- Towards mitigating impacts of excavation and construction immediately upstream of the creek areas, the following actions are prohibited:-
- Use of any chemical banned from use in Kenya,
- Use of any chemical that is harmful to marine life,
- Use of any chemical that persists in the environment or turns harmful upon contact with water,
- Use of equipment that spill oils into the water.

Use of any chemical within the creek areas will require approval by NEMA in consultation with the Kenya Maritime Authority in capacity of Lead Agency. Additionally, movement of construction equipment into the Port area will require approval by the KPA, KMA and obtain requisite permits.

Table 10.1: Mitigation of construction phase impacts

Project phase	**Activity**	**Potential Impacts**	**Severity ranking**	**Proposed Mitigation**	**Severity after Mitigation**
Project design phase	Field surveys and public particpation meetings	Creation of forums for public expression	P		
		Creation of shorrterm employment	P		
		Capacity building for Leadership Structures	P		
		Generation of new data on the project area	P		
Relocation and	Demolising of	Generation of	N	Recoverly for	P

Project phase	Activity	Potential Impacts	Severity ranking	Proposed Mitigation	Severity after Mitigation
reconstruction of PAP dwelings	current PAP dellings	rubble and other waste		re-use and sale	
	Pressure on natural resources- wood, water, mud etc in housing construction	Degradation of of the natural environment and natural resources	2N	Early payment of compensation money. Control of local souring of building wood and soil resources Designation of sites for controlled mud harvesting	N
	Destruction of site vegetation in land preparation for PAP housing construction	Loss of cover vegetation, natural habitat and climate amerioration impact	2N	KPA to issue guidelines for site layout and conservation	N
		Threat on vulnerable and enadangered flora and fauna resources	2N	Insitu mapping of endangered flora for preservation.	N
	Relocation of vulnerable PAPs	Vulnerable PAPs could be rendered destitute and exposed to suffering	N	Implementation of the Vulnerable Peoples Management Plan	0
	Challenges in accomodating large familes on eighth acre plots	Cross family strive and conflict	N	No feasible solution unless additional land is identified	N
Construction of Internal Roads, Water Supply, Public Market, Dispensary and Cemeteries	Opportunities for shorterm bussiness in constrcution and supplies	Cash income to both local and other bussinessment	2P	Shortterm	
	Opportunities for employment in consttruction	Cash income for local population	2P	Shortterm	
	Secondary	Opportunities for	P	Shortterm	

Project phase	Activity	Potential Impacts	Severity ranking	Proposed Mitigation	Severity after Mitigation
	benefits form contracts in construction	small scale bussiness in catering for construction workers, provision of housing , sale of food etc			
	Potential conflict in labour sourcing	Local community could resent influx of speculators	N	Negotiated job placement	0
	Potential escallation of labour costs	Escallation of constrcution costs for PAPs who will be building at the same time	N	Early compensatiion and relocation of PAPs	0
	Stripping of cover vegetation and top soil in land preparation; stockpiling of stripped soil	Loss of biodiversity and habitat	N	Reuse of stripped soil in landscaping. Refforestation with indigenous species	P
		Possible spillage of sediment into natural drainage including the Port Reitz Creek	N	Stockpiles to avoid erosion vulnerable sites	0
	Land degradation in material sourcing and transport sites	Destruction of the landscape, loss of habitat and hazzards to life	N	Sourcing from licensed sources Shortterm	0
	Hazzards posed to other motorists and pedestrians	Potential injury, loss of life and unnecessary expenses	N		0
	Hazzards of introduction of additional invasive species with building material	Further degradation of local biodiveristy	N	Site screening before sourcing	0
	Hazards	Pollution from	N	Maintenance	0

Project phase	Activity	Potential Impacts	Severity ranking	Proposed Mitigation	Severity after Mitigation
	associated with operation of contractor and labour camps	waste oils and spares		only in designated garages for recoverly and disposal	
		Sanitation concerns for workers	N	Always provide adequate gender segragated washroom facilities -	0
		Proliferation of social vices	N	Local sourcing of labourcoupled with strict surveillance	0
		Threats of fire hazzard	N	Contrctor to implement Fire Control Plan	N
	Occupational Health and Safety Hazards in operating Plant and Equipment	Hazzards of potential injury and loss of life	N	Deploy sober competent staff with PPEs under competent supervision	0
		Pollution from fumes, noises and vibrations	N	Shortterm	Irreversible
Summary Scenario after mitigation		• 10P (Ten Possitive Effects) • N (One Residual Effect) • Net Effect: 9P Post Mitigation			

Source: This study

Minimization of degradation in material sourcing and transport: Potential sites for material sourcing are yet to be identified as at the time of finalizing this ESIA Study. Subsequent to, the contractor for internal roads will prepare standalone SPR Studies so as to put in place measures to mitigate degradation in the source areas.

Material supply to construction sites will seek to utilise existing road network where possible while any new opening should target sites earmarked for road development. In the event that new access routes will require to be opened, the same should target areas reserved for roads so that, the same will be graded and late in the source areas.

Mitigation of accidents in material transport: The Contractor will deploy qualified, sober and disciplined drivers who will be sufficiently motivated to adhere to professionalism and standards of quality management.

Insurance against possible introduction of colonising species: Associated with material sourcing is the question of alien species of which *Prosopis chilensis* and *Leceana lucocephala* are the worst culprits in the coastal region. Both weeds establish from seeds ferried in construction material and thereafter, the weeds form aggressive colonies which turn impossible to control especially where roots can access sub-surface saline water. Mitigation of this occurrence will require that sand be source only from fluvial coastal deposits exploited fresh without bulking and provided that the organic layer is stripped and isolated.

In the sourcing of murram, the option will be to subject each identified source to a stand alone SPR Study conducted by respective contractors.

10.4.3: Mitigation of impacts from operation of the Contractor Camp, plant and equipment:

Contingency plans will be prepared covering all aspects of Occupational Health and safety during construction. Key among this is the need to deploy sober staff under supervision, enforcement of a code of operations backed up be insurance cover for all staff. A strict system for ensuring observation of a drug, alcohol, violence free working environment should be enforced. Measures have been identified as follows:-

(a) **Mitigation of impacts in General Health and Safety:**

The Contractor shall comply with all standard and legally required health and safety regulations as promulgated by Occupational Health and Safety Act and the Factories and Other Places of Work Regulations.

- Each Construction Project will be registered as a Place of Work with the DOHS
- The Abstract Poster from Cap 514 will henceforth be strategically posted in a place where its clearly visible by all workers
- The Contractor shall provide a standard first aid kit to field staff;
- The Contractor shall ensure that staff are made aware of the risks of contracting or spreading sexually transmitted diseases, particularly HIV/AIDS and how to prevent or minimize such risks;
- The Contractor shall be responsible for the protection of the public and public property from any dangers associated with construction activities, and for the safe and easy passage of pedestrians and traffic in areas affected by the construction activities;
- All works which may pose a hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the RE. If appropriate, symbolic warning signs must be erected;
- Speed limits appropriate to the vehicles driven are to be observed at all times on access and haul roads. Operators and drivers are to ensure that they limit their potential to endanger humans and animals at all times by observing strict safety precautions;

- No unauthorized firearms are permitted on site;
- The Contractor shall provide the appropriate Personal Protective Equipment for staff.

(b) **Fire Prevention and control:** The Contractor shall take all reasonable and precautionary steps to ensure that fires are not started as a consequence of his activities on site;

- The Contractor shall ensure that there is basic fire-fighting equipment available on site;
- Flammable materials should be stored under conditions that will limit the potential for ignition and the spread of fires;
- 'Hot' work activities shall be restricted to a site approved by the RE;
- Smoking shall not be permitted in fire hazard areas.
- The Contractor shall ensure that all site personnel are aware of the fire risks and how to deal with any fires that occur. This shall include, but not be limited to regular fire prevention talks and drills and, posting of regular reminders to staff.
- Any fires that occur shall be reported to the RE immediately and then to the relevant authorities;
- In the event of a fire, the Contractor shall immediately employ such plant and personnel as is at his disposal and take all necessary action to prevent the spread of the fire and bring the fire under control;
- Costs incurred through fire damage will be the responsibility of the Contractor, should the Contractor's staff be proven responsible for such a fire.

(c) Emergency Procedures: The Contractor shall submit a Method Statement/ Comprehensive Health and Safety Plan covering the procedures for the main activities which could generate emergency situations through accidents or neglect of responsibilities. These situations include, but are not limited to accidents at the work place including falling of the platforms, accidental fires; accidental leaks and spillages and vehicle and plant accidents. Specific to accidents at work place:

- The Contractor shall ensure that his employees are drilled in the procedure for working in sensitive areas including marine areas
- He shall comply with all safety conditions imposed by the Kenya Maritime Authority and other Agencies to ensure safety of workers at all times.
- The Contractor shall also ensure that the necessary equipment for work in hazardous area –protective boots, PPEs, helmets, etc., are provided.
- The Contractor will continuously train employees on safety procedures including use of PPEs.

(d) Mitigation of HIV/AIDS: The contractor in consultation with implementing agencies responsible for HIV/AIDS will mount educational campaigns to keep workers sensitized on the reality of this pandemic. He shall monitor activities regularly to assess effectiveness and impact. This should include an initial, interim and final assessment of basic knowledge, attitude and practices taking account of existing data sources and recognizing the limitations due to the short timeframe to show behaviour change. The assessment will be supported by qualitative information from observations on workers behaviour.

(e) Mitigation of Solid Waste: All storage and construction sites are to be kept clean, neat and tidy at all times. No burying or dumping of any waste materials, metallic waste, litter or refuse shall be permitted. The Contractor must adhere to Environmental Management and Co-ordination (Waste Management) Regulations 2006 and shall implement measures to minimize waste and develop a waste management plan to include the following:-

- All personnel shall be instructed to dispose of all waste in a proper manner;
- At all places of work the contractor shall provide litter collection facilities;
- The final disposal of the site waste shall be done at the location that shall be approved by the RE, after consultation with local administration and local leaders;
- The provision of sufficient bins (preferably vermin and weatherproof) at the camp and work sites to store the solid waste produced on a daily basis;
- Wherever possible, materials used or generated by construction shall be recovered at the conclusion of each task for safe disposal including recycling.
- Provision for responsible management of any hazardous waste generated during the construction works.

(f) Wastewater and contaminated water management: No grey water runoff or uncontrolled discharges from any site or working areas (including wash-down areas) to adjacent watercourses and/or water bodies shall be permitted;

- Water containing such pollutants as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site. This particularly applies to water emanating from concrete batching plants and concrete swills;
- The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses including the creek areas;

- Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered;

- Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted;
- The Contractor shall notify the RE of any pollution incidents on site.

(g) General materials handling, use and storage: All materials shall be stored within the Contractor's camp unless otherwise approved by the RE;

- Stockpile areas shall be approved by the RE;
- All imported fill, soil and/or sand materials shall be free of weeds, litter and contaminants. Sources of imported materials shall be listed and approved by the RE;
- The Contractor shall ensure that delivery drivers are informed of all procedures and restrictions (including 'No go' areas) required;
- Any electrical or petrol driven pumps shall be equipped and positioned so as not to cause any danger of ignition of the stored product;

- Collection containers (e.g. drip trays) shall be placed under all dispensing mechanisms for hydrocarbons or hazardous liquid substances to ensure no contamination from any leaks is reduced;
- Regular checks shall be conducted by the Contractor on the dispensing mechanisms for all above ground storage tanks to ensure faulty equipment is identified and replaced in timely manner;

Only empty and externally clean tanks may be stored on bare ground. All empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.

(h) Mitigation of social impacts of construction crew: To the largest extent possible, each contractor will avoid setting up of labour camps in favour of labour operating directly from homes. Such labour will then be routinely sensitised, assessed and rewarded for good behaviour while simultaneously penalised for offensive behaviour.. Additionally, the Contractor will undertake routing counselling of workers on the need for responsible behavior and will lead by example. Cases of indiscipline, crime and violence will not be tolerated.

(i) Sanitation facilities for workers: OSHA 2007 is clear on the question of sanitation facilities As such, each Contractor will provide adequate and gender segregated toilets, bathrooms and changing areas as appropriate.

10.4.4: Mitigation of loss and damage to cultural and heritage resources

Preservation of the Kaya Culture: Towards preservation of the kaya groves which are locally preserved as centers fort he local indigenous worship, each Kay has been mapped and zoned out for preservation. A standalone report on the status of each of the MSEZ Kayas has been prepared under auspices of this ESIA and attached as Appendix 5.4.

Incorporation of Chance Find and Recovery Procedures: In line with requirements of OP 4.11, the services of the NMK will be retained during construction stage to facilitate monitoring for chance finds which will then be recovered as appropriate.

10.5: Mitigation of Impacts at Operation Stage

Proposed mitigation activities at this stage (Table 10.2) are focused on minimizing hazards associated operation of all subcomponent of the project. As will appear, effective mitigation at operationalization will require two strategic moves namely:-

- The KPA to establish a physical presence at Dongo Kundu
- All sub components to be promptly handed over to respective mandate holders for ease of management

Mitigation details specific to impacts are highlighted in sections below.

Table 10.2: Mitigation of Operation Stage Impacts

Activity	Potential Impacts	Severity ranking	Proposed Mitigation	Net effect after Mitigation
Settling-in of PAPs in the Resettlement	Gains to the National Economy through	2P	Long-term	Irreversible

Activity	Potential Impacts	Severity ranking	Proposed Mitigation	Net effect after Mitigation
Areas	implementation of the MSEZ			
	Opportunity to start life again	2P	Long-term	Irreversible
	Benefits associated with owning a Titled Plot	2P	Long-term	Irreversible
	Creation of new neigbourhoods	2P	Long-term	Irreversible
	Expossure to new opportunities and means to livelihoods	2P	Long-term	Irreversible
	Loss of means to food production upon resettling	2N	Implementation of LRP including PAP Integration into SEZ activites	P
	Over-explotation of wood resources in search of biomass energy and associated loss of habitat and biodiversity	2N	Introduction of alternative sources of Household energy as per LRP	N
	Incompatibility of some aged PAPs to urban livestyles	N	Counselling and intensive outreach programme through MCG	N
	Breakup of exisiting social networks upon resettlement	N	Extensive capacity building as part of LRP	0
Commissioning and operation of the road network	Ease of access and means to doing bussiness	P	Long-term	Irreversible
	Opportunities for investing in the transport sector	P	Long-term	Irreversible
	Change local hydrology due to creation of impervious surfaces	N	Installation anti-scour checks to control erosion coupled with riprap and grass plating to stabilize cut and fill aeas	
			Safe disposal of runoff coupled with harvesting through water pans	P
	Increased expossure to hazzards of road accidents	N	Implementation of a road safety programme	N
Commissioning and operation of the Public market	Stabilization of food security	P	Long-term	Irreversible
	Opportunities for trade in food suppply	P	Long-term	Irreversible

Activity	Potential Impacts	Severity ranking	Proposed Mitigation	Net effect after Mitigation
	Solid and liquid effluent from garbage and market refuse	N	Aply the 3 Rs principle	P
	Opportunity for revenue generation for County Government	P	Long-term	Irreversisble
	Opportunities for employment in the trade	P	Long-term	Irreversible
	Creates a forum for social enagement and bonding	P	Long-term	Irrevresible
Commissioning and operation of the water supply system	Health benefits asociated with easy supply of clean potable water	2P	Long-term	
	Opportunity for limited kitchen gardening for dietary and nutritional security	P	Long-term	
	Saving on time spent fetching water from long distance source	P	Long-term	
	Improved security and quality of life for the girl-child	P	Long-term	
	Employment creation in runiing water kiosks and associated infrastrcuture	P	Long-term	
Commissioning and operation of the Public Dispensary	Increased efficiency in responding to medical emergencies	P	Long-term	
	Provision of a forum for disseminating public health information and services	P	Long-term	
	Threats posed to public health by medical wastes	N	Segregation for appropriate disposal	0
	Creation of job opportunties at the dispensary	P	Long-term	
Christian and Muslim Cemeteries	Provision of a designated site for resting the departed	2P	Long-term	
	Long-term leakage of pollutatnts into local water bodies	N	No known measure for mitigation	N
Net Scenario	• 31P (31 Possitive Effects) • 4 Adverse Effects • ***Net Effect:*** 27P (Overall net positive Effect pre- mitigation)		4 Long-term adverse impacts	4Irreversible Adverse Impacts
Net Secenarion for all Project Phases:				

Activity	Potential Impacts	Severity ranking	Proposed Mitigation	Net effect after Mitigation
• 9P for Construction Phase • 27 for Operation Phase • ***Net Effect:*** 36P (Net Overall Positive Effect after mitigation); 4 Long-term Adverse Impacts all (4) irreversible				

Source: This study

10.5.1: Mitigation of issues related to PAP settlement in the Resettlement areas:

Mitigation of loss of means for economic production and food security: A major objective of resettling PAPs within the SEZ is to integrate them into activities lined up to ensure maximum benefits. As such, where PAPs were previously subsistence farmers, they will now be expected to secure employment and trade opportunities associated with the SEZ and thus upgrade on their livelihoods. Towards cushioning them in the period between relocation and start of the SEZ activities, a Livelihood Restoration Programme will be implemented under which, each landed PAP will be entitled to a cash handout of Ksh 67,500 per acre claimed as a means of further cushioning them from loss of access to land while one member from all vulnerable households will undergo skills development training in readiness for jobs to be created by the SEZ.

Additionally, each PAP will be paid compensation commensurate with the productive resources and assets likely to be lost in relocation.

Mitigation of further loss of cover vegetation in pursuit of biomass energy: Energy consumption is largely ordained to the energy ladder which depends on the purchasing power of consumers. It is thus expected that as the income of households upgrade, the tendency to rely on cleaner , high calorie fuels will also go up the first level, in which case, the first step is to ensure that as many PAPs as possible secure both employment and income generating opportunities within the SEZ. This is the reason behind implementation of the Livelihood restoration plan (LRP) already under development by the KPA.

Under the LRP, PAPs will further be introduced to energy saving technologies and energy efficient cookstoves whose production can also be taken up as an economic venture.

Management of Elderly and Vulnerable PAPs: Under the LRP, all elderly and vulnerable PAPs will be intensively monitored to determine effectiveness of the caregiver in mitigating relocation related stress. The same PAPs will be monitored for continued access to regular and relevant GOK outreach programmes such as the cash Transfer Programme, familine relief, etc.**:** Under the LRP, all elderly and vulnerable PAPs will be intensively monitored to determine effectiveness of the caregiver in mitigating relocation related stress. The same PAPs will be monitored for continued access to regular and relevant GOK outreach programmes such as the cash Transfer Programme, familine relief, etc.

Cushioning of social networks: Under the Contract for Services in RAP Implementation and ESIA Studies, PAPs will be aggresivelly mobilized to retain current networks and forge others as need arises.

10.5.2: Mitigation of operation stage impacts from roads:

Mitigation of change in hydrology and attendant erosion and sedimentation threats: All unstable sites will be fitted with antiscour measures, grass and riprap to stabilize the oos exposed soil and control erosion. Each road will be fitted with mitre rains and culverts to safely dispose runoff to natural drainage, Tapping of such runoff for water supply could further forestall erosion and sedimentation threats.

Mitigation of traffic accidents: Once completed roads are handed over to the County Government, the latter will roll out a road safety campaign in collaboration with relevant stakeholder such as local community, Traffic Department, National Transport and Safety Authority-NTSA among others.

10.5.3: Mitigation of solid and liquid menace from operation of the Public Market and Dispensary

Once completed, the Public Market and Dispensary will be handed over to the County Government of Mombasa for operation. The CGM will deploy relevant management staff who will clean the facilities and arrange for garbage sorting under the Three Rs principle. And given that there is no Public Dump yard within Mombasa Southern mainland, the County Government could activate the site provisioned for one within the Land Use Plan.

10.5.4: Mitigation of leachates from the Public Cemeteries

There is no known practical method of trapping and isolating cadaver leachates from reaching releasing into water resources. Probably, public cemeteries should offer the option of cremation.

10.6: Effectiveness of the Mitigation Programme

10.6.1: Viability of Mitigation

Effectiveness of the proposed mitigation programme has been assessed based on analysis of impact prevalence before and after mitigation (Table 10.3) based on this analysis, this Environmental and Social Impact Assessment Study observes that, there is a great potential to mitigate adverse impacts and hence improve the net worth of the project. From Table 10.3, it is apparent that application of mitigation measures as identified and recommended has potential to increase the net worth from 6P before mitigation to a tall of 36P after mitigation.

Table 10.3: Analysis of impacts scenario before and after mitigation

Nature of impact	Pre-mitigation tally	Post-mitigation tally
Positives	38P	41P
Negatives	32N	5N
Net	6P	36P

Source: This Study

10.6.2: Prevalence of residue impacts

This study observes that 24 of the 34 adverse impacts associated with the project will persist even after mitigation. These are the impacts whose probability can be reduced substantially through mitigation but cannot be eliminated entirely. Their management requires implementation of a strict monitoring programme as outlined elsewhere below.

10.7: The Environmental and Social Monitoring Plan

10.7.1: Overview of the ESMP

Modalities for mitigation of impacts and their phasing are presented in the Environmental and Social Management Plan provided in Table 10.4 below. From Table 10.4, it is apparent that most of the mitigation activity will take place during the construction phase. However, planning for the mitigation will take place at design stage (this stage) to ensure that such mitigation is incorporated and allocated for in the project design. Thus, the first action in mitigation will be a thorough scrutiny of the Design Report to ensure that the ESMP provided in this report has been fully incorporated and allocated for. Further, all mitigation to be implemented during civil works will be allocated for in the Bills of Quantities and captured in the Contract for Construction. The KPA will hire a qualified Resident Engineer to ensure full implementation of contractual tasks in mitigation.

10.7.2: Feasibility of impact mitigation

Majority of impacts have readily available means for mitigation while some of the negative impacts will acquire positive effects after mitigation. Thus, upon application of the Impact Mitigation Programme, majority of the impacts are dispensed with and the project is likely to achieve an overwhelming net positive effect. It is expected that there will be no land acquisition within the scope of the proposed work.

10.7.3: Phasing of mitigation action

Mitigation of impacts associated with civil works has been planned in the design and allowance has been made in the Bills of Quantities (BOQs). Also the contract for civil works bears several relevant clauses binding the contractor to implement environmental and social management as outlined in Table 10.4 below.

10.7.4: Responsibility for mitigation

As per the ESMP below, responsibility for mitigating impacts of civil works falls on the contractor under the supervision of the KPA or his appointed representative. At the Operation Stage, each subcomponent will be handed over to the Mombasa County Government for both Management and Oversight with KPA retaining the right and responsibility of monitoring activities of resettled PAPs. Particularly, KPA has a huge responsibility to preserving their reserve land from encroachment by both current and new PAPs. .

10.7.5: Costs in environmental mitigation and monitoring

The sums of Ksh 112,998,520.00 (Read Ksh One hundred and Twelve Million, Nine Hundred and Ninety Eight Thousands, Five Hundred and Twenty) will be required in implementing mitigation as outlined in Table 10.4 below.

10.8: Environmental and Social Monitoring Requirements

10.8.1: Terminologies

Environmental monitoring refers to the systematic collection, analysis and interpretation of data on environmental parameters through periodic measurements. Accruing information would facilitate tracking of levels of anticipated impacts and to monitor compliance in implementation of mitigation measures. Through periodic observations, it is possible to detect and remedy previously non-anticipated impacts before they turn catastrophic. Further, through continuous assessment of both the negative and positive benefits of a project, it is possible to determine the net impact (change) emanating from a project and thus determine its worth. Environmental monitoring falls in three categories as follows:-

- Baseline studies to document local environmental conditions of the project site. Since project impacts are generated by interaction between local environmental conditions and project activities, a study of baseline conditions facilitates prediction of impacts as already undertaken in Chapter Six of this EA study.
- The documented baseline environment also provides a permanent benchmark against which long-term changes due to project activities can be monitored.
- Routine measurement of effects through measurements on environmental parameters is undertaken during project implementation and operation so as to detect changes attributed to the project.

Compliance monitoring is effected through regular review of monitoring returns coupled with independent periodic sampling of environmental parameters and indicators. By evaluating the level of parameters against previously agreed standards, the supervising authority is able to monitor compliance with regulatory requirements. Surveillance and routine inspections also form part of compliance monitoring.

Table 10.4: Matrix for Environmental and Social Management and Monitoring Plan (ESMMP)

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
Project design phase	Field surveys and public particpation meetings	Creation of forums for public expression						
		Creation of shorrterm employment						
		Capacity building for Leadership Structures						
		Generation of new data on the project area						
Relocation and reconstruction of PAP dwelings	Demolising of current PAP dellings	Generation of rubble and other waste	Recoverly for re-use and sale	Individual PAPs	Compensation proceeds	KPA	No debri left behind	Daily
	Pressure on natural resources-wood, water, mud etc in housing construction	Degradation of of the natural environment and natural resources	KPA to deploy scouts to control local soucring of building wood and soil resources	KPA	1080000	KPA	Guards hired, Monthly Incidence Reports	Monlthy
			KPA to lobby KFS to gazette all ain Kayas into Forest Reserves under Forest Act 2013	KPA	Inbuilt	KPA	Periodic progress reports	Periodic
			KPA to undertake fencing and refforestation in Kaya Miongani, Ngombeni and Mwanakuku combined area of 8.5ha	KPA	3000000	KPA	Field progress reports	Monthly
	Destruction of site vegetation in land preparation for PAP housing construction	Loss of cover vegetation, natural habitat and climate amerioration impact	KPA to issue guidelines for site layout and conservation	KPA	Ongoing	KPA	No. of sites built as per plan	Quarterly inspections
		Threat on vulnerable and enadangered flora and fauna resources	Insitu mapping of endangered flora for preservation.	Contract for Services	Ongoing	KPA	Mapping Report submitted	Quarterly inspections

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
	Relocation of vulnerable PAPs	Vulnerable PAPs could be rendered destitute and exposed to suffering	Implementation of the Vulnerable Peoples Management Plan	Contract for Services	Ongoing	KPA	Implementation Reports	Daily
	Challenges in accomodating large familes on eighth acre plots	Cross family strive and conflict	No feasible solution unless additional land is identified					
	Alteration of local hydrology of resettlement area through generation of roof runoff	Erosion hazards from non mananaged roof runoff	KPA to promote technology for low-cost water harvesting and storage	KPA	3,200,000	KPA	Training Report	Monthly
Construction of Internal Roads, Water Supply, Public Market, Dispensary and Cemeteries	Opportunities for shorterm bussiness in constrcution and supplies	Cash income to both local and other bussinessment						
	Opportunities for employment in consttruction	Cash income for local population						
	Secondary benefits form contracts in construction	Opportunities for small scale bussiness in catering for construction workers, provision of housing , sale of food etc						
	Potential conflict in labour sourcing	Local community could resent influx of speculators	Negotiated job placement to ensure employing the locals, gender equity and equality (apply Kenya Constitutional Requirement on gender throughout the project)	PAPs Commi ittee	720,000	KPA	Minutes of PAPs Committee	Monthly

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
			to be observed and considering of People living with disabilities					
	Potential escallation of labour costs	Escallation of constrcution costs for PAPs who will be building at the same time	Early compensation and relocation of PAPs	KPA Compensation Budget	Committed	KPA	Resettlement Report	Monthly
	Stripping of cover vegetation and top soil in land preparation; stockpiling of stripped soil	Loss of biodiversity and habitat	Reuse of stripped soil in landscaping.	Cotract for works	Inbuilt	KPA	Approved Contruction Report	Monthly
			Refforestation with indigenous species	Each of 1648 PAPs to plant 20 trees to mark boundaries on individual plots	3,296,000	KPA	Total trees planted	Monthly
				Contractor for roads to plant 13588 on either side of 33.97 Kilometers of roads	4,076,520	KPA	Total trees planted	Monthly
				Contractor for Market, Dispensary and Cemeteries to plant 100 trees each	90,000	KPA	Total trees planted	Monthly

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
				Contractor for water to plant 20 trees on each of 7 Water Kiosk sites	42,000	KPA	Total trees planted	Monthly
		Threat of dust emmissions from earthworks	Perioding wet curing of the soil	Contract for works	Inbuilt	KPA	Approved Contruction Report	Monthly
		Possible spillage of sediment into natural drainage including the Port Reitz Creek	Proposed stockpile site for Road contractor to undergo ESIA Study separate	Contract for Works	1,250,000	KPA	EIA License for tockpile site	Quarterly
	Land degradation in material sourcing and transport sites	Destruction of the landscape, loss of habitat and hazzards to life	Sourcing from NEMA licensed suppliers, quarries and borrow sites	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Monthly
	Hazards posed to other motorists and pedestrians	Potential injury, loss of life and unnecessary expenses	Contractor for roads to Implement an aggressive road safety campaign	Contracts for works	2,500,000	KPA	No of drivers trained and sensitized	Monthly
	Hazzards of introdcution of additional invasive species with building material	Further degradation of local biodiveristy	Contracor for roads to hire environmentalist who will screen all sources before supply	Contract for Works	2,500,000	KPA	Approved Site Screening Reports	Quarterly
	Hazards associated with operation of contractor and labour camps	Pollution from waste oils and spares	Maintenance only in designated garages for recoverly and disposal	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Monthly inspections
			proper segregation of bins, licensed waste handler, the contractor to prepare a site waste management plan and	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Monthly inspections

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
			responsibility					
		Sanitation concerns for workers	Always provide at least 10 gender segragated washroom facilities for construction workers	Contract for Works	5,824,000	KPA	Approved Construction Report	Quarterly inspections
		Proliferation of social vices	Local sourcing of labour coupled with strict surveillance	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Daily
		Threat of spread of HIV&AIDs	Aggressive counselling, voluntary testing and continued sensitization.	Contract for Works	2424000	KPA	Periodic Reports	Monthly
		Threats of fire hazzard	Contrctor to implement approved Fire Control Plan	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Quarterly inspections
	Occupational Health and Safety Hazards in operating Plant and Equipment	Hazzards of potential injury and loss of life including injury from expossure todust, noise, fumes and vibrations	Contrators site to be registered as ***A Place of Work*** under OSHA 2007	Contract for Works	Inbuilt	KPA	Registration Certificate from DOSH	Once
			Provide adequate barriers, information, signage and reflective tapes all construction area and material site	Contract for Works	Inbuilt	KPA	Approved Contruction Report	Once
			Deploy sober qualified staff under competent supervision	Ditto	Ditto	Ditto	No of accidents reported	Daily
			Provide adequate and appropriate PPEs for staff estimated at 100	Contrct for Works	3,000,000	KPA	No of staff wearing appropriate PPEs	Daily

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
			Mount an aggressive safety campaign	Contract for Works	Same vote with Road Safety	KPA	No of Staff trained	Monthly
			Contractor to deploy only serviceable plant and equipment	Contract for Works	Inbuilt	KPA	Service records for Plant and Equipment	Monthly
			Plant Operators to work only for stipulated hours daily	Contract for Works	Inbuilt	KPA	Staff Deployment Records	Monthly inspections
Commissioning and operation phase	Settling-in of PAPs in the Resettlement Areas	Gains to the National Economy through implementation of the MSEZ	Long-term					
		Opportunity to start life again						
		Benefits associated with owning a Titled Plot						
		Creation of new neigbourhoods						
		Expossure to new opportunities and means to livelihoods						
		Loss of means to food production upon resettleing	Implementation of the Livelihood Restoration Proframme including skills upgrading training as per CPF	KPA	80,000,000	KPA	No of PAPs trained	
			Priority job placement in the SEZ for PAPs	PAPs Committee	Same vote as for Negotiated Job Placement	KPA	Number Youths employed in SEZ	Monthly
			KPA to grant PAPs continued access to non utilised SEZ land under lease	KPA	Inbuilt	KPA	Number of Lease Agreements signed	Quarterly

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
			aggreements					
		Over-explotation of wood resources in search of biomass energy and associated loss of habitat and biodiversity	KPA to mount a programme to promote alternative sources of Household energy as per LRP	KPA	2420000	KPA	Number of PAPs using implroved cookstoves	Monthly
		Incompatibility of some aged PAPs to urban livestyles	KPA to mount aggressive counselling and outreach programme through MCG as	KPA/MCG	Ongoing Contract for Services	KPA	Number of Vulnerable PAPs counselled	Monthly
		Breakup of exisiting social networks upon resettlement	Part of LRP				Number groups reenergised through mobilization	
	Commissioning and operation of the road network	Ease of access and means to doing bussiness	Long-term					
		Opportunities for investing in the transport sector	Long-term					
		Change in local hydrology dues to creation of impervious surfaces	Safe disposal and harvesting of runoff into water pans (6No.)	Contract for Works	6 000000	KPA	Approved construction reports	Monthly
		Increased expossure to hazzards of road accidents	Contractor to Install adequate safety features (speed control bumps, warning signage, etc)	Contract for works	Inbuilt	KPA	Approved Design Report	Quarterly

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
			Promopt handover of completed roadds to the County Government of Mombasa	Contract for Works	Inbuilt	KPA/MCG	Handing over reports	Once
			Residents to mount an aggressive road safety programme	Contract for Services	Ongoing	KPA/MCG	Periodic Reports	Periodic
	Commissioning and operation of the Public market	Stabilization of food security	Long-term					
		Opportunities for trade in food supply	Long-term					
		Solid and liquid effluent from garbage and market refuse	Market to be prompltly handed over to MCG who will deploy a market supritendant and cleaner	Contract for Works	Inbuilt	KPA/MCG	Handing over reports	Monthly inspections
			A Market management Committee to be formed	Contract for Services	Ongoing	MCG	Periodic Reports	Periodic
			One of the conservation groups to be mobilised to undertake recoverly, recycling and composting applying the Rs principle	Contract for Services	Ongoing	MCG	Periodic Reports	Periodic
		Opportunity for revenue generation for County Government	Long-term					
		Opportunities for employment in the trade	Long-term					

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
		Creates a forum for social enagement and bonding	Long-term					
	Commissioning and operation of the water supply system	Health benefits asociated with easy supply of clean potable water	Long-term					
		Opportunity for limited kitchen gardening for diestary and nutritional security	Long-term					
		Saving on time spent fetching water from long distance source	Long-term					
		Improved security and quality of life for the girl-child	Long-term					
		Employment creation in runiing water kiosks and associated infrastrcuture	Long-term					
	Commissioning and operation of the Public Dispensary	Increased efficiency in responding to medical emergencies	Long-term					
		Provision of a forum for disseminating public health information and services	Long-term					
		Threats posed to public health by medical wastes	Dispensary to be promptly handed over to the Mombasa County Government	Contract for works	Inbuilt	KPA	Handing over reports	Once

Project phase	Activity	Potential Impacts	Proposed Mitigation	Responsible Cost Head	Cost (Ksh)	Responsibility	Objectively Verifiable Indicator	Monitoring and Reporting frequency
			County Government to immdedeately deploy professional staff who will operate the facility	County Government Revenue	Internal to MCG	MCG	Routine Reports	Monthly inspections
			Segregation of waste for appropriate disposal					Daily
		Creation of job opportunties at the dispensary	Long-term					
	Christian and Muslim Cemeteries	Provision of a designated site for resting the departed	Long-term					
		Long-term leakage of pollutatnts into local water bodies	No known measure for mitigation					
Total Budget in implementing the ESMMP					**112,998,520**			

To be successful, monitoring and evaluation begins with clear project design followed by identification and elaboration of appropriate criteria and indicators. This document provides guidance about incorporating monitoring and evaluation elements in each stage of the project cycle.

10.8.2: Requirements of the 'Impacts monitoring' programme

Table 10.4 provides the framework proposed for biophysical monitoring. At construction stage, the Contractor will conduct biannual monitoring for all parameters specified mainly through sampling (pollutants) and counts in case of flora and fauna. In case of pollutants, samples will be analysed at an outsourced laboratory.

Table 10.5: Framework for environmental monitoring

Parameter and method	**Specific location**	**Monitoring criteria**
Ambient air quality through sampling and laboratory analysis	During construction: Pipeline installation sites, road construction sites, land development site and along the transportation route of soil for embankment (six sites in total) During operation: Three locations along road(s)	Particulate Matter (PM2.5, PM10), Carbon Monoxide (CO), Nitrogen Oxides (NO_2), Sulphur Oxides (SO_2), Lead (Pb), Ozone(O_3)
Noise through onsite measurement	During construction: 2 locations at the construction site boundary, and 3 locations in the residential area During operation: 3 locations along road(s)	Equivalent sound Level (Leq: dB), Vibration level (dB), Traffic volume (at sites which is impacted by road traffic noise)
Coastal water quality through sampling and laboratory analysis	During construction: three locations around the land development area	Color, Water Temperature, pH, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Turbidity (surface and bottom layer of water), Oil/Grease (Petroleum Ether Extracts), Suspended solids (SS), Total Coliforms

Floral monitoring and counts	Entire RA	*Julbernardia magnistipulata* *Cola minor* *Dalbergia melanoxylon* *Delonix baccal* *Lannea schweinfurthii* *Milicia excelsa* *Millettia usaramensis* *Sideroxylon inerme* *Sterculia africana* *Vitellariopsis kirkii* *Vitex ferruginea* *Rhynchosia velutina* *Rhynchosia velutina* *Zanthoxylum holtzianum* *Canthium glaucum*
Bird monitoring and counts		*Terathopius ecaudatus* *Ciconia microscelis* *Polemaetus bellicosus*

Source: ESIA Study Team

10.8.3: The Compliance Monitoring Strategy

This activity is essential to ensure implementation of recommended mitigation measures and to thus secure the overall environmental quality of any project. The monitoring activities should primarily target implementation of recommended mitigation measures in addition to surveillance for new impacts. Table 11.5 provides an M&E matrix for the MSEZ-RSIP Project with a full complement of criteria and indicators. In addition to specification of impacts and required mitigation activities, the plan also identifies key players in each activity and the recommended timing of interventions. The Environmental and Social Action Plan for the MSEZ Resettlement Site Infrastructure Project Bridge Project also essentially constitutes its compliance monitoring program. Key features of the compliance monitoring programme are as follows:-

The Monitoring Authority: The burden of implementing impact mitigation will fall on the Project Contractor under supervision by KPA in the capacity of Employer. Through the

Supervisor of Works (SOW), KPA will monitor activities of the Contractor to ensure compliance with contractual requirements including implementation of this EMP. Where issues not anticipated in this report do arise, the SOW will notify KPA for action.

10.8.4: Monitoring Reports

A number of monitoring reports will be developed as follows:

ESIA Study Report under Cap 387: This ESIA Study Report as currently prepared provides a documentation of the baseline environment of the area traversed by the MSEZ-RSIP as proposed and thus provides a useful datum against which future monitoring can take place. The ESIA Study Report also includes a project-specific ESMP detailing the means for mitigating identified impacts. It therefore lays the basis for monitoring.

Annual Audit Reports: The MSEZ-RSIP will be subjected to an annual environmental audit in line with Cap 387. The report will include a summary of the environmental performance of the facility/enterprise vis-à-vis the Environmental Management Plan prepared and, a synthesis of Emergent Concerns.

Signed minutes of Monthly Site Meetings: Following every site meeting, minutes of deliberations will be produced by the SOW, confirmed, signed and adopted as a basis for following up on Contractor's activity.

CHAPTER ELEVEN: CONCLUSIONS AND RECOMMENDATIONS

11.1: The Mombasa Special Economic Zones

Since 2013, the Government of the Republic of Kenya has been developing the Mombasa Special Economic Zone with a view to attracting Foreign Direct Investment in Port related enterprises and in the process create employment and boost export-based revenue thus providing a firm underpin to the Economic Pillar of Kenya Vision 2030. In 2013, the MSEZ underwent a Feasibility Study under auspices of the Ministry of Industrialization and Enterprise Development with support of JICA, leading to development of the Master plan for the Mombasa Special Economic Zone which targets the 3006-acre property in Dongo Kundu-Likoni sub-County owned by the Kenya Ports Authority.

Implementation of the Masterplan however required resolution of land access challenges occasioned by presence of squatters who have settled on and converted the 3006-acre Dongo Kundu property into a rural settlement boasting of 1648 land owners, a resident population totaling 2792 people (579 Households) and 2585 built structures distributed in the six Villages of Dongo Kundu, Mbuta, Mwangala, Kaya Mtongwe, Mrongondoni and Tembo Siji all of which together make the Mbuta Location. The Community also boasts of one Primary School at Mwangala, a Health Center at Mbuta, an Administrative Complex at Dongo Kundu, seven churches, four mosques and fourteen Kayas of which, six are major.

11.2: The MSEZ Resettlement Site Infrastructure Project (MSEZ-RSIP)

Towards resolution of the squatter problem, a Resettlement Action Plan–RAP was commissioned by the KPA in 2018 and later on validated by the National Land Commission (NLC) in 2020. In their determination, the NLC observed that the MSEZ land belongs to the government and was therefore not eligible for compulsory acquisition, in which case, NLC made provision to only pay compensation for developments to land leaving the government to find a solution to the land issue. A Compensation Policy Framework (CPF) which provides for internal resettlement of the squatters through creation of two resettlement sites within the SEZ was developed by the KPA and later adopted by the government in 2022. Under the Policy, each of the 1648 MSEZ Squatters will be allocated an eighth-acre plot for settlement while the NLC pays compensation for all developments on the land as per the RAP, upon which, they will surrender currently occupied lands for development of the SEZ.

As conceived, the Mombasa Special Economic Zone Resettlement Project unveiled in this Chapter comprises two main components namely:-

The Resettlement Sites: Design of the entire Mombasa Special Economic Zones Resettlement Site Infrastructure Project (MSEZ-RSIP) was executed by the State Department for Lands and Physical Planning (SDLPP) on behalf of the Kenya Ports Authority. The Resettlement Area comprises two sites designated Resettlement Area A and Resettlement Area B in which, each of the 1624 PAPs will receive either eighth or a third-acre plot for housing. The KPA property at Dongo Kundu comprises 4 pieces of land totaling 1223ha (Table ES 01). The lands targeted for resettlement fall under MSA/MS/Block IV/250 and MSA/MS/Block IV/251. All plots are held on a 99 years lease with effect from 1987.

The Infrastructure Component: The Infrastructure component comprises facilities to be installed within the Resettlement Area namely:-

- Internal Roads (33.98Km) and Drainage (18.50 Km)

- Water Supply Infrastructure (Pumping station-1 No., Water transmission pipeline-5.4 Km, and Water Kiosk-5 No.)
- Health Centre (1 No.)
- Market (1 No.)
- Cemetery (2 No.)

The total cost in driving the Infrastructure component based on the Bills of Quantities is Ksh 663,104,460 (Kenya Shillings, six hundred and sixty-three million, one hundred and four thousands, four hundred and sixty only). Of this amount, the roads component is significant as it accounts for 72.4% of the entire cost.

11.3: Progress and scope of the ESIA Study

The ESIA Study for MSEZ-RSIP was undertaken in full compliance to the Environmental Management and Coordination Act-EMCA-1999 (Cap 387) and its 2015 Amendment. In line with Regulation 11(1) of LN 101 of EMCA, The Mombasa Special Economic Zones Resettlement Project was scoped following which Terms of Reference for this ESIA Study were prepared for review by NEMA. The TORs were thereafter approved vide NEMA TOR 624 thus paving the way for the full cycle ESIA Study to proceed. A full cycle ESIA Study entailing Scoping, Detailed Investigations, Public Review and Final Report Stage activities was designed and undertaken.

11.4: Core outcomes of the ESIA Process

Activities of the Detailed ESIA Stage followed the Study work-plan approved as part of the Scoping Report and progress has been achieved as follows:-

Review of baseline data: Available data and reports for the Mombasa Mainland South and Dongo Kundu was reviewed so as to assemble a profile of the baseline pre-project scenario.

Documentation of the Project Intervention: Towards documentation of Project Intervention, both the Land Use Advisory Plan developed by the State Department for Lands and Physical Planning and the Design Report for Infrastructure Component were reviewed alongside the Compensation Policy Framework. Each intervention proposed under the infrastructure project was analyzed and documented in terms of scope, scale, resource requirements including target site. It is the potential interaction between project intervention and prevailing baseline that is likely to occasion adverse impacts.

Documentation of the Policy, Legal and Institutional Framework: All these were reviewed and documented so as to set the legal limits of the ESIA Study.

Execution of baseline studies: Baseline studies were executed with the objective of documenting then pre-project baseline against which future monitoring will take place. Stand-alone reports were generated from studies as follows:-

- Baseline socio-economic survey for the entire Dongo Kundu households
- Stratification surveys with special interest groups;- vulnerable PAPs, school going children, herbalists, diviners and healers, etc

- Floral mapping survey for the Resettlement Sites
- Mapping Survey for the Dongo Kundu Kayas
- Bird counts for the entire Dongo Kundu area
- Air quality surveillance on nine sites within the proposed resettlement areas
- A Climate Change Mitigation Plan

Stakeholder Engagement and Public Participation:
Stakeholder engagement applied diverse means including entry point meetings with leaders, public Baraza with potentially displaced community, dissemination seminars, Focus Group Discussions with special Interest groups (widows, widowers, herbalists, Kaya Elders, Religious Leaders, school going children), Key Informant Interviews with lead Agencies among others.

Data analysis and impact prediction:
Upon data analysis, potential environmental impacts (both positive and adverse) were predicted based on available tools. The magnitude, significance, and acceptability of predicted impacts were evaluated with a view to determining whether observed adverse impacts are significant enough to warrant mitigation. The potential environmental impacts were described in both quantitative and qualitative terms through application of existing body of knowledge, checklists, flow charts, and monographs and from input from diverse stakeholders. In particular, impact prediction in this study drew heavily on five documents namely:-

- The Third Schedule to Legal Notice 101
- JICA Guidelines for Environmental and Social Considerations (2010)
- The World Bank Safeguard Policies
- The Checklist of Environmental Characteristics developed by the Department of Environmental Affairs of the Republic of South Africa and,
- The Reference Guidelines for Environmental Assessments (which incorporates the Leopold Matrix) developed by USAID / REDSO / WCA–Abidjan.

Formulation of an Environmental and Social Management Plan
Measures or interventions necessary to minimize, reduce, avoid, or offset identified adverse impacts were evaluated and presented in form of an Impact Mitigation Plan for the proposed development. Such evaluation also included an assessment of Project Alternatives. The ESMP also identified modalities for monitoring and evaluation to ensure compliance in implementation of proposed mitigation measures. This involved development of monitoring indicators and procedures for continuous generation of project monitoring data and information.

Reporting procedure
The ESIA Study methodology as described above culminated with production of a Draft Environmental and Social Impact Assessment Study Report formulated in line with Regulation 18 of Legal Notice 101 of EMCA.

11.5: Core findings from the Baseline Mapping Studies

Climatic Potential: Rainfall occurrence in Kenya's coast region is associated with the semi-annual passage of the Inter-Tropical Convergence Zone (ITCZ) and the monsoons – the North Easterly Monsoon (NEM) from December to March and the South Easterly Monsoon from May to October. Mean annual rainfall in the MSEZ area is 1031mm. Most of the rainfall occurs between the monsoons when convection activity is enhanced. Annual rainfall is delivered in one long season lasting from March to July and a minor one in October and November. With a long-term average of 275 mm, May is the wettest month in the project area while the period between January and mid-March is the driest. Long-term climate ranges from transitional semi-humid to semi-humid.

Dominant Ecosystems: Vegetation of the Dongo Kundu site of the proposed MSEZ was once part of the East African coastal forests-ecologically important and highly threatened centres of endemism for plants (c 550 spp.); mammals (6 spp.); birds (9 spp.); reptiles (26 spp.); frogs (2 spp.); butterflies (79 spp.); snails (>86 spp.); and millipedes (>20 spp.). However, on account of many factors mainly anthropogenic, the original vegetation was systematically lost and will only be found in a few dwindling patches of forests called Kayas, locally revered as centers for traditional worship.

Bush fallow is apparently the most dominant cover type within the target resettlement area accounting for 55.8% of the land followed by secondary thicket at 31.5%. Closed canopy forests and associated woodlands (Kaya Miongani) account for only 12.7% of the land area. Thus, vegetation at the resettlement site is largely dominated by bush fallow comprised of abandoned grasslands and farmlands followed by secondary thickets at diverse stages of regeneration and only broken by scattered homesteads at the ridge tops. The once flourishing closed canopy forest that connected the Shimba hills forest to the mangroves on the Indian Ocean Coastline has now been reduced to isolated patches mainly within the Kaya enclaves accounting for a partly 2.3% of the land area.

Secondary thickets have the highest species diversity in the MSEZ Arba y followed by woodlands while closed canopy forests, farmlands and bush fallow follow closely. Trees are the dominant growth form across all vegetation types followed mainly by shrubs, crops or grass depending on the vegetation type. As such, and contrary to expectation, secondary thickets and woodlands harbor the highest species diversity in Dongo Kundu Area compared to closed canopy forests with woodlands even displaying a much higher count of tree species compared to the closed canopy forests.

A total count of 210 vascular plants as recorded in the study area compares favorably with the count of 203 observed for the area (Pakia, 2015) but compares very unfavourably with the count of 2489 species observed for the entire coastal region.[4] Trees remain the most dominant growth form with a count of 120 equivalent to 57.14% of the total species recorded, followed by

[4] Ngumbao, Veronicah Mutele, et. al; (2020): An annotated checklist of the coastal forests of Kenya, East Africa. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7237506/#

shrubs, herbs and lianas with a combined count of 58 equivalent to 27.62% with grasses coming a distant third at 10.48%. An over-dominance of species diversity by trees followed by Shrubs and lianas is an indication of a once thriving forest formation which has been degraded through selective exploitation and conversion to farmlands and settlements, a trend confirmed by the high presence of crops which, at 22 account for 10.48% of the floral diversity.

20.5% of the entire floral biodiversity of 210 vascular species are introduced (exotic) while the bulk, at 79.5% are indigenous to the area. The stocking density counted for all the 210 vascular species recorded in the Study Area, is 98,837 standing trees most of which are juvenile to medium sized. However, the top six most stocked tree species are all exotic accounting for 27.8% of all wood stocks in the area with both the Neem *(Azadirachta indica)* and Jujube *tree (Zizuphus mauritania)* being dominant. Given that most of the trees are saplings, it is apparent that regeneration of forests in the Study area is dominated by exotic colonising tree species which have been known for similar tendencies in other areas of the coast region especially in Kilifi County.

Each of the 210 individual species identified were analysed for conservation status through screening against the IUCN Red Data Local Tools. A total of 15 species were found to be of conservation interest with five (5) being near threatened; Eight (8) being Vulnerable and Two (2) being endangered. Fig. 5.6 presents a map of their distribution in the Study area.

Occurrence of Birds: A total count of 136 bird species was recorded out of which, 11 species are observed to feature in the AEWA checklist. One bird species (*Ciconia microscelis*) is Near Threatened and another one (*Polemaetus bellicosus*) is classified as Endangered as per the IUCN Red Data listing.

11.6: Core findings from Stakeholder Engagement Process

A total of 67 meetings were conducted under auspices of this ESIA Study for the MSEZ-RSIP through which a total attendance of 6,567 participants was netted. Core concerns were expressed as follows:-

Local Employment: Consultations with different stakeholders brought out the need of the local community to be priority in job opportunities in the project area.

Size of Plots to be allocated: Though landed PAPs will be provided with titled plot, they expressed their dissatisfaction with the size of plot noting that the plot was inadequate to accommodate more than one household. PAPs expressed their fear on where to take their livestock saying that the provided plots have no room for livestock keeping nor farming activities. This concern was also aired by religious groups which deemed the size of plot too small to accommodate their developments and plan for future developments.

Additional land: This was brought about by the fact that the majority of residents in the project area are non-landed raising the question of where they will be resettled considering the 1/8 plot cannot accommodate many households. The need for additional land was evidenced by the number of PAPs who flock the resettlement office requesting for additional land after

Cabinet Secretary for trade and Investment, Hon. Moses Kuria, opened a window for registration.

Inadequate Compensation: Concerns were raised about awards provided to development owners by National Lands Commission. The amount awarded was termed inadequate by PAPs who aggrieved that the money is not enough to construct standard structures. PAPs were awarded based on their individual effort and the type of development they owned during inventory. However, there is a concern that the resettlement area will be converted into a slum as there will be no standard structures.

Allocation of cemeteries in both resettlement areas: Stakeholders consulted felt that land for cemeteries should be provided in both resettlement areas.

Benefits of MSEZ-RSIP: The project will open up the area and improve the local economy and country at large. It is expected that there will be numerous employment opportunities and that priority will be given to the PAPs. However, the skills and competencies will be a necessity in a competitive job market.

*The Plight of Herbalists and Traditional Healers***:** On their part, the herbalist and traditional healers expressed major difficulty in relocating their shrines (Mbuyu) and fitting operations on an eighth acre plot and feared that, they could lose their public-shy customers.

11.7: Salient Impacts of the Project

The overall impression from impact analysis is that the Resettlement Site andinfrastructure is itself an intervention in mitigating would be displacement impacts of the wider MSEZ and is therefore immensely beneficial. As with most civil works, adverse impacts largely manifest at the construction stage but are however short-lived, ceasing once construction activity is ended. This is the scenario with the MSEZ Resettlement Site Infrastructure Project.

Cost to the landscape and natural biodiversity: Construction stage impacts will mainly be felt through clearing of natural vegetation and stripping of top soil in land preparation for both developments of infrastructure and construction of PAP dwellings.

Short-term nuisances and pollution during civil works: Construction activity mainly for the roads sector is likely to be associated with numerous disturbances including those associated with an influx of job seekers, hazards associated with operation of plant and equipment, effluent from the contractor's camp, land degradation from material sourcing and transport among others.

Possible siltation threat to the Port Reitz Creek Ecosystem: A core concern in implementation of the civil works component is the threat of potential sediment spillage into the Port Reitz Creek from cut and fill activities including stockpiling. Given that the Volume of Cut far exceeds demand for fill leaving a surplus 224,511 cubic meters of soil which will require to be disposed off, siltation threats to this ecosystem are very real.

*Loss of means to food production***:** Majority of the PAPs currently are subsistence farmers growing crops and keeping animals such as goats and cows. Once settled in the Resettlement Areas, PAPs will henceforth loose all access to their former lands and will therefore lose any agricultural based food and income security. For aged and vulnerable PAPs who cannot secure employment, this move will render them both food and income insecure.

*Long-term degradation of natural vegetation by settlers***:** At a pa capita daily firewood consumption of 1.5Kg, the 579 households currently resident within the MSEZ consume about 4.34 tonnes of biomass energy daily which is sourced from their farmlands and surrounding bushes. Once settled, residents of the new settlements are likely to exert pressure in surrounding bush lands and thickets in search of their daily demand for household energy. This would further aggravate losses already accrued from land preparation and would pose a threat to the conservation of special interest trees already flagged out.

Erosion and further siltation from change in local hydrology: Concentration of housing and density of roads will immediately change the hydrology of the resettlement sites with most of the rainfall naturally converting into surface runoff which will be evacuated into natural drainage through the roads. Such runoff is likely to erode soil along its course and could end up depositing its sediment load into the Port Reitz Creek.

11.8: The Environmental and Social management Plan-ESMP

An ESMP has been prepared to guide and monitor mitigation of impacts by respective actors. Core strategies at mitigation have been identified as follows:-

- The ESMP will be integrated into the Final Design Report will be provided for in the BOQs to ensure funding allocation for environmental and social mitigation
- Clauses binding parties to affirmative action on the ESMP will be integrated into Contracts for Construction to ensure that the contractor is legally bound to implement impact mitigation.
- Upon commissioning, all facilities will be promptly handed over to the County Government of Mombasa so as to put in place management structures required in implementation of the ESMP.
- On its part, the KPA will put in place, a governance system to take charge of all non-settled land for purposes of enhancing conservation. This should include lobbying relevant Authorities towards gazzetment of all Kayas within the SEZ.

Viability of Mitigation: Majority of impacts have readily available means for mitigation while some of the negative impacts will acquire positive effects after mitigation. Thus, upon application of the Impact Mitigation Programme, majority of the impacts are dispensed with and the project is likely to achieve an overwhelming net positive effect.

Responsibility for mitigation: As per the ESMP, responsibility for mitigating impacts of civil works falls on the contractor under the supervision of the KPA or his appointed representative. At the Operation Stage, each subcomponent will be handed over to the Mombasa County

Government for both Management and Oversight with KPA retaining the right and responsibility of monitoring activities of resettled PAPs. Particularly, KPA has a huge responsibility to preserving their reserve land from encroachment by both current and new PAPs. .

Costs in environmental mitigation and monitoring: The sums of Ksh 112,998,520.00 (Read Ksh One hundred and Twelve Million, Nine Hundred and Ninety Eight Thousands, Five Hundred and Twenty) will be required in implementing mitigation.

11.9: Conclusion and Recommendations

A Major observation in this ESIA Study is that the MSEZ-RSIP is in itself an action in mitigation with a very positive profile even before mitigation. Majority of impacts are costs on the local biodiversity associated with land preparation to build the PAPs dwellings and to lay the infrastructure. However, by implementing an effective mapping and preservation of special interest trees coupled with a massive reforestation programme, such impacts can easily be countered. Further, the long-term concern of PAPs losing their means to livelihood and thus being driven further into poverty will be countered through implementation of the LRP which among others is aimed at ensuring that that the bulk of PAPs are gainfully integrated into activities of the MSEZ.

In the impression of this study, the MSEZ-RSIP meets the bar of being technically viable, economically sustainable and socially acceptable more-so, given that it will unlock the SEZ land for investment to the benefit of both the local and national economies.

The recommendation here is for the MSEZ-RSIP to be granted an EIA Licence to enable it move to the next phase.

REFERENCES

1. Amaury de Souza et al, *Analysis of The Correlations Between NO, NO_2 and O_3 Concentrations In Campo Grande – Ms, Brazil*
2. Donald E. Canfield[1] and James Farquhar[2] (2019), *Institute of Biology and Nordic Center for Earth Evolution (NordCEE), [1]University of Southern Denmark Campusvej 55 5230 Odense M, Denmark; [2]Department of Geology and ESSIC, University of Maryland, College Park, Maryland 20742, USA*
3. Engelbrecht, J.F.P (1993), Groundwater pollution from cemeteries, Water Institute of South Africa, http://www.ewisa.co.za/ literature/files/1998%20-%2017.pdf
4. Engelbrecht,J.F.P (1993), ***An assessment of health aspect on the impact of domestic and industrial waste disposal activities on groundwater sources*** , Water Research Commission, Pretoria
5. An Ethnobotanical study of the Digo at the Kenya Coast by Mohamed PAKIA, M.Sc. JANUARY 2005
6. GoK, 2014, *Socio-Economic Atlas of Kenya Depicting the National Population Census by County and Sub-location*.
7. GoK, *2019 Kenya Population and Housing Census: Volume IV*.
8. http://www.iucnredlist.org/
9. https://biogas.co.ke/
10. https://cookswell.co.ke/product
11. https://www.agrifarming.in/
12. https://www.pewresearch.org/social-trends/2013/03/14/chapter-6-time-in-work-and-leisure-patterns-by-gender-and-family-structure/
13. https://www.unep-aewa.org/en/species
14. Kaya-Kauma-Biodiversity-Report-2019F.docx-African-World-Heritage-Fund.pdf
15. KeNHA (2022), *Detailed Design Study in the Mombasa Gate Bridge Construction Project, Mombasa County*
16. Kenya Census 2019
17. Kenya Vision 2030 - https://vision2030.go.ke
18. KenyaTrees_ConsActionPlan2020
19. Minimum wages in Kenyan cities - https://africapay.org/kenya/salary/minimum-wages/2182-cities-nairobi-mombasa-and-kisumu)
20. Mombasa County Integrated Development Plan (CIDP) - 2023-2027 - https://repository.kipra.or.ke
21. National Nutritional Action Plan 2014-17
22. Silvia, F.C.B, Haberland, n.t. & Filho, P.C.O (2011), ***Cemeteries as a source of contamination of ground water and watercourse***, UNICENTRO, Santa Cruz
23. Social protection safety net - *inua jamii* - https://www.socialprotection.go.ke

WHO global air quality guidelines (2021) *Particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide*